



Microsoft

Dynamics CRM 2015 Installation and Deployment

Microsoft Specialist

Courseware



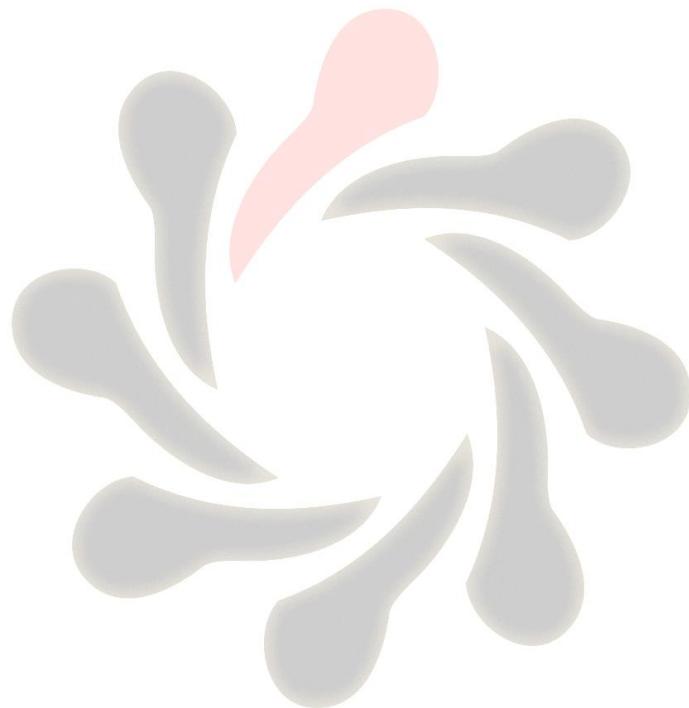
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Module 0 – Course Content and Plan

Objectives

Deployment in Microsoft CRM describes the techniques required to deploy and administrate Microsoft Dynamics CRM, focusing on hardware, software and installation instructions for the primary use of Microsoft Dynamics CRM components.

It will provide you with the skills to install Microsoft Dynamics CRM2015. This course focuses on Microsoft CRM server, the E-Mail Router and Microsoft Dynamics CRM for Office Outlook. It will also cover upgrading from earlier versions and administration tasks

What this course covers

- System requirements and required technologies
- How to install Microsoft Dynamics CRM Server and reporting extensions
- Deployment-wide administration tasks using the deployment manager
- Upgrading to Microsoft Dynamics CRM 2015
- Configuring an internet-facing deployment
- High availability options
- Planning and Deploying Dynamics CRM Online
- Managing Dynamics CRM Online with the Office 365 portal
- Managing Instances of Dynamics CRM Online
- Managing Updates to Dynamics CRM Online
- Email Management
- How to install Microsoft Dynamics CRM for Outlook
- Maintenance and troubleshooting tasks

Course Plan

This course takes 2.5 days to complete and helps prepare for both the Microsoft Dynamics CRM 2015 Installation and Microsoft Dynamics CRM 2015 Online Deployment certification exams.

Course Modules

1. System Requirements and Required Technologies
2. Install Dynamics CRM Server
3. Install Dynamics CRM Reporting Extensions
4. Managing Deployments
5. Upgrading to Dynamics CRM 2015
6. Internet Facing Deployment
7. High Availability Options
8. Introduction to Office 365 and CRM Online
9. Plan and Deploy Microsoft Dynamics CRM Online
10. Managing Microsoft Dynamics CRM Online
11. Administering Microsoft Dynamics CRM Online Instances
12. Microsoft Dynamics CRM Client for Outlook
13. Email Management
14. Maintenance and Troubleshooting

Resources

Virtual Machines

The course employs a set of Virtual Machines running on Hyper-V:

- Case-Study-AD. This is a Windows Server computer with Active Directory and DNS.
- Case-Study-ADFS. This is a Windows Server computer with ADFS.
- Case-Study-SQL. This is a Windows Server computer with SQL Server 2012.
- Case-Study-SQLRS. This is a Windows Server computer with SQL Reporting Services.
- Case-Study-CRM1. This is a Windows 2012 Server computer ready for CRM to be installed
- Case-Study-CRM2. This is a Windows 2012 Server computer ready for CRM to be installed
- Case-Study-SP. This is a Windows Server computer with SharePoint
- Case-Study-MAIL. This is a Windows Server computer running a simple POP3/SMTP mail server.
- Case-Study-CLIENT. This is a Windows 8 PC computer with Office 2010

A Windows 8.1 computer with Office 2013 is also available for use to connect to Dynamics CRM Online.

You start virtual machines by starting Hyper-V Manager and right-clicking on the virtual machine and selecting Start.

Dynamics CRM Online

This course uses a Dynamics CRM Online Trial.

Host Machine

Internet Explorer 10 and Office 2013 are supplied on the host computer.

On-Premise Installation Exam

The MB2-708 Microsoft Dynamics CRM Installation exam is a Microsoft certification exam and is taken online in one of the testing rooms off the Firebrand reception and refreshments area.

Id

You will need two forms of id; one with a photo id e.g., a passport or driving license and the other with your signature e.g., a debit/credit card.

Exam Format

The exam has 48 multiple choice questions and you are allowed 90 minutes.

Exam Preparation

There are currently no practice tests available to prepare for the exam.

Skills Measured

This certification exam measures your ability to install Microsoft Dynamics CRM 2015 on-premise including planning the deployment of Microsoft Dynamics CRM, installing Dynamics CRM Server, managing the deployment, performing upgrades, , implementing application events, and monitoring and managing the system.

Install and configure Microsoft Dynamics CRM (30–35%)

- Identify system requirements and required technologies
 - Identify editions and licensing options for Microsoft Dynamics CRM on-premises; identify required and optional technologies (Active Directory, IIS, SQL Server, Microsoft SharePoint, Exchange Server, Secure Token Service); identify SharePoint, web application, and mobile device requirements; identify language and currency support; identify Microsoft Dynamics CRM server roles and role groups; Active Directory modes; explore SureStep planning
- Install Microsoft Dynamics CRM Server
 - Identify Microsoft Dynamics CRM Server hardware and software requirements and SQL Server and SQL Server Reporting Services requirements, identify components installed during server setup (folders, web components, services, Active Directory groups, SQL Server components), identify other software installed, identify IIS considerations, install required rights, perform install on a single server and multiple servers (front-end and back-end server roles), troubleshoot installation, perform post-installation tasks, install Microsoft Dynamics CRM Server by using the command line, load sample data, install language packs, uninstall Microsoft Dynamics CRM Server
- Install Microsoft Dynamics CRM reporting extensions
 - Explore SQL-based and fetch-based reports, identify installation requirements, install reporting and report authoring extensions
- Upgrade to Microsoft Dynamics CRM 2015
 - Identify upgrade strategy, planning, and paths; identify components supported for upgrade and not supported for upgrade; identify Microsoft Dynamics CRM editions and versions supported for direct upgrade; plan for merging of base and extension tables; upgrade editions of Microsoft Dynamics CRM not supported for direct upgrade; upgrade other components (Email Router, Microsoft Dynamics CRM Client for Outlook)

Configure and manage Microsoft Dynamics CRM (30–35%)

- Manage Microsoft Dynamics CRM with the Deployment Manager
 - Identify deployment administrators, manage organizations (create, disable, delete, edit, and import), manage servers in the deployment, modify web addresses,

identify the redeployment process and Active Directory considerations, manage Microsoft Dynamics CRM by using Windows PowerShell

- Configure email management
 - Explore the role of the Email Router; identify Email Router components and hardware and software requirements; configure supported email systems, automatic email tracking (smart-matching and tracking token), incoming and outgoing message options, and individual mailbox and forward mailbox monitoring; install the Email Router and the Rule Deployment Wizard; configure the Email Router; perform Email Router administration tasks (approve email addresses); explore supported scenarios for server-side synchronization; configure server-side synchronization
- Implement Microsoft Dynamics CRM for Outlook
 - Identify client for Outlook hardware and software requirements, identify deployment methods (manual, group policy, System Center Configuration Manager), configure Microsoft Dynamics CRM for Outlook, install by using the command line, configure offline capability, identify compatibility of Microsoft Dynamics CRM Client with Microsoft Dynamics CRM Server

Maintain and extend Microsoft Dynamics CRM deployments (30–35%)

- Configure an Internet-facing deployment
 - Identify IFD and SSL certificate requirements; configure required DNS entries; explore claims-based authentication; use AD FS as the Secure Token Service; configure claims-based authentication, an Internet-facing deployment, and Service Principal Names (SPNs); establish federation across domains
- Maintain and troubleshoot a deployment
 - Manage service accounts and system jobs, manage disaster recovery, implement Volume Shadow Copy Service (VSS) support, manage SQL databases and data encryption, identify troubleshooting steps, configure tracing, install update rollups, use the Best Practices Analyzer
- Implement high-availability options
 - Deploy multiple Microsoft Dynamics CRM servers, implement Network Load Balancing (NLB), install a SQL Server cluster

Online Deployment Exam

The MB2-706 Microsoft Dynamics CRM Online Deployment exam is a Microsoft certification exam and is taken online in one of the testing rooms off the Firebrand reception and refreshments area.

Id

You will need two forms of id; one with a photo id e.g., a passport or driving license and the other with your signature e.g., a debit/credit card.

Exam Format

The exam has 48 multiple choice questions and you are allowed 90 minutes.

Exam Preparation

There are currently no practice tests available to prepare for the exam.

Skills Measured

This certification exam measures your ability to deploy and administer Microsoft Dynamics CRM 2015 Online including planning the deployment of Microsoft Dynamics CRM Online, managing the deployment, performing upgrades, , implementing application events, and monitoring and managing the system.

The current skills also include elements of Microsoft Dynamics CRM on-premise.

Administer Microsoft Dynamics CRM Online (15–20%)

- Plan a deployment
 - Identify options for accessing CRM data; describe licensing plans; identify requirements; customize Microsoft Dynamics CRM Online; create user accounts; manage subscriptions, licenses, and user accounts; assign users to security roles
- Deploy Microsoft Dynamics CRM Online
 - Create a deployment plan, identify objects that you can customize, implement customizations, grant users access to Microsoft Dynamics CRM Online, compare Microsoft Online services administrative roles and Microsoft Dynamics CRM Online security roles, provision users and assign licenses
- Manage Microsoft Dynamics CRM Online instances
 - Compare multiple instances versus multiple tenants, describe reasons to implement multiple instances, add instances to a subscription, configure instances, copy instances, identify features and constraints of a multi-tenant deployment, create a sandbox organization, copy an organization
- Manage Microsoft Dynamics CRM Online
 - Prepare for updates; import solutions; manage email notifications; configure Microsoft Dynamics CRM to use Exchange Online, Lync, SharePoint Online, and Yammer; add storage; free storage space

Upgrade a Microsoft Dynamics CRM edition and redeploy Microsoft Dynamics CRM (15–20%)

- Select an upgrade strategy
 - Describe upgrade paths, processes, and supported upgrade editions; identify upgrade considerations
- Upgrade Microsoft Dynamics CRM and other components
 - Upgrade the Email Router, upgrade Microsoft Dynamics CRM for Microsoft Outlook, import and update organization

Configure and manage email (10–15%)

- Configure email and message processing
 - Identify email process options; explain the advantages and disadvantages of email processing options; track email, appointments, tasks, and contacts; configure automatic email tracking; configure correlation; monitor individual mailboxes; identify available synchronization methods; manage synchronization filters
- Install and configure the Microsoft Dynamics CRM Email Router
 - Identify supported email systems and Windows operating systems; install the Email Router; install the Rule Deployment Wizard; create incoming and outgoing email profiles, deploy Inbox rules and forwarding rules; create and monitor a forward mailbox; migrate Email Router settings
- Configure server-side synchronization
 - Describe the features of and identify supported configurations; enable and configure server-side synchronization; configure Exchange Online; synchronize appointments, contacts, and tasks

Install and deploy other client tools for Microsoft Dynamics CRM (15–20%)

- Identify hardware and software requirements for the Microsoft Outlook client
 - Identify minimum hardware requirements, identify supported operating systems, identify supported Outlook versions, identify supported Internet browsers
- Install and upgrade the Microsoft Outlook client
 - Identify deployment methods, install the client, prepare a configuration file and install the client by using the command prompt
- Configure the Microsoft Outlook client

- Use the Configuration Wizard for on-premises or hosted organizations, work online and offline, configure multiple organizations, configure user email settings, create and modify data synchronization filters
- Install and configure the client for tablets and phones
 - Identify supported mobile platforms, install the app, configure security permissions required to use the app, troubleshoot the app, capture trace logs

Manage and troubleshoot a Microsoft Dynamics CRM deployment (15–20%)

- Manage system jobs
 - Describe system job types, identify the Windows services that process system jobs, view and delete system jobs, limit the number of asynchronous jobs, delete records, use the Bulk Deletion Wizard
- Monitor and troubleshoot Microsoft Dynamics CRM
 - Configure tracing for Microsoft Dynamics CRM for Microsoft Outlook, implement the Volume Shadow Copy Service (VSS) Writer Service, discuss the Microsoft Dynamics Marketplace
- Manage data encryption
 - Describe data encryption, identify attributes that support encryption, identify required privileges to manage encryption, import a database that has encrypted fields

Administer Microsoft Dynamics CRM (20–25%)

- Identify deployment considerations
 - Describe the hardware and software requirements for Microsoft Dynamics CRM; identify the roles of the Microsoft Dynamics CRM Server; explain the role of supporting technologies, including Active Directory, Active Directory Federation Services (ADFS), Internet Information Services (IIS), Microsoft SQL Server, SQL Server Reporting Services, Microsoft SharePoint, Microsoft Exchange, and the Secure Token Service; explain the rights required to install Microsoft Dynamics CRM; identify supported browsers
- Plan an implementation
 - Identify the required Active Directory groups, plan a single and multiple-server deployment, identify the Microsoft Dynamics CRM licensing model and license types, explain product key types and access mode types, plan multiple organizations, plan how to access Microsoft Dynamics CRM, identify high-availability options
- Install and configure Microsoft Dynamics CRM Server

- Install sample data, install and configure language packs, install the email router, configure server synchronization, configure SharePoint integration, install the SSRS data connector
- Configure an Internet-facing deployment
 - Identify the requirements for Internet-facing deployments, identify supported token service providers, identify supported web protocol bindings, identify supported ports, identify the required security certificates
- Configure claims-based authentication
 - Identify supported AD FS versions, describe claims-based authentication, identify steps in the claims-based authentication sequence, use the claims-based Authentication Wizard, add trusted relying parties

Feedback

You will need to complete two sets of feedback at the end of the course. One is for Firebrand and is available on your PC; <http://www.firebrandtraining.co.uk/feedback>. The other is for Microsoft and your instructor will give you the link to the KnowledgeAdvisors MetricsThatMatter website that Microsoft uses for feedback.

Module 1 - System Requirements and Required Technologies

Objectives

The key objective of this module is to describe the required software and supporting technologies for an on-premise Microsoft Dynamics CRM installation.

In this module we will cover:

- Describe the Microsoft Dynamics CRM offerings.
- Describe the licensing model and client access license types.
- Provide an overview of the supporting technologies.
- Examine the role of the Microsoft Dynamics CRM Server in a Microsoft Dynamics CRM deployment.
- Describe the ways to access Microsoft Dynamics CRM.
- Review the role of Microsoft Dynamics CRM Reporting Extensions.
- Review the role of Microsoft Dynamics CRM Language Packs.

Lesson 1-1 Offerings and Licensing

Microsoft Dynamics CRM 2015 is available in the following ways:

- An on-premises installation.
- A Microsoft Partner-hosted offering.
- Microsoft Dynamics CRM Online (Microsoft-hosted offering).

This training focuses on on-premises installations, where the Microsoft Dynamics CRM software is installed on an organization's computers.

Microsoft Dynamics CRM On-Premises Editions

Microsoft Dynamics CRM is available in two on-premises editions:

- Microsoft Dynamics CRM 2015 Workgroup. This edition has five built-in user licenses. Additional licenses cannot be added, and the software is limited to a single organization and a single computer that is running Microsoft Dynamics CRM. Microsoft Dynamics CRM Server roles cannot be split over multiple computers.
- Microsoft Dynamics CRM 2015 Server. There is no user limit in this edition. Additional features include support for multiple organizations, multiple server instances, and separate role-based server installation. Role-based services can increase performance by installing Microsoft Dynamics CRM roles on different computers.

There is one Microsoft Dynamics CRM Server Setup program; the product key entered during installation determines the installed edition.

Product Key Types

Only one product key is required to install Microsoft Dynamics CRM. The product key defines the edition that is installed.

A time-limited trial version of Microsoft Dynamics CRM can be installed using a trial product key. During the trial period, a purchased product key can be installed to convert from the trial version to a licensed version without having to re-install Microsoft Dynamics CRM.

Upgrading the Edition

A Workgroup edition can be upgraded to a Server edition by entering a new product key in Microsoft Dynamics CRM Deployment Manager. This removes the five-user limit and allows you to create multiple organizations. Microsoft Dynamics CRM does not have to be reinstalled.

Note: Downgrading from Server Edition to Workgroup Edition is not supported.

On-Premises Licensing Model

An on-premises deployment of Microsoft Dynamics CRM uses a server- and client-licensing model.

Each server that has Microsoft Dynamics CRM installed requires a server license and each internal user requires a client access license (CAL). An internal user includes employees, on-site agents, on-site contractors, and other on-site vendors. External users (users who are not internal users) do not need a CAL unless they use the Microsoft Dynamics CRM client applications.

Client Access License (CAL) Types

Internal users of Microsoft Dynamics CRM require a Client Access License and must be configured with a license type and access mode.

Users are added to Microsoft Dynamics CRM in the application; product keys are not required to add client access licenses.

License Types

- Essential - Access to system and custom entities, SDK, activities, and activity feeds.
- Basic - Features of the Essential license type, plus access to accounts, contacts cases, leads, reporting, personal dashboards and visualizations.
- Professional - Access to all features of Microsoft Dynamics CRM.

The restrictions of the license types are not enforced by Microsoft Dynamics CRM. To help with license type compliance, create security roles that match the restrictions of the license type.

Note: The External Connector, which was available in earlier versions of Microsoft Dynamics CRM, is no longer used. Access for external users is included with the Server License.

Access to Microsoft Dynamics CRM using the mobile and desktop applications is included with all license types. The three license types enable customers to license Microsoft Dynamics CRM based on how their users work with Microsoft Dynamics CRM functionality and to mix-and-match the licenses within a deployment.

Device and User CALs

The Essential, Basic, and Professional CALs are available as a device or user CAL.

- A user CAL entitles a user to connect to Microsoft Dynamics CRM from any number of computers or other devices.
- A device CAL entitles any number of users to connect to Microsoft Dynamics CRM from a single computer or device (but only one at a time).

Although the price of user and device CALs are not necessarily the same, device CALs might be more cost effective in certain scenarios. For example, in a call centre that operates three shifts and uses the same 100 computers in each shift, you can use 100 device CALs rather than 300 user CALs.

Access Mode

As well as the license type, a user account must also be configured with an access mode. The following describes the available access modes.

- Administrative. Users can administer the Microsoft Dynamics CRM server but do not have access to records in the Sales, Marketing, or Service areas. A CAL is not required for users configured with the administrative access mode, and the license type is automatically set to Administrative (this is the only option for the administrative access mode).
- Read-Write. Users have read and write access to records.
- Read. Users have read access only to records. This setting is only available for the Basic and Device Basic license types.

Lesson 1-2 Supporting Technologies

The following topics describe the required and optional technologies for a Microsoft Dynamics CRM implementation.

Detailed hardware and software requirements for each technology are described in other modules.

Microsoft SQL Server

Microsoft Dynamics CRM uses Microsoft SQL Server 2012 (or a later version) to store the databases that contain data for a Microsoft Dynamics CRM deployment and each of the organizations in a deployment.

You must install or have a supported installation of Microsoft SQL Server before installing Microsoft Dynamics CRM.

The Microsoft Dynamics CRM Server Setup program does not install Microsoft SQL Server.

Software Requirements

One of the Microsoft SQL Server editions shown in the following table is required.

Microsoft SQL Server Versions	Supported Editions	Minimum Service Pack
SQL Server 2012 64-bit	Standard Business Intelligence Enterprise	SP1
SQL Server 2014 64-bit	Standard Business Intelligence Enterprise	None

Microsoft SQL Server must be installed on a computer running a 64-bit edition of Windows Server that is supported for Microsoft Dynamics CRM.

The following editions and versions are not supported:

- 32-bit versions of Microsoft SQL Server
- Microsoft SQL Server Web, Compact, and Express editions.
- Microsoft SQL Server 2008 and earlier versions.

SQL Server Reporting Services

The default reporting solution in Microsoft Dynamics CRM is SQL Server Reporting Services.

Several reports are included in Microsoft Dynamics CRM, which are published to the SQL Server Reporting Services server during the installation of Microsoft Dynamics CRM.

Additional reports can be created using a variety of tools.

Microsoft Dynamics CRM provides filtered views in the SQL database for all records types in the organization. The filtered views include a security check so that only records to which a user has access are returned when they are used in a query. The views also de-normalize Microsoft Dynamics CRM data to simplify querying. For more information on filtered views and report writing, refer to the Microsoft Dynamics CRM Software Development Kit (SDK).

Any OLE DB (Object Linking and Embedding, Database) or ODBC (Open Database Connectivity) compliant third-party reporting tools can use the filtered views to generate reports.

The system does not support querying the tables in the organization database for reporting.

You must install or have a supported installation of SQL Server Reporting Services before installing Microsoft Dynamics CRM.

The Microsoft Dynamics CRM Server Setup program does not install SQL Server Reporting Services.

Software Requirements

Microsoft SQL Server Reporting Services running on one of the supported Microsoft SQL Server editions is required.

Microsoft SQL Server 2012 Workgroup is not supported for running the Microsoft Dynamics CRM Reporting Extensions because SQL Server 2012 Workgroup does not support custom data extensions. Therefore, features such as Fetch-based reports and scheduling of custom SQL-based reports do not work.

Using a Microsoft SQL Server 2012 Reporting Services server running in SharePoint mode is not supported with Microsoft Dynamics CRM.

SQL Server Configurations

A number of Microsoft SQL Server configurations are possible depending on your expected usage of Microsoft Dynamics CRM:

- Microsoft Dynamics CRM can be installed on a computer that is running Microsoft SQL Server or on a separate computer.
- Microsoft SQL Server can be installed on multiple computers in a cluster configuration.
- Microsoft SQL Server Reporting Services can be installed on the same Microsoft SQL Server computer that has the Microsoft Dynamics CRM databases or on a separate report server that is running Microsoft SQL Server.

We recommend that you use a dedicated Microsoft SQL Server to host the Microsoft Dynamics CRM databases. Although you can use a Microsoft SQL Server that hosts other database applications, it is important to test and understand the impact of adding Microsoft Dynamics CRM on response times for the other applications.

Multiple Microsoft Dynamics CRM front-end servers with network load balancing can be configured to use an instance of Microsoft SQL Server.

Other SQL Server Requirements

Other requirements and considerations for Microsoft SQL Server include the following:

- When Microsoft Dynamics CRM Server and SQL Server are installed on different computers, they must be in the same Active Directory domain.
- Microsoft Dynamics CRM Server supports the default instance or a named instance of SQL Server.
- SQL Server can be installed by using either Windows Authentication or mixed-mode authentication; Microsoft Dynamics CRM only uses Windows Authentication.
- The service account that SQL Server uses to log on to the network must be either a domain user account (recommended) or one of the built-in system accounts supported by SQL Server (Network Service, Local Service, or Local System). You cannot use a local user account.

on the server. We recommend using a low-privilege account strategy to avoid compromising the security of the server.

- The SQL Server service must be started. This service should be configured to automatically start when the computer starts.
- SQL Server Agent must be started. This service should be configured to automatically start when the computer starts.
- SQL Server Full-Text Search must be installed and started. This service should be configured to automatically start when the computer starts.
- Microsoft Dynamics CRM Server Setup requires a network library to authenticate SQL Server. By default, TCP/IP network libraries are enabled when Microsoft SQL Server is installed. SQL Server can use both TCP/IP and Named Pipes for authentication. However, the computer that is running SQL Server must be configured for at least one of the two network libraries.
- We recommend that the computer that runs SQL Server be located on the same local area network (LAN) as the computer that runs the Microsoft Dynamics CRM Server 2015 Back End Server roles.

Consider the location for the Microsoft Dynamics CRM databases. When Microsoft Dynamics CRM is installed, the databases are created in the default location on the SQL Server. Depending on your disk configuration, consider moving the databases to a different disk.

Internet Information Services

Microsoft Dynamics CRM requires a website using Internet Information Services (IIS) as the web server platform. You cannot use other web server systems with Microsoft Dynamics CRM.

Internet Information Services (IIS) is installed as part of the Windows operating system.

Microsoft Dynamics CRM Server 2015 supports Internet Information Services (IIS) versions 8.0 and 8.5.

If IIS is not installed and it is required for a Microsoft Dynamics CRM server role, Microsoft Dynamics CRM Server Setup will install it.

There are two ways to create the Microsoft Dynamics CRM website in IIS that is used by Microsoft Dynamics CRM:

- Create the Microsoft Dynamics CRM website before installing Microsoft Dynamics CRM.
- Let the Microsoft Dynamics CRM Server Setup program create the Microsoft Dynamics CRM website.

Active Directory

The Active Directory® directory service is a component of Microsoft Windows Server operating systems. Active Directory provides a directory and security structure for network applications such as Microsoft Dynamics CRM.

Microsoft Dynamics CRM uses Active Directory to store user and group information, to provide application security, and to authenticate users.

When Microsoft Dynamics CRM Server is installed, the system creates a number of security groups in Active Directory. The groups are described in the module “Install Microsoft Dynamics CRM Server” in this course.

During installation, you can specify whether these groups are created at the top level of the domain or in an organizational unit.

Active Directory Modes

The domain where the Microsoft Dynamics CRM server is located must be running in one of the following Active Directory modes:

- Windows Server 2008 Interim and Native modes
- All Windows Server 2012 modes
- All Windows Server R2 2012 modes

Active Directory Requirements

The following Active Directory requirements must be met:

- The computers that run Microsoft Dynamics CRM Server 2015 roles and the computer that runs SQL Server must be in the same Active Directory domain.
- The Active Directory domain where a Microsoft Dynamics CRM Server 2015 role is located must run in Windows Server 2008 or Windows Server 2012 domain modes.
- The Active Directory forest where a Microsoft Dynamics CRM Server 2015 role is located can run in Windows Server 2008, or Windows Server 2012 forest functional levels.
- The Microsoft Dynamics CRM security groups (PrivUserGroup, SQLAccessGroup, ReportingGroup, and PrivReportingGroup) must be in the same domain as the computer that is running Microsoft Dynamics CRM.

Active Directory Federation Services

If you need to access Microsoft Dynamics CRM over the Internet, an Internet-facing deployment (IFD) must be configured.

Claims-based authentication using a Secure Token Service (STS), such as Active Directory Federation Services, must be used.

Microsoft Dynamics CRM 2015 Server supports Active Directory Federation Services 2.0, 2.1, and 2.2 versions. This topic is discussed in detail in the module “Configure Microsoft Dynamics CRM for an Internet-Facing Deployment” in this course.

Microsoft SharePoint

Microsoft SharePoint provides a number of collaboration tools including the following:

- Document and content management
- Business website management
- Search

Although Microsoft SharePoint is not required to install Microsoft Dynamics CRM 2015 Server, one of the following SharePoint editions is required to use document management functionality:

- Microsoft SharePoint 2013
- Microsoft SharePoint 2013 with SP1
- Microsoft SharePoint 2010 with SP1 or SP2
- Microsoft SharePoint Online

At least one Microsoft SharePoint site collection must be configured and available for Microsoft Dynamics CRM.

SharePoint Foundation versions aren't compatible to use for Microsoft Dynamics CRM document management.

Document management functionality is enabled in the Settings area of the Microsoft Dynamics CRM web application.

For documents to appear using a list view in Microsoft SharePoint either Server-based SharePoint integration (recommended) or Microsoft Dynamics CRM List Component must be enabled.

SharePoint authentication method support

SharePoint version	List Component Support	Server based SharePoint integration support
Microsoft SharePoint 2013 or Microsoft SharePoint 2013 SP1	Yes	*Microsoft SharePoint 2013 SP1 when used with Microsoft Dynamics CRM Online
Microsoft SharePoint 2010 SP1 or SP2	Yes	No
Microsoft SharePoint Online	Yes	Yes

Server-based SharePoint integration

Earlier versions of CRM document management use a client-to-server strategy to authenticate and transmit data from Microsoft Dynamics CRM to SharePoint. Server-based (using server-to-server authentication) SharePoint integration provides the following benefits:

1. User interface that is consistent with the newly updated Microsoft Dynamics CRM user interface.
2. To configure and use document management, you do not need to be signed in to both Microsoft Dynamics CRM and SharePoint.
3. You no longer need to install or continue to use the Microsoft Dynamics CRM List Component solution. Notice that client-to-server authentication strategies that require SharePoint Online server sandboxing may become deprecated soon. This functionality is required by the Microsoft Dynamics CRM List Component

Currently, Server-based SharePoint integration is not supported with Microsoft Dynamics CRM (on-premises).

Microsoft Dynamics CRM List Component

The Microsoft Dynamics CRM List Component has the following benefits:

- Users can create and view folders when using document management within Microsoft Dynamics CRM.
- Users can create custom content types such as a Sales Contract content type.

There are two versions of the Microsoft Dynamics CRM List Component:

- Microsoft Dynamics CRM 2015 List Component for Microsoft SharePoint Server 2013. This version doesn't work with SharePoint 2010.
- Microsoft Dynamics CRM 2015 List Component for Microsoft SharePoint Server 2010. This version doesn't work with SharePoint 2013.

Microsoft Exchange

Microsoft Exchange is not required to install Microsoft Dynamics CRM Server 2015. However, it can be integrated with Microsoft Dynamics CRM to provide synchronization of emails, tasks, and calendar items using one of the following:

- Microsoft Dynamics CRM Email Router
- Server-side synchronization
- Microsoft Dynamics CRM Client for Microsoft Office Outlook

Exchange Online in an Office 365 plan, and other email systems that support POP-3 and SMTP can also be used.

Lesson 1-3 Server Roles

The Microsoft Dynamics CRM Server is the application server that contains the application and custom business logic. The following topics describe the roles of the Microsoft Dynamics CRM server.

The Role of the Microsoft Dynamics CRM Server

The Microsoft Dynamics CRM Server contains the application and platform layer code that processes queries and updates the Microsoft Dynamics CRM database. The Microsoft Dynamics CRM Server is responsible for the following tasks:

- Controlling access to objects through security.
- Controlling access to the database.
- Providing the user interface to web and mobile clients based on the user's security rights.
- Executing workflow processes and custom business logic implementations.
- Synchronizing the Microsoft Dynamics CRM for Microsoft Office Outlook offline database changes back to the Microsoft Dynamics database.

There are several server roles that can be installed on one or more computers. By installing server roles on multiple servers, additional performance and scaling benefits can be obtained for enterprise deployments.

Server roles are grouped as follows:

- Front End Server
- Back End Server
- Deployment Administration Server

Although we recommend that you install server roles by group, you can install an individual server role or combination of roles on a computer.

Front End Server Roles

The Front End Server role group includes the server roles for running client applications and applications developed with the Microsoft Dynamics CRM Software Development Kit (SDK).

Server role	Description
Web Application Server	Provides access to data and content through the Web application client and the Microsoft Dynamics CRM for Outlook. This role also includes the Microsoft Dynamics CRM Unzip Services, which handles the uncompressing of zipped files for data import. The Organization Web Service role is automatically added with this role.
Organization Web Service	Provides the components to run applications that use the methods described in the Microsoft Dynamics CRM Software Development Kit (SDK).

Server role	Description
Discovery Web Service	Provides the components that let applications discover the organizations to which a specified user belongs and the URL endpoint address for each organization.
Help Server	Provides the components to make Microsoft Dynamics CRM Help available to users.

Back End Server Roles

The Back End Server role group includes the server roles that handle processing asynchronous events such as workflows, custom plug-ins, and SharePoint integration. These roles are usually not exposed to the Internet.

Server role	Description
Asynchronous Processing Service	Processes queued asynchronous events such as bulk email, workflows, asynchronous plug-ins, and data import.
Email Integration Service	Sends and receives email messages by connecting to an external email server.
Sandbox Processing	Provides an isolated environment to allow for the execution of custom code, such as plug-ins. The isolated environment reduces the possibility of custom code interfering with the operation of the organizations in the Microsoft Dynamics CRM deployment.

Deployment Administration Server Roles

The Deployment Administration Server role group provides the server roles for components that are used to manage the Microsoft Dynamics CRM deployment either by using the methods described in the Microsoft Dynamics CRM Deployment Software Development Kit (SDK) or with the Deployment Manager.

Server role	Description
Deployment Tools	<p>Includes Deployment Manager and Windows PowerShell cmdlets.</p> <p>Deployment Manager is a Microsoft Management Console (MMC) tool that deployment administrators can use to manage Microsoft Dynamics CRM organizations, servers, and licenses.</p>
Deployment Web Service	Provides the components that are required to manage the deployment by using the methods described in the Microsoft Dynamics CRM SDK, such as for creating an organization or for removing a Deployment Administrator role from a user.
VSS Writer Service	Provides an interface to back up and restore Dynamics CRM data by using the Windows Server Volume Shadow Copy Service (VSS) infrastructure.

Lesson 1-4 Other Components

Accessing Microsoft Dynamics CRM

A user can work with Microsoft Dynamics CRM using either of the following:

- Microsoft Internet Explorer and other supported browsers (for browsers that are not supported, the Microsoft Dynamics CRM Mobile Express interface is shown).
- Microsoft Dynamics CRM for tablet devices.
- Microsoft Dynamics CRM for phone devices.
- Microsoft Office Outlook

Internet Explorer and Supported Browsers

Using Internet Explorer 10.0 or later as the browser client provides access to Microsoft Dynamics CRM functionality without requiring you to install client software on the user's computer.

The latest publicly released versions of the following browsers are also supported:

- Mozilla Firefox on Windows 7, Windows 8 and Windows 8.1
- Google Chrome on Windows 7, Windows 8 and Windows 8.1, or Nexus 10 tablet
- Apple Safari on Mac OS-x 10.8 or 10.9 or Apple iPad

Note: Microsoft Dynamics CRM supports web client access over the Internet using https and Secure Sockets Layer (SSL) certificates.

Microsoft Dynamics CRM Mobile Express

If a user accesses Microsoft Dynamics CRM using an unsupported browser and operating system combination, the application appears using the Microsoft Dynamics CRM Mobile Express client. This client provides a simpler interface optimized for hand-held devices.

To see the Microsoft Dynamics CRM Mobile Express experience, append “/m” to the URL for your organization.

Microsoft Dynamics CRM for Tablet Devices

Apps for Microsoft Surface and Apple iPad tablets are available for Microsoft Dynamics CRM on-premises and Microsoft Dynamics CRM Online.

Microsoft Dynamics CRM for Microsoft Surface Tablet application is designed for Windows 8 tablet devices. Microsoft Dynamics CRM for Microsoft Surface Tablet will work on any computer that runs Windows 8 by using the immersive modern application; however, Microsoft Dynamics CRM for Microsoft Surface Tablet does not work when you run it in Windows 8 desktop mode.

Microsoft Dynamics CRM for Apple iPad Tablet application is designed only for iOS iPad tablet devices.

Note: For on-premises deployments, Microsoft Dynamics CRM for tablet devices requires an Internet-facing deployment that uses claims-based authentication.

Microsoft Dynamics CRM for Phone Devices

Apps for Windows Phone and Apple iPhones and Android are available for Microsoft Dynamics CRM on-premises and Microsoft Dynamics CRM Online.

Note: For on-premises deployments, Microsoft Dynamics CRM for phone devices requires an Internet-facing deployment that uses claims-based authentication.

Microsoft Dynamics CRM for Office Outlook

Microsoft Dynamics CRM for Office Outlook provides a Windows-based user experience that is highly integrated with Microsoft Office Outlook.

Microsoft Dynamics CRM for Microsoft Office Outlook

Microsoft Dynamics CRM for Microsoft Office Outlook is a feature-rich client that is installed on the user's computer. Microsoft Dynamics CRM for Microsoft Office Outlook is available in 32-bit and 64-bit versions. To install and run the 64-bit version of Microsoft Dynamics CRM for Microsoft Office Outlook, a 64-bit version of Microsoft Office Outlook is required.

Microsoft Dynamics CRM for Microsoft Office Outlook can, optionally, be installed with offline capability. This allows a user to work with Microsoft Dynamics CRM data when not connected to the corporate network. Offline capability can be added as follows:

- During the installation of Microsoft Dynamics CRM for Microsoft Office Outlook.
- After the installation is complete. In this case, a user can add offline capability by clicking Go Offline in Microsoft Office Outlook. This starts the installation of additional required components and stores a copy of the user's Microsoft Dynamics CRM data locally.

Note: To add offline capability, a user must either be a member of the Local Administrators group on his or her computer or provide administrator credentials.

Microsoft Dynamics CRM for Microsoft Office Outlook Without Offline Capability

Microsoft Dynamics CRM for Microsoft Office Outlook without offline capability supports the following user scenarios:

- A computer operated by a single user.
- A computer shared by several users (whereby each user has a separate logon account and is a valid Microsoft Dynamics CRM user).
- Multiple concurrent users for centralized application servers such as Remote Desktop Services.

- Many Microsoft Dynamics CRM for Office Outlook deployments are on computers that are never disconnected from the Microsoft Dynamics CRM server or in scenarios where offline use is not permitted (such as due to company policy).

In these scenarios, the ability to go offline and the components that support offline use are not required and should not be installed.

Microsoft Dynamics CRM for Microsoft Office Outlook with Offline Capability

Adding offline capability to Microsoft Dynamics CRM for Microsoft Office Outlook provides a user with Microsoft Dynamics CRM functionality while disconnected from the corporate network.

When offline capability is added (either during the installation of Microsoft Dynamics CRM or later) the following components are installed to support offline functionality:

- A local version of the Microsoft Dynamics CRM platform logic.
- A local web server.
- A supported version of Microsoft SQL Server Express.

Microsoft Dynamics CRM for Microsoft Office Outlook with offline capability supports the following user scenarios:

- A computer used by a single user.
- A computer shared by several users (whereby each user has a separate logon account and is a valid Microsoft Dynamics CRM user). However, only one user can be configured to work offline.

Note: To go offline, a user must have the Go Offline privilege and the Microsoft Dynamics CRM for Outlook with offline capability installed.

Managing Emails

Microsoft Dynamics CRM provides the following methods to send and receive emails:

- The Microsoft Dynamics CRM Email Router
- Server-side synchronization
- Microsoft Dynamics CRM for Microsoft Office Outlook (but not for queues).

The above methods are used to perform the following:

- Send email messages generated by the Microsoft Dynamics CRM application (such as emails created in a marketing campaign, a quick campaign, workflows, or dialogs).
- Automatically copy email messages received in a user's mailbox to Microsoft Dynamics CRM (subject to the user's tracking settings).
- Receive email messages addressed to a Microsoft Dynamics CRM queue.

The Microsoft Dynamics Email Router and server-side synchronization provide centrally managed email routing solutions for Microsoft Dynamics CRM users and queues.

Or, you can use Microsoft Dynamics CRM for Microsoft Office Outlook, in which case the Microsoft Dynamics CRM Email Router is not needed and server-side synchronization does not have to be configured.

Microsoft Dynamics CRM Reporting Extensions

To create, use, and schedule reports in Microsoft Dynamics CRM, you must install Microsoft Dynamics CRM Reporting Extensions for SQL Server Reporting Services. Additionally, Microsoft Dynamics CRM Reporting Extensions for SQL Server Reporting Services is required to create or import an organization in a Microsoft Dynamics CRM deployment.

Microsoft Dynamics CRM Reporting Extensions for SQL Server Reporting Services are data processing extensions that are installed on the SQL Server Reporting Services server. The Microsoft Dynamics CRM Reporting Extensions accepts authentication information from the Microsoft Dynamics CRM Server and passes it to the SQL Server Reporting Services server.

Data Processing Extensions

Microsoft Dynamics CRM Reporting Extensions Setup installs the following items:

- Microsoft Dynamics CRM Fetch Data Processing Extension
- SQL Data Processing Extension
- Default Reports

The Microsoft Dynamics CRM Fetch Data Processing Extension is required to create, run, and schedule Fetch-based reports. The SQL Data Processing Extension is required to run and schedule SQL-based reports.

For SQL reports, the SQL Data Processing Extension eliminates the need to enable delegation for the Kerberos double-hop authentication that is required when SQL Server Reporting Services is installed on a separate computer.

Kerberos double-hop is a method of maintaining a user's Kerberos authentication credentials over two or more connections. This allows a service to act on behalf of a user in connections to other servers. For a service to perform Kerberos double-hop, it must be trusted to act on another user's behalf (trusted for delegation).

Note: If Microsoft Dynamics CRM Reporting Extensions is not installed, then the default reports are not available, you cannot create new organizations, and you cannot import organization databases.

Microsoft Dynamics CRM Language Packs

Microsoft Dynamics CRM is available in several languages. The language used for installation is referred to as the base language and cannot be changed after installation.

With Microsoft Dynamics CRM Language Packs, users can change the language of the user interface or the Help that is displayed in the application.

For example, your multinational organization can be standardized on an English user interface to simplify internal training and troubleshooting. However, if you prefer to read Help in your native language of German, you can specify that Microsoft Dynamics CRM displays Help in German.

Language Pack Installation

Microsoft Dynamics CRM Language Packs are installed separately from the Microsoft Dynamics CRM installation.

A separate installation file is available for each supported language. The language pack changes only the Microsoft Dynamics CRM user interface and Help. If you already have a Microsoft Office Language Pack installed, you must also install the Microsoft Dynamics CRM Language Pack for users to change the language displayed in Microsoft Dynamics CRM.

After a language pack is installed, it must be enabled in each organization before a user can select the language.

Planning Overview

Implementing a Microsoft Dynamics CRM implementation is a significant task, so it is important that the implementation is carefully and thoroughly planned. Sometimes a team of individuals, or one or two individuals, fulfilling various roles, will be responsible for the implementation.

Organizations that implement Microsoft Dynamics CRM software may use the services of an independent software vendor (ISV) or value-added reseller (VAR), a consultant, or other organization that is partnered with Microsoft.

Microsoft Dynamics Sure Step Methodology

Microsoft Dynamics Sure Step provides a complete Microsoft Dynamics CRM implementation methodology. This includes project management discipline and field-tested best practices, plus user-friendly tools that can help you deploy, migrate, configure, and upgrade Microsoft Dynamics products.

Microsoft Dynamics Sure Step is available to Microsoft partners to help reduce risk and guide you through the tasks associated with deployment and configuration of Microsoft Dynamics solutions. For more information about Microsoft Dynamics Sure Step, including training, methodology, and tool downloads, contact Firebrand.

Module 2 - Install Dynamics CRM Server

Successfully installing Microsoft Dynamics CRM requires more than running the Server Setup program.

Make sure that you have a detailed implementation plan, that the required supporting technologies are in place, and that all hardware and software components are installed and running before you start an installation.

Objectives

The objectives are:

- Describe the hardware and software requirements for the Microsoft Dynamics CRM Server.
- Identify the components that are installed during Microsoft Dynamics CRM Server Setup.
- Review the rights required to install Microsoft Dynamics CRM Server.
- Install Microsoft Dynamics CRM Server.
- Identify the tasks and configuration settings that are completed after the installation of Microsoft Dynamics CRM Server.

Lesson 2-1 Hardware and Software Requirements

The following topics detail the hardware and software requirements for installing Microsoft Dynamics CRM Server.

Hardware Requirements

The following table lists the minimum and recommended hardware requirements for Microsoft Dynamics CRM Server running in a Full Server configuration. These requirements assume that additional components such as Microsoft SQL Server, Microsoft SQL Server Reporting Services, Microsoft SharePoint, or Microsoft Exchange Server are not installed or running on the same computer.

Component	Minimum	Recommended
Processor	x64 architecture or compatible dual-core 1.5 gigahertz (GHz)processor	Quad-core x64 architecture 2 GHz CPU or higher such as AMD Opteron or Intel Xeon systems
Memory	2-GB RAM	8-GB RAM or more
Hard disk	10 GB of available hard disk space	40 GB or more of available hard disk space

The minimum and recommended requirements are based on 320-user load simulation tests.

Windows Server Operating System

Microsoft Dynamics CRM 2015 Server can be installed only on Windows Server 2012 x64-based computers. The following tables show the supported versions and editions.

Windows Server Version	Supported Editions	Minimum Service Pack
Windows Server 2012	Standard Data Centre	None
Windows Server 2012 R2	Standard Data Centre	None

The following editions and versions are not supported:

- Windows Server 2012 installed using the Server Core option.
- Windows Server 2012 R2 installed using the Server Core option.
- Windows Server 2012 Foundation
- Windows Server 2012 Essentials
- Windows Server 2008 family

Server Virtualization

Microsoft Dynamics CRM servers can be deployed in a virtualized environment by using Windows Server 2012 or Windows Server 2012 R2 with Hyper-V or virtualization solutions from vendors who participate in the Microsoft Windows Server Virtualization Validation Program (SVVP).

Lesson 2-2 Planning installation

Required Installation Rights for Microsoft Dynamics CRM Server

The user who installs Microsoft Dynamics CRM Server does not have to be a Domain Administrator, but he or she must have the following rights:

- The ability to create security groups within the desired Organizational Unit in Active Directory or the ability to use security groups that were created before the Microsoft Dynamics CRM installation by an Active Directory administrator.
- SQL Server Administrator privilege.
- Local Administrator on the computer where Microsoft Dynamics CRM is to be installed.

Assigning Pre-created Groups

If the installation user does not have rights to create security groups in the appropriate Organization Unit in Active Directory, the Microsoft Dynamics CRM Server installation can use security groups that are created by an Active Directory administrator before installation.

This functionality is available only when you run the Microsoft Dynamics CRM Server Setup through the command line and specify the names of the pre-created groups in the command-line configuration file.

Supported Server Topologies

When planning an implementation of Microsoft Dynamics CRM, consider the number of servers to use in the deployment.

Single-Server Deployment

Installing Microsoft Dynamics CRM Server, Microsoft SQL Server, Microsoft SQL Server Reporting Services, and Microsoft Exchange Server on the same computer is a supported configuration but only if the computer is a member server.

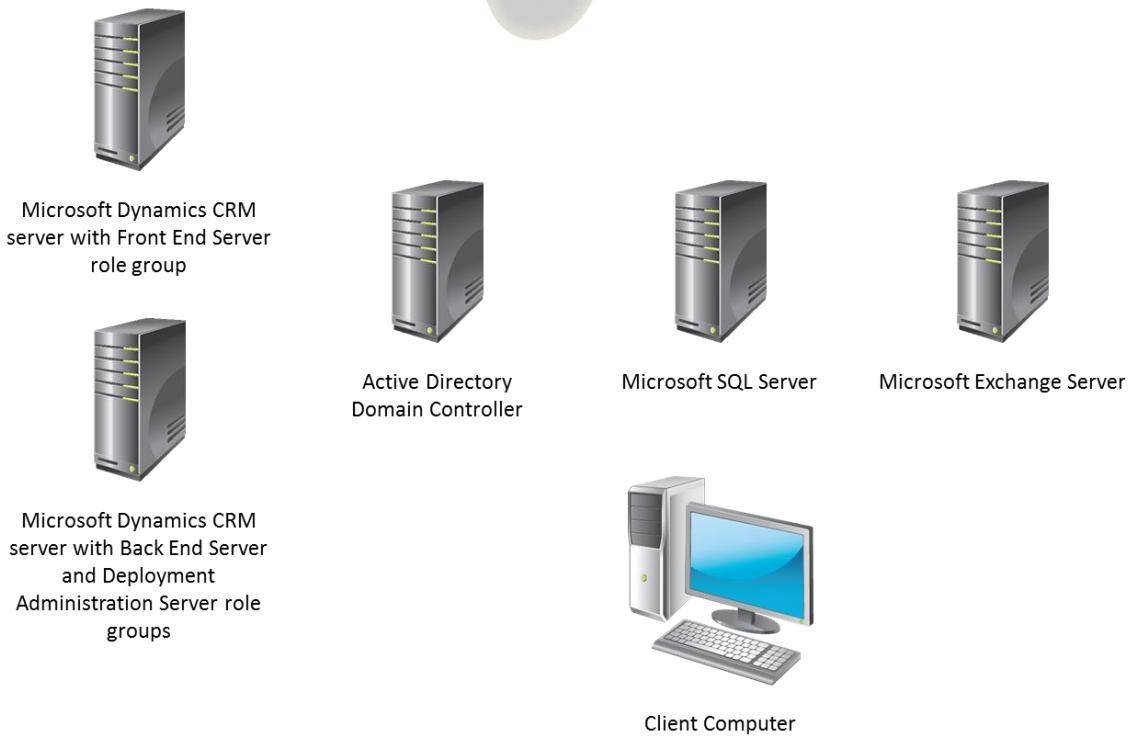
A single-server deployment where the server is also a domain controller is not a supported configuration.

We do not recommend a single-server deployment for the best application performance and disaster recovery.

Multiple-Server Deployment

Microsoft Dynamics CRM deployments can include multiple servers, which provide additional performance and scaling benefits.

The “Multiple-Server Deployment” figure shows a multiple-server topology.



In this example multiple-server topology, five servers are used running the following:

- Microsoft Dynamics CRM with the Front End Server role group.
- Microsoft Dynamics CRM with the Back End Server and Deployment Administration Server role groups.
- Microsoft SQL Server.
- Active Directory.
- Microsoft Exchange Server.

Other configurations with more computers are possible.

Microsoft Dynamics CRM Website

Microsoft Dynamics CRM Server requires a website in Internet Information Services (IIS). You can create the website before installing Microsoft Dynamics CRM Server or the setup program can create a new website.

If you select the Create new Website option during setup, the TCP port number for the website can be specified. Otherwise, 5555 is used as the port. Users must know the port number to connect to Microsoft Dynamics CRM Server unless a host header is configured.

Note: Active Directory Federation Services (required for an Internet-facing deployment) requires a website and can only be installed to the default website. Therefore, if you plan to install Active Directory Federation Services and Microsoft Dynamics CRM on the same computer, do not use the default website for Microsoft Dynamics CRM.

Using a Host Header

The benefit of a host header is that users can connect to the Microsoft Dynamics CRM server using an easy-to-remember URL, such as the following:

`http://crm`

If a host header is not used, then users must enter a URL that includes the computer name and port used for the Microsoft Dynamics CRM website such as the following:

`http://<computername>:5555`

If you wish to use a host header, we recommend that you create a website, configure the port, assign a host header, and create the appropriate Domain Name System (DNS) entry before installing Microsoft Dynamics CRM Server. However, you can change bindings and host headers for the website after installation provided the web addresses in the Deployment Manager are updated.

Bindings

Dynamics CRM only permits one binding on the website used for Dynamics CRM.

Lesson 2-3 Dynamics CRM Server Installation

Demo

Your instructor will now demonstrate installing Dynamics CRM Server.

Components installed during setup

Components added before installation of CRM Server

If not already installed, the following software is installed for a Full Server during Microsoft Dynamics CRM Server Setup:

- Microsoft SQL Reporting Service Report Viewer Control
- Microsoft SQL Server Native Client
- SQL System CLR Types
- SQL Server Management Objects
- Microsoft Application Error Reporting Tool
- Microsoft Visual C++ Runtime Library
- Windows Identity Foundation (WIF) Framework
- Windows Server Web Server Role
- Windows Search
- Microsoft .NET Framework 4, which includes the following components:
 - Microsoft .NET Framework 4.5.2
 - Windows Workflow Foundation
 - Windows Presentation Foundation
 - Windows Communication Foundation (WCF)
- Microsoft Chart Controls for Microsoft .NET Framework
- Windows PowerShell
- Microsoft URL Rewrite Module for IIS
- File Server Resource Manager

Some of these require a reboot before continuing with CRM Server setup.

Web Components Installed

The following web components are added during installation.

Component	Name	Description
Application pool	CRMAppPool	Microsoft Dynamics CRM Server Setup creates a separate application pool for the Microsoft Dynamics CRM application.
Application pool	CRMDeploymentServiceAppPool	Microsoft Dynamics CRM Server Setup creates a separate application pool for the Deployment Web Service.
Website	Microsoft Dynamics CRM	Website for Microsoft Dynamics CRM.
Applications	XRMDeployment	Facilitates the management of Microsoft

Component	Name	Description
		Dynamics CRM deployments.
Applications	Help	Services the Microsoft Dynamics CRM Help system for the application.

Active Directory Security Groups

The following Active Directory groups are added to the Organizational Unit specified during installation (or can be added beforehand and Dynamics CRM Server is installed via the command line using an XML file specifying these groups).

Group	Description
PrivReportingGroup	Privileged Microsoft Dynamics CRM user group for reporting functions. This group is created during Microsoft Dynamics CRM Server Setup and configured during Microsoft Dynamics CRM Reporting Extensions Setup.
PrivUserGroup	Privileged Microsoft Dynamics CRM user group for special administrative functions, including CRMAppPool identity (domain user or NetworkService). The users who configure Microsoft Dynamics CRM Server must be added to this group. If the Microsoft Dynamics CRM Email Router is installed the name of the Email Router server must be added to this group.
SQLAccessGroup	All server processes/service accounts that require access to SQL Server, including CRMAppPool identity (domain user or NetworkService). Members of this group have db_owner permission on the Microsoft Dynamics CRM databases.
ReportingGroup	All Microsoft Dynamics CRM users are included in this group. This group is updated automatically as users are added and removed from Microsoft Dynamics CRM. By default, all Microsoft Dynamics CRM Reporting Services reports grant Browse permission to this group. Microsoft Dynamics CRM users that are not members of this group cannot use the reporting feature in the application.

Services

The following services are added during installation.

Service	Description
Microsoft Dynamics CRM Asynchronous Processing Service	Services asynchronous processes such as bulk email and workflow.
Microsoft Dynamics CRM Asynchronous Processing Service (maintenance)	Services asynchronous maintenance such as encryption key generation for authentication and database deletion cleanup.
Microsoft Dynamics CRM Unzip Service	Handles the uncompressing of zipped files for data import. This service is installed as part of the Web Application Server role.
Microsoft Dynamics CRM Sandbox	Provides an isolated environment, which is used for the

Service	Description
Processing Service	execution of custom code such as plug-ins.
Microsoft Dynamics CRM Monitoring Service	Monitors all Microsoft Dynamics CRM server roles that are installed on the local computer.
Microsoft Dynamics CRM VSS Writer	Provides an interface to back up and restore Microsoft Dynamics CRM data by using the Windows Server Volume Shadow Copy Service (VSS).

SQL Server

The following Microsoft SQL Server components are added.

Component	Name	Description
Databases	MSCRM_CONFIG OrganizationName_MSCRM	Microsoft Dynamics CRM Server Setup creates the Microsoft Dynamics CRM configuration database and organization database.
SQL Server jobs	MSCRM_CONFIG.SiteWideCleanup	Microsoft Dynamics CRM Server Setup creates one SQL Server job that is used for maintenance.
Logins	PrivReportingGroup ReportingGroup SQLAccessGroup MSCRMSqlLogin	Microsoft Dynamics CRM Server Setup creates SQL Server logins for the PrivReportingGroup, ReportingGroup, and SQLAccessGroup Active Directory groups that are created. MSCRMSqlLogin is used for time zone conversions when you use dashboards and charts, and do queries using Advanced Find. When Microsoft SQL Server is enabled to use common language runtime (CLR), this can significantly improve performance for those features.

Folders

When Microsoft Dynamics CRM is installed on the server, the folders listed in the following table are created.

Folder	Comment
SystemDrive:\Program Files\Microsoft Dynamics CRM\	Microsoft Dynamics CRM Server program files.
SystemDrive:\Program Files\Microsoft Dynamics CRM\LangPacks\<LanguageID>\Reports\MSCRM	Contains a Microsoft Dynamics CRM subfolder that contains an .rdl file for each default report.
SystemDrive:\Program Files\Microsoft Dynamics CRM\LangPacks	Location of Language Pack installations. Language Packs are downloaded and installed separately.
SystemDrive:\Program Files\Microsoft Dynamics CRM\Trace	Stores trace file logs when tracing is enabled.

Folder	Comment
SystemDrive:\Program Files\Microsoft Dynamics CRM\Customization Import	Location used to process data imports.
SystemDrive:\Program Files\Microsoft Dynamics CRM\Unzip	Location used for unpackaging solutions.
SystemDrive:\Program Files\Microsoft Dynamics CRM\CRMWeb	Microsoft Dynamics CRM website and web services.
SystemDrive:\Program Files\Microsoft Dynamics CRM\CRMWeb\CRMReports	Microsoft Dynamics CRM report services.

Installation Troubleshooting

Log Files

Setup creates log files that you can review and use for troubleshooting. By default, the location of the log files (where User is the user account of the user who ran Setup) is as follows:

SystemDrive:\Users\User\AppData\Roaming\Microsoft\MSCRM\Logs\

Clients Cannot Connect to Microsoft Dynamics CRM

Clients might be unable to connect to the Microsoft Dynamics CRM Web application. This issue can occur for the following reasons:

- The Microsoft Dynamics CRM Web application is configured for a TCP port that is not the default port (80), such as 5555.
- Windows Firewall does not include an exception for the TCP port.

To resolve this issue, add the port as an exception in the firewall configuration on the server where Microsoft Dynamics CRM is installed. Make sure that users specify the port in the URL for the Web application when a non-default port is used.

Microsoft Dynamics CRM Server Cannot Connect to Microsoft SQL Server

Microsoft Dynamics CRM Server may be unable to connect to Microsoft SQL Server. This issue can occur when Windows Firewall does not include an exception for the TCP port used by Microsoft SQL Server. By default, the TCP port used by Microsoft SQL Server is 1433.

Install Microsoft Dynamics CRM Using the Command Line

Microsoft Dynamics CRM, Microsoft Dynamics CRM Reporting Extensions, Microsoft Dynamics CRM for Microsoft Office Outlook, and the Microsoft Dynamics CRM Email Router can be installed using the command prompt.

An advantage of a command line installation is that you do not have to attend the installation. The required setup information is provided to the Setup program as command-line parameters and an XML configuration file. This can save time if you often need to perform installations.

For more information on installing Microsoft Dynamics CRM using the command line, refer to the Microsoft Dynamics CRM Implementation Guide.

Install Microsoft Dynamics CRM Server Using the Command Line

The command to install Microsoft Dynamics CRM is as follows:

```
SetupServer.exe [/Q] [/InstallAlways] [/L [drive:][[path] logfile.name.log]] [/config [drive:][[path] configfilename.xml]]
```

XML Configuration File

The XML configuration file must contain a series of XML elements in English (US) that provides the information that the Setup program needs to complete an installation of Microsoft Dynamics CRM Server.

Refer to the Microsoft Dynamics CRM Implementation Guide for a description of each element required in the configuration file

Lesson 2-4 Post Installation

Internet Explorer Security Zone

To remove the need for users to enter their username and password every time they access Microsoft Dynamics CRM, add the URL for the Microsoft Dynamics CRM website to the appropriate security zone in Internet Explorer on each computer that accesses Microsoft Dynamics CRM. The security zone is determined by your organization's security policies. Typically, the Local intranet or Trusted sites zones are used.

Dynamics CRM Reporting Extensions

You must now go and install the Dynamics CRM Reporting Extensions on the SQL Reporting Services computer.

Using Hypertext Transfer Protocol Secure (HTTPS) Bindings

Server Setup cannot create a website configured for HTTPS. If you must have a website configured with an HTTPS binding (for example, for an Internet-facing deployment), we recommend that let CRM create the website and then configure an HTTPS binding with an SSL certificate from a trusted certification authority post installation.

Microsoft Dynamics CRM does not support using a website that has more than one binding even though IIS supports multiple http and HTTPS bindings.

The binding for the website can be changed after setup in Internet Information Services (IIS) Manager. The binding must also be updated in the Microsoft Dynamics CRM Deployment Manager.

Internet Facing Deployment

If you need to access Dynamics CRM from outside your organisation and do not want to use VPN or you wish to use the Tablet or Phone clients, you will need to install and configure ADFS and then enable Claims Based Authentication and Internet Facing Deployment.

Sample Data

Microsoft Dynamics CRM includes sample data that you can, optionally, add to an organization to provide records for sales demonstrations and training.

To install sample data, follow these steps:

1. In the Microsoft Dynamics CRM web application, navigate to Settings.
2. Then navigate to Data Management.
3. Click Sample Data.
4. In the Sample Data window, click Install Sample Data

Module 3 - Install Dynamics CRM Reporting Extensions

Microsoft Dynamics CRM uses Microsoft SQL Server Reporting Services as the reporting platform. To create, use, or schedule reports, Microsoft Dynamics CRM Reporting Extensions must be installed.

This module describes the role of Reporting Extensions and provides an overview of the report types that are available in Microsoft Dynamics CRM.

Objectives

The objectives are:

- Examine the two types of Reporting Services reports.
- Review when Microsoft Dynamics CRM Reporting Extensions is required.
- Identify the requirements for installing Microsoft Dynamic CRM Reporting Extensions.
- Review when Microsoft Dynamics CRM Report Authoring Extension is required.

Lesson 3-1 Reporting Overview

Microsoft Dynamics CRM supports the provision of reports using Microsoft SQL Server™ Reporting Services.

As with all Microsoft SQL Server Reporting Services reports, the definition (data and layout) of a Microsoft Dynamics CRM report resides in a Report Definition Language (RDL) file. The file conforms either to the RDL 2010 schema for SQL Server 2012.

Microsoft Dynamics CRM provides several out-of-box or default reports for viewing your business data. You can create custom reports using any of the following:

- Microsoft Dynamics CRM Report Wizard
- Report Builder for SQL Server 2012
- Visual Studio
- SQL Server Data Tools (for SQL Server 2012)
- Third-party RDL editors

You can write reports using SQL-based or Fetch-based queries.

Note: How to write reports is beyond the scope of this training.

SQL-Based Reports

SQL-based reports use Structured Query Language (SQL) queries to retrieve data for reports.

These reports use the filtered views in a Microsoft Dynamics CRM SQL database to retrieve data. Using filtered views makes sure a report includes only data that a user has permission to view according to the security roles that he or she has been granted in Microsoft Dynamics CRM.

All the default reports that are shipped with Microsoft Dynamics CRM and Microsoft Dynamics CRM Online are SQL-based reports.

Note: Deploying custom SQL-based reports to Microsoft Dynamics CRM Online is not allowed for security reasons; the SQL-based report might contain malicious code in the form of SQL statements that might compromise the system.

Fetch-Based Reports

Fetch-based reports were introduced in Microsoft Dynamics CRM 2011.

Fetch-based custom reports use Microsoft Dynamics CRM proprietary FetchXML queries, instead of SQL statements, to retrieve data for reports.

To deploy custom reports to Microsoft Dynamics CRM Online, you must use Fetch-based reports.

All reports that are created using the Report Wizard in Microsoft Dynamics CRM 2015 and Microsoft Dynamics CRM Online are Fetch-based reports.

Lesson 3-2 Reporting Extensions

Microsoft Dynamics CRM Reporting Extensions for SQL Server Reporting Services is a set of processing extensions that are installed on the SQL Server Reporting Services server.

Microsoft Dynamics CRM Reporting Extensions has the following characteristics:

- It supports Fetch-based reports and removes the need to configure trust for delegation.
- It is not required to run Microsoft Dynamics CRM. However, if you do not install Reporting Extensions, most reporting options are not available.
- It is required to create or import an organization in a Microsoft Dynamics CRM deployment.

Data Processing Extensions

Microsoft Dynamics CRM Reporting Extensions Setup installs two data processing extensions: Microsoft Dynamics CRM Fetch Data Processing Extension and SQL Data Processing Extension.

The Microsoft Dynamics CRM Fetch Data Processing Extension is required to support Fetch-based reports.

The SQL Data Processing Extension is required as follows:

- To schedule SQL-based reports in Microsoft Dynamics CRM.
- To deploy and run custom reports when the Microsoft Dynamics CRM Server and SQL Server are not installed on the same computer and trust for delegation is not configured.

For SQL-based reports, the SQL Data Processing Extension eliminates the need to enable delegation for the Kerberos double-hop authentication that is required when Microsoft Dynamics CRM and SQL Server Reporting Services are installed on different computers.

Kerberos double-hop is used to describe a method of maintaining a user's Kerberos authentication credentials over two or more connections. This allows a service to act on behalf of a user in connections to other servers. For a service to perform Kerberos double hop, it must be trusted to act on another user's behalf (trusted for delegation).

Summary of Reporting Options for SQL-based Reports

The available reporting options for SQL-based reports depend on whether Reporting Extensions is installed. These options are summarized below

Reporting Extensions Not Installed

Default (SQL-based) reports - Not available in a new installation and will not run if previously installed

Custom SQL-based reports - Cannot be scheduled but can be uploaded and run (Provided that Microsoft Dynamics CRM Server and Microsoft SQL Server are installed on the same computer or Trust for Delegation is configured if Microsoft Dynamics CRM Server and Microsoft SQL Server are installed on different computers)

Reporting Extensions Installed

Default (SQL-based) reports - Published for the default organization and can be run

Custom SQL-based reports - Can be scheduled, uploaded, and run

Summary of Reporting Options for Fetch-Based Reports

The available reporting options for Fetch-based reports depend on whether Reporting Extensions is installed. These options are summarised below.

Reporting Extensions Not Installed

Fetch-based Wizard reports - Not available

Custom Fetch-based reports - Cannot be uploaded

Reporting Extensions Installed

Fetch-based Wizard reports - Can be created, run, and scheduled

Custom Fetch-based reports - Can be scheduled, uploaded, and run

Requirements for Microsoft Dynamics CRM Reporting Extensions

Microsoft Dynamics CRM Reporting Extensions must be installed after Microsoft Dynamics CRM Server setup has been completed.

After a Microsoft Dynamics CRM Server setup, if the Reporting Server instance specified during Setup points to the same computer as the Server installation, the Server Setup provides an option to launch Microsoft Dynamics CRM Reporting Extensions Setup. If you do not complete the Reporting Extensions Setup at this time, you can run it later.

Installation Requirements

Note the following requirements for Microsoft Dynamics CRM Reporting Extensions:

- Microsoft Dynamics CRM Reporting Extensions can be installed only once on a server and can be linked to only one instance of SQL Server Reporting Services.
- Separate deployments of Microsoft Dynamics CRM cannot share a SQL Server Reporting Services server. However, a single deployment of Microsoft Dynamics CRM that has multiple organizations can use the same SQL Server Reporting Services server.

Microsoft Dynamics CRM Reporting Extensions must be installed on a computer that has Microsoft SQL Server Reporting Services installed for a supported edition and version of Microsoft SQL Server.

Multiple Servers

For smaller data sets and a small number of users, Microsoft Dynamics CRM Reporting Extensions can be installed on the same server as the SQL Server that hosts the Microsoft Dynamics CRM databases.

For larger data sets or scenarios where complex reports are frequently run, consider installing Microsoft SQL Server Reporting Services and Microsoft Dynamics CRM Reporting Extensions on a different server than the one used for SQL Server.

If you start by installing Microsoft SQL Server Reporting Services and Microsoft Dynamics CRM Reporting Extensions on the same server as the SQL Server, you can redeploy them to another server later.

Potential Security Vulnerability

To reduce the risk of certain security vulnerabilities, we recommend that the account used to run Microsoft SQL Server Reporting Services is not used to run any of the Microsoft Dynamics CRM components.

Lesson 3-3 Reporting Authoring Extension

Microsoft Dynamics CRM Report Authoring Extension

Microsoft Dynamics CRM Report Authoring Extension is required for writing custom Fetch-based reports. It must be installed on the computer where SQL Server Data Tools is installed.

Microsoft Dynamics CRM Report Authoring Extension obtains the metadata and data from Microsoft Dynamics CRM and is used to validate the FetchXML query used in a report.

Note: Microsoft Dynamics CRM Report Authoring Extension is only available in a 32-bit version.

Module 4 - Managing Deployments

You can redeploy Microsoft Dynamics CRM and use the Microsoft Dynamics CRM Deployment Manager to carry out deployment-wide administration tasks, such as the following:

- Manage existing organizations.
- Create new organizations.
- Import organizations.
- Update organizations.
- Manage servers in the CRM deployment.
- Review license information.
- Configure Microsoft Dynamics CRM for access from the Internet.

You can also use Windows PowerShell to perform deployment tasks.

Deployment Manager is available on Microsoft Dynamics CRM Servers that have the Deployment Tools role installed.

Objectives

The objectives are:

Describe the Deployment Manager and the role of deployment administrators.

- Review the steps to create new organizations.
- Describe the management tasks for existing organizations.
- Describe how to add an existing organization database to the deployment.
- Review Microsoft Dynamics CRM Server management tasks.
- Describe how to update the Microsoft Dynamics CRM web addresses.
- Review Microsoft Dynamics CRM license information.
- Describe the Microsoft Dynamics CRM Edition upgrade options.
- Explore why the redeployment of Microsoft Dynamics CRM is required.
- Examine Windows PowerShell for performing deployment commands.

Lesson 4-1 Deployment Manager

Microsoft Dynamics CRM Deployment Manager is a Microsoft Management Console (MMC) snap-in used to manage the deployment which includes managing the following items:

- Deployment Administrators
- Organizations
- Servers
- Licenses
- Claims-based authentication
- Internet-facing deployment
- Product keys

You can also perform many deployment tasks by using the Windows PowerShell. This is described in another topic.

Deployment

A deployment consists of one or more servers that have Microsoft Dynamics CRM installed. For the deployment to function, all the Microsoft Dynamics CRM roles must be installed across the servers. If a role is missing, an error message appears in Deployment Manager.

Within a deployment, multiple organizations can be created, each with its own database (this feature is not available in the Workgroup edition).

Deployment Manager manages only one deployment. The configuration information for a deployment is stored in the MSCRM_CONFIG database.

Deployment Administrators

To run Deployment Manager, a user must have the Deployment Administrators role. During Microsoft Dynamics CRM Server Setup, the user running Setup is automatically added as a member of this role and can grant Deployment Administrators membership to other Active Directory users.

Deployment Administrators can perform all Deployment Manager tasks on all organizations and servers in a Microsoft Dynamics CRM deployment. For example, Deployment Administrators can create a new organization or disable a server in the deployment.

Additional users who are granted this role are not automatically added as Microsoft Dynamics CRM users and do not require a client access license (unless they are added to an organization).

The Deployment Administrators role cannot be managed in the Microsoft Dynamics CRM client applications.

Note: Make sure that at least two users have the Deployment Administrator role to avoid system lockout if the primary administrator is not available.

Microsoft Dynamics CRM user accounts are not managed in the Deployment Manager; they are managed in the client applications.

Add a Deployment Administrator

The Deployment Administrator role is granted or removed in the Deployment Administrators node in Deployment Manager.

Note: Only users with accounts in Active Directory can be added as Deployment Administrators.

Note: If only one user is assigned the Deployment Administrator role, then that user cannot be removed.

Create a New Organization

With Microsoft Dynamics CRM Server Edition, you can host multiple organizations in a single deployment.

You might create additional organizations for training and testing purposes or to host separate databases for different departments.

Manage Existing Organizations

With Deployment Manager, you can perform management tasks on existing organizations that include the following:

- View organization properties.
- Disable an organization.
- Enable an organization.
- Change the organization name.
- Change the SQL Server and SQL Server Reporting Services URL.
- Delete an organization.
- Update an organization.

View Existing Organizations

When viewing an organisation the following information appears:

- Name. The unique database name of the organization.
- Display Name. The display name of the organization.
- SQL Server. The name of the computer running Microsoft SQL Server where the organization database is stored.
- SQL Server Reporting Services URL. The URL of the computer running Reporting Services.
- Base Language. The language used for the installation.

Disable or Enable an Organization

You can use the Organizations area to disable or enable an organization. We recommend that you disable an organization when you need to perform database maintenance.

Note: When you disable an organization, users can no longer access the Microsoft Dynamics CRM application for the organization. To make it available to users again, you must enable it.

Change an Organization

For an existing organization, you can change the following:

- Organization display name (but not the unique database name).
- SQL Server computer where the organization database is located.
- SQL Server Reporting Services URL.

You must disable an organization before you can make changes to it. After you have made the required changes, enable the organization so that it is available to users.

To specify a new SQL Server for an organization, make sure the organization database has been moved to the new SQL Server. The Edit Organization Wizard does not move the database for you.

If you change the SQL Server Reporting Services URL, the Edit Organization Wizard publishes reports for the organization to the new URL. Reports are then not deleted from the previous SQL Server Reporting Services URL.

Delete an Organization

To delete an organization, you must disable it first. When you delete an organization, the SQL Server database for the organization is not deleted. Therefore, you can import the organization later if needed.

Update an Organization

Periodically, updates are released for Microsoft Dynamics CRM. Depending on the Microsoft Update settings for the server, the updates for Microsoft Dynamics CRM are applied automatically or might have to be manually applied.

Depending on the nature of the update, consider making a backup of the organization database in case you have to roll back the update.

The Organizations node in Deployment Manager shows the version of the organization database and if updates are available.

Note: Only enabled organizations can be updated. To update a disabled organization, enable the organization.

Manage Servers

To view a list of Microsoft Dynamics CRM Servers and the roles they are running, click Servers.

The Details pane shows the following information:

- Name: The name of the computer on which Microsoft Dynamics CRM Server is running.
- Status: Whether the computer is enabled or disabled.
- Version: The version of Microsoft Dynamics CRM Server.
- Roles: List of roles running on the server.

Disable and Enable Servers

Use the Servers area to disable or enable a Microsoft Dynamics CRM Server in a deployment.

When a server is disabled, users can no longer access the Microsoft Dynamics CRM application through the server. If the deployment contains only a single server running Microsoft Dynamics CRM, users cannot access the application.

Depending on the server roles that are installed, disabling a server stops the following services or server roles:

- Web Application Server
- Organization Web Service
- Help Server
- Discovery Web Service
- Deployment Web Service
- Asynchronous Processing Service
- Asynchronous Processing Service (maintenance)
- Sandbox Processing Service
- Microsoft Dynamics CRM VSS Writer Service

Enabling a server that is disabled starts the roles installed on the server. You cannot disable the SQL Server and Reporting Extensions server roles by using Deployment Manager's Disable feature.

Delete Servers

Use the Servers area to delete a Microsoft Dynamics CRM Server from a deployment. Before a server can be deleted, it must be disabled.

When a server is deleted, users may no longer be able to access or use the Microsoft Dynamics CRM application, or use certain features of the application, such as reporting. To restore a deleted server, run Microsoft Dynamics CRM Server Setup and reinstall the server roles that were removed when the server was deleted.

Configure Access from the Internet

To configure access to Microsoft Dynamics CRM from the Internet, you must use Deployment Manager for the following:

- Configure claims-based authentication.
- Configure Internet-facing deployment.

These tasks are described in the module, “Configure an Internet-Facing Deployment.”

Note: An Internet-facing Deployment is required to use Microsoft Dynamics CRM for tablets and phones.

Update Web Addresses

During Microsoft Dynamics CRM Server Setup, web addresses for internal connections are established for the following web services:

- Web Application Server
- Organization Web Service
- Discovery Web Service
- Deployment Web Service

If you change the binding type or the address of any of the web services after installation in IIS, you must update the web address values on the Web Address tab of the Deployment properties page. Changing web address values in Deployment Manager does not make changes to IIS — the changes must be made in IIS before you update web address values.

In a Full Server role deployment, the values for all web services are the same. However, if Microsoft Dynamics CRM is deployed on multiple servers, where the server roles are on different computers, the web address values vary.

The values for web addresses must be in the following form:

address:port

where address is the web address of the server providing the web service as defined in IIS (this might be a host header rather than the actual computer name) and port is the TCP port that the web service is configured to listen on.

Do not include http:// or https:// in the web address. This is specified using the Binding Type.

Network Load Balancing

If Microsoft Dynamics CRM is installed in a Network Load Balancing configuration, then you must select “The deployment uses an NLB option” in the Microsoft Dynamics CRM Deployment Manager by following these steps:

1. In the console tree, right-click Microsoft Dynamics CRM and then click Properties.
2. On the Microsoft Dynamics CRM Properties page, click the Web Address tab.
3. On the Web Address tab, click Advanced.
4. Select The deployment uses an NLB.
5. Click OK and then OK again.

Secure Sockets Layer Offloading Hardware

If Secure Sockets Layer (SSL) offloading hardware is used for Microsoft Dynamics CRM, then you must specify the SSL header for the hardware in the Microsoft Dynamics CRM Deployment Manager by following these steps:

1. In the console tree, right-click Microsoft Dynamics CRM and then click Properties.
2. On the Microsoft Dynamics CRM Properties page, click the Web Address tab.
3. On the Web Address tab, click Advanced.
4. Enter the SSL header in SSL Header.
5. Click OK and then OK again.

View License Information

After Microsoft Dynamics CRM is installed, you do not have to add more license keys for additional users. Microsoft Dynamics CRM users are managed in the Microsoft Dynamics CRM Web application.

You can use Deployment Manager to view the number of configured users and deployed servers.

To view a summary of required CALs, follow these steps:

1. In the console tree, right-click Microsoft Dynamics CRM and then click Properties.
2. On the Microsoft Dynamics CRM Properties page, click the License tab.
3. Review the information, and click OK.

The tab shows the number of the following:

- Administrative users configured
- Professional CALs required
- Basic CALs required
- Essential CALs required
- Server Licenses required

The Product ID is also shown.

Upgrade the Microsoft Dynamics CRM Edition

To upgrade the edition of Microsoft Dynamics CRM, you must acquire the appropriate upgrade license and product key and then enter the new product key in Deployment Manager. A re-installation is not required. Upgrading the version of Microsoft Dynamics CRM requires a different procedure.

The following table shows the supported upgrades of editions.

Current Edition	Available Edition for Upgrade
Workgroup Trial	Server Trial, Workgroup or Server
Server Trial	Server
Workgroup	Server
Server	None

Lesson 4-2 Redeployment

There are many reasons why an organization would redeploy Microsoft Dynamics CRM:

- To maintain a test environment that has the same data as a production system.
- To install, evaluate, and configure add-on products without risking damaging the production system.
- To create a development environment outside of the company network for external consultants.
- To maintain a training system for users.
- To implement infrastructure changes such as hardware or software upgrades.
- To adapt to Active Directory domain reorganizations.
- To consolidate multiple instances of Microsoft Dynamics CRM into one deployment.

Plan a Redeployment

A redeployment must be carefully planned in the same way as a new installation of Microsoft Dynamics CRM.

Depending on the type of redeployment, you might need to perform the following:

- Install Microsoft Dynamics CRM in a new domain or forest.
- Install or migrate supporting components such as Microsoft SQL Server and Microsoft Exchange Server.

If you want to establish a training or test system in the same Microsoft Dynamics CRM deployment, the redeployment process is much simpler.

Redeployment Process

For a high-level overview of redeploying the Microsoft Dynamics CRM Server using the SQL Server Management Studio, follow these steps:

1. Back up the Microsoft Dynamics CRM organization database (Organization_MSCRM).
2. Restore the backup of the Microsoft Dynamics CRM organization database, with a different database name, to the same SQL Server computer or to a new computer that is running SQL Server.

If the organization is being imported into the same deployment, import the organization database into the existing deployment using Deployment Manager.

If the organization is being imported into a new deployment, install Microsoft Dynamics CRM and then import the organization database into the new deployment using Deployment Manager.

Map Users

Because Microsoft Dynamics CRM uses Active Directory for user authentication, a link exists between a CRM user account and a corresponding Active Directory user account. Every user account in an Active Directory has a GUID (globally unique identifier), and the GUID for each CRM user is stored in Microsoft Dynamics CRM.

When a Microsoft Dynamics CRM organization database is moved from one domain to another, the Import Organization Wizard in Deployment Manager must be used to link the CRM users in the database to the appropriate GUIDs in the Active Directory of the new domain. This process is referred to as Mapping Users.

Import Organizations

You can import an existing Microsoft Dynamics organization database by using the Import Organization Wizard.

Note: You cannot import a database that is already part of the Microsoft Dynamics CRM deployment.

The Import Organization Wizard can be used to import a Microsoft Dynamics CRM 2013 organization database; the database is upgraded during the import.

Only Microsoft Dynamics CRM 2015 Server Edition supports multiple organizations in the deployment. If you import an organization into Microsoft Dynamics CRM 2015 Workgroup Edition, the existing organization is removed (although the corresponding SQL Server database is not deleted).

Before you can import an organization by using the Import Organization Wizard, the organization database must be available in SQL Server and not already in a deployment.

Note: If an organization that has data encryption enabled is imported and there are records with encrypted fields, you must provide the encryption key. Enter the encryption key in Settings > Data Management > Data Encryption after the import has finished.

Lesson 4-3 Powershell

With Windows PowerShell, you can run deployment commands to change the configuration of a deployment instead of using the Deployment Manager. Windows PowerShell can retrieve deployment settings.

Microsoft Dynamics CRM cmdlets (commands that are used in the Windows PowerShell environment) are installed on Microsoft Dynamics CRM servers which have the Deployment Tools server role.

Before Windows PowerShell can be used for Microsoft Dynamics CRM, the cmdlets must be registered for the session. Type the following command in a Windows PowerShell window:

```
Add-PSSnapin Microsoft.Crm.PowerShell
```

To get a list and short description of the Microsoft Dynamics CRM cmdlets, type the following:

```
Get-Help *crm*
```

To get detailed help for a specific cmdlet, type Get-Help cmdletname –full. For example, to get help for the Get-CrmOrganization cmdlet, type the following:

```
Get-Help Get-CRMOrganization –full
```

Module 5 - Upgrading to Dynamics CRM 2015

This module examines the planning considerations and the steps for upgrading an existing Microsoft Dynamics CRM deployment to Microsoft Dynamics CRM 2015.

The available upgrade paths are described and compared to help you decide the most suitable method for your deployment.

Objectives

The objectives are:

- Identify considerations before starting an upgrade.
- Review the high-level phases of an upgrade process.
- Describe an in-place upgrade of Microsoft Dynamics CRM.
- Describe a migration upgrade of Microsoft Dynamics CRM.

Lesson 5-1 Upgrade Considerations

Before starting an upgrade to Microsoft Dynamics CRM 2015, you must be aware of the restrictions, requirements, and timescales so that the production deployment can be upgraded successfully with the minimum of downtime.

Versions Supported for Upgrade

Only Microsoft Dynamics CRM 2013 with the following update service packs/rollups can be upgraded to Microsoft Dynamics CRM 2013:

- CRM 2013 SP1

If you try to upgrade Microsoft Dynamics CRM 2013 with any other rollup, the upgrade will fail.

Earlier versions can be upgraded but only by successive upgrades to the immediate successor version. For example, Microsoft Dynamics CRM 4.0 must first be upgraded to Microsoft Dynamics CRM 2011, then upgraded to Microsoft Dynamics CRM 2013 SP1, and finally upgraded to Microsoft Dynamics CRM 2015.

Microsoft Dynamics CRM 2013 servers can be upgraded in any order; but for a functioning deployment, all server roles in the deployment must be present on upgraded servers.

Upgrade Method

The following table describes the ways in which Microsoft Dynamics CRM 2013 can be upgraded.

Upgrade Method	Features
In-place	An existing Microsoft Dynamics CRM 2013 server is upgraded to Microsoft Dynamics CRM 2015
Migrate using the same instance of	Microsoft Dynamics CRM 2015 is installed on a new server. During installation, select the Connect to, and if necessary, upgrade an existing deployment option.

Upgrade Method	Features
SQL Server	The Microsoft Dynamics CRM 2013 configuration and the default organization databases are upgraded during installation.
Migrate using a new instance of SQL Server	Microsoft Dynamics CRM 2015 is installed on a new server. Setup creates a new configuration database on a new SQL Server or on a new instance on the existing SQL Server

Upgrade Method Comparison

The following table shows the specific requirements and considerations for each upgrade method.

Upgrade Method	Considerations
In-place	<ul style="list-style-type: none"> Microsoft Dynamics CRM Server and SQL Server must meet installation requirements. Does not require new hardware. Simplest to perform. Longest downtime. Harder to recover from failure. Can upgrade one or no organization databases during the upgrade. Other organizations are disabled and must be upgraded in Deployment Manager after the upgrade is completed.
Migrate using the same instance of SQL Server	<ul style="list-style-type: none"> Requires additional hardware for the Microsoft Dynamics CRM 2015 Server. The Microsoft Dynamics CRM 2013 Server is unaffected. All Microsoft Dynamics CRM 2013 organization databases in the deployment must be at a supported version. Only the default organization is upgraded. Other Microsoft Dynamics CRM organizations must be upgraded in Deployment Manager Failure of upgrade requires a restore of the Microsoft Dynamics CRM 2013 databases.
Migrate using a new instance of SQL Server	<ul style="list-style-type: none"> Requires additional hardware for the Microsoft Dynamics CRM 2013 Server. Requires a new SQL Server or new instance of SQL Server. The Microsoft Dynamics CRM 2013 production system is maintained until the final migration. The Microsoft Dynamics CRM 2013 Server is not affected. Each Microsoft Dynamics CRM 2013 organization database must be restored to the new SQL Server and then imported into the new deployment using Deployment Manager. The migration can be repeated as often as needed to fix upgrade issues without having to roll back. During the final migration, only the organization database has to be upgraded, reducing downtime.

Upgrade Method	Considerations
	<ul style="list-style-type: none">• Useful for establishing a test environment and a training environment.

Sharing a SQL Server

In Microsoft Dynamics CRM versions 4.0 and later, only one Microsoft Dynamics CRM deployment for each instance of SQL Server is supported. This is because each Microsoft Dynamics CRM deployment has its own MSCRM_Config database, and there can be only one MSCRM_Config database on an instance of SQL Server.

A Microsoft Dynamics CRM deployment can be hosted in the default or named instances of SQL Server. Therefore, if you have multiple SQL Server instances running on a computer, you can host multiple deployments on the same computer. However, this might decrease system performance depending on the hardware specification of the computer.

Connector for Reporting Services

If the Microsoft Dynamics CRM Connector for Microsoft SQL Server Reporting Services is installed, it must be uninstalled. Otherwise the upgrade is blocked.

Upgrade Product Key

A product key is required to perform the upgrade. Make sure that you obtain the product key before starting the upgrade.

Upgrade Paths for Microsoft Dynamics CRM 2013 Editions

The editions in Microsoft Dynamics CRM 2015 are the same as in Microsoft Dynamics CRM 2013 as shown in the following table.

Licensed CRM 2013 Edition	Available 2015 Edition
Workgroup	Workgroup
Server	Server

User Permissions and Privileges

To perform a successful upgrade, the user who runs Setup must meet the following requirements:

- Have an account in the same Active Directory domain as the server or servers that are being upgraded.
- Be a member of both the Deployment Administrators role and the Microsoft Dynamics CRM System Administrator security role.
- Have administrator rights on the SQL Server and the Reporting Services server that are associated with the deployment that is being upgraded.
- Have sufficient permissions to create new security groups in the Active Directory organizational unit that contains the existing Microsoft Dynamics CRM groups.

Upgrade from Microsoft Dynamics CRM 2011

Microsoft Dynamics CRM 2011 is not supported for a direct upgrade to Microsoft Dynamics CRM 2015. However, a Microsoft Dynamics CRM 2011 deployment can be upgraded to Microsoft Dynamics CRM 2013 using a trial version and then upgraded to Microsoft Dynamics CRM 2015.

The high-level tasks to upgrade Microsoft Dynamics CRM 2011 are as follows:

1. Migrate or upgrade to Microsoft Dynamics CRM 2013 using a Microsoft Dynamics CRM 2013 90-day trial version.
2. Migrate or upgrade the Microsoft Dynamics CRM 2013 installation to Microsoft Dynamics CRM 2015.

Deprecated Features

Any supported customizations made to a Microsoft Dynamics CRM 2013 organization will upgrade. However, the following deprecated SDK features will not upgrade:

- Microsoft Dynamics CRM 4.0 plug-ins
- Microsoft Dynamics CRM 4.0 custom workflow activities

Two tools can be used to detect deprecated features.

- The Dynamics CRM 2013 Custom Code Validation Tool (<https://www.microsoft.com/en-us/download/details.aspx?id=30151>) detects unsupported client-side code in JavaScript web resources including use of the Microsoft Dynamics CRM 4.0 client API. The tool is packaged as a solution which must be imported into a Microsoft Dynamics CRM organization. The tool detects common uses of unsupported scripts but does not detect all possible issues.
- The Dynamics CRM 2015 Custom Code Validation Tool (<https://www.microsoft.com/en-us/download/details.aspx?id=45535>) detects CRM 2013 deprecated APIs and common client-side code issues with JavaScript.

Lesson 5-2 Table Merge

In Microsoft Dynamics CRM 2011 and earlier two tables are used for each entity in the organization database. For example, data for the account entity is stored in the AccountBase and the AccountExtensionBase tables. The Base tables store system fields and the ExtensionBase tables store custom fields.

In Microsoft Dynamics CRM 2013, to improve performance, data is stored in a single table. During the upgrade of Microsoft Dynamics CRM 2011 organization databases, the Base and ExtensionBase tables are merged into a single Base table for each entity. For example, after an upgrade, data for the account entity is stored in one table named AccountBase.

Where an organization database has complex customizations or tables with large numbers of columns, the table merge might take many hours to complete. To reduce the downtime during an organization upgrade, the table merge can optionally be deferred.

For upgrade to Dynamics CRM 2015 all tables must have been merged or the upgrade process will merge automatically.

You can merge tables prior to upgrade with the CrmMergeBaseAndExtensionTableTool.

Determine the Entities That Are Not Merged

If the table merge tool was used to merge a subset of entities, you might lose track of the entities that have not been merged. To determine which entities have not been merged in an organization database, run the following SQL query in SQL Server Management Studio.

```
SELECT e.Name, e.ExtensionTableName  
FROM EntityView e  
where e.IsActivity = 0 and e.ExtensionTableName is not null  
and e.IsIntersect = 0  
and e.IsLogicalEntity = 0  
order by e.Name
```

Lesson 5-3 Upgrade Process

Upgrading a Microsoft Dynamics CRM 2013 deployment is a significant undertaking, more so than a new installation because the deployment is a working production system. Detailed planning is essential to minimize downtime.

The upgrade process can be divided into four phases:

- Prepare to upgrade.
- Establish a test environment.
- Upgrade and validate the test environment.
- Upgrade and validate the production deployment.

For a migration using a new instance of SQL Server, the test environment can be the new production environment.

Phase 1 – Prepare to Upgrade

Make sure you have sufficient staff, resources, and time to dedicate to the upgrade. Determine who will be involved in the upgrade, designate the test deployment hardware and software that will be used to validate the upgrade, and plan for potential failures.

During this phase, assess the current production environment for upgrade suitability. This requires reviewing the Microsoft Dynamics CRM 2015 documentation.

Additionally, determine the acceptance criteria that will be used to decide whether to go forward with the production upgrade.

Determine the Upgrade Strategy

To determine the upgrade strategy, consider the following questions:

- Which servers and components will be or must be upgraded?
- Which upgrade path will you use?
- What is required to establish a test environment?
- What is the timeline for the upgrade?
- What third-party add-ons and connectors are supported for upgrade?

Plan for Failure, Backup, and Recovery

Some components, such as custom reports, workflows, or third-party add-ons can cause the upgrade to fail or not function correctly. Document these items and establish a contingency plan for each issue. For example, you might have to modify unsupported JScript code used in Form events.

You must be prepared to completely roll back the system. To do this, you must have backups of the production deployment. Furthermore, you must create and rehearse a backup plan to make sure that, if a failure occurs, the maximum amount of data is recoverable.

Prepare an Upgrade Plan and Checklists

Your upgrade plan should detail how to evaluate the overall functionality and production readiness of the upgraded environment.

Use the following steps as a checklist for the tasks that are required leading up to the production upgrade or "go-live" day.

Verify that the system is functional after the upgrade by performing these tests:

- Review the Setup log files for issues that may have occurred during the upgrade.
- Review Event Viewer logs. Microsoft Dynamics CRM Server events are recorded under the sources that begin with MSCRM in Event Viewer.
- Start Deployment Manager and verify that all Microsoft Dynamics CRM servers and organizations are enabled.
- Start Internet Explorer, and connect to the Microsoft Dynamics CRM server.

After you have finished the previous tasks, perform a user acceptance test. Examples of the features to test include the following:

- Check that reports run as expected.
- Validate applicable data in the Microsoft Dynamics CRM system, such as creating, editing, deleting, and promoting/converting records for a range of entities (for example, Accounts, Contacts, and custom entities).
- Verify workflows against previous workflows. Update any workflow items affected by configuration or data model modifications.

- Test all custom code, JavaScript, and custom reports.
- Test all integration processes.
- Test third-party applications and add-ons.

Phase 2 – Establish the Test Environment

Run at least one test upgrade before you upgrade your production environment.

For an in-place or migration upgrade using the same instance of SQL Server, the test environment is a copy of the current Microsoft Dynamics CRM deployment, which will be used to validate the upgrade. For a migration using a new instance of SQL Server, the new production environment can serve as the test environment.

Depending on how extensive and rigorous your testing will be in the test environment, you may need to set up network load balancing or clustering. You might also have to install and configure other Microsoft Dynamics CRM components, such as the Email Router and third-party add-ons or solutions particular to the deployment. Virtualization technology such as Windows Server® Hyper-V™ can help with this process.

Establish a Test Domain

For the test environment, we recommend that you use a test domain that has a trust setting (for example, part of the same Active Directory forest) to the domain where the Microsoft Dynamics CRM production server is running.

Install prerequisite components such as SQL Server and Exchange Server. Make sure that all components meet the requirements for Microsoft Dynamics CRM 2015.

Back Up the Existing Environment

On the Microsoft Dynamics CRM production server, follow these steps:

1. Back up the organization database(s) and the configuration database.
2. Back up all customizations that exist outside the Microsoft Dynamics CRM organization database, such as manually applied registry settings and third-party solution files.

In-Place Upgrade

If you plan to perform an In-place upgrade on the production deployment, complete these steps in the test environment:

1. Restore the production database(s) and the configuration database to the SQL Server in the test environment.
2. Install Microsoft Dynamics CRM 2015. During Setup, select the **Connect to an existing deployment** option.

3. Reapply third-party solutions and any other changes that were not made within the Microsoft Dynamics CRM application.
4. Verify the test environment works as expected.

Migrate using the same instance of SQL Server

If you plan to perform a **Migrate using the same instance of SQL Server**, restore the organization database(s) and the configuration database to the SQL Server in the test environment.

Do not install Microsoft Dynamics CRM 2013.

Note: If you copy the configuration and organization databases to a new SQL Server to establish a test environment or for the final production deployment, you must update the configuration database (MSCRM_Config).

The configuration database contains references to the SQL Server that holds the database for each organization in the deployment. You must update the reference for each organization to the new SQL Server. If you do not update the references, then the Setup program tries to upgrade the databases on the original SQL Server. This could result in the production databases being upgraded instead.

Migrate Using a New Instance of SQL Server

If you plan to perform a **Migrate using a new instance of SQL Server** upgrade, then no action is required.

1. Restore the organization database(s) to the SQL Server in the test environment.
2. Do not restore the configuration database.
3. Do not install Microsoft Dynamics CRM 2013.

You do not have to restore the configuration database because a new configuration database is created during the installation of Microsoft Dynamics CRM 2015.

Phase 3 – Upgrade and Validate the Test Environment

Having established the test system, you perform the upgrade on the test environment.

You must validate one of the following:

- An **In-place** upgrade on the Microsoft Dynamics CRM 2013 test server.
- A new installation of Microsoft Dynamics CRM 2015 and a **Migrate using the same instance of SQL Server** or a **Migrate using a new instance of SQL Server** upgrade.

Verify the newly upgraded Microsoft Dynamics CRM 2015 environment for stability and operation. In particular, make sure that all third-party add-ons and integrations with other systems perform as expected.

Acceptance Testing

You might want to establish a set of users to perform testing. The group should use the system to perform all normal day-to-day tasks. The users should also work with a checklist of items to be tested. The results of testing should be reviewed against previously defined system acceptance criteria. From these results, you can decide whether to implement the upgrade on the production environment.

Phase 4 – Upgrade and Validate the Production Deployment

In this phase, the production deployment is upgraded. Even if everything goes as planned during the test upgrade, make sure that you back up the production Microsoft Dynamics CRM 2013 database before you upgrade the production deployment or migrate to the new deployment.

The production upgrade should be scheduled to allow time to disable organizations, run checklists, and correct undiscovered issues or, if necessary, roll back to Microsoft Dynamics CRM 2013.

Note: Always run a full backup of the Microsoft Dynamics CRM databases before you upgrade to a new version of the product. We recommend that for each organization that is upgraded, the volume on the SQL Server that contains the database files has free space that is at least three times the size of the organization database file and four times the size of the log file.

Lesson 5-4 Upgrading other components

Components not supported for in-place upgrade

The following products and solutions are not supported by Microsoft Dynamics CRM 2015 and will not be upgraded during Microsoft Dynamics CRM Setup. If you upgrade a Microsoft Dynamics CRM 2013 system that includes the product or solution listed below, or you install these components after you install Microsoft Dynamics CRM, these products or solutions may not function correctly. We recommend that you uninstall or manually remove the component before you upgrade.

- Microsoft Dynamics CRM 2013 Reporting Extensions (on-premises only)
- Microsoft Dynamics CRM List Component for SharePoint Server

Email Router

To upgrade your installation of the Email Router from Microsoft Dynamics CRM 2013 to Microsoft Dynamics CRM 2015, you first back up the files that contain information about the state of the Email Router, such as configuration settings, and then install the Microsoft Dynamics CRM 2015 Email Router. Follow the steps in the following tasks:

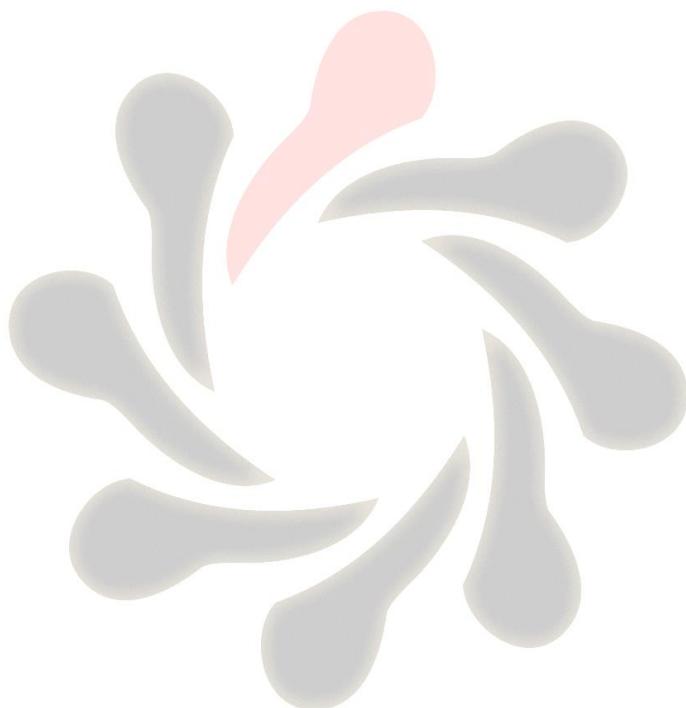
Upgrade Task 1: Back up and use Email Router state files and Smart Matching settings.

Locate the following files in the folder <drive:>\Program Files\Microsoft CRM Email\Service\:

- Microsoft.Crm.Tools.EmailAgent.Configuration.bin
- Microsoft.Crm.Tools.EmailAgent.SystemState.xml
- Microsoft.Crm.Tools.EmailAgent.xml

- Microsoft.Crm.Tools.Email.Management.config
- EncryptionKey.xml

Upgrade Task 2: Install the Microsoft Dynamics CRM 2015 Email Router.



Module 6 - Internet Facing Deployment

This module describes how to configure a Microsoft Dynamics CRM deployment for access over the Internet. A deployment that is configured in this way is referred to as an “Internet-facing deployment (IFD)”.

You must configure an IFD if users must access Microsoft Dynamics CRM over the Internet, either in a browser or by using Microsoft Dynamics CRM for Outlook. Other methods to provide access over the Internet, such as port forwarding, might work but are not supported.

Some applications, such as Microsoft Dynamics CRM for tablets and Microsoft Dynamics CRM for phones, require a deployment to be configured for IFD.

Before you can configure an IFD, you first must configure claims-based authentication. This module describes how to configure claims-based authentication using Active Directory Federation Services.

Even if you do not need an IFD, you can configure a deployment for claims-based authentication to benefit from a single sign-on experience where the deployment is integrated with other applications.

Objectives

The objectives are:

Provide a background to claims-based authentication.

- Describe the requirements for configuring an IFD.
- Review the certificates required for an IFD.
- Identify the steps to install Active Directory Federation Service.
- Review the Active Directory Federation Service configuration steps.
- Review the steps to configure claims-based authentication in Microsoft Dynamics CRM.
- Review the steps to configure an IFD in Microsoft Dynamics CRM.

Lesson 6-1 Claims Based Authentication

Claims-based authentication provides a standard way for applications to obtain the identity information they require from users to decide whether to grant access. Claims-based authentication can be used whether users are on an internal network, members of trusted partner organizations, or on the Internet.

Identity information, which can include the user's name and other personal information, is presented to an application using a security token (or simply a token). Each piece of information in the token is called a “claim.” The application provides access to the user on the basis of the claims in the token.

A token is issued and digitally signed by a “security token service” to prove its authenticity. The issuer or “identity provider” can be a service within an organization, such as Active Directory Domain

Services, or a third-party service. A significant benefit of claims-based authentication is that applications do not need to manage or store identity information for users. There are many security token service providers including Active Directory Federation Services (AD FS).

Connecting to an Application Using Claims-Based Authentication

Before users can access a web-based application that is enabled for claims-based authentication, such as Microsoft Dynamics CRM, the following steps are required:

1. A security token service (STS), such as AD FS, must be configured to issue the correct tokens for users.
2. The STS must be configured with details of the application.
3. The application must be configured to trust the identity provider for the STS.

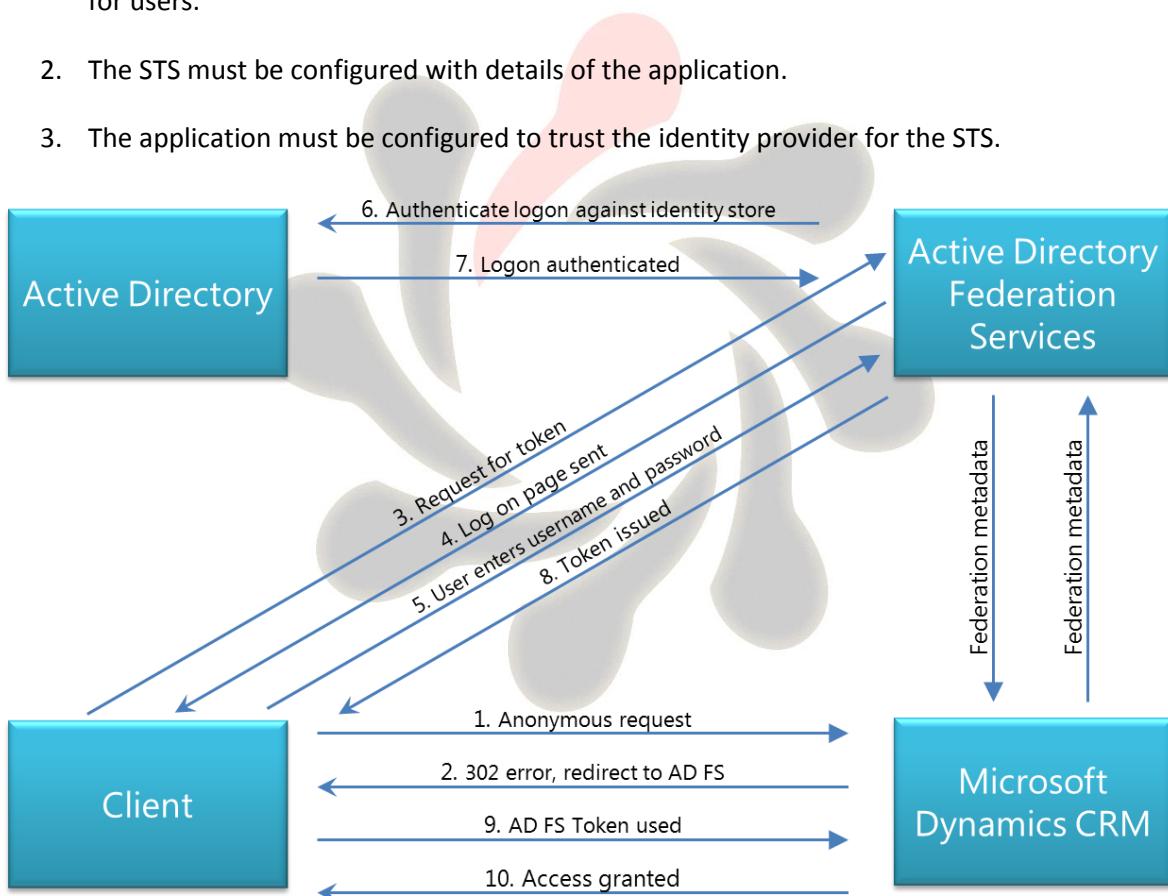


Figure 1 - CLAIMS-BASED AUTHENTICATION SEQUENCE

The “Claims-based Authentication Sequence” figure displays the sequence of events that occur when a user accesses a Microsoft Dynamics CRM application that is configured for claims-based authentication using AD FS as the STS.

The following steps describe the sequence of events in more detail (the step numbers correspond to the numbered events in the figure).

1. The client web browser connects to the Microsoft Dynamics CRM website using an anonymous request.
2. Microsoft Dynamics CRM returns an HTTP response code 302 redirecting the client web browser to AD FS.

3. The client web browser (on behalf of the user) requests a security token for Microsoft Dynamics CRM from AD FS. The request contains information about the user and the application (Microsoft Dynamics CRM) that the user wishes to access.
4. AD FS sends a logon page to the web browser.
5. The user enters his or her username and password.
6. AD FS sends the username and password to the identity store for authentication. In this case, the identity store is Active Directory.
7. If the user entered the correct username and password, AD informs AD FS that the logon is authenticated.
8. AD FS generates the security token and sends it to the web browser.
9. The web browser sends the security token to Microsoft Dynamics CRM.
10. The application checks the signature of the token. If the signature is valid, then Microsoft Dynamics CRM knows that AD FS issued the token. Because Microsoft Dynamics CRM is configured to trust AD FS, the claims in the token are accepted as valid and the user is given access.

Requirements for Configuring an Internet-facing Deployment

To configure Microsoft Dynamics CRM for access over the Internet, complete the following tasks:

- Install and configure a supported security token service such as AD FS.
- Configure claims-based authentication.
- Configure an IFD.

The following topics describe the general requirements for configuring an IFD.

Security Token Services

The computer where Microsoft Dynamics CRM Server is installed must have access to a security token service. The security token service provider must use the Web services trust model (WS-Trust) 1.3 standard. Endpoints that use an earlier standard, such as the WS-Trust 2005 standard, are not supported. In this module, Active Directory Federation Services is used as the security token service provider.

Microsoft Dynamics CRM 2015 supports Active Directory Federation Services versions 2.0, 2.1 and 2.2. References to ADFS in this module include any of the supported versions.

Website

The website for Microsoft Dynamics CRM must meet the following requirements.

- The website in Internet Information Services (IIS) must be configured to use an HTTPS binding.

- The website must have a single IIS binding. Multiple IIS bindings, such as an HTTPS and an HTTP binding or two HTTPS or two HTTP bindings, are not supported.
- The web addresses in the Microsoft Dynamics CRM Deployment manager must be configured to use an HTTPS binding.

AD FS also uses a website, which can only be installed to the default website. Therefore, if you are going to install AD FS and Microsoft Dynamics CRM on the same computer, do not use the default website for Microsoft Dynamics CRM.

If you plan to install AD FS and Microsoft Dynamics CRM on the same computer, the default website and the CRM website must use different port numbers. You do not have to use port 443 for the default website; instead we recommend that you use port 443 for the CRM website so that users do not have to type it when connecting to CRM in a browser and a different port number, such as 444, for the default website. If you decide to use a different port number for the default website, we recommend that you change it before installing AD FS.

DNS Records

The records in the following table are required in the Domain Name Server (DNS) server that hosts the records for the external domain that is used for the IFD.

Item	Use	Example record
AD FS server	Specified in the configuration of claims-based authentication	sts.contoso.com
Record for each Microsoft Dynamics CRM Organization	Browse to the correct Microsoft Dynamics CRM organization	contosoinc.contoso.com
Internal server with the Discovery Web Service role	Specified in the IFD Configuration Wizard	disco.contoso.com
Internal server with the Web Application Server role.	Specified in the IFD Configuration Wizard	auth.contoso.com

If the Discovery Web Service and Web Application Server roles are installed on the same server, then you can use the same external name with only one record.

Certificates

Websites that use the hypertext transfer protocol secure (HTTPS) protocol use a certificate called a “digital certificate” or “public key certificate” to encrypt web traffic and to verify the authenticity of the website.

This lesson describes the certificates that are required for AD FS and Microsoft Dynamics CRM when an IFD is configured.

Active Directory Federation Services

The following table displays the required certificates.

Certificate purpose	Description
Service communication certificate	<p>Federation servers use a server authentication certificate called a “service communication certificate,” to secure Web services traffic for Secure Sockets Layer (SSL) communication with Web clients, federation server proxies, and Windows Communication Foundation (WCF) Message Security. This is the same certificate that a federation server uses as the SSL certificate in Internet Information Services (IIS). The certificate must be trusted by AD FS clients. The use of self-signed certificates is not recommended.</p> <p>Ensure that the name on the certificate specifies an external name for AD FS (for example, sts.contoso.com).</p>
Token-signing certificate	<p>Certificate that is used to sign tokens issued by the Federation Service. Another purpose includes the signing of federation metadata when AD FS publishes it.</p> <p>AD FS generates a token-signing certificate during the initial configuration</p>
Token-decryption certificate	<p>This certificate is used to decrypt tokens that are received by the federation service.</p> <p>AD FS generates a token-decryption certificate during the initial configuration</p>

The token-signing and token-decryption certificates can be replaced after initial configuration with certificates that are issued by a trusted certificate authority.

Microsoft Dynamics CRM

The following table shows the required certificates.

Certificate purpose	Description
Website encryption certificate	<p>Microsoft Dynamics CRM uses the website encryption certificate to secure network traffic.</p> <p>The names specified in the certificate must match the URLs used to access the Microsoft Dynamics CRM website.</p> <p>If the website is accessed using an internal name (for example, http://crmserver) and an external name (for example, http://org1.contoso.com), then the certificate must support subject alternative names.</p> <p>If the Microsoft Dynamics CRM Web server roles are installed on different computers, then you can use a single wildcard certificate instead of individual certificates for each computer.</p>
Claims encryption	An encryption certificate is required to encrypt data that is sent between Microsoft Dynamics CRM and the security token service. The certificate must be installed on

Certificate purpose	Description
certificate	all Microsoft Dynamics CRM servers that run the Web Application Server, Organization Web Service, or Discovery Web Service server roles.

A single certificate can be used for both the purposes shown in the preceding table.

Encryption Certificate Access for CRMAppPool

The account used for the CRMAppPool of each Microsoft Dynamics CRM web application must have read permission to the private key of the claims encryption certificate that was specified when configuring claims-based authentication.

Use a Microsoft Management Console with the Certificates snap-in to add the **read** permission to the encryption certificate. The certificate is located in the Personal store of the local computer.

Certificate Expiry

Certificates have an expiry date. If any of the certificates used for claims-based authentication expires and is not renewed, Microsoft Dynamics CRM stops working. We recommend that you plan to renew certificates a month before expiry.

By default, the token signing and token decrypting certificates generated by AD FS are automatically renewed.

Lesson 6-2 ADFS

Windows Server 2008 and Windows Server 2008 R2 include Active Directory Federation Services 1.0 which is not supported for Microsoft Dynamics CRM 2015. Instead, AD FS 2.0 must be used.

Windows Server 2012 includes AD FS 2.1; Windows Server 2012 R2 includes AD FS 2.2. Both are supported for Microsoft Dynamics CRM 2015.

Installation Steps for AD FS 2.0

To add AD FS to a Windows Server 2008 R2 download and run the installer for the appropriate version of AD FS 2.0 for your operating system and architecture from <http://go.microsoft.com/fwlink/?LinkId=200773>.

Installation Steps for AD FS 2.1 and 2.2

To add AD FS to a Windows Server 2012 or Windows Server 2012 R2 server, use the Add Roles and Features Wizard.

Lesson 6-3 Configuring IFD

This lesson describes the steps that are required to configure AD FS as a stand-alone federation server. In AD FS 2.0, some user interface elements display the version number, whereas in AD FS 2.1

and 2.2 the version number is not displayed. Although the version number is not displayed in this lesson, the steps apply to AD FS versions 2.0, 2.1 and 2.2.

Note: Depending on the needs of your organization and network configuration, you might need to configure AD FS differently from the steps in this topic.

Configure ADFS

Federation Server Configuration Wizard Steps

AD FS must be configured before it can be managed.

Before starting the wizard, ensure that a suitable encryption certificate is installed on the default website. The name on the certificate must specify an external name for AD FS (for example, sts.contoso.com).

In the AD FS Management Console, click **AD FS Federation Server Configuration Wizard**, and then complete the following steps:

1. On the **Welcome** page, select **Create a new Federation Service**. Click **Next**.
2. On the **Select Stand-Alone or Farm Deployment** page, select **Stand-alone federation server**. Click **Next**.
3. On the **Specify the Federation Service Name** page, select the appropriate SSL certificate. If you are using a wildcard certificate, choose **the Federation Service name**. Click **Next**.
4. On the **Ready to Apply Settings** page, review the settings. Click **Next**.
5. On the **Configuration Results** page, review the status for each component. Click **Close**.

Configure Claims Provider Trust

A claims provider trust for Active Directory is automatically added to AD FS so that AD FS trusts Active Directory as an identity store. However, you must add a claims rule, which is required for Microsoft Dynamics CRM, to the claims provider trust.

In the AD FS Management Console, browse to **Claims Provider Trusts**, and then follow these steps:

1. In the list of **Claims Provider Trusts**, right-click on **Active Directory**, and then click **Edit Claim Rules**.
2. In the **Edit Claim Rules for Active Directory** window, click **Add Rule**.
3. On the **Select Rule Template** page, in the **Claim rule template** list, select **Send LDAP Attributes as Claims**.
4. Click **Next**.
5. On the **Configure Rule** page, do the following:
 - a. In the **Claim rule name** box, enter **UPN Claim Rule** (or a similar name).

- b. In the **Attribute store** list, select **Active Directory**.
 - c. In the **LDAP Attribute** list, select **User-Principal-Name**.
 - d. In the **Outgoing Claim Type** list, select **UPN**.
 - e. Click **Finish**.
6. Click **OK**.

Configure Relying Party Trusts

After claims-based authentication is enabled in the Microsoft Dynamics CRM Deployment Manager, a relying party trust must be added for Microsoft Dynamics CRM.

This process is described in the following lesson.

Configure Claims-Based Authentication

This lesson describes the steps that are required to configure claims-based authentication in Microsoft Dynamics CRM. After claims-based authentication is configured, it is automatically enabled and applies to internal and external access.

Configure Claims-Based Authentication Wizard

In the Microsoft Dynamics CRM Deployment Manager, start the Configure Claims-Based Authentication wizard by using one of the following methods:

- In the **Actions** pane, click **Configure Claims-Based Authentication**.
- In the **Tasks** pane, click **Configure Claims-Based Authentication**.
- In the console tree, right-click **Microsoft Dynamics CRM**, and then click **Configure Claims-Based Authentication**.
- In the **Action** pull-down menu, click **Configure Claims-Based Authentication**.

On the **Welcome to the Configure Claims-Based Authentication Wizard** page, click **Next**.

Note: The Configure Claims-Based Authentication wizard does not run unless the deployment properties are set to use HTTPS bindings on the Web Address tab in the Microsoft Dynamics CRM Deployment Manager.

Step 1 – Specify the Security Token Service

On the **Specify the security token service** page, enter the federation metadata URL of the security token service (STS) such as, <https://sts.contoso.com/FederationMetadata/2007-06/FederationMetadata.xml>.

Click **Next**.

Note: Verify that the URL for the federation metadata is correct by testing it in Internet Explorer.

Step 2 – Specify the Encryption Certificate

On the **Specify the encryption certificate** page, click **Select** to choose a certificate. The certificate is used to encrypt data sent between Microsoft Dynamics CRM and the security token service. The specified certificate must be installed on all CRM servers that are running the Web Application Server, Organization Web Service, or Discovery Web Service roles. The certificate may be the same one that is used to secure the Microsoft Dynamics CRM website.

Click **Next**.

Step 3 – System Checks

The **System Checks** page appears. This page is a summary of requirements. Failed tests must be corrected before configuration can continue. Use the **Details** and **Help** buttons for more information on failed tests and warnings.

If no errors or only warnings appear, you can continue with the configuration. To do this, click **Next**. The Next button is not available until all errors are resolved.

Step 4 – Selection Review

1. Review the **Review your selections** and then click **Apply** page.
2. Use the **Back** button to change any settings. When you are ready to continue, click **Apply**.
3. In the next page, make a note of the URL that is displayed for the federation metadata URL for Microsoft Dynamics CRM. This URL is used to add Microsoft Dynamics CRM as a trusted relying party to AD FS.
4. Click **Finish** to complete the wizard.

Disable Claims-Based Authentication

To disable claims-based authentication, click **Disable Claims-Based Authentication** in the Microsoft Dynamics CRM Deployment Manager. If an IFD is configured, it is disabled.

To re-enable claims-based authentication, run the Configure Claims-Based Authentication Wizard again. Previously specified settings in the wizard are the default.

Note: If claims-based authentication is disabled, Microsoft Dynamics CRM is not accessible for IFD users.

Configure Claims-Based Authentication by using the PowerShell

You can configure claims-based authentication by using the PowerShell.

Start the PowerShell and run the following command to add the Microsoft Dynamics CRM cmdlets:

```
add-pssnapin Microsoft.Crm.PowerShell
```

Run the following commands to enable claims-based authentication. Example settings are provided for the `EncryptionCertificate` and `FederationMetaData` parameters.

```
#Get the current settings into a variable  
$ClaimsSettings = Get-CrmSetting claimssettings  
#Set the enabled parameter to true  
$ClaimsSettings.Enabled = $true  
#Set the Encryption certificate and the Federation Metadata URL  
$ClaimsSettings.EncryptionCertificate = "CN=*.contoso.com, OU=Domain Control Validated,  
O=*.contoso.com"  
$ClaimsSettings.FederationMetadataUrl =  
"https://sts.contoso.com/federationmetadata/2007-06/federationmetadata.xml"  
#Enable claims-based authentication  
Set-CrmSetting $ClaimsSettings
```

Add a Relying Party Trust

After claims-based authentication is enabled, a relying party trust must be added to AD FS for Microsoft Dynamics CRM for each type of access that will be used (internal or IFD access).

If only IFD access or only internal access is required, then only one relying party trust is required.

If IFD and internal access is required, then two relying party trusts are required.

Note: Do not complete this process for internal access until claims-based authentication is configured in the Microsoft Dynamics CRM Deployment Manager. Do not complete this process for IFD access until an IFD is configured in the Microsoft Dynamics CRM Deployment Manager.

In the **Actions** pane in AD FS Management Console, click **Add Relying Party Trust**. Complete the following steps in the **Add Relying Party Trust Wizard**:

1. On the **Welcome** page, click **Start**.
2. On the **Select Data Source** page, select **Import data about the relying party published online or on a local network**, and then enter the URL for the Microsoft Dynamics CRM federation metadata. Click **Next**.
 - The URL for the metadata is displayed on the final page of the Configure Claims-Based Authentication wizard.
 - The format is `http://crmserver:port//FederationMetadata/2007-06/FederationMetadata.xml`
 - When configuring the relying party trust for internal access, specify the internal server name and port; for IFD access, specify the external name.
3. On the **Specify Display Name** page, enter a **Display Name**. Click **Next**.
4. On the **Choose Issuance Authorization Rules** page, select **Permit all users to access this relying party**. Click **Next**.
5. On the **Ready to Add Trust** page, review the settings, and then click **Next**.

6. On the **Finish** page, clear the **Open the Edit Claim Rules dialog for this relying party trust when the wizard closes** check box, and then click **Close** to complete the wizard.

Add Claims Rules to the Relying Party Trust

Claim rules describe the incoming claims that are accepted by AD FS, any conditions that apply to the claim, and the outgoing claims that are issued.

For Microsoft Dynamics CRM, the following three claims rules are required:

- Pass through UPN
- Pass through Primary SID
- Transform Windows account name to name

Complete the following steps to add the required claims rules to each relying party trust.

1. In the AD FS Management Console, browse to **Relying Party Trusts**.
2. Right-click on the relying party trust, and then click **Edit Claim Rules**.

To add the **Pass Through UPN** rule:

1. On the **Edit Claim Rules** page, click **Add Rule**.
2. On the **Add Transform Claim Rule Wizard** page, in **Claim rule template**, select **Pass Through or Filter an Incoming Claim**, and then click **Next**.
3. In the **Claim rule name** box, type **Pass Through UPN** (or a similar phrase).
4. In **Incoming claim type**, select **UPN**.
5. Select the **Pass through all claim values** option.
6. Click **Finish**.

To add the **Pass Through Primary SID** rule:

1. On the **Edit Claim Rules** page, click **Add Rule**.
2. On the **Add Transform Claim Rule Wizard** page, in **Claim rule template**, select **Pass Through or Filter an Incoming Claim**, and then click **Next**.
3. In the **Claim rule name** box, type **Pass Through Primary SID** (or a similar phrase).
4. In **Incoming claim type**, select **Primary SID**.
5. Select the **Pass through all claim values** option.
6. Click **Finish**.

To add the **Transform Windows Account Name to Name** rule:

1. On the **Edit Claim Rules** page, click **Add Rule**.
2. On the **Add Transform Claim Rule Wizard** page, in **Claim rule template**, select **Transform an Incoming Claim**, and then click **Next**.
3. In the **Claim rule name** box, type **Transform Windows Account Name to Name** (or a similar phrase).
4. In **Incoming claim type**, select **Windows account name**.
5. In **Outgoing claim type**, select **Name**.
6. Select the **Pass through all claim values** option.
7. Click **Finish**.

To complete the procedure, click **OK**.

Configure an IFD

This lesson describes the steps that are required to configure an IFD in Microsoft Dynamics CRM.

Configure IFD Wizard

In the Microsoft Dynamics CRM Deployment Manager, start the Configure IFD Wizard using one of the following methods:

- In the **Actions** pane, click **Configure Internet-facing Deployment**
- In the **Tasks** pane, click **Configure Internet-facing Deployment**
- In the console tree, right-click **Microsoft Dynamics CRM**, and then click **Configure Internet-facing Deployment**
- In the **Action** menu, click **Configure Internet-facing Deployment**.

On the Welcome to the Configure Internet-facing Deployment Wizard page, click **Next**.

Step 1 – Domain Names

On the **Domains** page, enter the domains for the following:

- Web Application Server Domain
- Organization Web Service Domain
- Discovery Web Service Domain

For the Web Application Server and Organization Web Service domains, enter the external domain name (for example, contoso.com). To connect to an organization, users must prefix the Microsoft Dynamics CRM organization name to the external domain name (for example, contosoinc.contoso.com).

The value for Discovery Web Service Domain must include a host name that resolves to the server with the Discovery Web Service role. Any host name that resolves to the correct server can be used (for example, dev.contoso.com).

If a port other than 443 is used, then you must append the port number to the domain names (for example, contoso.com:444).

Click **Next**.

Step 2 – External Domain

On the **External Domain** page, enter the external URL that resolves to the computer that has the Microsoft Dynamics CRM Web Application Server role (for example, auth.contoso.com).

If a port other than 443 is used, then the port number must be appended to the URL (for example, contoso.com:444).

Step 3 – System Checks

The **System Checks** page appears. This page is a summary of requirements. Failed tests must be corrected before configuration can continue. Use the Details and Help buttons for more information on failed tests and warnings.

If no errors or only warnings appear, you can continue with the configuration. To do this, click **Next**. The Next button is not available until all errors are resolved.

Step 4 – Selection Review

1. Review the **Review your selections** and then click **Apply** page.
2. Use the **Back** button to change any settings.
3. When you are ready to continue, click **Apply**.
4. Click **Finish** to complete the wizard.

Disable IFD

To disable an IFD, click **Disable Internet-facing Deployment** in the **Task** pane in the Microsoft Dynamics CRM Deployment Manager.

To re-enable an IFD, run the Configure Internet-facing Deployment Wizard again. Previously specified settings in the wizard are the default.

Note: If IFD is disabled, Microsoft Dynamics CRM is not accessible for IFD users.

Configure IFD using the PowerShell

You can configure an IFD using the PowerShell.

Start the PowerShell and run the following command to add the Microsoft Dynamics CRM cmdlets:

```
add-pssnapin Microsoft.Crm.PowerShell
```

Run the following commands to enable an IFD. Example settings are provided for the domain parameters.

```
#Get the current settings into a variable  
$IFDSettings = Get-CrmSetting ifdsettings  
#Set the enabled parameter to true  
$IFDSettings.Enabled = $true  
#Set the IFD Domain Values  
$IFDSettings.DiscoveryWebServiceRootDomain="dev.contoso.com"  
$IFDSettings.ExternalDomain="auth.contoso.com"  
$IFDSettings.OrganizationWebServiceRootDomain="contoso.com"  
$IFDSettings.WebApplicationRootDomain="contoso.com"  
#Enable claims-based authentication  
Set-CrmSetting $IFDSettings
```

Add a Relying Party Trust for IFD Access

After an IFD is configured, a relying party trust must be added to AD FS for Microsoft Dynamics CRM for IFD access.

Follow the steps in “Add a Relying Party Trust” described earlier in this module.

Module 7 - High Availability Options

In larger implementations, multiple computers are used to distribute the processing load and to provide high-availability for Microsoft Dynamics CRM servers and for the supporting components.

Because Microsoft Dynamics CRM uses memory and available processors, it is more common to install Microsoft Dynamics CRM components on multiple computers for availability rather than scaling. However, larger organizations might install Microsoft Dynamics CRM on multiple servers to cope with higher workloads. For example, if an organization makes extensive use of workflows, it can configure a server that is dedicated to the asynchronous processing service (which handles workflows).

Before deciding on a high-availability option, you should analyze the needs of the business and plan accordingly.

This module provides a high-level overview of the high-availability options rather than in-depth procedures.

Objectives

The objectives are:

- Review the reasons for installing Microsoft Dynamics CRM on multiple computers.
- Describe the role of Network Load Balancing in providing enhanced scaling and availability.
- Describe the options for Microsoft SQL Server in providing enhanced scaling and availability.
- Examine the high-availability options for other supporting components.

Lesson 7-1 Microsoft Dynamics CRM Server

Microsoft Dynamics CRM Server on Multiple Computers

You can install Microsoft Dynamics CRM Server on multiple computers to balance the processing load across several servers and to provide high availability. Deploying Microsoft Dynamics CRM Server in this manner can increase performance.

Before getting started with load balancing, installation and configuration planning is required. For more information and guidelines about installation and configuration for a Microsoft Dynamics CRM system, refer to the Microsoft Dynamics CRM Planning Guide.

Note: Microsoft Dynamics CRM Workgroup edition cannot be installed on multiple servers.

Server Roles

You can install Microsoft Dynamics CRM roles and server functionality on different computers. For example, the Front End and Back End server roles can be installed on different computers.

When a server role has not been installed, the Deployment Manager displays a message indicating the missing role.

To install server roles, use one of the following options.

- Run the Microsoft Dynamics CRM Server Setup Wizard to select one or more server role groups or one or more individual server roles. If Microsoft Dynamics CRM Server is already installed, you can use Programs and Features to add or remove server roles.
- Configure an XML Setup configuration file. Then run Setup at the command prompt to specify a server role group or one or more individual server roles.

The following table describes the available group server roles. We recommend that roles are installed as a group. However, any individual server role can be installed during Setup. In addition, you can add or remove server roles from Programs and Features after Microsoft Dynamics CRM Server is installed.

All server roles must be running in your organization's network to provide a fully functioning system. The following table describes server role groups.

Server Role Group	Description
Full Server	This group of server roles contains all the roles from Front End Server, Back End Server, and Deployment Administration Server roles. By default, Microsoft Dynamics CRM Server Setup deploys the system as Full Server
Front End Server	The Front End Server role group enables the server roles for running client applications and applications developed with the Microsoft Dynamics CRM Software Development Kit
Back End Server	The Back End Server role group includes the server roles that handle processing asynchronous events, such as workflows, custom plug-ins, and Microsoft SharePoint integration. These roles are usually not exposed to the Internet
Deployment Administration Server	The Deployment Administration Server role group enables the server roles for components that are used to manage the Microsoft Dynamics CRM deployment, either by using the methods described in the Microsoft Dynamics CRM Deployment Software Development Kit or the deployment tools

Microsoft Dynamics Server Placement

We recommend that computers that run the Microsoft Dynamics CRM Server roles and the computer that is running SQL Server are located on the same local area network (LAN). This is because of the large amount of network traffic passing between the computers. This is also true with Active Directory. To guarantee efficient Active Directory access to Microsoft Dynamics CRM, place the computers on which Microsoft Dynamics CRM Server and the Active Directory domain controller are running on the same LAN.

Hardware Considerations

The hardware used for the computers on which Microsoft Dynamics CRM components are installed play an important part in high-availability.

Consider the following options to protect against computer hardware failure.

- Redundant power supplies.
- Disk configurations that are tolerant of failure. For example, use redundant arrays of independent disks (RAID).
- Hot swappable memory.
- Multiple network cards.

Network Load Balancing

“Network Load Balancing” (NLB) is an optional component in Windows Server operating systems. It load balances network traffic (sent to a virtual IP address) among multiple servers in an NLB cluster.

An NLB cluster comprises multiple servers running a Windows Server operating system. Third-party hardware can also provide Load Balancing.

You can use NLB to combine application servers to provide a level of scaling and availability that is not possible with an individual server. NLB distributes incoming client requests among the servers in the configuration. This more evenly balances the workload of each server and prevents overload on any one server. To client computers, the NLB cluster appears as a single server that is highly scalable and fault tolerant.

Microsoft Dynamics CRM and Network Load Balancing

You can install Microsoft Dynamics CRM in a NLB configuration to provide improved availability and performance.

A multiple-server configuration of Microsoft Dynamics CRM has multiple computers running Microsoft Dynamics CRM that access a single server running SQL Server. For example, you can use a two-node network load-balancing configuration where all Microsoft Dynamics CRM Server roles are installed on a single computer. This kind of deployment is called a “Full Server” installation. You can use similar steps to install a particular server role group, such as the Front End Server role group, or one or more specific server roles.

When you install Microsoft Dynamics CRM, you have the following choices for load balancing the Microsoft Dynamics CRM Web application (both servers in the network load-balancing cluster must have the same set of server roles installed):

- Install the Full Server role.
- Install the Front End Server role group.
- Install specific Server roles using the Microsoft Dynamics CRM Server Setup Wizard or the command-line with an XML configuration file. At a minimum, you must install the following two roles on the load-balanced servers in the cluster.

- **Web Application Server role.** This Microsoft Dynamics CRM Server role runs the Web application components that connect users to Microsoft Dynamics CRM data.
- **Organization Web Service role.** This Microsoft Dynamics CRM Server role runs applications that use the methods described in the Microsoft Dynamics CRM SDK.

Note: If you decide to install only the Front End Server role group, you must install the Back End Server and Deployment Administration Server role groups on another server in the Active Directory domain for Microsoft Dynamics CRM to function. Similarly, if you install only the required Web Application Server and Organization Web Service roles, you must install the remaining server roles on other servers in the Active Directory domain for Microsoft Dynamics CRM to function.

Install Microsoft Dynamics CRM in an NLB Cluster

To install Microsoft Dynamics CRM in a NLB cluster, follow these high-level steps.

1. Create an NLB Cluster.
2. Configure Active Directory. When IIS is run in a network load-balanced environment, a Service Principal Name (SPN) is required to identify the instance of a running service. Microsoft Dynamics CRM uses a separate application pool in IIS for the Microsoft Dynamics CRM web application, which requires an SPN.
3. Install Microsoft Dynamics CRM on each server in the NLB. On the first server, select the Create a new deployment option. On other servers, select the Connect to, and if necessary, upgrade an existing deployment option.
4. Using the Microsoft Dynamics CRM Deployment Manager, configure the web address for the deployment to use the NLB cluster name. Select the **The deployment uses an NLB** option.
5. If the deployment is configured for IFD, run the Configure Internet-facing Deployment Wizard to add or revise the domain values.

Lesson 7-2 Microsoft SQL Server

Clustering Microsoft SQL Server

Failover clustering is a feature of the Windows Server platform that can improve server availability. When one server fails, another server provides service in its place. This process is called “failover”. Failover clusters in Windows Server operating systems provide high availability for databases, messaging servers, file and print services, and virtualized workloads.

You can install Microsoft Dynamics CRM Server so that it uses a clustered Microsoft SQL Server environment that runs Windows Server Failover Clustering.

Although you can install Microsoft Dynamics CRM on a SQL Server cluster that is configured for active-active or active-passive clustering, Microsoft Dynamics CRM will only function in an active-passive manner.

Note: To implement Failover Clustering, you must have supported editions of SQL Server and Windows Server.

Install a New Microsoft Dynamics CRM Deployment

You can configure Microsoft Dynamics CRM to use a Microsoft SQL Server cluster when installing a new Microsoft Dynamics CRM Server deployment.

To configure Microsoft Dynamics CRM to use a cluster, follow these steps.

1. Create the SQL Server Cluster.
2. Install Microsoft Dynamics CRM Server using the virtual server name for the SQL Server Cluster.

Note: In the Select SQL Server page of the CRM Server installation, you must type the virtual server name of the SQL Server. The name does not appear in the list of SQL Servers.

Change an Existing Deployment to Use an SQL Server Cluster for the Configuration Database

You can change an existing Microsoft Dynamics CRM deployment to use a Microsoft SQL Server Cluster for the configuration database. A Microsoft Dynamics CRM deployment can host several organizations. Each organization has its own database, but there is only one configuration database.

To change the configuration, follow these high-level steps.

1. Create the SQL Server Cluster
2. Back up the configuration database on the current SQL Server and restore the database to the SQL Server Cluster.
3. On the computers that are running the Microsoft Dynamics CRM web applications, modify the registry value KEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSCRM\configdb to reference the name of the SQL Server Cluster. For example, the old value might be the following:

```
DataSource=SQLServer;InitialCatalog=MSCRM_CONFIG;Integrated Security=SSPI
```

The new value would be the following:

```
DataSource>NewSQLServer;InitialCatalog=MSCRM_CONFIG;Integrated Security=SSPI
```

4. Restart IIS.

You only need to perform this procedure once.

Change an Existing Deployment to Use a SQL Server Cluster for the Organization Database

You can change an existing Microsoft Dynamics CRM deployment to use a Microsoft SQL Server Cluster for just the organization database. A Microsoft Dynamics CRM deployment can host several organizations. Each organization has its own database.

The high-level steps to change the configuration are as follows:

1. Create the SQL Server Cluster
2. Back up the appropriate organization database on the current SQL Server and restore the database to the SQL Server Cluster.
3. Use the Microsoft Dynamics CRM Deployment Manager to do the following:
 - a. Disable the organization.
 - b. Edit the organization and change the SQL Server name to the name of the SQL Server Cluster.
 - c. Enable the organization.
4. Restart IIS.

Repeat this procedure for each organization that you move to the SQL Server Cluster.

Other SQL Server High-Availability Solutions

This lesson describes at a high-level some of the other high-availability options in SQL Server.

The best option for your network depends on many factors including the following:

- Number of available servers
- SQL Server skillset
- Versions and editions of SQL Server that are in use
- Specifications of server hardware
- Available budget

Log Shipping

Log shipping operates at the database level. You can use log shipping to maintain one or more warm standby databases called “secondary databases” for a single production database called the “primary database”.

Log shipping uses transaction log file backups to update the secondary databases.

Database Mirroring

Failover clustering provides high-availability support for an entire instance of SQL Server. The cluster instance appears on the network as a single computer. Database Mirroring is an alternative high-availability solution for Microsoft SQL Server.

“Database Mirroring” is a software solution for increasing database availability. Mirroring is implemented for each database and works only with databases that use the full recovery model.

To mirror a Microsoft Dynamics CRM organization database, a minimum of two computers are required as follows:

- Primary database computer: This computer runs SQL Server where the Microsoft Dynamics CRM organization database is located.
- Mirrored database computer: This computer runs SQL Server with a connection to the primary database computer.

You can use a “Witness” computer to enable automatic failover. This computer runs SQL Server and must have a network connection to the primary and mirrored database computers.

Note: This feature will be removed in a future version of Microsoft SQL Server. Avoid using this feature in new development work, and plan to modify applications that currently use this feature. We recommend that you use AlwaysOn Availability Groups instead.

AlwaysOn Availability Groups

AlwaysOn Availability Groups is an enterprise-level high-availability and disaster recovery solution that was introduced in SQL Server 2012. With AlwaysOn Availability Groups, you can maximize availability for one or more user databases. AlwaysOn Availability Groups requires that the SQL Server instances reside on Windows Server Failover Clustering (WSFC) nodes.

An availability group supports a failover environment for a discrete set of user databases, called “availability databases” that fail over together. An availability group supports a set of read-write primary databases and one to four sets of corresponding secondary databases. You can make secondary databases available for read-only access and some backup operations.

Because the secondary databases (or replicas) are accessible, you can use them in Microsoft Dynamics CRM for reporting. This reduces the load on the primary database.

Lesson 7-3 High-Availability Options for Other Supporting Components

This lesson describes some of the high-availability options for other supporting components in a Microsoft Dynamics CRM deployment.

Microsoft Dynamics CRM E-mail Router

You can deploy and run the Microsoft Dynamics CRM E-mail Router on multiple computers in a Microsoft cluster to provide high availability and failover functionality.

Active Directory

You must have a minimum of one computer called a “domain controller” to set up an Active Directory infrastructure. However, one domain controller is a high-risk scenario because the failure of the Active Directory computer disrupts access to Microsoft Dynamics CRM. Consider at least two domain controllers to provide resilience against failure and load balancing of servicing logon and authentication requests.

Microsoft Exchange Server

The use of Microsoft Exchange Server is optional for Microsoft Dynamics CRM. Although the failure of Microsoft Exchange does not prevent access to Microsoft Dynamics CRM, it is important to consider the impact of a failure.

High-availability options for Microsoft Exchange include the following:

- Installing Microsoft Exchange server roles on different computers
- Failover Clustering

Module 8 - Introduction to Office 365 and CRM Online

Objectives

The key objective of this module is to describe Microsoft's cloud offering and how this works with Microsoft Dynamics CRM Online.

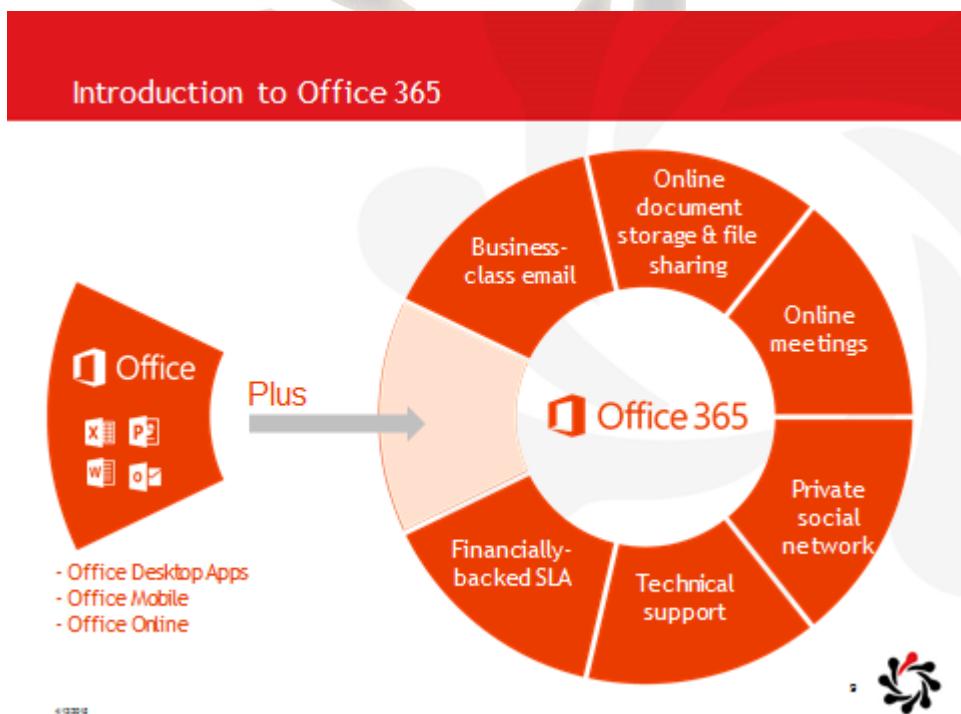
In this module we will cover:

- Introduction to Dynamics CRM Online
- Introduction to Office 365
- Describe the ways to access Microsoft Dynamics CRM.

Lesson 8-1 Introduction to Office 365

Office 365 is the brand name used by Microsoft for a group of software plus services subscriptions that provide productivity software and related services on a pay monthly basis.

Office 365 offers a variety of plans including e-mail and social networking services through hosted versions of Exchange Server, Lync, SharePoint and Office Web Apps, integration with Yammer, as well as access to Office software.



The Office 365 service consists of a number of products and services.

Core Components



Optional Components



The diagram shows a table of optional components for Office 365. The columns are 'Product', 'Plan', and 'Includes'. The rows correspond to the products listed in the table below:

Product	Plan	Includes
	SharePoint Online	Replacement of SharePoint as the primary enterprise social experience
	Project Pro for Office 365	Subscription version of Project Professional client software with roaming access and click to run
	Project Online	Online-only version of Project server, delivering enterprise project, program, and portfolio management
	Project Online with Project Pro for Office 365	Subscription version of Project Professional client with online capabilities of Project Online
	Microsoft Office Visio Pro for Office 365	Subscription version of the advanced diagramming software, including roaming access and click to run
	Microsoft Dynamics CRM	Subscription version of Microsoft Dynamics CRM provides customer management information in the cloud

Benefits of Office 365

- Familiar and full Office applications are available online
- Reliable services run at scale with a 99.9% SLA
- Continuous innovation

- Trusted service
- Active Directory integration to easily manage user credentials and permissions
- All of Office 365's components can be managed and configured through an online portal

Office 365 Portal

The Office 365 portal is used to

- Manage User Accounts
- Manage Subscriptions
- Monitor Service Settings
- Administer Dynamics CRM Online

Lesson 8-2 Introduction to Dynamics CRM Online

Microsoft Dynamics CRM Online is an online service offered by subscription through Microsoft's Office 365 platform. Microsoft installs the service on its servers and maintains it for you.

However, as the administrator, some tasks remain, such as adding information about your organization, creating business units if needed, licensing and registering your users, assigning security roles to users, and to configure user access to the service.

When you manage a Dynamics CRM Online subscription, the hands-on deployment takes place in two steps.

The first step takes place in the Office 365 admin portal and covers the initial tasks that are necessary to set up your subscription to the CRM Online service and to register users to be recognized by the service.

The second step takes place in CRM Online. You work on administrative tasks that include assigning users to at least one security role, preparing the system for first use, and importing your current CRM data.

Microsoft Dynamics CRM Online Functionality

Microsoft Dynamics CRM is designed to support the sales, marketing and service functions of an organisation.

Out of the box, Dynamics CRM provides significant functionality for many organisations and also provides capability to customise and extend the functionality to meet specific business requirements.

Sales

The sales functionality within Dynamics CRM covers the generation of leads for prospecting and qualifying, managing opportunities and keeping track of stages of deal closure, managing and

tracking communications between salespeople and the customers, and maintaining a database of product information.

Marketing

The marketing functionality within Dynamics CRM allows you to do campaign planning, campaign budgeting and creating target marketing lists of contacts, accounts and leads that you want to market your services to. You can generate campaigns in order to provide you the ability to send out email blasts or mail to a particular marketing lists, and then tracking and reporting the efficacy of those campaigns through reports and charts.

Service

The service functionality within Dynamics CRM allows you to record cases for issues or ticket tracking for customers, managing services that you provide or contracts that you have with a customer.

You can manage the services and resources that you have at hand through appointment scheduling allowing you to take your available resources, schedule them out optimally, and find when they are available to be deployed to render the services that you provide your customers.

A knowledge base of existing information and intelligence that you can use to help you more effectively solve cases and issues that may arise with a customer.

Microsoft Dynamics CRM Additional Functionality

Microsoft has purchased Dynamics and integrated a number of products which are now offered as additional subscriptions beyond the core CRM product:

- Microsoft Dynamics Marketing Enterprise
- Social Engagement
- Parature
- Unified Service Desk

Dynamics CRM Online Trial

A 30 day trial is available for Dynamics CRM Online through the Office 365 portal. This is for 25 users. It is possible to extend the trial by opening a service request, or you can purchase a subscription to convert your trial into a production system.

Lesson 8-3 Accessing Dynamics CRM Online

Accessing Microsoft Dynamics CRM

A user can work with Microsoft Dynamics CRM using either of the following:

- Web browser. No need to install anything to run CRM Online from a computer running a supported web browser.

- Microsoft Dynamics CRM for Outlook. An Outlook add-in that provides you with a complete set of CRM capabilities right within Microsoft Office Outlook.
- Microsoft Dynamics CRM for phones and CRM for tablets. Lightweight applications that let you access CRM data on almost any web browser running on a tablet, smartphone, or non-Windows computer

Internet Explorer and Supported Browsers

Using Internet Explorer 10.0 or later as the browser client provides access to Microsoft Dynamics CRM functionality without requiring you to install client software on the user's computer.

The latest publicly released versions of the following browsers are also supported:

- Mozilla Firefox on Windows 7, Windows 8 and Windows 8.1
- Google Chrome on Windows 7, Windows 8 and Windows 8.1, or Nexus 10 tablet
- Apple Safari on Mac OS-x 10.8 or 10.9 or Apple iPad

Note: Microsoft Dynamics CRM supports web client access over the Internet using https and Secure Sockets Layer (SSL) certificates.

Dynamics CRM 2015 has dropped support for IE 8 and IE 9.

Microsoft Dynamics CRM Mobile Express

If a user accesses Microsoft Dynamics CRM using an unsupported browser and operating system combination, the application appears using the Microsoft Dynamics CRM Mobile Express client. This client provides a simpler interface optimized for hand-held devices.

To see the Microsoft Dynamics CRM Mobile Express experience, append "/m" to the URL for your organization.

Microsoft Dynamics CRM for Tablet Devices

Apps for Microsoft Surface and Apple iPad tablets are available for Microsoft Dynamics CRM on-premises and Microsoft Dynamics CRM Online.

Microsoft Dynamics CRM for Microsoft Surface Tablet application is designed for Windows 8 tablet devices. Microsoft Dynamics CRM for Microsoft Surface Tablet will work on any computer that runs Windows 8 by using the immersive modern application; however, Microsoft Dynamics CRM for Microsoft Surface Tablet does not work when you run it in Windows 8 desktop mode.

Microsoft Dynamics CRM for Apple iPad Tablet application is designed only for iOS iPad tablet devices.

Note: For on-premises deployments, Microsoft Dynamics CRM for tablet devices requires an Internet-facing deployment that uses claims-based authentication.

Microsoft Dynamics CRM for Phone Devices

Apps for Windows Phone and Apple iPhones and Android are available for Microsoft Dynamics CRM on-premises and Microsoft Dynamics CRM Online.

Note: For on-premises deployments, Microsoft Dynamics CRM for phone devices requires an Internet-facing deployment that uses claims-based authentication.

Microsoft Dynamics CRM for Office Outlook

Microsoft Dynamics CRM for Office Outlook provides a Windows-based user experience that is highly integrated with Microsoft Office Outlook.

Office 2010 and Office 2013 are the supported configurations. Support for Office 2007 was dropped in Dynamics CRM 2015.

Microsoft Dynamics CRM for Microsoft Office Outlook

Microsoft Dynamics CRM for Microsoft Office Outlook is a feature-rich client that is installed on the user's computer. Microsoft Dynamics CRM for Microsoft Office Outlook is available in 32-bit and 64-bit versions. To install and run the 64-bit version of Microsoft Dynamics CRM for Microsoft Office Outlook, a 64-bit version of Microsoft Office Outlook is required.

Microsoft Dynamics CRM for Microsoft Office Outlook can, optionally, be installed with offline capability. This allows a user to work with Microsoft Dynamics CRM data when not connected to the corporate network. Offline capability can be added as follows:

- During the installation of Microsoft Dynamics CRM for Microsoft Office Outlook.
- After the installation is complete. In this case, a user can add offline capability by clicking Go Offline in Microsoft Office Outlook. This starts the installation of additional required components and stores a copy of the user's Microsoft Dynamics CRM data locally.

Note: To add offline capability, a user must either be a member of the Local Administrators group on his or her computer or provide administrator credentials.

Microsoft Dynamics CRM for Microsoft Office Outlook Without Offline Capability

Microsoft Dynamics CRM for Microsoft Office Outlook without offline capability supports the following user scenarios:

- A computer operated by a single user.
- A computer shared by several users (whereby each user has a separate logon account and is a valid Microsoft Dynamics CRM user).
- Multiple concurrent users for centralized application servers such as Remote Desktop Services.

- Many Microsoft Dynamics CRM for Office Outlook deployments are on computers that are never disconnected from the Microsoft Dynamics CRM server or in scenarios where offline use is not permitted (such as due to company policy).

In these scenarios, the ability to go offline and the components that support offline use are not required and should not be installed.

Microsoft Dynamics CRM for Microsoft Office Outlook with Offline Capability

Adding offline capability to Microsoft Dynamics CRM for Microsoft Office Outlook provides a user with Microsoft Dynamics CRM functionality while disconnected from the corporate network.

When offline capability is added (either during the installation of Microsoft Dynamics CRM or later) the following components are installed to support offline functionality:

- A local version of the Microsoft Dynamics CRM platform logic.
- A local web server.
- A supported version of Microsoft SQL Server Express.

Microsoft Dynamics CRM for Microsoft Office Outlook with offline capability supports the following user scenarios:

- A computer used by a single user.
- A computer shared by several users (whereby each user has a separate logon account and is a valid Microsoft Dynamics CRM user). However, only one user can be configured to work offline.

Note: To go offline, a user must have the Go Offline privilege and the Microsoft Dynamics CRM for Outlook with offline capability installed.

Module 9 – Plan and Deploy Microsoft Dynamics CRM Online

Objectives

The key objective of this module is to describe the licensing options for Dynamics CRM Online and planning for deployment of Microsoft Dynamics CRM Online.

In this module we will cover:

- Describe the Microsoft Dynamics CRM offerings
- Describe the licensing model and client access license types
- Plan for Microsoft Dynamics CRM Online deployment
- Describe the Office 365 administrative roles

Lesson 9-1 Offerings and Licensing

Microsoft Dynamics CRM 2015 is available in the following ways:

- An on-premises installation
- A Microsoft Partner-hosted offering.
- Microsoft Dynamics CRM Online (Microsoft-hosted offering)

This training focuses on Dynamics CRM Online.

Online Licensing Model

Microsoft Dynamics CRM Online uses a subscription licensing model. Each internal user requires a User Subscription License (USL).

The USL grants users non-perpetual rights (with no buy-out rights) to the use of Microsoft Dynamics Online. USLs are assigned on a “named-user” basis, meaning that each user requires a separate USL. USLs cannot be shared.

External users do not need a USL unless they use the Microsoft Dynamics CRM client applications.

Server licenses are not relevant to Microsoft Dynamics CRM Online.

Online Licensing Plans

Microsoft Dynamics CRM Online offers four levels of USLs:

- Essential - Access to system and custom entities, SDK, activities, and activity feeds. This is for access via custom applications.
- Basic - Features of the Essential license type, plus access to core entities accounts, contacts cases, leads and also provides access to reports, dashboards and visualizations.
- Professional - Access to all features of Microsoft Dynamics CRM

- Enterprise - Access to the full range of Dynamics CRM Online capabilities including sales, marketing, and customer service. It also provides full access to Social Engagement, Unified Service Desk, Parature and Microsoft Dynamics Marketing

Online Licensing Benefits

Microsoft Dynamics CRM Online provides a multi-tiered licensing model. The key benefits are:

- Flexibility. You can mix and match different types of licenses to accommodate the specific needs of your business.
- High value. You can choose from highly competitive offerings with a low Total Cost of Ownership.
- Clarity. You acquire licenses based on the functionality you require, rather than how you access the system.
- Parity. You use a consistent licensing model that applies equally to online and on-premises solutions built on Microsoft Dynamics CRM.
- Mobile access. You can access CRM data with your mobile device at no additional charge.

Subscription Add-Ons

A subscription includes one production instance of Microsoft Dynamics CRM and 5 gigabytes storage. Depending on the number of USLs purchased, additional non-production instances and storage are provided without charge.

Additional production instances, non-production instances, and storage are available for purchase regardless of the number of USLs purchased for a monthly charge.

Lesson 9-2 Planning Dynamics CRM Online Deployment

Implementing a Microsoft Dynamics CRM system is a significant task, so it is important that the implementation is carefully and thoroughly planned.

Microsoft Dynamics Sure Step Methodology

Microsoft Dynamics Sure Step provides a complete Microsoft Dynamics CRM implementation methodology. This includes project management discipline and field-tested best practices, plus user-friendly tools that can help you deploy, migrate, configure, and upgrade Microsoft Dynamics products.

Microsoft Dynamics Sure Step is available to Microsoft partners to help reduce risk and guide you through the tasks associated with deployment and configuration of Microsoft Dynamics solutions. For more information about Microsoft Dynamics Sure Step, including training, methodology, and tool downloads, contact Firebrand

Plan for Microsoft Dynamics CRM Deployment

A Microsoft Dynamics CRM Online deployment will go more smoothly with some preliminary planning. The following table lists some of the items to consider before starting the actual deployment process.

Item	Description	Considerations
Environment Discovery	<p>A detailed description of your organization's environment in terms of number of users, groups or teams, and the number and type of business units or divisions. Identify current CRM data that you would like to bring into CRM Online, and your overall data storage requirements. Include a business requirements analysis that describes your organization's expectation or requirements for a service level agreement (SLA). An SLA is an agreement between two or more parties describing the deliverables, support, and communication that each party will provide to the other. Specify your policies related to security and privacy</p>	<p>Is there enough overlap in customers and products across business units to be able to work in the same CRM data? What type of security policy does the organization already have in place? Are there any special requirements in this area? Is there a plan for business growth that could affect the number of users of CRM Online?</p> <p>Plan for enough time to do this discovery; information that comes out of this exercise can affect the way you implement the service.</p>
Single sign-on	<p>An authentication process that enables a user to access multiple systems or services through a single set of sign-on credentials.</p> <p>For example, implementing single sign-on for CRM Online in an organisation's network environment means that after a user signs in to the network, that user does not have to enter credentials again when accessing CRM Online.</p>	<p>There are additional requirements to implement single sign-on, therefore, consider how important it is to your organization.</p>
Administrative roles in the Microsoft Online Services environment	<p>A number of administrative roles are available to assign to users if you manage your subscription in the Microsoft Online Services environment.</p> <p>Administrative roles define administrative responsibilities related to subscription management activities, for example, billing administration, password administration, and user</p>	<p>Consider the available administrative roles and the needs of your environment to identify the roles you want to use and the users you will choose for each role. The global administrator role is the highest level role, having all the permissions to manage any part of the subscription process. We recommend that you assign this role to more than one person so that someone is always</p>

Item	Description	Considerations
	management administration.	<p>available to manage all aspects of the subscription.</p> <p>Note: Administrative roles cover all subscription management functions within the service. These aren't the same as the security roles that you assign to users in CRM Online, which are required and govern access to resources in the CRM Online service.</p>
Security roles in Microsoft Dynamics CRM Online	CRM Online uses role-based security. The security role assigned to a user determines the tasks the user is permitted to perform and the data that the user is permitted to view.	<p>Every user must be assigned at least one security role to access CRM Online.</p> <p>Note: Security roles aren't the same as administrative roles in the Microsoft Online Services environment, which cover subscription management and related activities in the Office 365 admin portal.</p>
Importing data	CRM Online offers a wizard to help with importing CRM data from other applications and services.	If you import data from other systems, consider the way you'll process the data to minimize errors.
Product updates	Some CRM Online releases will include optional product updates that you can choose to enable	Product updates may affect existing customizations in your CRM Online instance. Review the documentation associated with each product update before you enable it in a production environment. Additionally, some product updates, such as the sales and service process forms, can't be removed or easily reverted to the previous functionality. Therefore, you should give careful consideration before you enable a product update.

Lesson 9-3 Office 365 Administrative Roles

Differences between the Microsoft Online services environment administrative roles and Dynamics CRM Online security roles

Administrative roles are available to assign to users in the Office 365 admin portal. The administrative roles cover a set of rights and permissions related to managing the service subscription, such as adding users and assigning licenses.

The global administrator role has rights to control every aspect of the subscription and to add subscriptions to other online services.

The password administrator role has rights to reset a user's password, create service requests, and monitor the service.

Security roles are assigned within CRM Online and cover rights and permissions-related aspects, for example, permission to update records or to publish customizations. The roles are similar in that both types contain aggregated sets of permissions that allow access to some items and not to others, and that allow some actions to be taken but not others. The roles are different in that the first one applies to the management of the subscription but not to the service itself, and the second applies only within the service.

Using roles is a powerful way to group a set of rights that are common to a job title or business unit. This way, the administrator can grant a whole set of permissions to users simply by assigning a user or group of users to a given role.

Office 365 Administrative Roles

The following administrative roles are available:

- Global admin: Has access to all administrative features. Global admins are the only admins who can assign other admin roles. You can have more than one global admin in your organization. The person who signs up to purchase Office 365 becomes a global admin.
- Billing administrator: Makes purchases, manages subscriptions, manages support tickets, and monitors service health.
- Password administrator: Resets passwords, manages service requests, and monitors service health. Password admins are limited to resetting passwords for users and other password admins.
- Service administrator: Manages service requests and monitors service health.
- User management administrator: Resets passwords, monitors service health, and manages user accounts, user groups, and service requests. The user management admin can't delete a global admin, create other admin roles, or reset passwords for billing, global, and service admins.

Module 10 - Managing Microsoft Dynamics CRM Online

Objectives

The key objective of this module is to describe how to manage the Dynamics CRM Online Subscription.

In this module we will cover:

- Manage Microsoft Dynamics CRM Online subscriptions, licenses and user accounts
- Manage Microsoft Dynamics CRM Online updates

Lesson 10-1 Subscriptions, licenses, and user accounts

As a Microsoft Online Services environment administrator, you manage the Microsoft Dynamics CRM Online subscription, including billing and payments, user licenses, accounts and registration. You do these tasks in the Office 365 admin centre

Microsoft Dynamics CRM Online licenses

When you purchase a subscription to Microsoft Dynamics CRM Online, you receive a set of licenses to assign to users. Only licensed users are allowed access to the online service. You must assign a license to every user who will use the service.

A license conflict occurs if your organization has more users than licenses

If you run out of licenses, you have several options:

- Add licenses to your subscription and then assign licenses to users.
- Remove licenses from other users. This disables the user account in Microsoft Dynamics CRM Online and frees up the license so that you can re-assign it.
- Remove a user account by deleting it. This disables the user account in Microsoft Dynamics CRM Online and frees up the license so that you can re-assign it.
- Delete the user accounts of people who leave your company. This frees up the licenses so that you can re-assign them.
- If a license conflict occurs because your credit card information has become outdated in Microsoft Online Services, you can renew your subscription by updating the credit card information, for example, by updating the card's expiration date, or by adding a new credit card

Create a user account

When you create a user account in the Office 365 admin portal, the system generates a user ID and temporary password for the user. You have the option to let the service send an email message to the user as clear text,

Creating a user within the Office 365 portal only assigns a license to the user. Unless the user is set as global administrator, they do not yet have access to Dynamics CRM.

When you create a user in Office 365 and assign a license to the user by using the Office 365 Admin Centre, the user is also created in Microsoft Dynamics CRM Online. The synchronization process between the Office 365 admin portal and Microsoft Dynamics CRM Online can take a few minutes to complete.

Notice that when you assign a user the global administrator or the service administrator role in the Microsoft Online Services environment, it automatically assigns the user the System Administrator security role in Microsoft Dynamics CRM Online.

Add a license to a user account

In the Microsoft Online Services environment, you can license the user when you create the user account, or you can license the user later. You must assign a license to every user account that you want to access the online service.

Licensed users must be assigned at least one Microsoft Dynamics CRM security role to access CRM Online.

About user licenses

- Microsoft Dynamics CRM Online uses user licenses to provide access to your organization
- When you add a new user, the Add Users Wizard displays the number of user licenses available
- An unaccepted invitation requires a user license until the invitation expires two weeks after it was issued
- If you have more user licenses than you are using, contact support to reduce the number of licenses.
- Each user license requires a unique Microsoft account, and every user who logs on to Microsoft Dynamics CRM needs a license

Enable and disable users

To enable a user, assign a license to the user and add a user to the security group that is associated with an instance of CRM Online. If you enable a user that was disabled, you must send a new invitation for the user to access the system.

To disable a user, remove a license from the user or remove the user from the security group that is associated with an instance of CRM Online.

Create a non-interactive user account

The non-interactive user is not a ‘user’ in the typical sense – it is not a person but an access mode that is created with a user account. It is used for programmatic access to and from CRM between applications. A non-interactive user account lets these applications or tools, such as a CRM to ERP

connector, authenticate and access Microsoft Dynamics CRM Online, without requiring a Microsoft Dynamics CRM Online license. For each instance of Microsoft Dynamics CRM Online, you can create up to five non-interactive user accounts.

You need to have the System Administrator security role or equivalent permissions in Microsoft Dynamics CRM to create a non-interactive user. First, you'll create a user account in Office 365 and then in Microsoft Dynamics CRM Online, select the non-interactive access mode for the account.

1. Create a user account in the Office 365 portal.
2. Assign a Microsoft Dynamics CRM Online license to the account.
3. Go to Microsoft Dynamics CRM Online.
4. Choose Microsoft Dynamics CRM > Settings.
5. Choose Settings > Security > Users.
6. In the Enabled Users list, select the non-interactive user account name.
7. In the user form, select Administration > Access mode > Non-interactive.

You then need to remove the Microsoft Dynamics CRM Online license from the account.

8. In the Office 365 portal, go to the Office 365 admin centre.
9. Select Users > Active Users.
10. Check the box for the name of the non-interactive user account and select Edit > Licenses.
11. On the Assign licenses page, clear the box for the Microsoft Dynamics CRM Online license and select Save.
12. Go back to Microsoft Dynamics CRM Online and confirm that the non-interactive user account Access Mode is still set for Non-interactive.

Global and Service administrators can administer CRM without a license

By default, all Office 365 Global administrators and Office 365 Service administrators who do not have a Microsoft Dynamics CRM Online license are granted the following two levels of permission in Microsoft Dynamics CRM Online.

- System administrator security role
- Administrative access mode

The system administrator security role is typically granted to Microsoft Dynamics CRM administrators giving them unrestricted access to the administrative (Settings) areas, which are used for managing and configuring features of Microsoft Dynamics CRM.

Lesson 10-2 Microsoft Dynamics CRM Online Updates

You, as a Microsoft Online Services environment administrator, control when to install Microsoft Dynamics CRM Online service updates for your organization.

To update to the latest release of CRM Online, you complete two steps:

1. Review the update information on the “Manage all CRM Online instances” page (on the CRM Online Admin Centre) to find out what instances are ready to update and what is the schedule.
2. Approve the update

You will receive an email before the service update is available with a scheduled update date. This email will also include instructions about how to reschedule the update, if you choose.

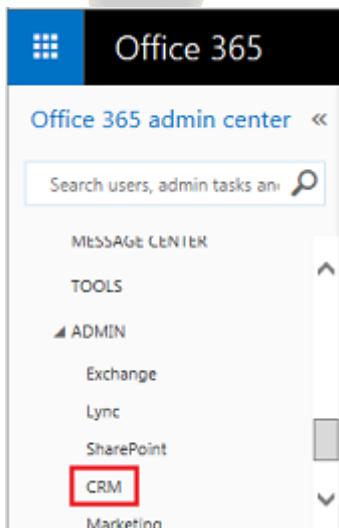
Admins will receive reminders 90, 30, 15, and 7 days before the update begins. Users will be notified 7 days before the update begins.

The service update will happen during a 12-hour window, and during that time your organization might be unavailable for several hours.

Approve an update

You must be a CRM system administrator to approve updates.

1. Sign in to <https://portal.office.com> .
2. On the Office 365 menu bar, choose Admin > CRM



3. Choose Updates tab

CRM Online Administration Center

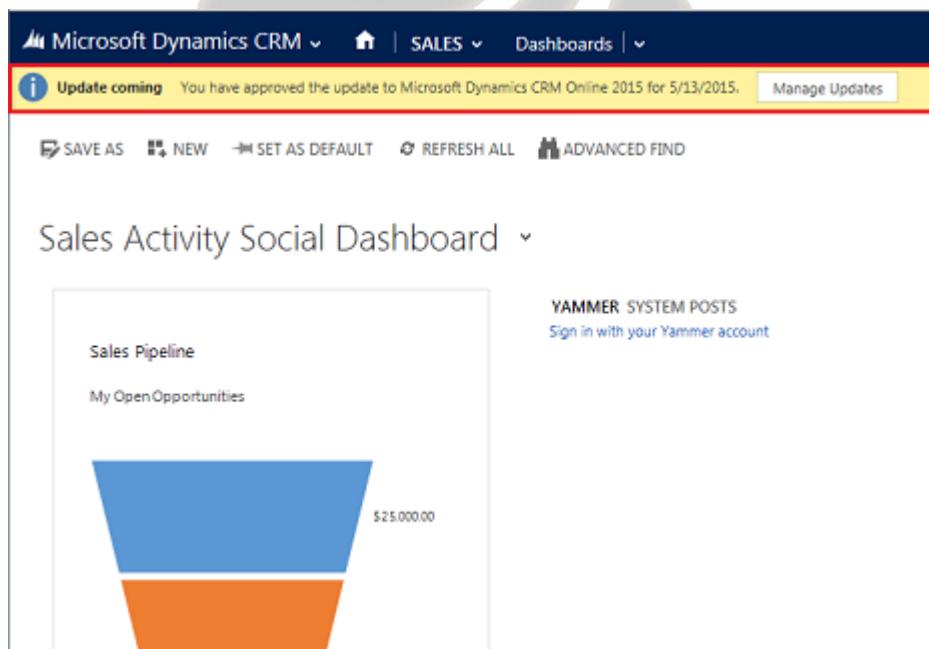
[INSTANCES](#) | [UPDATES](#)

Manage your Dynamics CRM updates

NAME	TYPE	RELEASE	SCHEDULED	STATUS	
[REDACTED]	Production instance	Microsoft Dynamics CRM...	5/13/2015 (6PM - 6AM)	Approved	Sandbox instance Microsoft Dynamics CRM Online Spring '14 This instance has pending updates. Manage updates now Geographic area: North America (NA) Details: Scheduled update: 3/9/2015 (6PM - 6AM) (GMT-08:00) Pacific Time (US & Canada); Tijuana Reschedule update IMPORTANT: Updates must be approved by an authorized administrator. To approve scheduled updates, click APPROVE UPDATES. APPROVE UPDATE
	Production instance	Microsoft Dynamics CRM...	3/8/2015 (6PM - 6AM)	Approval required	
	Production instance	Microsoft Dynamics CRM...	3/8/2015 (6PM - 6AM)	Approved	
	Sandbox instance	Microsoft Dynamics CRM...	3/5/2015 (6PM - 6AM)	Approved	
	Sandbox instance	Microsoft Dynamics CRM...	3/9/2015 (6PM - 6AM)	Approval required	

4. Choose the instance to approve.
5. Choose Approve Update to approve and proceed with the update

A notification will appear in the Dynamics CRM web application.



The screenshot shows the Microsoft Dynamics CRM Sales Activity Social Dashboard. At the top, there's a navigation bar with links for Microsoft Dynamics CRM, Home, Sales, Dashboards, and a search bar. A red banner at the top right displays a message: "Update coming You have approved the update to Microsoft Dynamics CRM Online 2015 for 5/13/2015. Manage Updates". Below the banner, there are standard CRM navigation buttons: Save As, New, Set as Default, Refresh All, and Advanced Find. The main dashboard features a large funnel chart titled "Sales Pipeline" under the heading "My Open Opportunities". The funnel is divided into two segments: a blue segment at the top and an orange segment at the bottom, with a total value of "\$25,000.00" indicated. To the right of the funnel, there's a "YAMMER SYSTEM POSTS" section with a link to "Sign in with your Yammer account".

Reschedule an update

You must be a CRM system administrator to reschedule updates.

1. Sign in to <https://portal.office.com>.
2. On the Office 365 menu bar, choose Admin > CRM > Updates tab.

3. Choose the instance to reschedule.
4. Choose Reschedule update for the instance whose update schedule you want to change.
5. Select new preferred and alternate dates and times for the update, and then choose Next.
6. Review the new dates and times and choose Approve Update

CRM Online Administration Center

INSTANCES | UPDATES

Manage your Dynamics CRM updates

NAME	TYPE	RELEASE	SCHEDULED	STATUS	
	Production instance	Microsoft Dynamics CRM...	5/13/2015 (6PM - 6AM)	Approved	
	Production instance	Microsoft Dynamics CRM...	3/8/2015 (6PM - 6AM)	Approval required	
	Production instance	Microsoft Dynamics CRM...	3/8/2015 (6PM - 6AM)	Approved	
	Sandbox instance	Microsoft Dynamics CRM...	3/5/2015 (6PM - 6AM)	Approved	
	Sandbox instance	Microsoft Dynamics CRM...	3/9/2015 (6PM - 6AM)	Approval required	

PRODUCTION INSTANCE
Microsoft Dynamics CRM Online Spring '14

 Your updates are approved.

Geographic area: North America (NA)

Details:
Scheduled update: 5/13/2015 (6PM - 6AM) (GMT-08:00) Pacific Time (US & Canada); Tijuana

Alternate scheduled update: 6/3/2015 (6PM - 6AM) (GMT-08:00) Pacific Time (US & Canada); Tijuana

Reschedule update

Lesson 10-3 Email Notifications

By default, CRM admins will receive update notifications. You can add others to receive update notifications.

1. Sign in to <https://portal.office.com>.
2. On the Office 365 menu bar, choose Admin > CRM > Instances tab.
3. Choose an instance that has notifications you want to change.
4. Choose Notifications.
5. Enter the email addresses of people to receive update notifications for the selected instance and choose Save.

CRM Online Administration Center

INSTANCES | UPDATES

Manage all CRM Online instances

NAME	STATE	TYPE	
[Redacted]	ready	Production instance	
	ready to configure	Production instance	
	ready	Production instance	
	ready to configure	Sandbox instance	
	ready	Sandbox instance	
	Instance to configure	Sandbox instance	
PRODUCTION INSTANCE Microsoft Dynamics CRM Online Spring '14			
 EDIT  COPY  NOTIFICATIONS			

Lesson 10-4 Migrate between Microsoft Dynamics CRM Online and Microsoft Dynamics CRM On-Premises

Migrate Microsoft Dynamics CRM Online to Microsoft Dynamics CRM On-Premise

You can transition from Dynamics CRM Online to Dynamics CRM On-Premise.

- Restore a copy of the Microsoft Dynamics CRM Online database
 - Obtain a copy of the Microsoft Dynamics CRM Online database from Microsoft Technical Support.
- Restore the Microsoft Dynamics CRM Online database
 - The backup of your Microsoft Dynamics CRM Online database must be restored by using a server running the same, or a later version, of Microsoft SQL Server. Restore the copy of the Microsoft Dynamics CRM Online database to a computer running SQL Server in the target Microsoft Dynamics CRM (on-premises) deployment.
- Import the Microsoft Dynamics CRM Online Organization
 - Open Deployment Manager and click Import Organisation and select the database
- Map Users
 - Map CRM Users to Active Directory users

Migrate Microsoft Dynamics CRM On-Premise to Microsoft Dynamics CRM Online

It is not possible to use the redeployment method of copy the Dynamics CRM database. The only supported method is to migrate the data

Module 11 - Administering Microsoft Dynamics CRM Online Instances

Objectives

The key objective of this module is to describe how to manage instances within an Dynamics CRM online account.

In this module we will cover:

- Managing Sandbox Instances
- Managing Production Instances

When you sign up for a trial or purchase a Microsoft Dynamics CRM Online subscription, a CRM Online production instance is created. Each additional production or non-production CRM Online instance you add creates a separate and isolated Microsoft Dynamics CRM organization on the same tenant.

Terminology

- Tenant – Account created when you sign up for CRM Online
- Instance – Isolated CRM organization on a tenant
- Subscription – Number and type of licenses
- Identity – User account used to sign in to CRM
- User Account – Provides sign in access to one or more cloud services
- Security Group – Control which users can access a particular instance

Lesson 11-1 Sandbox Instances

A Sandbox instance is any non-production instance of Microsoft Dynamics CRM Online. Isolated from production, a Sandbox instance is the place to safely develop and test application changes.

Customers with a combined total of 25 or more Professional or Enterprise licenses are provided with a free Sandbox instance. You can also purchase additional Sandbox instances.

Reset a Sandbox instance

You can reset a Sandbox instance to delete and re-provision it. Consider a reset when you want to:

- Create a new project
- Free up storage space
- Remove an instance containing Personally Identifiable Information data

You can only reset Sandbox instances.

To reset an instance

Browse to the Office 365 portal (<https://portal.microsoftonline.com>) and sign in using Global administrator or CRM System Administrator credentials.

Click or tap Admin > CRM

On the select a Microsoft Dynamics CRM Online instance page, select a Sandbox instance and then click or tap Reset.

On the reset instance page, adjust the instance settings as needed and then click or tap Reset.

Click or tap yes in the confirmation dialog box.

Manage all CRM Online instances

NAME	STATE	TYPE	
ODR Pilot	ready	Production instance	
ODR Pilot Sandbox	ready	Sandbox instance	

ODR Pilot Sandbox
SANDBOX INSTANCE
Dynamics CRM Online 2015 Update

OPEN

EDIT **RESET** **ADMIN** **NOTIFICATIONS**

Purpose
Development and Testing

The Sandbox instance will be deleted and reset to factory settings. You will not be able to recover any deleted data.

Administration mode

When you place a Sandbox instance in administration mode only users with CRM System Administrator or System Customizer security roles will be able to sign in to that instance.

Administration mode is useful when you want to make operational changes and not have regular users affect your work, and not have your work affect regular users.

You can only place Sandbox instances in administration mode.

On the admin settings page, you can set the following.

Setting	Description
Enable administration mode	Select to enable administration mode for the selected Sandbox instance. Only System Administrators or System Customizers will be able to sign in to the selected Sandbox instance.
Disable background operations	Select to disable all asynchronous operations such as workflows and synchronization with Microsoft Exchange. Emails will not be sent and server-side synchronization for appointments, contacts, and tasks are disabled
Custom message for end users	Enter a message that will be displayed to all users when they attempt to sign in.

To set administration mode

1. Browse to the Office 365 portal (<https://portal.microsoftonline.com>) and sign in using Global administrator or CRM System Administrator credentials.
2. Click or tap Admin > CRM
3. On the select a Microsoft Dynamics CRM Online instance page, select a Sandbox instance and then click or tap the administration mode toggle to change to the desired state.

Lesson 11-2 Production Instances

Copy Instance

You can use Copy instance in the CRM Online Administration Centre to copy the CRM application and all data from any Production, or Sandbox, instance to a Sandbox instance. You can do either a full or minimal copy.

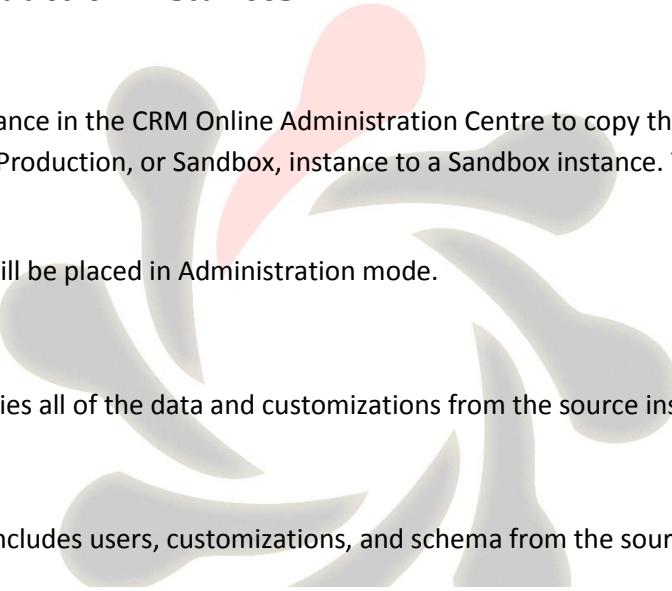
The copied instance will be placed in Administration mode.

Full Copy

A Full copy option copies all of the data and customizations from the source instance to the target.

Minimal Copy

A Minimal copy only includes users, customizations, and schema from the source instance.



copy instance

Source instance:
ODR Pilot

Target instance:

Copy type:
 Full copy
 Minimal copy

Lesson 11-3 Editing Instance Properties

Edit Instance

Administrators can edit properties of a Microsoft Dynamics CRM Online instance, such as the friendly name, URL, and the purpose.

Module 12 – Microsoft Dynamics CRM for Microsoft Office Outlook

Objectives

Microsoft Dynamics CRM for Microsoft Office Outlook provides access to the same Microsoft Dynamics CRM data as the Web client.

This module describes the installation requirements for the Microsoft Dynamics CRM for Outlook client and how to install and configure the client.

After Microsoft Dynamics CRM for Outlook is installed, each user on the computer must configure it for their use.

In this module we will cover:

- Review the hardware and software requirements for Microsoft Dynamics CRM for Outlook.
- Identify the deployment methods for installing Microsoft Dynamics CRM for Outlook.
- Install Microsoft Dynamics CRM for Outlook.
- Configure Microsoft Dynamics CRM for Outlook to connect to Microsoft Dynamics CRM organizations.
- Configure user settings and options related to emails.
- Install Microsoft Dynamics CRM for Outlook using the command line.
- Review how Microsoft Dynamics CRM for Outlook with offline capability works and how to configure the offline database

Lesson 12-1 Hardware and Software Requirements

This lesson outlines the hardware and software requirements for Microsoft Dynamics CRM for Outlook.

Hardware Requirements

Component	Online	Offline
Processor	x86- or x64-bit 1.9 gigahertz (GHz) or faster dual core processor with SSE2 instruction set	x86- or x64-bit 1.9 gigahertz (GHz) or faster dual core processor with SSE2 instruction set
Memory	2-GB RAM or more	4-GB RAM or more
Hard disk	1.5 GB of available hard disk space	2 GB of available hard disk space 7200 RPM or more
Display	Super VGA with a resolution of 1024 x 768	Super VGA with a resolution higher than 1024 x 768

Supported Operating Systems

Microsoft Dynamics CRM 2015 for Outlook is supported on the following operating systems.

- Windows 8.1 or Windows 8 (64-bit and 32-bit versions)
- Windows 7 Service Pack 1 (64-bit and 32-bit versions)
- Windows Server 2012 when running as a Remote Desktop Services application

Software Component Requirements

One of the following versions of Microsoft Office Outlook must be installed.

- Microsoft Office 2010
- Microsoft Office 2013

Note: Office 2007, which was supported for Microsoft Dynamics CRM 2013, is not supported for Microsoft Dynamics CRM 2015.

Internet Explorer 10 or 11 must be installed before you run Microsoft Dynamics CRM for Outlook Setup.

Note: Internet Explorer 8 and 9, which were supported for Microsoft Dynamics CRM 2013, is not supported for Microsoft Dynamics CRM 2015.

The 64-bit version of Microsoft Dynamics CRM for Outlook is only supported with 64-bit versions of Microsoft Office.

If needed, the following software will be installed by Microsoft Dynamics CRM for Outlook Setup:

- Microsoft SQL Server 2012 Express
- Microsoft .NET Framework 4.5.
- Microsoft Windows Installer 4.5.
- MSXML 4.0.
- Microsoft Visual C++ Redistributable.
- Microsoft Report Viewer 2010.
- Microsoft Application Error Reporting.
- Windows Identity Framework (WIF).
- Microsoft Azure AppFabric SDK V1.0.
- Windows Live ID Sign-in Assistant 6.5.
- Microsoft Online Services Sign-in Assistant 2.1.

- Microsoft SQL Server Native Client.
- Microsoft SQL Server Compact 4.0.
- Reporting Services Microsoft ActiveX control. If not installed on the computer, the user will be prompted to install the software at first attempt to print a report.

The Microsoft Dynamics CRM 2013 Client for Outlook is not supported with Microsoft Dynamics CRM 2015. You first need to update to Microsoft Dynamics CRM for Outlook to Microsoft Dynamics CRM 2013 Update Rollup 1 or 2 or to Microsoft Dynamics CRM 2013 Service Pack 1 (SP1).

Full details of the support for the Outlook client can be found at <https://technet.microsoft.com/en-us/library/dn832152.aspx>.

Lesson 12-2 Deploying and Configuring CRM for Outlook

A number of methods are available for deploying Microsoft Dynamics CRM for Outlook. You should review the methods and decide on the appropriate one for your organization.

Deployment Methods

Microsoft Dynamics CRM for Outlook can be installed using one of the following methods:

- Manual installation
- Download link in the web application
- Group Policy
- Microsoft System Center Configuration Manager
- Desktop Virtualisation

This topic provides an overview of these methods

The installation of the Dynamics CRM for Outlook is made up of two parts:

- Installation of the client software
- Connection to a Dynamics CRM organisation or instance

Manual Installation

In a manual installation, Microsoft Dynamics CRM for Outlook is installed on each computer separately. The installing user must be a member of the Local Administrators group on the computer, but he or she does not need to be a Microsoft Dynamics CRM user.

However, each Microsoft Dynamics CRM for Outlook user must run a configuration wizard after the installation.

This installation method is appropriate when only a few computers require an installation of Microsoft Dynamics CRM for Outlook.

Download Link in the Web Application

By default, if a Microsoft Dynamics CRM user does not have Microsoft Dynamics CRM for Outlook installed, the web application displays a Get CRM for Outlook link in the message bar.

The link is for users to download and install Microsoft Dynamics CRM for Outlook. As with a manual installation, the installing user must be a member of the Local Administrators group on the computer.

It is possible to stop the link from showing from within System Settings.

Group Policy

You can deploy Microsoft Dynamics CRM for Outlook using Group Policy, which is a feature of Active Directory. This installation method is appropriate if you need to deploy Microsoft Dynamics CRM for Outlook for more than 10 users.

Using an **assigned** policy, Group Policy can be configured to automatically install Microsoft CRM for Office Outlook without requiring user intervention.

Alternatively, using a **published** policy, Group Policy can be configured to make Microsoft CRM for Office Outlook available for manual installation by a user. When installing software made available by Group Policy, a user does not require local administrator privileges.

Microsoft System Center Configuration Manager

Where an organization has a more formal approach to software management, Configuration Manager can be used to deploy and maintain Microsoft Dynamics CRM for Outlook (as well as other products).

Configuration Manager (part of the Microsoft System Center) provides remote control, patch management, software distribution, operating system deployment, network access protection, and hardware and software inventory.

Before users can run Microsoft Dynamics CRM for Outlook, the software must be installed and then configured for each user. To configure Microsoft Dynamics CRM for Outlook using Configuration Manager, you must create a script that has the appropriate configuration settings. You can use an XML configuration file to configure Microsoft Dynamics CRM for Outlook with no user interaction.

Desktop Virtualisation

CRM 2015 for Outlook is supported for running on Windows Server 2012 Remote Desktop Services. When users run an application on Remote Desktop Services, the application execution occurs on the server.

Enable multi-factor authentication through OAuth

In the newly redesigned Microsoft Dynamics CRM for Outlook Configuration Wizard, System Administrators can enable multi-factor authentication (MFA) through the OAuth 2.0 Framework.

OAuth 2.0 is an open framework for authorization that lets users provide access tokens, instead of credentials, to access their data that is hosted by a given service provider (such as CRM).

Using MFA can help make client authentication more secure, especially for mobile users. CRM Online and on-premises versions of Microsoft Dynamics CRM 2015 can take advantage of MFA; Microsoft Dynamics CRM 2015 on-premises requires at least Windows Server 2012 R2. CRM Online automatically uses OAuth.

If you have upgraded your authentication server to use OAuth prior to installing CRM 2015 for Outlook, CRM 2015 for Outlook will automatically check for and use OAuth for MFA. Users will see the OAuth sign-in form the first time they use CRM 2015 for Outlook.

Task 1: Install Microsoft Dynamics CRM for Outlook

This is the manual procedure to install CRM for Outlook. You can add offline capability for the user either during this installation or at a later time.

- Meet the CRM for Outlook requirements specified in Microsoft Dynamics CRM for Outlook hardware requirements and CRM for Outlook support matrixes.
- Log on to the computer as Local Administrator.
- Locate and run the appropriate installation file (32-bit or 64-bit):
 - To install from a DVD, double-click SetupClient.exe in the installation folder
 - To install from the web, go to Microsoft Downloads and search for Microsoft Dynamics CRM 2015 for Microsoft Office Outlook (Outlook Client) and then download and run the executable file that matches the architecture of Microsoft Office that you've installed.
 - To install from the Microsoft Dynamics CRM web application, choose Get CRM for Outlook on the message bar. If you see any dialog boxes titled Security Warning, choose Run in each.
- The Microsoft Dynamics CRM 2015 for Microsoft Office Outlook Setup wizard starts.
- On the License Agreement page, review the information. If you accept the license agreement, select I accept the license agreement, and then choose Next.
- If the Get Recommended Updates page appears, indicate whether you want to obtain updates through the Microsoft Update program, and then choose Next.
- Choose either Install Now or Options.
 - To install CRM for Outlook with offline capability, choose Options, select Offline Capability on the Customize Installation page, and then choose Install Now.
 - To install CRM for Outlook without offline capability, choose Install Now

The program features are installed and a progress indicator is displayed. You may be asked to restart your computer to complete the installation.

- On the completion page of the Microsoft Dynamics CRM 2015 for Microsoft Office Outlook Setup wizard, choose Close.

Task 2: Configure Microsoft Dynamics CRM for Outlook

After CRM for Outlook is installed, it must be configured.

- When you restart Outlook after you've installed CRM for Outlook, Add a Microsoft Dynamics CRM Organization starts automatically

Alternatively, Start the Configuration Wizard: On the Start screen, choose Configuration Wizard or on earlier versions of Windows click Start > All Programs > Microsoft Dynamics CRM 2015, and then click Configuration Wizard.

Alternatively, choose Configure Microsoft Dynamics CRM for Outlook on the CRM tab in Outlook.

- To add an organization, choose the option appropriate for you.
 - To connect to a Microsoft Dynamics CRM Online organization, choose CRM Online from the drop-down menu.
 - To connect to an on-premises deployment of Microsoft Dynamics CRM, type the discovery-service URL for Microsoft Dynamics CRM in the format <https://orgname.contoso.com> for Internet-facing deployments (IFD) or <http://crmserver:5555> for internal deployments.
- Choose Connect.
- If you are prompted for credentials, select from the following options.
 - For a Microsoft Dynamics CRM Online organization, enter your Microsoft Online Services user name and password, and then choose OK. This information should have been sent to you in email when your account was added.
 - For an on-premises deployment of Microsoft Dynamics CRM, you may not be prompted because Microsoft Dynamics CRM will use your Active Directory domain credentials.
- Choose Close.

Configure Multiple Organizations

Microsoft Dynamics CRM 2015 for Outlook can be configured for multiple organizations (including Microsoft Dynamics CRM Online) in Outlook.

However, only one organization can be designated as the synchronizing organization. For the non-synchronizing organizations, the following restrictions apply:

- Going offline is only available for the synchronizing organization.
- Synchronization between Outlook and Microsoft Dynamics CRM items does not occur for non-synchronizing organizations.
- Tracking items only applies to the synchronizing organization

Use the procedure above to add other organisations in Outlook.

Post Installation Activities

After you install CRM for Outlook, you have to set some options so that users can send and receive email from CRM for Outlook and to specify what data is synchronised.

Command Line

Microsoft Dynamics CRM for Microsoft Office Outlook can be installed using the command prompt.

An advantage of a command line installation is that you do not have to attend the installation. The required setup information is provided to the Setup program as command-line parameters and an XML configuration file. This can save time if you often need to perform installations.

For detailed more information on installing Microsoft Dynamics CRM using the command line, refer to the Microsoft Dynamics CRM Implementation Guide.

Install Microsoft Dynamics CRM for Outlook Using the Command Line

The command to install Microsoft Dynamics CRM is as follows:

```
Setupclient.exe [/A] [/Q] [/X] [/L or /LV "[drive:][[ path] logfilename.log]" ] [/targetdir "[drive:][path]" ] [/installofflinecapability] [/disableofflinecapability] [/ignoreofflinequeue]
```

Parameters for Command Line installation

Parameter that affect the installation of the Offline capability are listed below:

- `Installofflinecapability` - determines whether offline capability will be installed. When you include this parameter, offline capability and components are installed. If you don't specify this parameter, the online-only client is installed.
- `disableofflinecapability` - when you specify this parameter, CRM for Outlook is configured to hide the "go offline" button in the application. This button lets users switch to CRM for Outlook with offline capability.

Lesson 12-3 Offline Capability

This lesson examines the offline capability of Microsoft Dynamics CRM for Outlook, including the following:

- The features of working offline.
- Going offline and online.

- Synchronization options using data filters

Features of Working Offline

Without offline capability, a user must have connectivity to the Microsoft Dynamics CRM server to work with Microsoft Dynamics CRM data in Outlook.

Using offline capability, a user may work with Microsoft Dynamics CRM data even when disconnected from the Microsoft Dynamics CRM Server. A user-configurable subset of Microsoft Dynamics CRM data is stored in a Microsoft SQL Server 2012 Express database on the user's computer.

When working offline, the following conditions apply:

- All application and business logic processing is performed on the user's computer.
- All changes to Microsoft Dynamics CRM records are stored in a Microsoft SQL Server 2012 Express database on the user's computer.
- For all changes to records, a second update is made to a local store known as a "playback graph." This is a queue used to synchronize changes with the Microsoft Dynamics CRM database when the computer goes back online.
- Only records that are specified to be offline by data filters are available.

Adding Offline Capability

Offline capability can be added as follows:

- During the installation of Microsoft Dynamics CRM for Microsoft Office Outlook.
- After the installation is complete. In this case, a user can add offline capability by clicking Go Offline in Microsoft Office Outlook. This starts the installation of additional required components and stores a copy of the user's Microsoft Dynamics CRM data locally.

Note: To add offline capability, a user must either be a member of the Local Administrators group on his or her computer or provide administrator credentials.

Components added with Offline Capability

Adding offline capability to Microsoft Dynamics CRM for Microsoft Office Outlook provides a user with Microsoft Dynamics CRM functionality while disconnected from the corporate network.

When offline capability is added (either during the installation of Microsoft Dynamics CRM or later) the following components are installed to support offline functionality:

- A local version of the Microsoft Dynamics CRM platform logic.
- A local web server.
- A supported version of Microsoft SQL Server Express.

Going Offline

Working offline occurs under the following conditions:

- You choose to work offline, and click the Go Offline button in Outlook.
- Connectivity is lost to the Microsoft Dynamics CRM Server.

If you choose to go offline, then Microsoft Dynamics CRM data is synchronized with the local database according to your data filters. This means that you have the latest data available.

If connectivity is lost, then no option exists to synchronize the data and the state of the local database is that of the last synchronization.

To make sure that the local database is kept up to date, the Update local data every x minutes setting in Personal Options can be used to configure Microsoft Dynamics CRM for Outlook to periodically update the local database. You can specify how often data should be updated, but the minimum allowed interval is 15 minutes (unless the administrator has configured a longer interval).

Note: To go offline, a user must have the Go Offline privilege and the Microsoft Dynamics CRM for Outlook with offline capability installed.

Going Online

If you choose to work offline by clicking the Go Offline button in Outlook, then Microsoft Dynamics CRM for Outlook remains offline until you click Go Online.

If Microsoft Dynamics CRM for Outlook goes offline because connectivity is lost to the Microsoft Dynamics CRM Server, then Microsoft Dynamics CRM for Outlook automatically goes online when connectivity is restored.

Synchronise Changes

When a computer goes back online, the playback graph replays changes made while offline against the Microsoft Dynamics CRM Server.

This process is required to validate changes and is needed for the following reasons:

- A user's security privileges might have changed after going offline. For example, the privilege to update leads may have been removed from the user. In this case, any changes made to lead records while offline are not applied to the Microsoft Dynamics CRM Server.
- The state of a record may have changed while the user is offline. For example, an offline user may update a case. However, while the user is offline, another user may resolve the case. When the user goes back online, the updates made to the case are not applied because a resolved case cannot be changed. The offline changes are discarded.

Synchronization of records occurs at the field level. If two users make changes to different fields in a record while offline, both changes are synchronized.

If two users make changes to the same field in a record while offline, then the change made by each user is applied as each one goes online. This means that the change made by the last user to go online overwrites the change from the first user to go online. This applies regardless of the actual time the change is made to the record.

Data Synchronization Filters

When a user goes offline, only a subset of Microsoft Dynamics CRM data is made available offline. The user specifies the data that is to be made available offline and synchronized with the Microsoft Dynamics CRM Server using **Offline Synchronization Filters** for Outlook.

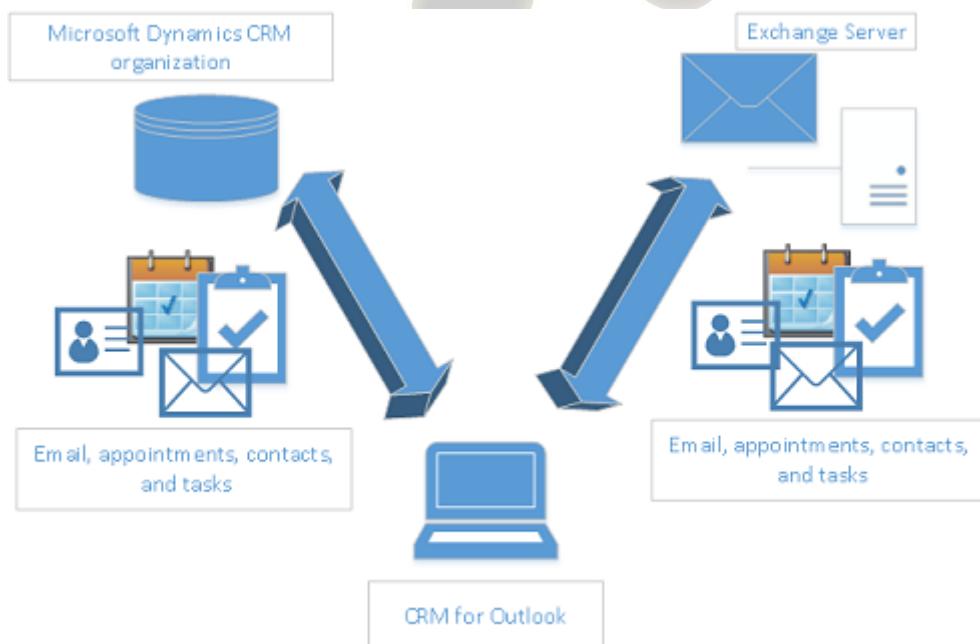
A user can also specify the data that is synchronized between Microsoft Dynamics CRM Server and Outlook folders using Outlook Synchronization Filters.

A default set of offline synchronization filters provides users with offline capability. These filters generally specify that items owned by the user are to be made available offline.

Lesson 12-4 CRM for Outlook Synchronising Concepts

Microsoft Dynamics CRM for Microsoft Office Outlook can synchronize email messages, contacts, tasks, and appointments between Microsoft Office Outlook and Microsoft Dynamics CRM (client-to-server synchronization).

Similar to server-side synchronization, synchronization filters are used to synchronize messaging data from Microsoft Dynamics CRM to Outlook or Exchange. Manually tracked or Inbox-rule based tracking is used to synchronize messaging data from Exchange or Outlook to Microsoft Dynamics CRM.



When you use CRM for Outlook, there are a few synchronization concepts that are helpful to understand. Notice that, to have any of this CRM for Outlook functionality, each Microsoft Dynamics CRM user must run the CRM for Outlook add-in and the Microsoft Dynamics CRM user mailbox record must be configured appropriately.

When you select CRM for Outlook as the messaging data synchronization method in the user mailbox record, email, contacts, appointments, and tasks created in Outlook are synchronized with Microsoft Dynamics CRM Online or Microsoft Dynamics CRM (on-premises).

Synchronizing organization

Only one organization can be designated as the synchronizing organization. If you have more than one Microsoft Dynamics CRM organization configured, you can view the synchronizing organization in the Microsoft Dynamics CRM Configuration Wizard. The Configuration Wizard is an application included with CRM for Outlook. Notice that you can still connect to additional organizations by using CRM for Outlook. However, when an organization is not defined as the synchronizing organization in CRM for Outlook, messaging data in Outlook does not synchronize with that organization.

Synchronizing mailbox

Only one Exchange or POP3 mailbox can be designated for a single Microsoft Dynamics CRM user. You cannot designate multiple mailboxes and you cannot map more than one Microsoft Dynamics CRM user to a single Exchange or POP3 email mailbox. This mailbox is referred to as the primary mailbox.

Synchronizing CRM for Outlook instance

Only one CRM for Outlook instance can be designated as the Synchronizing CRM for Outlook instance. When you sign-in to an organization from another PC that is running CRM for Outlook that is not the synchronizing CRM for Outlook instance you will receive a dialog message asking whether you want to designate the current CRM for Outlook instance as the synchronizing CRM for Outlook instance. Notice that, when you choose not to set the CRM for Outlook instance as the synchronizing instance, you can still connect to the Microsoft Dynamics CRM organization and perform tasks, but messaging data in Outlook will not synchronize with the Microsoft Dynamics CRM organization.

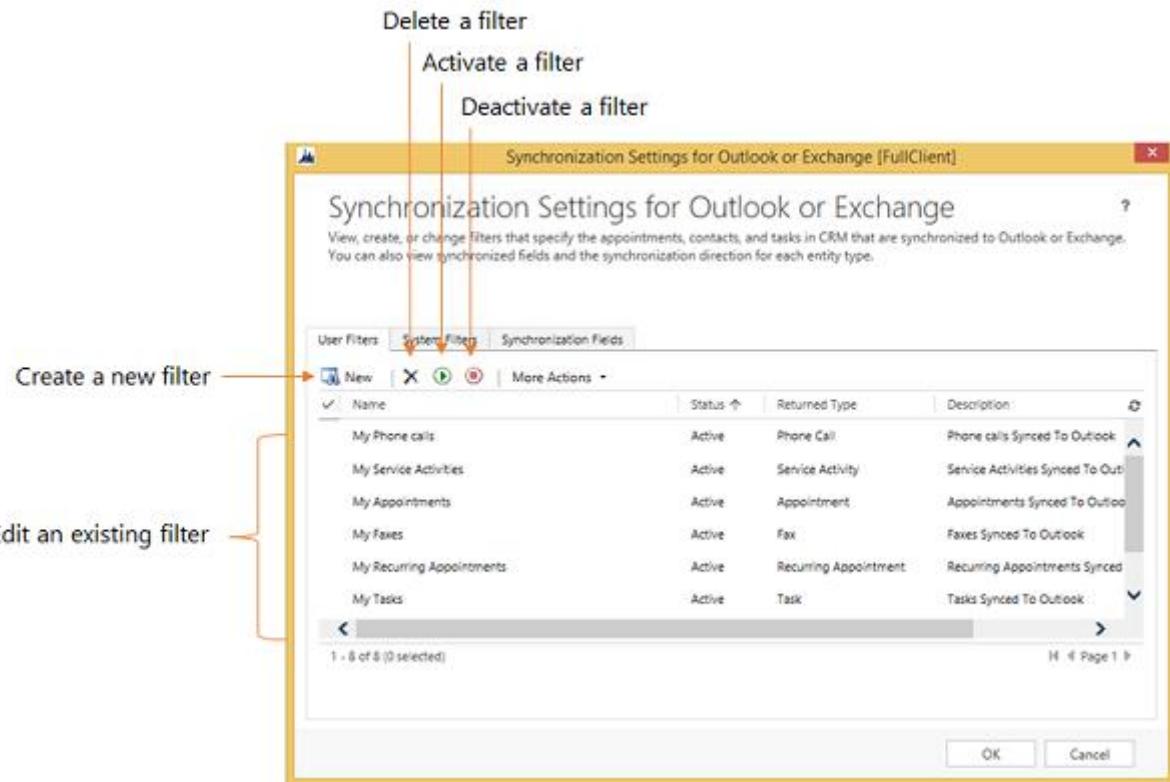
Go Offline data sync

Go offline capability uses Microsoft SQL Server Express as the local data store. When you go offline or come back online, CRM for Outlook synchronizes the records for the entity types you choose with the Microsoft Dynamics CRM Online or Microsoft Dynamics CRM (on-premises). When you go offline or come back online, a separate synchronization process takes place that is not part of the messaging data synchronization described here. Go offline capability allows users to create, modify, or delete records offline that can be later synchronized to Microsoft Dynamics CRM Online or Microsoft Dynamics CRM (on-premises) when CRM for Outlook comes online again.

Online Synchronization Filters for Outlook

CRM automatically synchronizes appointments, contacts, and tasks that you own from the CRM server to your Outlook folders. CRM for Outlook uses **online synchronization filters** to determine the records to copy from CRM to your local hard drive. You can modify these filters or create new filters

Modifying Synchronization Filters



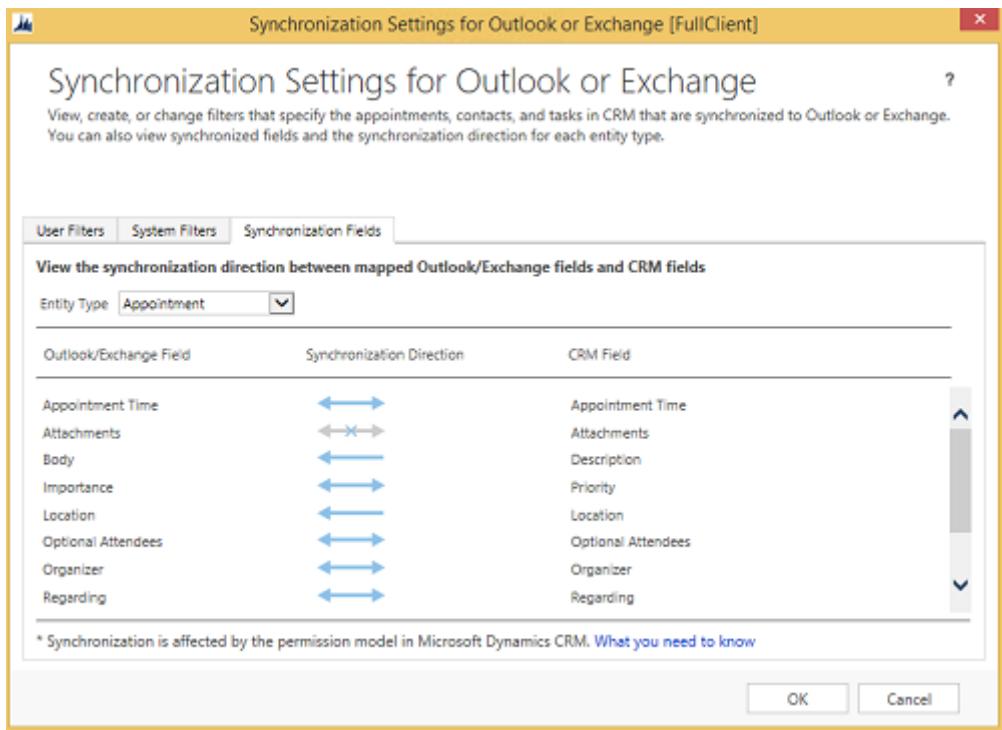
Control field synchronization between CRM and Outlook

User

In Microsoft Dynamics CRM 2015 for Outlook, you can view the appointments, contacts, and tasks fields that are synchronized between Microsoft Dynamics CRM and Outlook

1. CRM for Outlook, choose File, and then choose CRM.
2. On the Synchronize button, choose the down arrow, and then choose Review Synchronization Settings.
3. In the Synchronization Settings for Outlook or Exchange dialog box, choose the Synchronization Fields tab.
4. In the Entity Type list, select the record type you want to view.

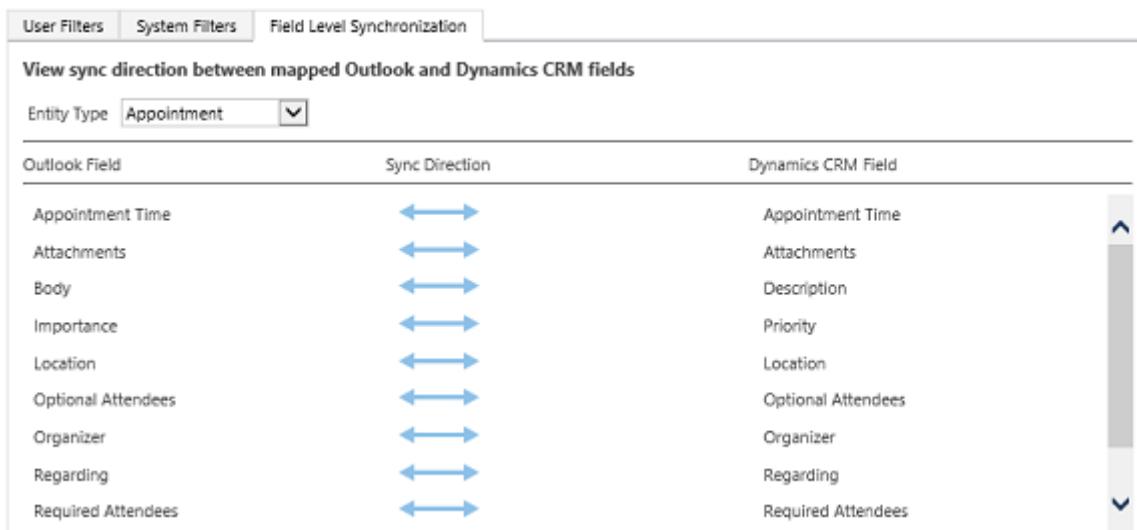
Outlook fields are displayed on the left and the corresponding CRM fields are displayed on the right. The blue arrows show the sync direction:



Administrator

With field synchronization, admins can set the sync direction between Microsoft Dynamics CRM and Microsoft Dynamics CRM for Outlook fields. You can control synchronization when using either Outlook synchronization or server-side synchronization (Exchange).

1. In CRM, choose Microsoft Dynamics CRM > Settings > Email Configuration > Email Configuration Settings
2. Choose the Synchronization tab > synchronized fields
3. For the fields you want to change synchronization, choose the arrows in the Sync Direction column. Each choice will change the direction



Module 13 - Email Management

Microsoft Dynamics CRM integrates with email systems using server-based or client-based processing systems. An implementation of Microsoft Dynamics CRM should include a strategy for email management.

This module describes management topics that are common to each of the email processing methods and the email processing methods

Objectives

The objectives are:

- Describe the email processing options in Microsoft Dynamics CRM.
- Explain email tracking and correlation.
- Discover how mailboxes are monitored.
- Describe the purpose of Microsoft Dynamics CRM mailbox records.
- Examine the email synchronization options.
- Review the requirement to approve email addresses.
- Explain the role of the Microsoft Dynamics CRM Email Router.
- Install the Microsoft Dynamics CRM Email Router.
- Review the Email Router configuration options.
- Create a forward mailbox.
- Review the purpose of deploying forwarding rules.
- Review options for installing the Email Router on multiple computers.
- Review troubleshooting tips.
- Describe the role of Server-Side Synchronization.
- Configure Server-Side Synchronization.
- Test Server-Side Synchronization settings.

Lesson 13-1 Email Processing options

Managing Emails

Microsoft Dynamics CRM does not include an email system. Instead, it integrates with email systems using one of the following email processing methods:

- **Server-side Synchronization** is a feature built-in to Microsoft Dynamics CRM that is used to integrate CRM with Exchange and POP3 or SMTP-based email servers. In most situations, server-side synchronization is the preferred option for organizations with users who run Microsoft Dynamics CRM in a web browser or on a mobile device, such as a tablet or smartphone.
- **CRM for Outlook**, an Outlook add-in, provides messaging data integration capabilities on a single-user basis. CRM for Outlook doesn't require server-side synchronization or the Microsoft Dynamics CRM Email Router (described below) as the synchronization agent runs in the CRM for Outlook on the user's computer. This is frequently the better option for organizations that regularly use Outlook, especially if they need rich offline data capabilities. Note that if CRM for Outlook isn't running, messaging synchronization doesn't occur until CRM for Outlook is started again.
- **The Microsoft Dynamics CRM Email Router** is a separate application that provides centrally managed Exchange Server and POP3/SMTP-based email server routing for users, queues, and forward mailboxes. The Email Router runs continuously as a service and only synchronizes email messages. You cannot use it to synchronize, appointments, contacts, or tasks.

To send emails from Microsoft Dynamics CRM, one of the above methods must be configured.

Note: Only one of the server-based email processing options can be selected for an organization. Either the Microsoft Dynamics CRM Email Router or Server-Side synchronization can be used, but not both.

Comparison of Email Processing Options

Option	Advantages	Disadvantages
Microsoft Dynamics CRM Email Router	<ul style="list-style-type: none"> • Centrally managed solution. • Easier to manage for larger deployments. • Can be used in mixed environments where one of Microsoft Dynamics CRM and Exchange is on-premises and the other is online. 	<ul style="list-style-type: none"> • Must be installed on a computer. • Managed and configured using a separate program, the Email Router Configuration Manager. • Appointments, Contacts, and Tasks created in Microsoft Dynamics CRM must be synchronized with Outlook using Microsoft Dynamics CRM for Outlook
Server-Side Synchronization	<ul style="list-style-type: none"> • Centrally managed solution. • Easier to manage for larger deployments. • Managed and configured in the Microsoft Dynamics CRM web application. • Can synchronize with Office 365 Exchange Online without 	<ul style="list-style-type: none"> • Can only be used in environments where both Microsoft Dynamics CRM and Exchange are on-premises or both online.

Option	Advantages	Disadvantages
	<p>configuring credentials.</p> <ul style="list-style-type: none"> Provides error reporting in the Microsoft Dynamics CRM web application through Alerts. Appointments, Contacts, and Tasks created in Microsoft Dynamics CRM can synchronize directly with Exchange. No installation needed 	
Microsoft Dynamics CRM for Outlook	<ul style="list-style-type: none"> No configuration. Nothing further to install (other than Microsoft Dynamics CRM for Outlook). 	<ul style="list-style-type: none"> Cannot be used for queues. Emails created in Microsoft Dynamics CRM are not sent unless Outlook is running. Incoming emails are not automatically tracked unless Outlook is running.

Incoming and Outgoing Email Synchronization

You have several options for synchronizing email messages with Microsoft Dynamics CRM. Use the following information to deploy the best option for your company.

You can set the default synchronization method applied to all newly created user mailboxes: Settings > Email Configuration > Email Configuration Settings > Email tab

You can set the synchronization method for individual mailboxes: Settings > Email Configuration > Mailboxes > select a mailbox

Incoming Email Messaging Options

The available incoming email configurations that you can use when a user or a queue receives Microsoft Dynamics CRM email messages are as follows:

- **None.** Use this option for users or queues that do not use Microsoft Dynamics CRM to track received email messages.
- **Microsoft Dynamics CRM for Outlook.** This option is available for users and requires that Microsoft Office Outlook be installed on the user's computer. This option does not require the Email Router component and is not available for queues.
- **Server-Side Synchronization or Email Router.** When you select this option, the server-side synchronization or Email Router will process Microsoft Dynamics CRM email messages directly from the user's or queue's inbox, without using a forward or a sink mailbox. Although this option does not require a sink mailbox, it does make troubleshooting server-side synchronization or Email Router issues more complex for larger user bases (10 or more users) because each incoming email message is processed by the server-side synchronization or Email Router in every user's mailbox instead of in a single dedicated mailbox.
- **Forward Mailbox.** To use this option, you must install the Email Router. This option requires a

sink mailbox, which is a dedicated mailbox that collects email messages transferred from each Microsoft Dynamics CRM user's mailbox by a server-side rule. Although this option does not require users to run Outlook, it does require that the rule be deployed for each user. You use the Rule Deployment Wizard to deploy rules to each Microsoft Dynamics CRM user mailbox.

Outgoing Email Messaging Options

The available outgoing email configurations that you can use when users or queues send Microsoft Dynamics CRM email messages are as follows:

- **None.** Use this option for users or queues that do not use Microsoft Dynamics CRM to send email messages.
- **Microsoft Dynamics CRM for Outlook.** This option is available for users and requires that Microsoft Office Outlook be installed on the user's computer. This option does not require the Email Router component and is not available for queues.
- **Server-Side Synchronization or Email Router.** This option delivers Microsoft Dynamics CRM email messages by using the server-side synchronization or Email Router component. The email system must be SMTP-compliant. The server-side synchronization or Email Router can be installed on the SMTP server or on a different computer that has a connection to the SMTP server.

Email message filtering and correlation

Server-side synchronization, Microsoft Dynamics CRM for Outlook, or the Email Router can automatically create email activities in Microsoft Dynamics CRM, which are based on received email messages. This type of automation is known as email message tracking.

Automatic Tracking

Users can select a filtering option that determines what email messages will be tracked in Microsoft Dynamics CRM. Filtering is set on the Email tab of the Set Personal Options dialog box in the Microsoft Dynamics CRM client applications. Users can set the following options:

- **All email messages.** All email messages received by the user are tracked (will have activities created).
- **Email messages in response to CRM email.** Only replies to email messages that have already been tracked will be saved as email activities. This option uses smart matching, a correlation method that uses the existing properties contained in the email to relate email messages to activities.
- **Email messages from CRM Leads, Contacts, and Accounts.** Only email messages sent from leads, contacts, and accounts in the Microsoft Dynamics CRM database are saved as activities.
- **Email messages from Microsoft Dynamics CRM records that are email enabled.** Email messages are tracked from any record type that contains an email address, including customized record types (entities).

By default, the Email messages in response to CRM email option is enabled. Correlation occurs after an email message is filtered. System administrators can turn off all message tracking for a particular user by setting the Email Access Type - Incoming value to None on the General tab on the User form.

Email Correlation

Email correlation is set on the Email tab of the System Settings page and can be enabled or disabled for the entire Microsoft Dynamics CRM organization. Microsoft Dynamics CRM uses two kinds of correlation, tracking tokens and smart matching. By default, both correlation types are enabled.

Email Correlation: Smart Matching

When an incoming email message is processed by the Email Router, the system extracts information associated with the email message subject, sender address, and recipients' addresses that link the email activity to other Microsoft Dynamics CRM records. This correlation process, also known as smart matching, uses the following criteria to match received email message information to email activities:

- Subject matching. Prefixes, such as RE: or Re:, and letter case are ignored. For example, email message subjects with Re: hello and Hello would be considered a match.
- Sender and recipient matching. The system calculates the number of exact sender and recipient email addresses in common.

When the matching process is complete, the system selects the owner and the object of the incoming email message.

By default, smart matching is turned on.

Email Correlation: Tracking Token

The tracking token feature can match email messages with the appropriate records in Microsoft Dynamics CRM.

A tracking token is an alphanumeric string generated by Microsoft Dynamics CRM that is appended to the end of the subject line for tracked emails. Tracking tokens can be used on their own or with Smart Matching.

A tracking token string has the following configurable parts:

- Prefix
- Deployment base tracking number
- Number of digits for user numbers
- Number of digits for incremental message counter

The resulting tracking token is the prefix followed by several digits based on the configured parts.

An example of a tracking token is CRM:00101

The deployment base tracking number is used to configure tracking tokens that are unique to each organization where a company has a deployment with multiple organizations.

You do not have to enable tracking tokens, and they can be turned on or off at any time.

Forward mailbox vs. individual mailboxes

You can use mailbox monitoring to poll one or more mailboxes for incoming email messages, and then determine what actions Microsoft Dynamics CRM will take based on the email message, such as create or update records in the system. You can configure server-side synchronization or the Email Router to monitor either of the following:

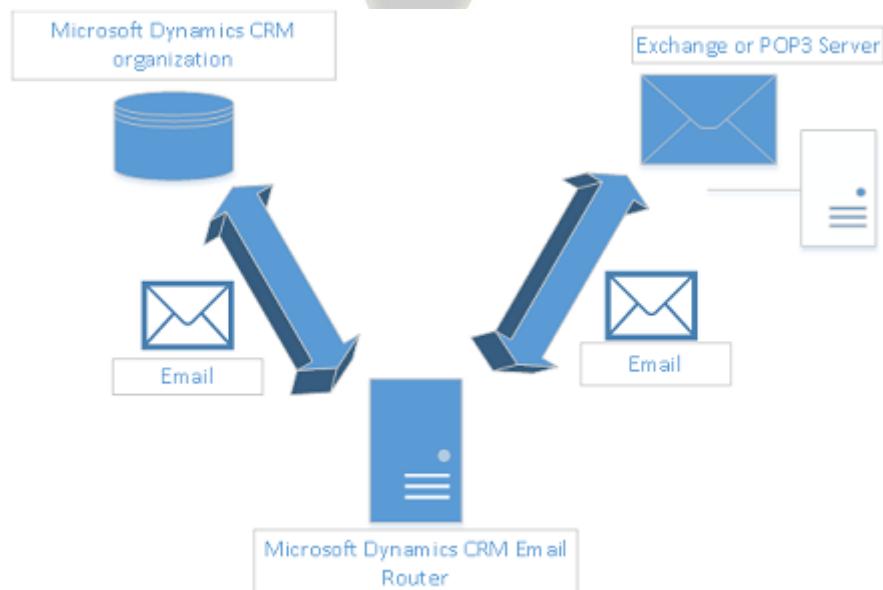
- A forward mailbox. This is a single, central mailbox.
- The mailbox for each user or queue

If you administer an organization that has to monitor a large number of mailboxes, you should consider using a forward mailbox to reduce the administrative effort. Monitoring many mailboxes can sometimes require maintaining access credentials in many incoming configuration profiles.

By using a forward mailbox, you shift the administrative effort to the task of deploying a server-side forwarding rule to each user mailbox. The forwarding rule forwards all incoming email messages as attachments to the centralized forward mailbox. For Microsoft Exchange Server only, you can use the Rule Deployment Wizard (installed with the Microsoft Dynamics CRM Email Router) to deploy forwarding rules. This can significantly reduce administration and maintenance requirements because the Rule Deployment Wizard can deploy forwarding rules to multiple Microsoft Dynamics CRM users at the same time.

Lesson 13-2 Email Router

The Microsoft Dynamics CRM Email Router acts as an intermediary application that provides server-to-server synchronization between Microsoft Dynamics CRM and Exchange or POP3/SMTP based email servers. The Email Router only synchronizes email messages. It doesn't synchronize appointments, contacts, or tasks.



The Email Router enables you to configure an interface between your Microsoft Dynamics CRM deployment and one or more servers running Exchange Server, Exchange Online accounts, or POP3 servers, for incoming email. For outgoing email, one or more SMTP servers, Exchange Web Services

(EWS), or Exchange Online accounts are supported. Email messages come into the Microsoft Dynamics CRM system through the Email Router

Email Router Components

The Email Router contains the following components:

- Email Router service. The Email Router runs as a Windows service.
- Email Router Configuration Manager. The configuration manager is used to configure the Email Router.
- Rule Deployment Wizard. The wizard is used to deploy forwarding rules for Microsoft Exchange users who are configured to use a forward mailbox.

Supported Email Systems

The Email Router can work with the following email systems:

- Microsoft Exchange Server 2010
- Microsoft Exchange Server 2013
- Microsoft Exchange Online
- Simple Mail Transfer Protocol (SMTP) servers (for outgoing email only)
- Post Office Protocol-3 (POP3) compliant servers (for incoming email only)

Software Requirements

The Microsoft Dynamics CRM Email Router is available in 32-bit and 64-bit versions.

The 64-bit version can be installed on any computer that is running one of the following operating systems and that has network access to both the Microsoft Dynamics CRM Server and the email server:

- Microsoft Windows 7 64-bit editions
- Microsoft Windows 8 64-bit editions
- Microsoft Windows Server 2012

The 32-bit version can be installed on any computer that is running:

- Microsoft Windows 7 32-bit editions
- Microsoft Windows 8 32-bit editions

Configure the Email Router

You can configure Email Router after it is installed. Some of these configuration tasks are mandatory. Others are optional in that you use them to enable the following functionality:

- Configuration Task 1: Set up profiles and (optionally) set up deployments, by using the Email Router Configuration Manager.
- Configuration Task 2: Microsoft Dynamics CRM users must have their incoming email access type set to Email Router.
- Configuration Task 3: (Optional) As part of configuration, you can deploy rules.
- Configuration Task 4: (Optional) As part of configuration, you can set up a forward mailbox.
For more information

Merge email server profiles for migration

In Microsoft Dynamics CRM Email Router, incoming and outgoing Email Server profiles are different and each user or queue is attached to both an incoming and an outgoing profile. However, in server-side synchronization, both the incoming and outgoing profiles are present in a single profile and a user is attached to a single Email Exchange Server profile.

If you are using the Email Router, but want to start using server-side synchronization instead, you can easily migrate the configuration settings from the Email Router to server-side synchronization to set up email

Lesson 13-3 Server Side Synchronisation

Server-side synchronization is a component in Microsoft Dynamics CRM that is used to integrate Microsoft Dynamics CRM with Exchange and POP3 or SMTP based email servers. Server-side synchronization is the preferred option for organizations with users who run Microsoft Dynamics CRM in a web browser or on a mobile device, such as a tablet or smartphone.

If you have the System Administrator Role, you can use server-side synchronization to:

- Enable email synchronization for users and queues with external email systems.
- Enable synchronization of email, appointments, contacts, and tasks from Exchange.

You configure and manage server-side synchronization from within Microsoft Dynamics CRM.

Configure server-side synchronization

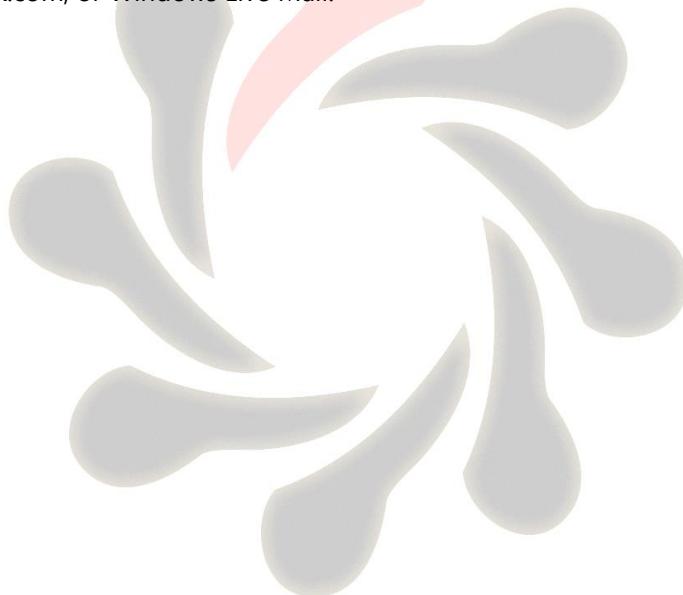
Follow these steps to configure server-side synchronization:

1. Create an email server profile
2. Add mailboxes to an email server profile
3. Set the delivery method for incoming and outgoing email
4. Test email configuration of mailboxes set up through server-side synchronization

Unsupported email service configurations

Server-side synchronization doesn't support the following scenarios:

- Hybrid deployments:
 - CRM Online with Exchange (on-premises)
 - Microsoft Dynamics CRM (on-premises) with Exchange Online
- Mix of Exchange/SMTP and POP3/Exchange
- Creation of mass email marketing campaigns
- Extensibility scenarios like extending EWS/POP3/SMTP protocols and creating custom email providers
- Exchange Server 2003 and Exchange Server 2007
- Server-side synchronization in CRM Online, or in a Microsoft Dynamics CRM (on premises) deployment that is configured for FIPS 140-2 compliancy, requires a POP3/SMTP email server that is also FIPS 140-2 compliant. Some email servers are not FIPS 140-2 compliant, such as MSN, Outlook.com, or Windows Live Mail.



Module 14 - Maintenance and Troubleshooting

This module provides information on maintaining performance, troubleshooting, and updating Microsoft Dynamics CRM.

Objectives

The objectives are:

- Describe how to change Microsoft Dynamics CRM service accounts.
- Examine how to manage system jobs.
- Show how to delete records using the Bulk Delete Wizard.
- Discuss areas to consider for a disaster recovery plan.
- Describe tasks in Microsoft SQL Server that can improve performance.
- Review ways to troubleshoot and diagnose problems and monitor performance.
- Examine how to configure tracing.
- Describe how to update Microsoft Dynamics CRM.
- Examine data encryption.
- Describe the Best Practices Analyzer.
- Describe the VSS Writer Service for Microsoft Dynamics CRM.
- Examine the Microsoft Dynamics marketplace.

Lesson 14-1 Manage System Jobs

Microsoft Dynamics CRM runs several tasks in the background, such as the following:

- Data import
- Workflows
- Bulk delete
- Other database maintenance activities

These are shown in the Microsoft Dynamics CRM application as system jobs. An administrator's routine monitoring tasks should include deleting old records and reviewing whether system jobs completed successfully.

Services

System jobs are processed by two Windows services: the Microsoft Dynamics CRM Asynchronous Processing Service and the Microsoft Dynamics CRM Asynchronous Processing Service

(maintenance) service. If system jobs are not running as expected, check the status of these two services to make sure that they are running.

Review System Jobs

To review system jobs, in the Microsoft Dynamics CRM web application browse to Settings > System Jobs. The default view shows completed system jobs. You can also use Advanced Find to search for system jobs.

For more information on a system job failure, add the following columns to an Advanced Find search:

- Error Code
- Friendly Message
- Message
- Message Name

System jobs are classified by type in the System Job Type field. The types include the following:

- Activity Propagation
- Audit Partition Creation
- Bulk Delete
- Bulk Delete Subprocess
- Bulk Duplicate Detection
- Bulk Email
- Calculate Organization Maximum Storage Size
- Calculate Organization Storage Size
- Check For Language Pack Updates
- Cleanup inactive workflow assemblies
- Collect Organization Database Statistics
- Collect Organization Statistics
- Collection Organization Size Statistics
- Database log backup
- Database Tuning
- DBCC SHRINKDATABASE maintenance job
- DBCC SHRINKFILE maintenance job
- Deletion Service
- Duplicate Detection Rule Publish
- Encryption Health Check
- Execute Async Request
- Goal Roll Up
- Import
- Import File Parse
- Import Sample Data

- Import Subprocess
- Incoming Email Processing
- Index Management
- Mailbox Test Access
- Matchcode Update
- Organization Full Text Catalog Index
- Outgoing Activity
- Post to Yammer
- Provision Language Pack
- Quick Campaign
- Recurring Series Expansion
- Regenerate Entity Row Count Snapshot Data
- Regenerate Read Share Snapshot Data
- Reindex all indices maintenance job
- SQM Data Collection
- Storage Limit Notification
- System Event
- Transform Parse Data
- Update Contract States
- Update Organization Database
- Update Solution
- Update Statistic Intervals
- Workflow

Delete System Jobs

To delete large numbers of records, use the Bulk Deletion Wizard. When using bulk delete, you can specify search criteria to specify the set of records to delete. For example, you can delete all Matchcode Update system jobs or jobs that completed more than a year ago.

Limit Number of Asynchronous Jobs

In a multi-organization deployment, the asynchronous service might be overwhelmed with numerous jobs for one organization. This might prevent the asynchronous service from processing jobs for other organizations in a timely manner.

You can use a deployment-wide setting to limit the number of asynchronous jobs that are processed for each organization. This setting can help reduce asynchronous operation backlog.

The setting is configured using the Windows PowerShell.

Lesson 14-2 Monitor and Troubleshoot

This lesson describes where to find more information that can help resolve issues when troubleshooting problems in Microsoft Dynamics CRM.

Windows Event Logs

Similar to many Microsoft Windows applications, Microsoft Dynamics CRM writes logs to the Windows Application log in the Event Viewer. The logs can provide useful information when troubleshooting Microsoft Dynamics CRM issues.

The Microsoft Dynamics CRM event sources include the following:

- MSCRMAsyncService
- MSCRMAsyncService\$maintenance
- MSCRMCallout
- MSCRMDeletionService
- MSCRMDeployment
- MSCRMKeyArchiveManager
- MSCRMKeyGenerator
- MSCRMKeyService
- MSCRMLocatorService
- MSCRMMonitoringRuntime
- MSCRMMonitoringServerRole
- MSCRMMonitoringService
- MSCRMMonitoringTest
- MSCRMPerfCounters
- MSCRMPlatform
- MSCRMReporting
- MSCRMReportingDataConnector
- MSCRMSandboxClient
- MSCRMSandboxService
- MSCRMSandboxWorker
- MSCRMTracing
- MSCRMUnzipService
- SCRMVssWriter
- MSCRMWebService

The application log on the Microsoft Dynamics CRM Server can have thousands of entries. Use the event sources filter to show events that are directly connected to Microsoft Dynamics CRM.

Performance Counters

Windows Server includes Performance Monitor which can be configured to display performance data.

Performance objects provide sets of counters that generate data on how various components perform. For example, the Processor object collects metrics that show how one or more microprocessors are performing on a particular server.

Many performance objects are built into the operating system, and more are installed with software applications and services. Microsoft Dynamics CRM adds many performance counters which you can use to monitor performance.

Diagnostics

Microsoft Dynamics CRM includes a web page to display bandwidth, latency, and JavaScript rendering performance.

To run the diagnostics, browse to <http://OrganizationName/tools/diagnostics/diag.aspx> where OrganizationName is the name of the organization to test (if necessary, replace http with https). Click Run. When the tests are complete, detailed results and a summary are displayed.

Configure Tracing

Trace files record the actions that are performed by the server and the client applications. Trace files are helpful when you troubleshoot error messages or other issues in Microsoft Dynamics CRM that cannot be resolved by other tools. When you troubleshoot issues with Microsoft Product Support, you may be asked to enable tracing and submit the trace files.

Trace files are only created when tracing is turned on. Because tracing can significantly affect performance, we recommend that you only turn on tracing to gather trace files. Then turn it off.

Microsoft Dynamics CRM Server

Tracing for the Microsoft Dynamics CRM Server is enabled by using any of the following:

- Registry keys, which enable tracing on only one server
- PowerShell commands, which enable tracing on all servers in a deployment

To enable tracing by using the registry, configure the keys in the location
HKEY_LOCAL_MACHINE\Software\Microsoft\MSCRM

Trace files are located in the traces folder of the Microsoft Dynamics CRM installation directory. The default location is C:\Program Files\Microsoft Dynamics CRM\Traces.

Microsoft Dynamics CRM for Microsoft Office Outlook

Tracing for the Microsoft Dynamics CRM client for Microsoft Office Outlook is enabled through the registry keys or the Microsoft Dynamics CRM Diagnostics application

The registry keys are located in HKEY_CURRENT_USER\Software\Microsoft\MSCRMClient.

The trace files are located in C:\Users\LoggedInUser\AppData\Local\Microsoft\MSCRM\Traces.

Update Microsoft Dynamics CRM

Updates to the Microsoft Dynamics CRM software are released periodically as “update rollups”.

An update rollup consists of a collection of updates that include a tested, cumulative set of hotfixes, security updates, critical updates, and updates that are packaged together for easy deployment. Update rollups for Microsoft Dynamics CRM 2015 do not include new features.

Update Rollup Packages

A separate update rollup package is released for each of the components in CRM. Update rollups are cumulative so that you only have to apply the latest update rollup.

Microsoft Update

You can use Microsoft Update to automatically download and install updates for Microsoft Dynamics CRM.

Best Practices Analyzer (BPA)

The Microsoft Dynamics CRM 2015 BPA is a diagnostic tool that gathers information from installed Microsoft Dynamics CRM 2015 server roles and builds a report of best practices and recommended solutions based on the existing deployment.

Requirements

You can only install BPA on a computer that has the following installed:

- At least one Microsoft Dynamics CRM 2015 server role
- Microsoft Baseline Configuration Analyzer 2.0

Microsoft Baseline Configuration Analyzer 2.0 is available in 32-bit and 64-bit versions. Because Microsoft Dynamics CRM can only be installed on 64-bit operating systems, you must install the 64-bit version of Microsoft Baseline Configuration Analyzer 2.0.

View Baseline Configuration Analyzer Report
12/09/2013 10:14:45

Select Report Type: Results Collected Data

Noncompliant | All | Noncompliant [6 items]

Export Report Filter Arrange by: Severity

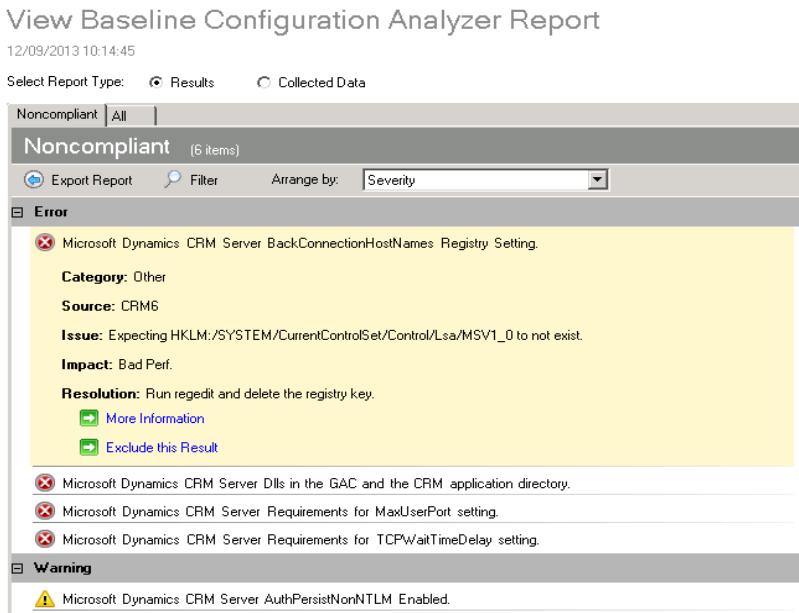
Error

Microsoft Dynamics CRM Server BackConnectionHostNames Registry Setting.
Category: Other
Source: CRM6
Issue: Expecting HKLM:/SYSTEM/CurrentControlSet/Control/Lsa/MSV1_0 to not exist.
Impact: Bad Perf.
Resolution: Run regedit and delete the registry key.
[More Information](#) [Exclude this Result](#)

Microsoft Dynamics CRM Server DLLs in the GAC and the CRM application directory.
Microsoft Dynamics CRM Server Requirements for MaxUserPort setting.
Microsoft Dynamics CRM Server Requirements for TCPWaitTimeDelay setting.

Warning

Microsoft Dynamics CRM Server AuthPersistNonNTLM Enabled.



VSS Writer Service for Microsoft Dynamics CRM

The Microsoft Dynamics CRM VSS Writer Service provides added functionality for backup and restore of Microsoft Dynamics CRM databases through the Volume Shadow Copy Service (VSS) framework.

VSS is a set of Component Object Model (COM) application programming interfaces (APIs) that provides standardized interfaces. These interfaces enable backup and restoration software, such as Systems Center Data Protection Manager, to centrally manage the backup and restore operations on a variety of applications. VSS also implements a framework that enables volume backups to be performed while applications on a system continue to write to the volumes.

Requirements

You can use the VSS Writer Service with System Center 2012 Data Protection Manager (DPM). Earlier versions of DPM are not supported.

The SQL Server VSS Writer service is required and must be started and running.

The Microsoft Dynamics CRM VSS Writer runs as a service and can be run under the Network Service account or a domain user account.

Features

The Microsoft Dynamics CRM VSS Writer has the following features:

- Full and differential backup and restore of the configuration (MSCRM_CONFIG) and organization databases (organizationName_MSCRM).
- The Microsoft Dynamics CRM application does not have to be offline while databases are backed up. However, the application must be offline for database restoration.
- When an organization database is backed up, information from the MSCRM_CONFIG database that is related to that specific organization is saved to an XML file. This file is used to restore relevant information to the MSCRM_CONFIG database without restoring the entire MSCRM_CONFIG database. The XML files are stored in C:\Program Files\Microsoft Dynamics CRM\VSS.

The VSS Writer does not support backup and restore of SharePoint databases that are associated with Microsoft Dynamics CRM or the databases that are used for Microsoft SQL Server Reporting Services.

Lesson 14-3 Manage Data Encryption

To protect against data theft, Microsoft Dynamics CRM 2013 uses standard SQL Server cell-level transparent data encryption for password fields in system entities. You cannot use the encryption feature for other attributes.

Data Encryption Activation Status

All new and upgraded organizations use data encryption. A random key is generated for the encryption key, but you can change this key at any time. When you import an organization, you must provide the original encryption key if there are any records with encrypted fields in the database.

Change the Data Encryption Key

Users with the appropriate permissions can activate data encryption or change the encryption key after data encryption is enabled by browsing to Settings > Data Management > Data Encryption.

To change the key, the Microsoft Dynamics CRM website must be configured to use HTTPS.

Import a Database with Encryption

When you import an organization database that has any records with encrypted fields, the original encryption key is required to activate encryption. If you do not activate encryption, you cannot open or create records that contain encrypted fields.



Microsoft

Dynamics CRM 2015 Application

Microsoft Specialist

Courseware



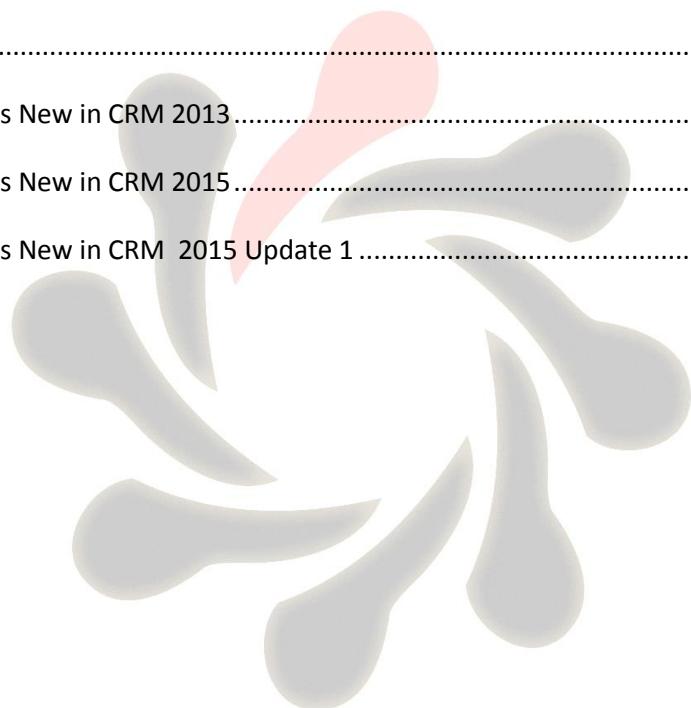
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Module 0 - Course Content and Plan

Objectives

The key objective of this course is to enable you to understand the functionality of Dynamics CRM 2015.

What this course covers

- Dynamics CRM Overview
- Working with the Dynamics CRM Application, Records, Data and Processes
- Sales functionality
- Service functionality
- What's new in CRM 2013 and 2015

What this course does not cover

- Marketing functionality
- Dynamics Online Additional Subscription functionality

Course Plan

This course takes two days to complete and helps prepare for the Microsoft Dynamics CRM 2015 Applications certification exam.

Course Modules

1. Dynamics CRM Overview
2. Working with the Dynamics CRM Application
3. Working with Dynamics CRM Records
4. Working with Dynamics CRM Data
5. Working with Dynamics CRM Processes
6. Customer Service Scenarios
7. Case Management
8. Knowledge Base
9. Queue Management
10. Entitlements and SLAs
11. Service Scheduling
12. Sales Management Concepts
13. Leads and Opportunities
14. Products and Sales Order Processing
15. Goal Management
16. Analysis and Reporting
17. Social Engagement

Resources

Dynamics CRM Online

This course uses a Dynamics CRM Online Trial.

Exam

The MB2-704 Microsoft Dynamics CRM Application exam is a Microsoft certification exam and is taken online in one of the testing rooms off the Firebrand reception and refreshments area.

Id

You will need two forms of id; one with a photo id e.g., a passport or driving license and the other with your signature e.g., a debit/credit card.

Exam Format

The exam has 48 multiple choice questions and you are allowed 90 minutes.

Exam Preparation

There are currently no practice tests available to prepare for the exam.

Skills Measured

This certification exam measures your ability to understand and use the standard functionality provided with Microsoft Dynamics CRM 2015

Apply sales management concepts (10–15%)

- Work with customers
 - Identify customers who would benefit from sales management, identify core record types, describe how core record types are used in sales management, create and maintain customer records
- Manage sales operations
 - Create, maintain, and use sales literature; create and maintain competitors; create and maintain sales territories; configure multiple currencies
- Understand social listening
 - Identify social media channels, create and run search to listen for keywords, create an alert, determine where social insights can be added

Manage leads and opportunities (10–15%)

- Work with leads
 - Determine when to use leads and opportunities, create and maintain leads, qualify and disqualify leads, convert email messages to leads, describe stages and steps in the lead process ribbon, describe the lead conversion process

- Create opportunities
 - Create and maintain opportunities, convert activities and leads to opportunities, evaluate when to use system-calculated or user-provided values for revenue fields, describe stages and steps in the opportunity process ribbon
- Manage opportunities
 - Close opportunities; view resolution activities; work with opportunity views; create and maintain opportunity connections; add post, activities, and notes in the collaboration pane; assign ownership of opportunity records to users or teams; add sales teams to opportunity records

Process sales (10–15%)

- Manage the product catalog
 - Create unit groups, create products and add them to the product catalog, create price lists, create tailored price lists, create product kits and product bundles, group products by using product families, view product relationships by using hierarchy visualization, manage multiple currencies
- Work with opportunities and quotes
 - Add opportunity products, capture product properties, suggest cross-sell and up-sell products, create new quotes, create a quote from an opportunity, activate and revise quotes, determine the impact of different currencies on price calculations and price lists
- Work with orders and invoices
 - Create new orders; create new invoices; convert a quote to an order to an invoice; identify quote status changes; select alternate price lists with opportunities, quotes, orders, or invoice records

Analyse reports and sales (10–15%)

- Manage sales metrics and goals
 - Define goal metric records; configure fiscal periods; define goal records; describe target, actual, and in-progress values for goal records; describe how to recalculate goals; describe a rollup query
- Work with reports and views
 - Build reports with Report Wizard; identify report outputs; export information to Microsoft Excel; differentiate between features of static and dynamic view exports to Excel; work with Advanced Find; share dashboards, charts, and Advanced Find queries
- Work with charts and dashboards
 - Create, configure, and share personal charts; create, configure, and publish system charts; create new system dashboards; describe uses of web resources and IFrames; differentiate between personal and system dashboards, charts, and views

Apply service management (10–15%)

- Work with service management
 - Identify customers who would benefit from service management, identify core record types, describe how core record types are used in service management
- Work with business process flows
 - Describe the purpose of business process flow in service management, identify what can be done programmatically in a business process flow, describe the rules-based branching feature of business process flow
- Configure service management
 - Create case routing rules, create automatic case creation rules, create and maintain the subject tree, configure parent-child case settings

Manage service cases (10–15%)

- Work with cases
 - Identify case lists and views, describe steps in automated case creation, identify benefits of case hierarchy, search for cases
- Create cases
 - Identify ways to create new cases; create new case record; convert activity records to cases; create parent-child cases; identify case relationships; add posts, activities, and notes in the collaboration pane
- Maintain cases
 - Describe stages and steps in the case process ribbon; identify actions that can be taken on a case; merge cases; cancel, delete, resolve, and reactivate cases; apply routing rules to cases
- Work with the Knowledge Base
 - Search for Knowledge Base articles; create and maintain article templates; create, approve, and publish articles; search articles from case records; associate articles to a case; send Knowledge Base articles
- Use queues
 - Differentiate between system and personal queues, create and maintain queues, assign cases and activities to queues, work with queue items, describe the process of working with queues, describe how case routing rules apply to queues

Manage contracts and entitlements (10–15%)

- Work with entitlements
 - Create entitlement templates, create entitlements for a customer, add entitlement lines and associate with products, identify channels supported for entitlements, identify when case entitlements decrement and increment, describe the entitlement life cycle

- Work with service level agreements (SLAs)
 - Identify SLA tracking KPIs and indicators, create a service level agreement, create SLA items, associate a service level agreement with an entitlement, describe the purpose of the timer control on the case form, configure service system settings for SLAs

Work with service scheduling (10–15%)

- Service scheduling concepts
 - Identify customers who would benefit from service scheduling functionality, define service scheduling terminology, identify service scheduling process flow
- Manage service scheduling operations
 - Configure work hours for users and facilities/equipment, limit a resource's availability, create resource groups, create a site and associate resources with it, create customer service schedules, create holiday schedules
- Maintain services and capacity planning
 - Define capacity planning, create a new service record, add a selection rule for required users and resources, configure account and contact service preferences, create a service with a same-site selection rule
- Schedule service activities
 - Schedule a service activity in the Service Calendar, schedule specific resources by using the scheduling engine, schedule a service activity with same site rules, reschedule service activities, change the status of service activities, display and resolve scheduling conflicts

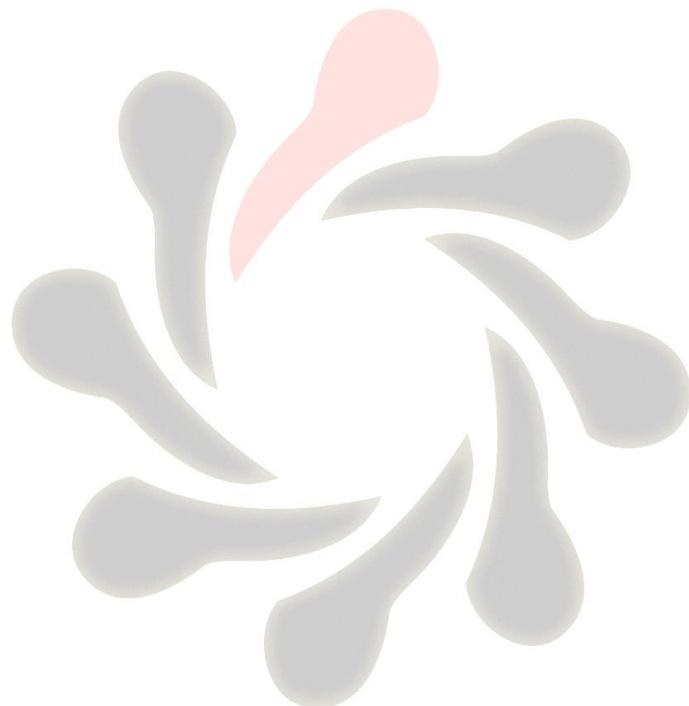
Analyse and report on service management (5–10%)

- Manage service metrics and goals
 - Identify typical service goals and metrics, create a monthly metric and goal for case records, describe steps for adding a Target-In-Progress-Actual chart to the service dashboard
- Work with service management reports
 - Identify key features and uses of the Service Activity Volume report, evaluate which service management report is best used in a given situation, identify key features and uses of the Case Summary Table report
- Work with charts and dashboards
 - Identify service management system dashboards, create a personal service dashboard, create a system chart for service management.

Feedback

You will need to complete two sets of feedback at the end of the course. One is for Firebrand and is available on your PC; <http://www.firebrandtraining.co.uk/feedback>. The other is for Microsoft and

your instructor will give you the link to the KnowledgeAdvisors MetricsThatMatter website that Microsoft uses for feedback.



Module 1 – Dynamics CRM 2015 Application Overview

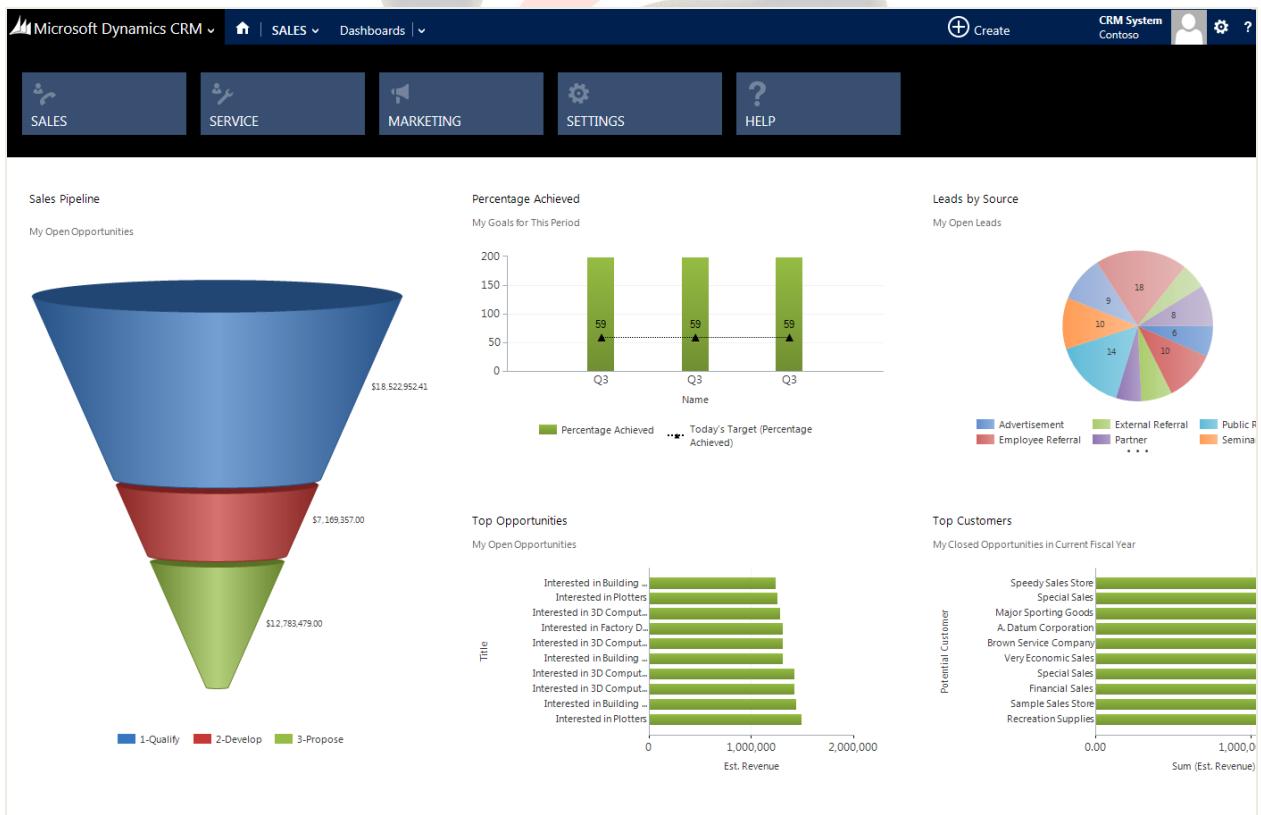
Objectives

The key objective of this module is to provide a high level overview of Microsoft Dynamics CRM 2015 and its capabilities.

In this module we will cover:

- CRM Concepts
- What's New in CRM 2013 and CRM 2015
- Navigation

Lesson 1-1 CRM Overview



Microsoft Dynamics CRM Functionality

Microsoft Dynamics CRM is designed to support the sales, marketing and service functions of an organisation.

Out of the box, Dynamics CRM provides significant functionality for many organisations and also provides capability to customise and extend the functionality to meet specific business requirements.

Third parties also provide pre-built customisations via the Dynamics CRM Marketplace.

Sales

The sales functionality within Dynamics CRM covers the generation of leads for prospecting and qualifying, managing opportunities and keeping track of stages of deal closure, managing and tracking communications between salespeople and the customers, and maintaining a database of product information

- Leads
- Opportunities
- Communication tracking
- Products and Pricing
- Sales processes

Sales Process

The sales process starts with the generation of a lead; that then follows a qualification process to convert it to an opportunity. A quote can be generated for the customer, which then can become an order and, from this order, invoices can be generated. This entire sales process is modelled within Dynamics CRM.

Marketing

The marketing functionality within Dynamics CRM allows you to do campaign planning, campaign budgeting and creating target marketing lists of contacts, accounts and leads that you want to market your services to. You can generate campaigns in order to provide you the ability to send out email blasts or mail to a particular marketing lists, and then tracking and reporting the efficacy of those campaigns through reports and charts.

- Market lists
- Campaigns
- Tracking responses
- Reporting

Service

The service functionality within Dynamics CRM allows you to record cases for issues or ticket tracking for customers, managing services that you provide or contracts that you have with a customer.

You can manage the services and resources that you have at hand through appointment scheduling allowing you to take your available resources, schedule them out optimally, and find when they are available to be deployed to render the services that you provide your customers.

A knowledge base of existing information and intelligence that you can use to help you more effectively solve cases and issues that may arise with a customer.

- Case recording and resolution
- Entitlements and SLA Management
- Service and Resource Management

- Service Scheduling
- Knowledge Base

Dynamics Online Additional Subscription functionality

Microsoft is enhancing the base Dynamics CRM functionality with optional cloud offerings that integrate with Dynamics CRM.

- Dynamics Marketing Enterprise
- Parature
- Social Engagement
- Unified Service Desk

Deployment

Deployment Options

There are various ways in which you can deploy Dynamics CRM 2015; on-premise, online, or a partner-hosted model.

The functionality is almost identical between the deployment options.

Clients

Microsoft Dynamics CRM is essentially a web-based application. There are various different supported browsers; Internet Explorer, Firefox, Chrome and Safari. You can just open your browser and type in the URL of the CRM server.

Another way to access it is through Outlook. The CRM Client for Outlook uses the standard Outlook interface, and enables you to access all of your records and CRM data through Outlook. It also provides you additional ability to track and sync your emails, appointments and tasks between Outlook and CRM.

New from 2013 are the Native Mobile Clients; these are available for tablets and various phones through app stores. You are able to access your CRM data through a native application on your phone or tablet.

Security

User Access

All users must be authorised and authenticated before they can access Dynamics CRM.

- On Premise



- Online



If a user with an on-premise deployment of Dynamics CRM user logs into their computer and access CRM, they are logged in with their Active Directory user name and the user is automatically logged into CRM 2015.

Active Directory manages the security and password the passwords and the other types of security requirements of your organization in Active Directory and pass that along to CRM 2015.

For CRM Online and partner-hosted, users will need to login to CRM separately and will have a different username and password to that use to login to their computer. The user and password management will be managed by the cloud provider.

Security Roles

Security roles allow different access to different parts of CRM both functionality and records. Users must be given at least one security role to access CRM.

Other Security Features

Records can be shared with other users and teams.

CRM 2013 introduced new functionality, access teams, to allow records to be shared with multiple users via access templates.

Users can also be provided with different forms based on their security roles.

It is also possible to restrict access to specific fields via Field Level Security.

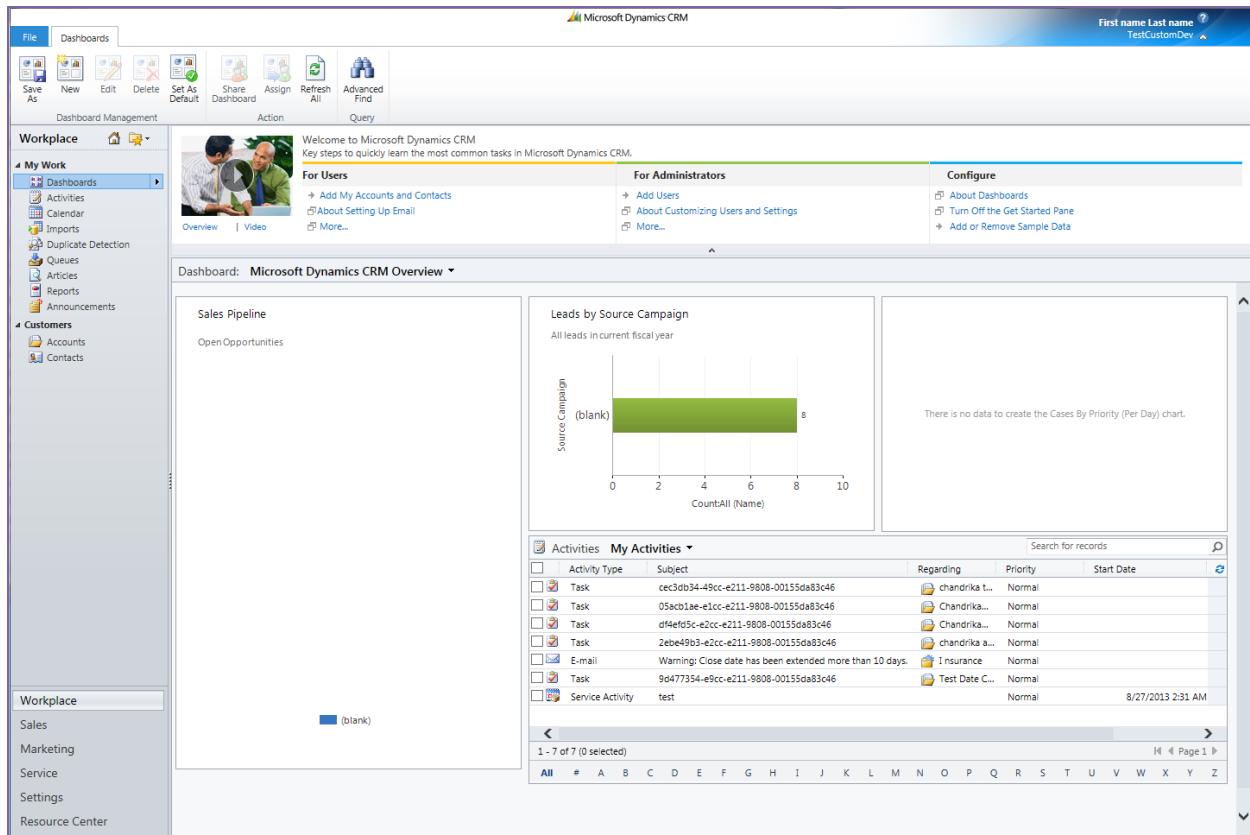
The security model is very flexible and robust and cannot be bypassed.

Lesson 1-2 Navigation

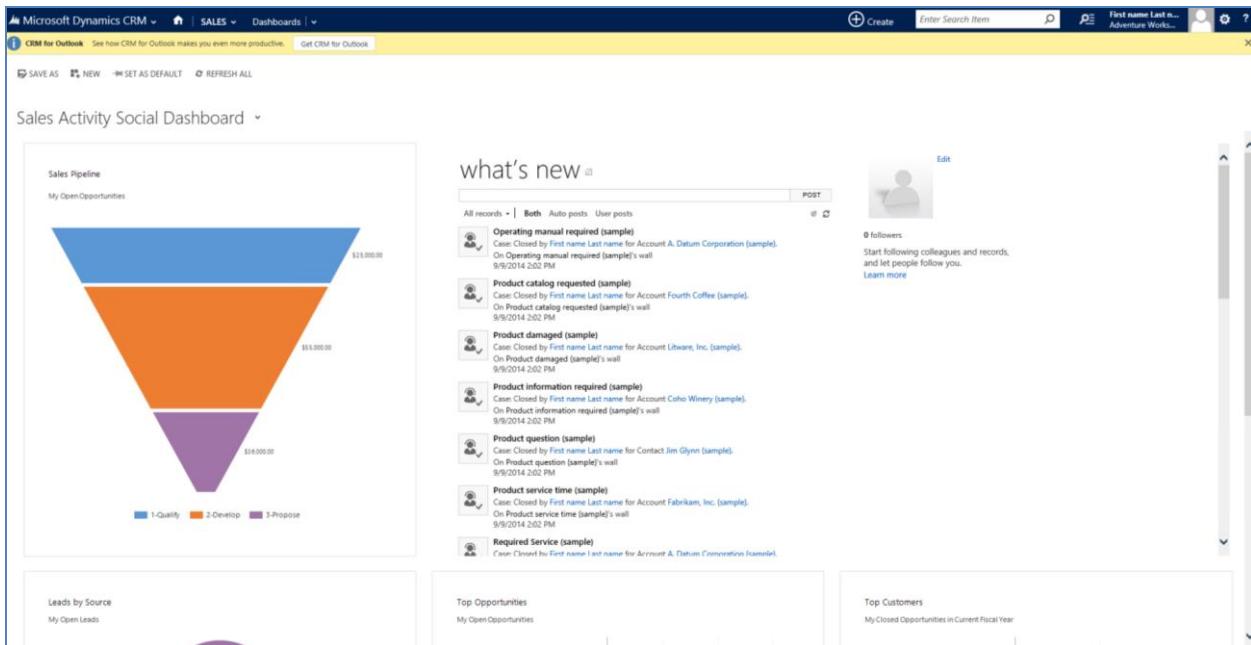
The CRM user interface has been redesigned to make more room for what's most important – your customer data.

Navigation Pane

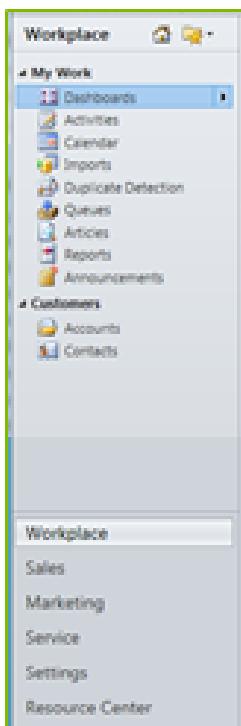
CRM 2011 looked like this:



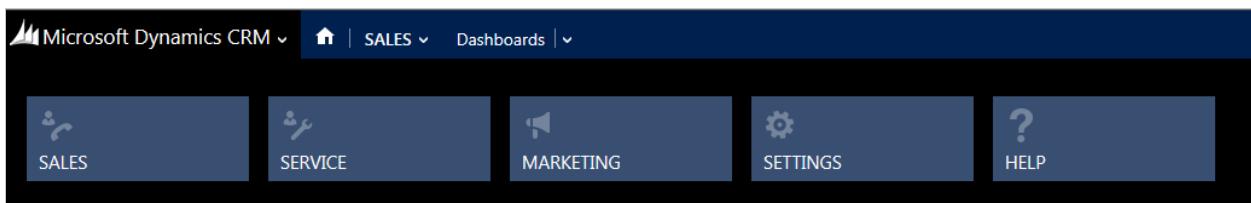
The new menu bar replaces CRM 2011 Navigation pane and designed to ease user navigation, free up screen space and create a consistent look and feel across desktop and touch enabled mobile devices.



In CRM 2011 you navigated using the left hand navigation pane to areas and records.

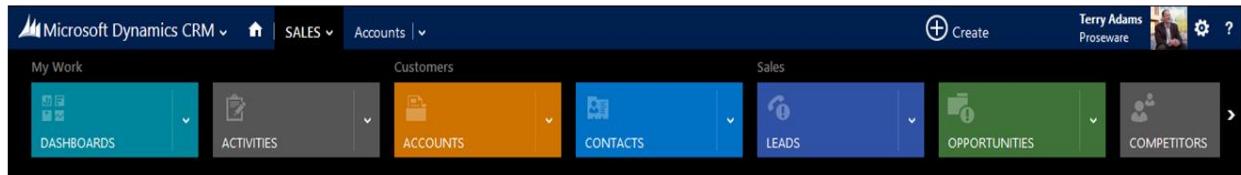


The new, streamlined navigation drops down from the top of the screen



Record Types

You can quickly get to different record types—accounts, contacts, leads, opportunities, and so on. On the nav bar, click or tap a work area to see tiles for the record types you work with most often



Find your records

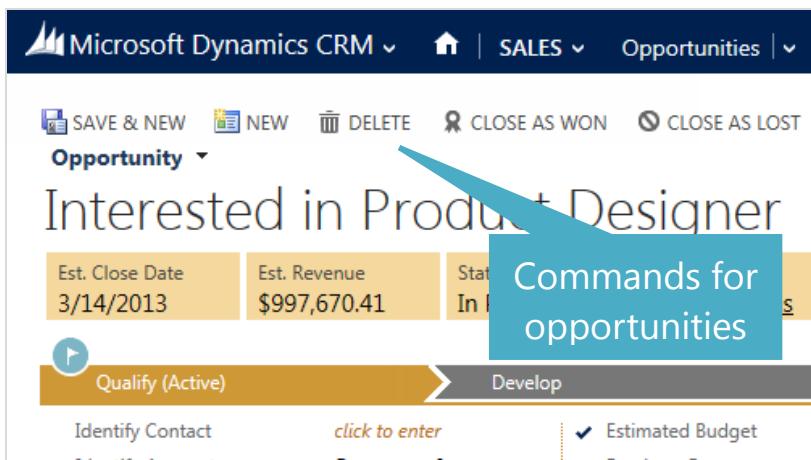
On the nav bar, click or tap your work area, and then click or tap the tile for the record type - you will see a list of records

Full Name	Email	Parent Customer	Business Phone
Abu Obeida Bakhach	abuobeidabakhach@metr...	Metropolitan Sports Supply	685-442-5388
Adam Smith	franzkohl@cohownery.com	Coho Winery	874-152-2115
Aidan Delaney	aidandelaney@littleindustr...	Little Industries	587-166-7850
Aidan Delaney	aidandelaney@weekendto...	Weekend Tours	604-551-6286
Alex J. Simmons	alexj.simmons@rallydayma...	Rally Day Mall	245-678-8770
Alistair Speirs	alistairspeirs@moresalesl.c...	More Sales!	780-705-3003
Amr Zaki	amrzaki@ridenravesales.co...	Ride n Rave Sales	744-874-8788
Amritansh RagHAV	amritanshraghav@majorsp...	Major Sporting Goods	321-737-3560
Anat Kerry	anatkerry@breathetakingsp...	Breathtaking Sporting Goo...	201-286-8782
Andreas Herbinger	andreasherbinger@speedy...	Speedy Sales Store	136-567-1030
Andrew Lan	andrewlan@a.datumcorpo...	A. Datum Corporation	605-780-7661

Action Bar

The CRM 2011 ribbon has been replaced by a simpler single line action bar with a “more actions” drop down list freeing up screen space for more data, charts and information on forms. Commands are related to what you are working on and change based on data and record opened.

Full Name	Email	Parent Customer	Business Phone
Abu Obeida Bakhach	abuobeidabakhach@metr...	Metropolitan Sports Supply	685-442-5388
Adam Smith	franzkohl@cohownery.com	Coho Winery	874-152-2115
Aidan Delaney	aidandelaney@littleindustr...	Little Industries	587-166-7850



Opportunity

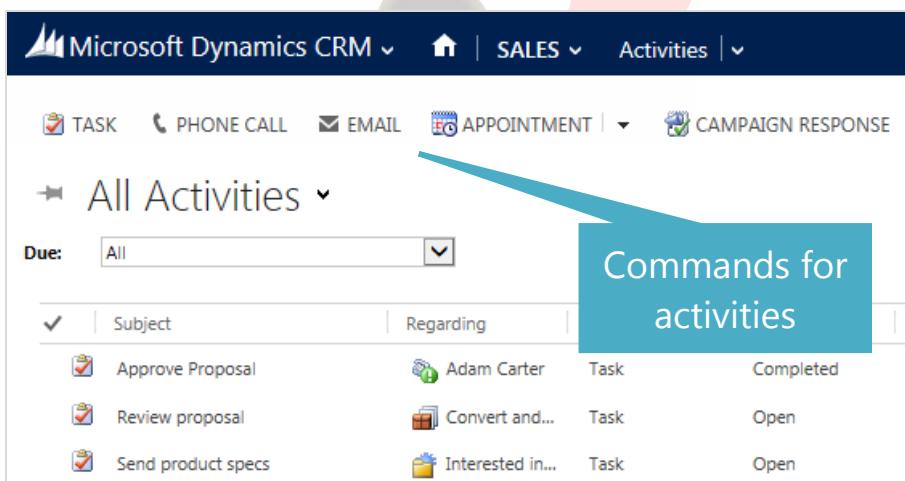
Interested in Product Designer

Est. Close Date: 3/14/2013 | Est. Revenue: \$997,670.41 | Status: In Progress

Qualify (Active) ➤ Develop

Identify Contact *click to enter* ✓ Estimated Budget

Commands for opportunities



SALES Activities

TASK PHONE CALL EMAIL APPOINTMENT CAMPAIGN RESPONSE

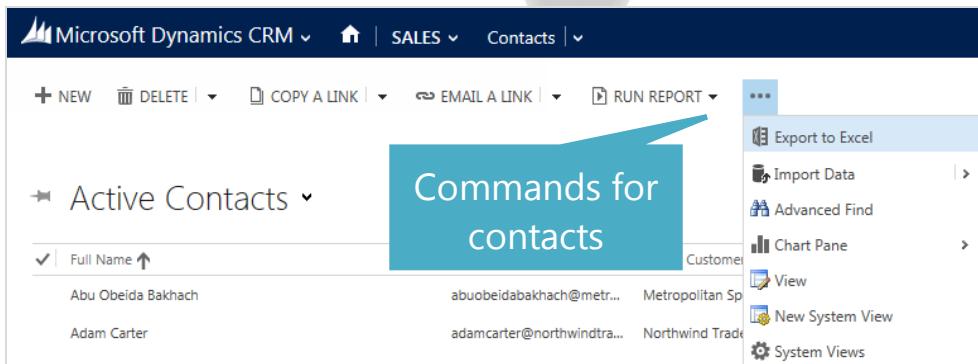
All Activities

Due: All

Subject	Regarding	Owner	Type	Status
Approve Proposal	Adam Carter	Task	Completed	
Review proposal	Convert and...	Task	Open	
Send product specs	Interested in...	Task	Open	

Commands for activities

More commands



SALES Contacts

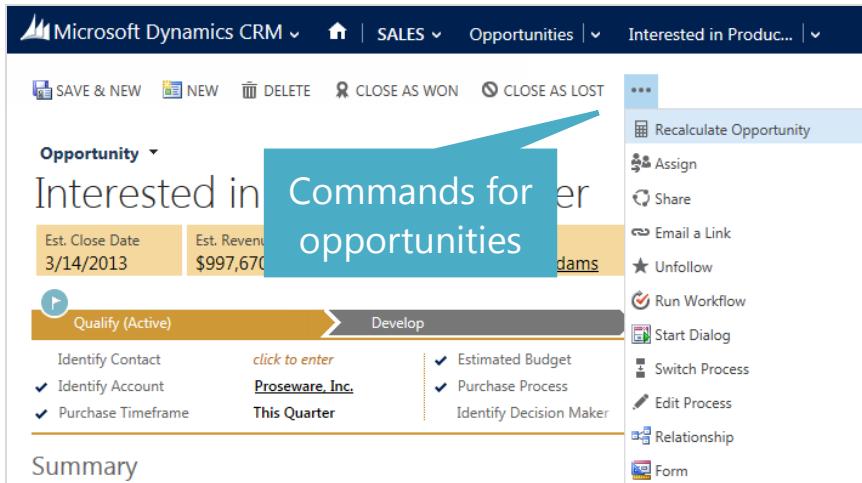
NEW DELETE COPY A LINK EMAIL A LINK RUN REPORT

Active Contacts

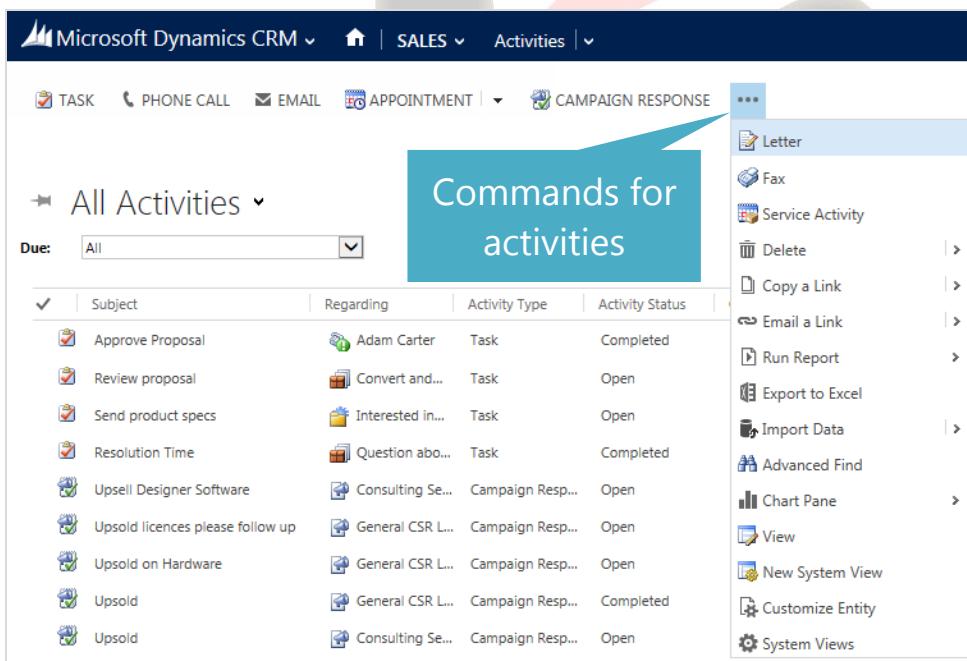
Full Name	Email Address	Customer
Abu Obeida Bakhach	abuobeidabakhach@metr...	Metropolitan Sp...
Adam Carter	adamcarter@northwindtra...	Northwind Trade...

Commands for contacts

... Export to Excel Import Data Advanced Find Chart Pane View New System View System Views



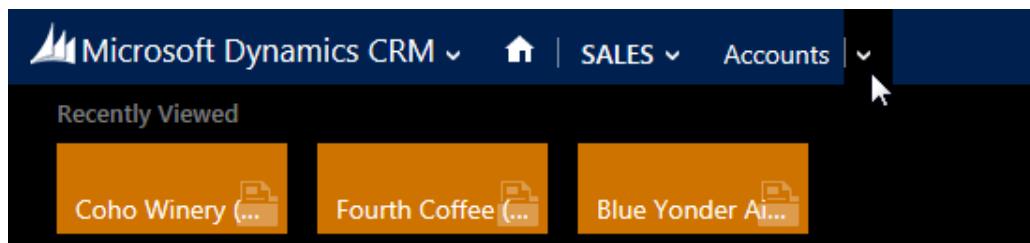
The screenshot shows the Microsoft Dynamics CRM Opportunity page. A context menu is open on the right side, listing various commands such as Recalculate Opportunity, Assign, Share, Email a Link, Unfollow, Run Workflow, Start Dialog, Switch Process, Edit Process, Relationship, and Form. A blue callout box labeled "Commands for opportunities" points to the menu.



The screenshot shows the Microsoft Dynamics CRM Activities page. A context menu is open on the right side, listing commands like Letter, Fax, Service Activity, Delete, Copy a Link, Email a Link, Run Report, Export to Excel, Import Data, Advanced Find, Chart Pane, View, New System View, Customize Entity, and System Views. A blue callout box labeled "Commands for activities" points to the menu.

Recently viewed

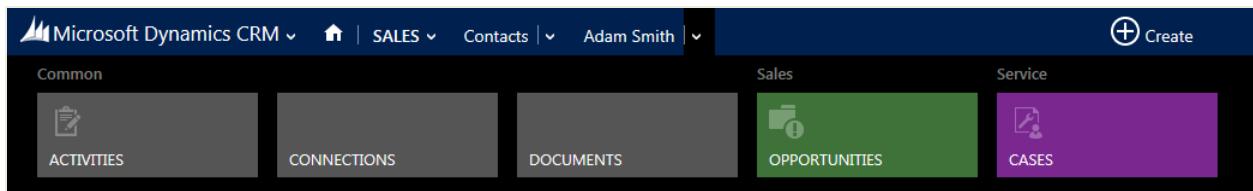
On the nav bar, next to the name of the record type, click or tap . Click or tap a tile, and then get right back to what you were doing



The screenshot shows the Microsoft Dynamics CRM Accounts page. At the top, there's a "Recently Viewed" section with three tiles: "Coho Winery", "Fourth Coffee", and "Blue Yonder AI...". On the far right of the nav bar, there's a dropdown arrow icon.

Related information

To get to other info related to the record you're viewing, on the nav bar, click or tap the arrow  next to the name.



Edit data inline

You can click or tap a field to update info for a record right inline. No flipping to another screen

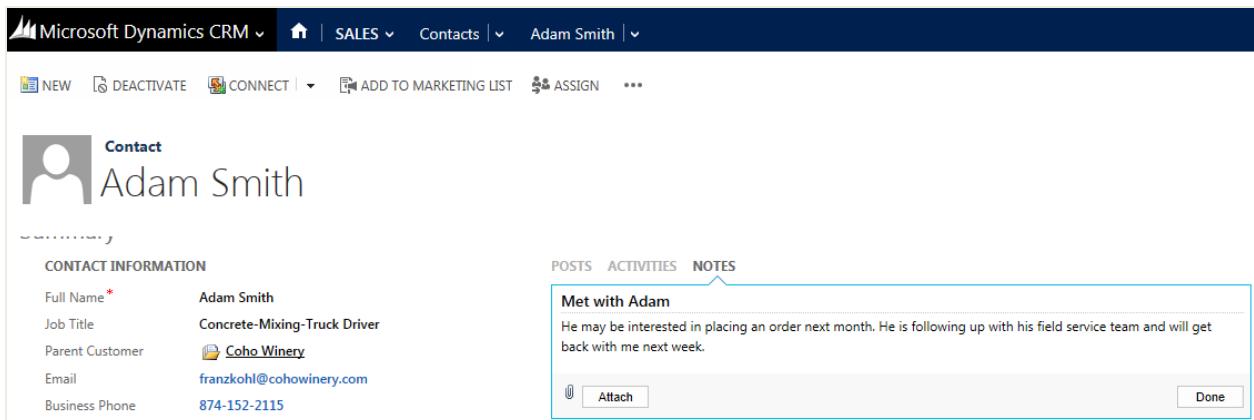
Quick Create

Now, you can quickly capture key data points when you enter new records.

On the nav bar, click or tap Create, and then select the type of record you want. Enter data for a few fields, or more if you have it. You can come back and fill in the gaps later when you have more time.

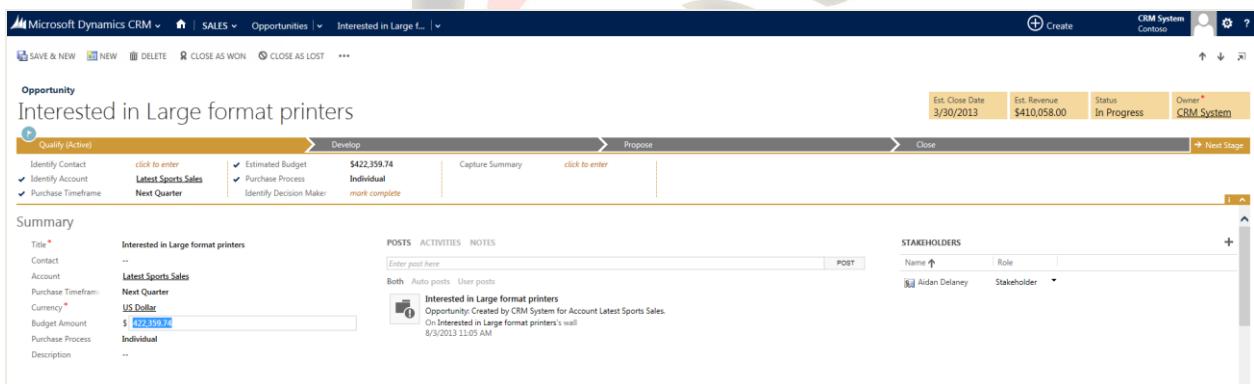
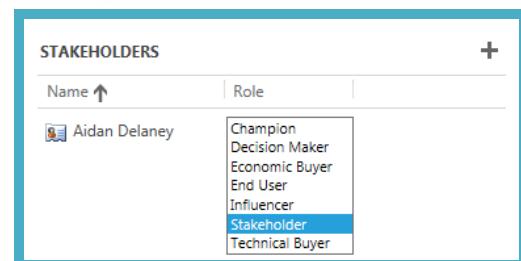
Add notes

When you're viewing the details for a record, click or tap Notes, then type in the information



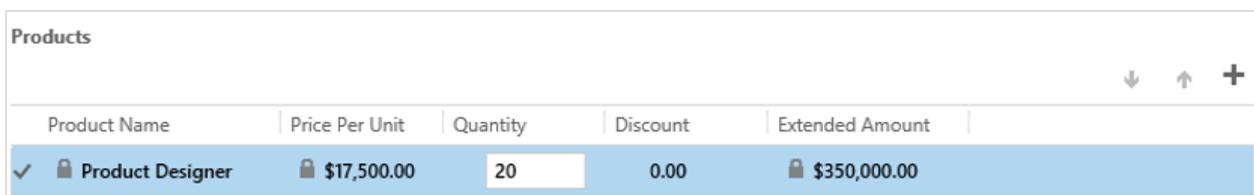
Related records

Inline editing makes it quick and easy to keep data current. Lookup lists help you identify key players and the parts they play in your opportunities.

Opportunity products

You can edit product fields on the screen where you're working. Easily enter details like price, quantity, and discount.



Module 2 – Working with the Dynamics CRM Application

Objectives

The key objective of this module is to understand the core CRM 2015 records that are common to all areas of the application.

In this module we will cover:

- Understanding customer records
- Using notes and attachments
- Using Connections
- Using activity records to track customer interactions

Lesson 2-1 Working with the Dynamics CRM Application

Customer Records

CRM stores information about organisations and people in two types of customer record:

- Account
- Contact

Almost all other records in CRM are related to either an Account or Contact or both.

Accounts and Sub-Accounts

A sub-account is part of an organisation. Sub-accounts can be used for organisations of any size. For example, a sub-account can be used to record the local office of a larger company or the details of a corporation that is owned by a holding company.

It is recommended that sub-accounts are used to track sales and service to parts of an organization that are separate legal entities or have their own purchasing authorities.

An alternative way to track multiple office locations for an organization is to have one account record and multiple address records.

The appropriate method will depend on the requirements of each business but it is important that a standardised approach to storing organization information is used so that users know how to enter and find the relevant information.

Contacts and Parent Account

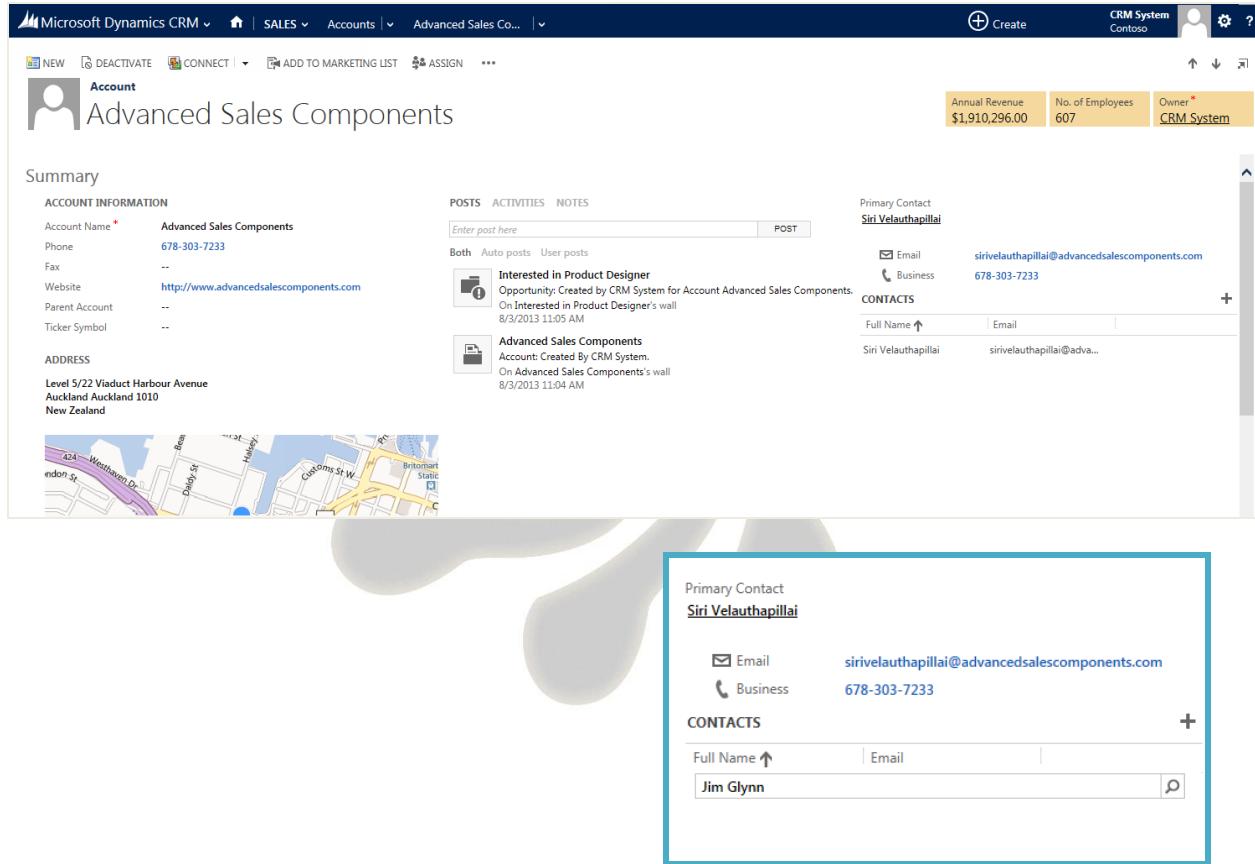
Contacts can be linked to other account (or contact records) using the Parent Customer field. Often, a contact will be linked to a parent account to indicate that the contact works for a particular organization.

A contact can have only one parent account or contact. If you need to link a contact to several organisations then consider using connections.

If a contact has a parent account or contact, any opportunities, quotes, orders, or invoices related to the contact will, by default, automatically appear in the parent record as well.

Primary Contact

On account records, use the Primary Contact lookup field to identify a key contact at the organization.



The screenshot shows the Microsoft Dynamics CRM 2015 interface for an account record. The account name is 'Advanced Sales Components'. The 'Primary Contact' field is populated with 'Siri Velauthapillai'. A callout box highlights this information, showing the contact's email (sirivelauthapillai@advancedsalescomponents.com) and business phone number (678-303-7233). The 'CONTACTS' section below lists 'Jim Glynn'.

Addresses

Many Microsoft Dynamics CRM records have address fields. These records include:

- Accounts
- Contacts
- Leads
- Competitors
- Quotes
- Orders
- Invoices
- Users

As well as recording important contact details, address information can be used in mail merges with Microsoft® Office Word and to populate billing and shipping details in quote, order, and invoice records without requiring you to retype data.

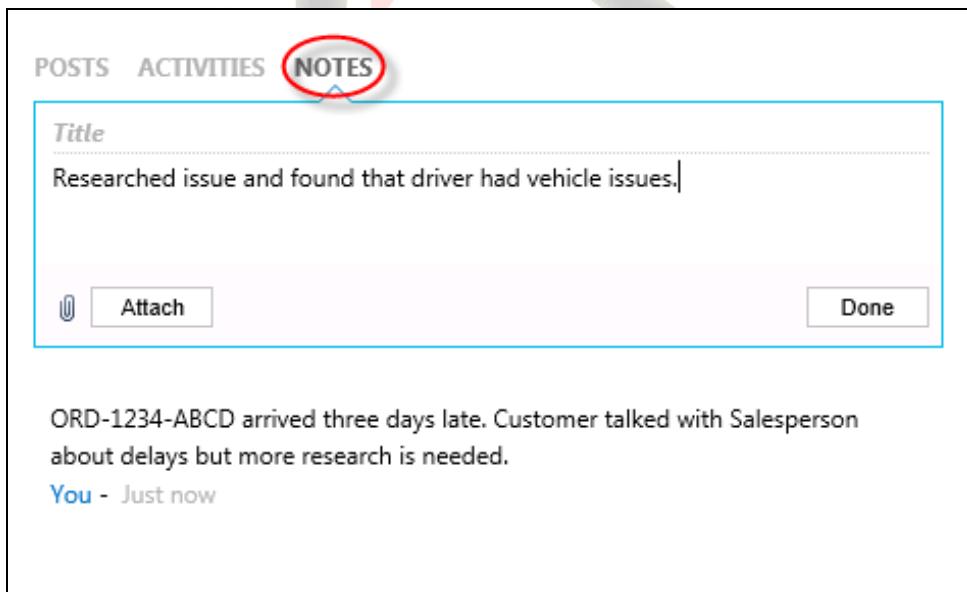
In a default installation, the forms for accounts, contacts, leads, competitors, opportunities, and users only show fields for one address. However, Microsoft Dynamics CRM includes provision for a second address, so an administrator can add the fields for the second address to the form.

Accounts and contacts can have more than two addresses through more addresses option.

Notes and Attachments

Most record types in Microsoft Dynamics CRM can have notes attached. A note adds, to a record, additional text-based information that doesn't fit into any of the other fields on a record.

Although notes can be used to record interactions, such as meetings and phone calls, it is recommended that activity records are used to do this.



Files can be attached to notes. These are stored in the Microsoft Dynamics CRM database.

Files of any type can be attached to a note, though by default, files with certain extensions are not allowed. The list of blocked extensions and the maximum file size can be changed by an administrator.

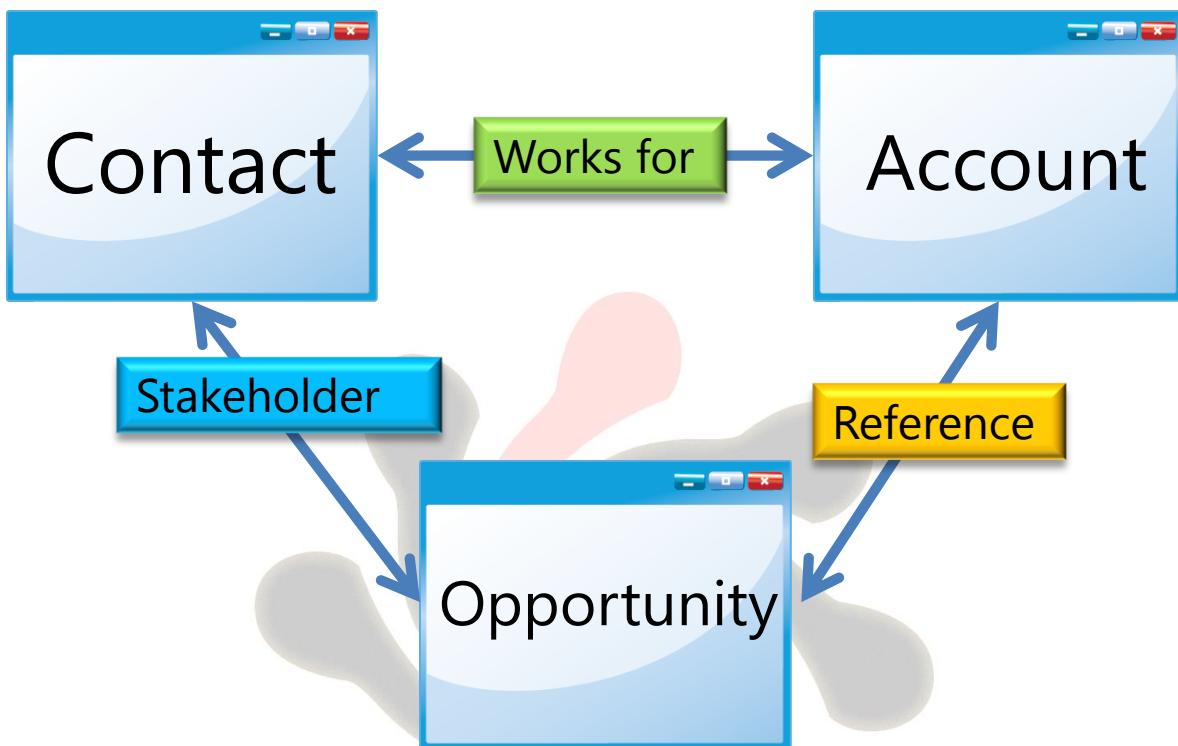
Consider using SharePoint to store files instead of Notes.

Connections

Connection records provide a flexible way to connect and describe the relationships between records stored in Microsoft Dynamics CRM. They help to promote teamwork, collaboration, and effective management of business and sales processes.

Account, contacts, users, quotes, sales orders, and many other record types can be associated with each other using connections.

The records in the association can be assigned particular roles that help define the purpose of the relationship such as employer, colleague, or stakeholder.



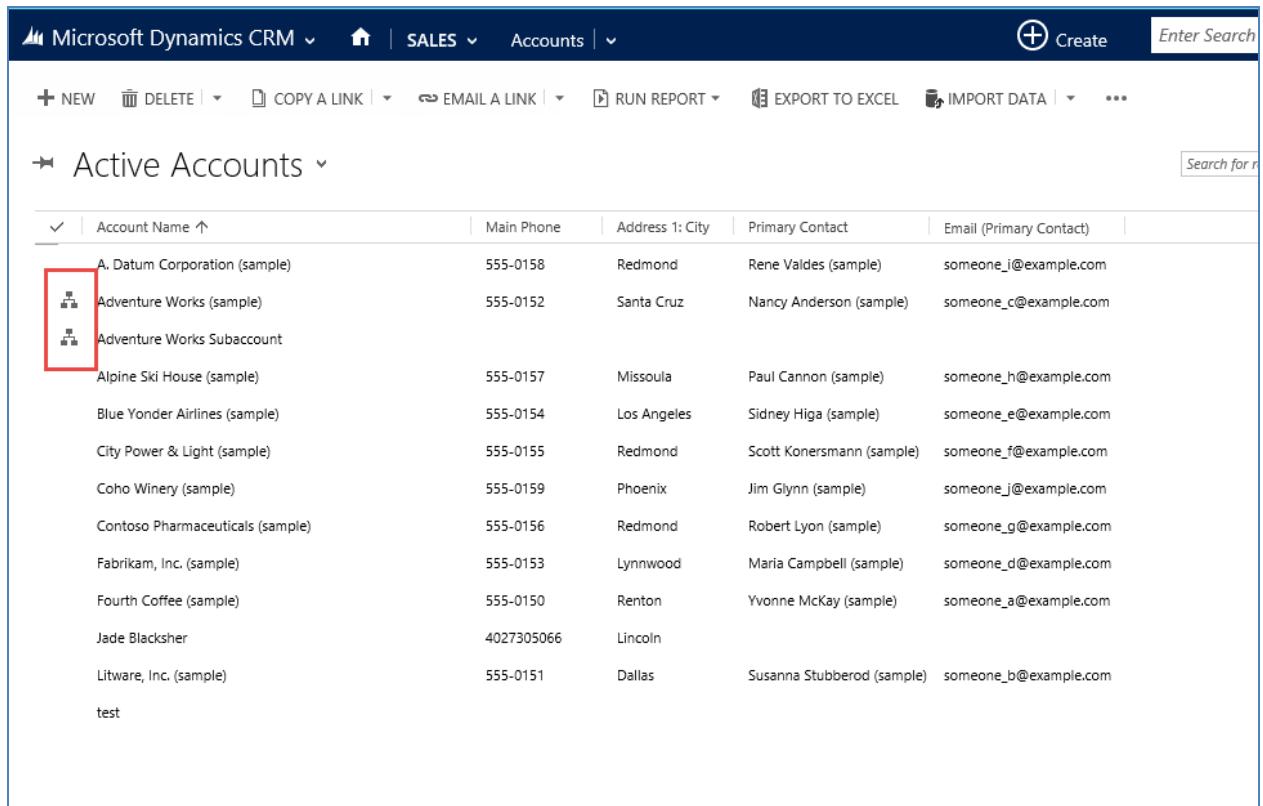
Connections provide the following capabilities:

- An easy and flexible way to make a connection between two records of most Microsoft Dynamics CRM record types. All customizable business and custom record types can be enabled for connections.
- An option to add useful information, such as a description of the connection and the duration.
- The ability to create connection roles that describe the relationship between two records, such as a relationship between a doctor and a patient, or a manager and an employee.
- A way to create multiple connections and roles for a particular record. For example, a contact may have many relationships with other contacts, accounts, or contracts. In each relationship a contact may play a different role.
- Information for building queries and creating graphs. You can search for all connections and connection roles for a particular record and create graphs and charts for visual representation of the connections.

Relationship Hierarchy

Microsoft has added a new way to look at records, and their relationships to records of the same record type. This new functionality is called Hierarchy Visualizations.

Accounts, Positions, Products, and Users record types are enabled and setup for hierarchy visualizations by default.

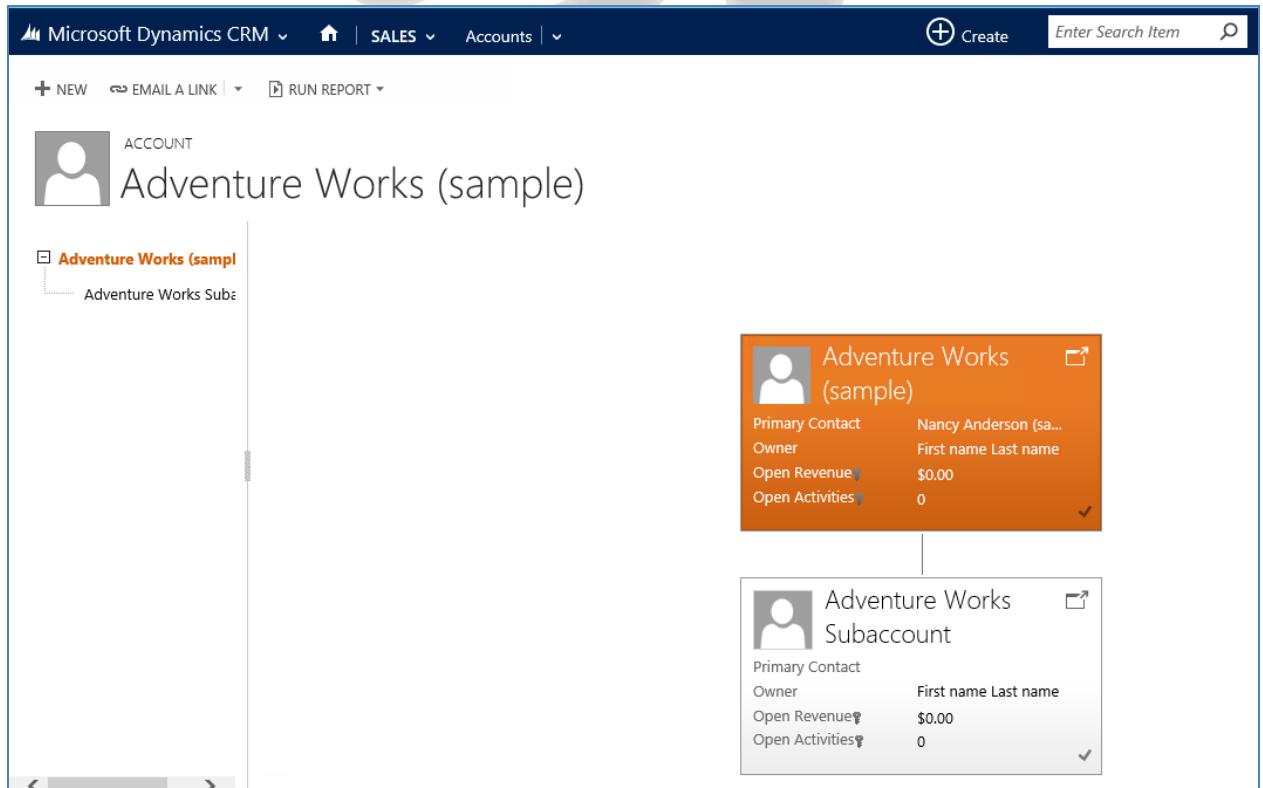


Active Accounts

Account Name ↑	Main Phone	Address 1: City	Primary Contact	Email (Primary Contact)
A. Datum Corporation (sample)	555-0158	Redmond	Rene Valdes (sample)	someone_i@example.com
Adventure Works (sample)	555-0152	Santa Cruz	Nancy Anderson (sample)	someone_c@example.com
Adventure Works Subaccount				
Alpine Ski House (sample)	555-0157	Missoula	Paul Cannon (sample)	someone_h@example.com
Blue Yonder Airlines (sample)	555-0154	Los Angeles	Sidney Higa (sample)	someone_e@example.com
City Power & Light (sample)	555-0155	Redmond	Scott Konersmann (sample)	someone_f@example.com
Coho Winery (sample)	555-0159	Phoenix	Jim Glynn (sample)	someone_j@example.com
Contoso Pharmaceuticals (sample)	555-0156	Redmond	Robert Lyon (sample)	someone_g@example.com
Fabrikam, Inc. (sample)	555-0153	Lynnwood	Maria Campbell (sample)	someone_d@example.com
Fourth Coffee (sample)	555-0150	Renton	Yvonne McKay (sample)	someone_a@example.com
Jade Blacksher	4027305066	Lincoln		
Litware, Inc. (sample)	555-0151	Dallas	Susanna Stubberod (sample)	someone_b@example.com
test				

The Hierarchy Symbol notifies the user that a parent child relationship exists between the records.

Clicking on the Hierarchy Icon displays the relationship breakdown



ACCOUNT

Adventure Works (sample)

Adventure Works (sample)

Adventure Works Subaccount

Adventure Works (sample)

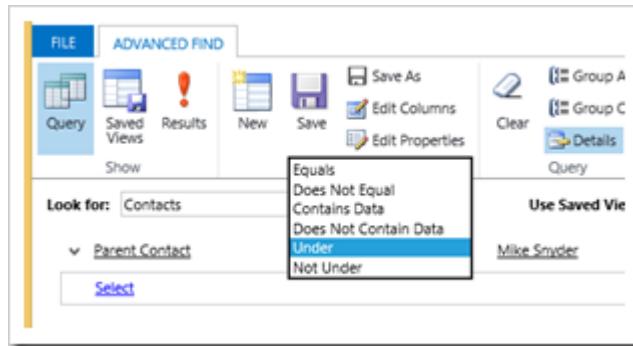
Primary Contact: Nancy Anderson (sa...)
Owner: First name Last name
Open Revenue: \$0.00
Open Activities: 0

Adventure Works Subaccount

Primary Contact
Owner: First name Last name
Open Revenue: \$0.00
Open Activities: 0

Microsoft have also added a couple new operators to Advanced Find related to Hierarchy visualizations:

- Under: Finds all records that are UNDER a specific node
- Not Under: Inverse of Under



Hierarchy visualizations do not currently allow for relationships between different entities.

Activities

Activities are used to track customer interactions, such as sending e-mails or letters or making appointments or telephone calls.

Users can create activities for themselves or they can assign them to another user to complete. An activity has attributes (such as start date and time, due date, and duration) that indicate when the action occurred or is due to occur. Activities also have properties that determine what the action was about, for example, subject and description.

Most activities also record participants. For example, for a telephone call the participants are the person making the call and the person receiving the call. For a meeting, the participants are the people attending the meeting.

Microsoft Dynamics CRM provides several types of activities as shown in the following list:

- Task
- E-mail
- Phone call
- Letter
- Fax
- Appointment
- Recurring appointment
- Service activity
- Campaign response
- Custom activities

Module 3 – Working with Dynamics CRM Records

Objectives

The key objectives of this module are to provide an understanding of how to find and edit records in CRM.

In this module we will cover:

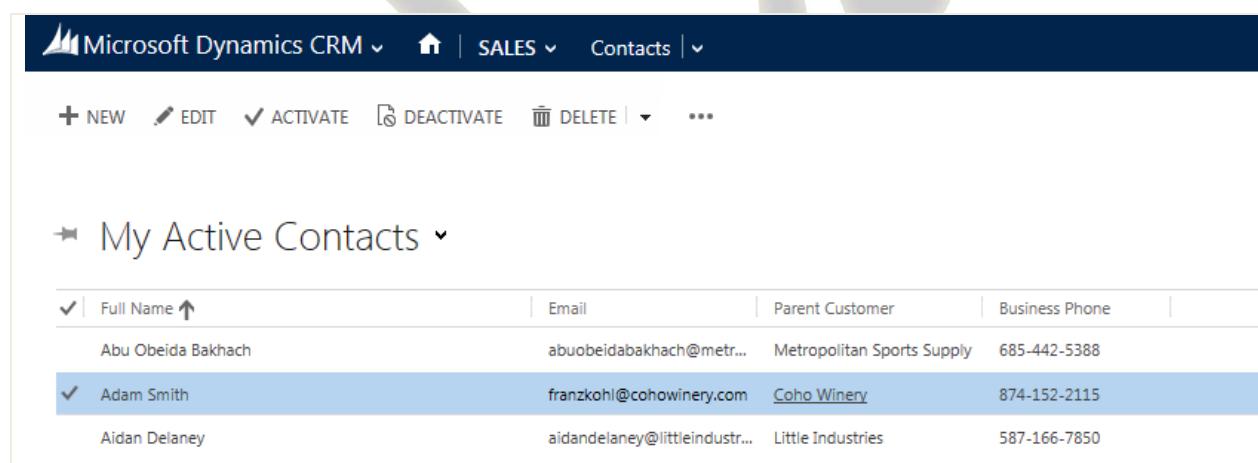
- Creating records
- Editing records
- Understanding ownership of records
- Understanding sharing of records

Lesson 3-1 Working with Dynamics CRM Records

Creating records

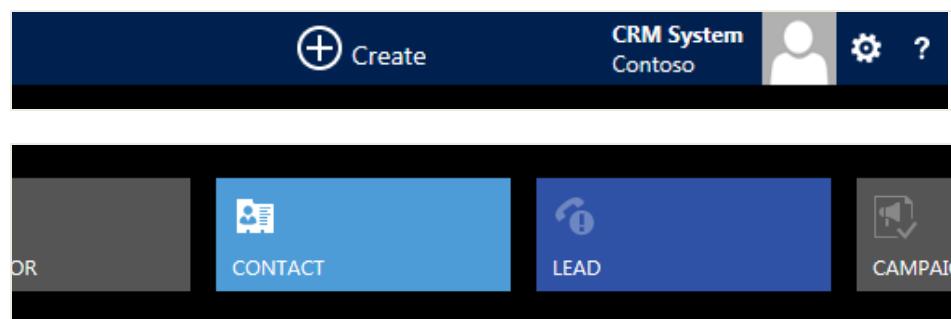
There are several ways to create new records within Dynamics CRM.

You can use the +NEW button whenever a list of records is displayed



Full Name	Email	Parent Customer	Business Phone
Abu Obeida Bakhach	abuobeidabakhach@metr...	Metropolitan Sports Supply	685-442-5388
Adam Smith	franzkohl@cohowinery.com	Coho Winery	874-152-2115
Aidan Delaney	aidandelaney@littleindustr...	Little Industries	587-166-7850

The Quick Create, new in CRM 2013, allows you to create new records at anytime without leaving your current work.

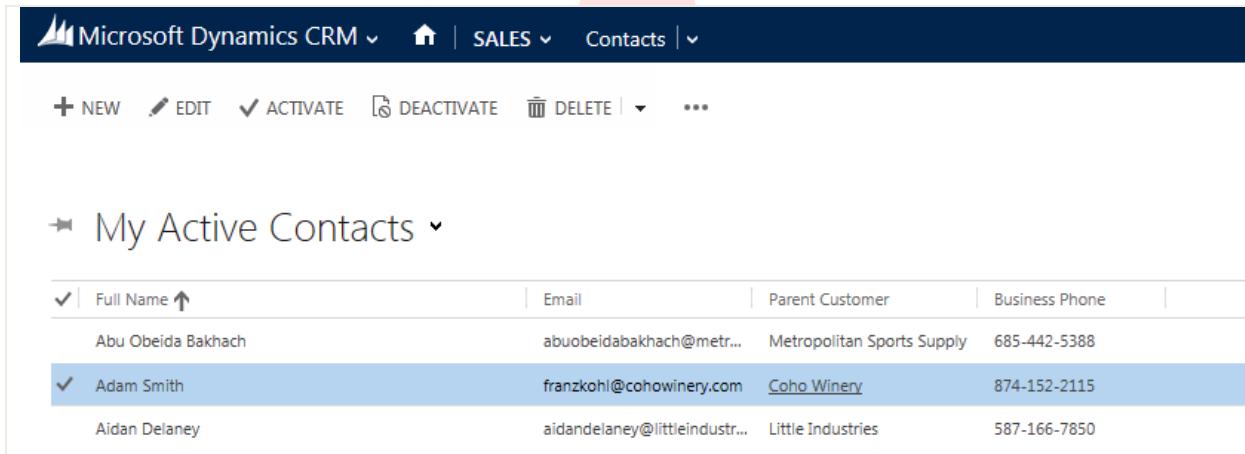




The screenshot shows the Microsoft Dynamics CRM Contact edit screen. At the top, there are tabs for Home, SALES, Contacts, and Adam Smith. On the right, there are buttons for Create, CRM System Contoso, and settings. The main area is titled 'Contact' and contains three sections: Details, Contact Information, and Address. Under Details, First Name is Marcia and Last Name is Douglas. Under Contact Information, Email is blank, Mobile Phone is blank, Business Phone is blank, and Description is blank. Under Address, Street 1 is blank, Street 2 is blank, City is blank, and ZIP/Postal Code is blank. At the bottom right are Save and Cancel buttons.

Edit records

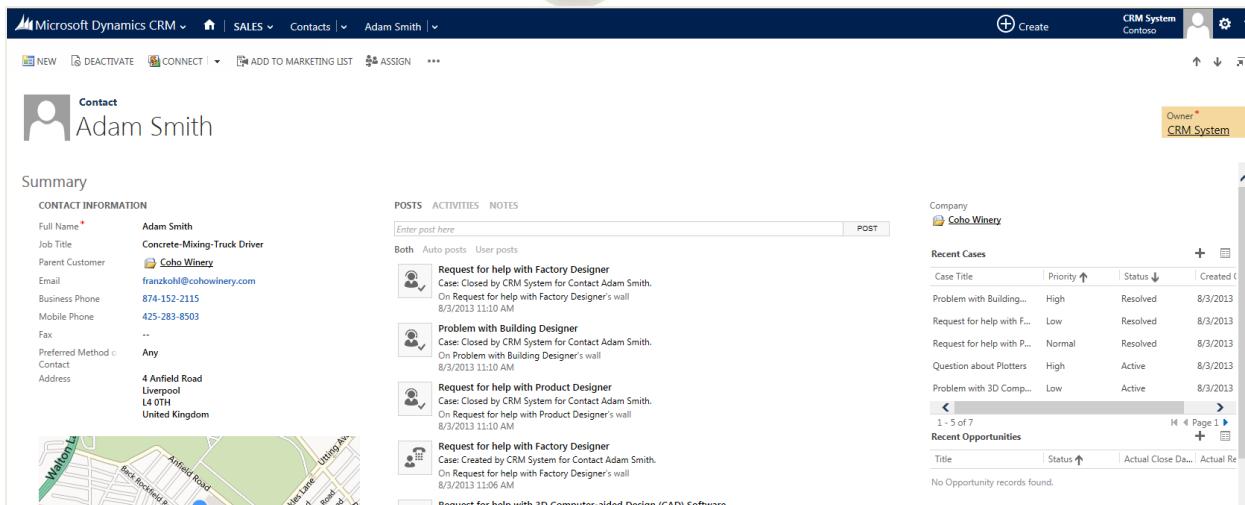
To edit a record, click or tap the name in the list to see more details



The screenshot shows the Microsoft Dynamics CRM Contacts list. At the top, there are buttons for NEW, EDIT, ACTIVATE, DEACTIVATE, DELETE, and more. Below is a section titled 'My Active Contacts' with a dropdown arrow. A table lists contacts: Abu Obeida Bakhach, Adam Smith (selected), and Aidan Delaney. The table columns are Full Name, Email, Parent Customer, and Business Phone.

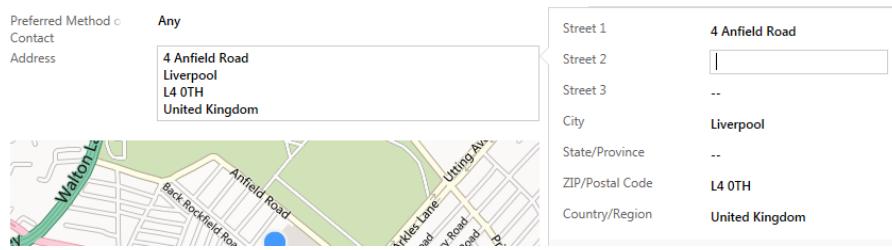
Full Name	Email	Parent Customer	Business Phone
Abu Obeida Bakhach	abuobeidabakhach@metr...	Metropolitan Sports Supply	685-442-5388
Adam Smith	franzkohi@cohownery.com	Coho Winery	874-152-2115
Aidan Delaney	aidandelaney@littleindustr...	Little Industries	587-166-7850

You'll see everything going on with this customer, including any recent updates and posts, and the status of any service cases. Click or tap a field to update info for a contact right inline. No flipping to another screen



The screenshot shows the Microsoft Dynamics CRM Contact detail page for Adam Smith. At the top, there are buttons for NEW, DEACTIVATE, CONNECT, ADD TO MARKETING LIST, ASSIGN, and more. The contact information includes: Full Name (Adam Smith), Job Title (Concrete-Mixing-Truck Driver), Parent Customer (Coho Winery), Email (franzkohi@cohownery.com), Business Phone (874-152-2115), Mobile Phone (425-283-8503), Fax (blank), Preferred Method (Any), and Address (4 Anfield Road, Liverpool, L4 0TH, United Kingdom). To the right, there is a map of Anfield Road, Liverpool. Below the contact info are sections for POSTS, ACTIVITIES, and NOTES. The POSTS section shows a post from Coho Winery about a factory designer. The ACTIVITIES section shows a recent case about a building designer. The NOTES section shows a recent case about a product designer. On the right, there are sections for Recent Cases (listing cases like 'Problem with Building...' and 'Request for help with Product Designer') and Recent Opportunities (listing opportunities like 'Problem with 3D Comp...').

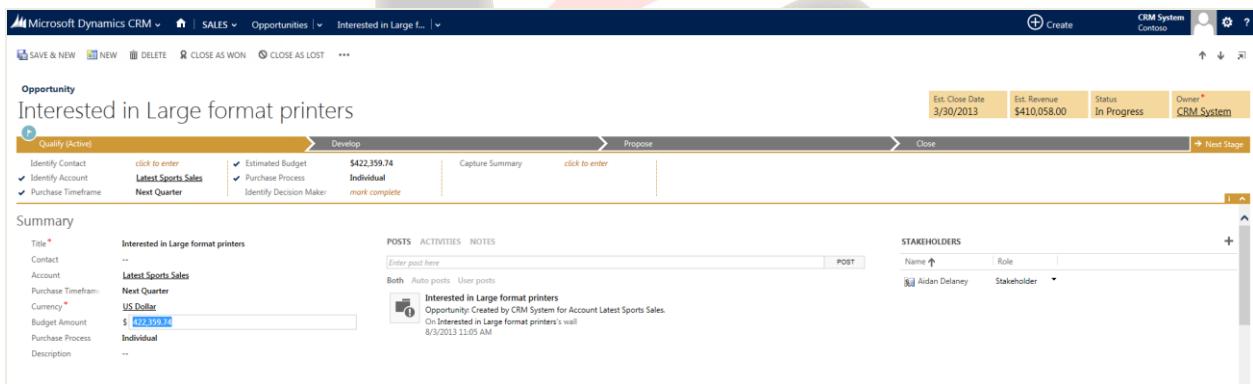
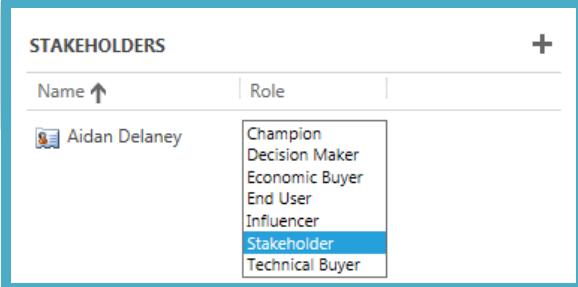
Some fields are composite fields. Clicking or tapping these will expand the fields.



Address and full name fields are examples of composite fields.

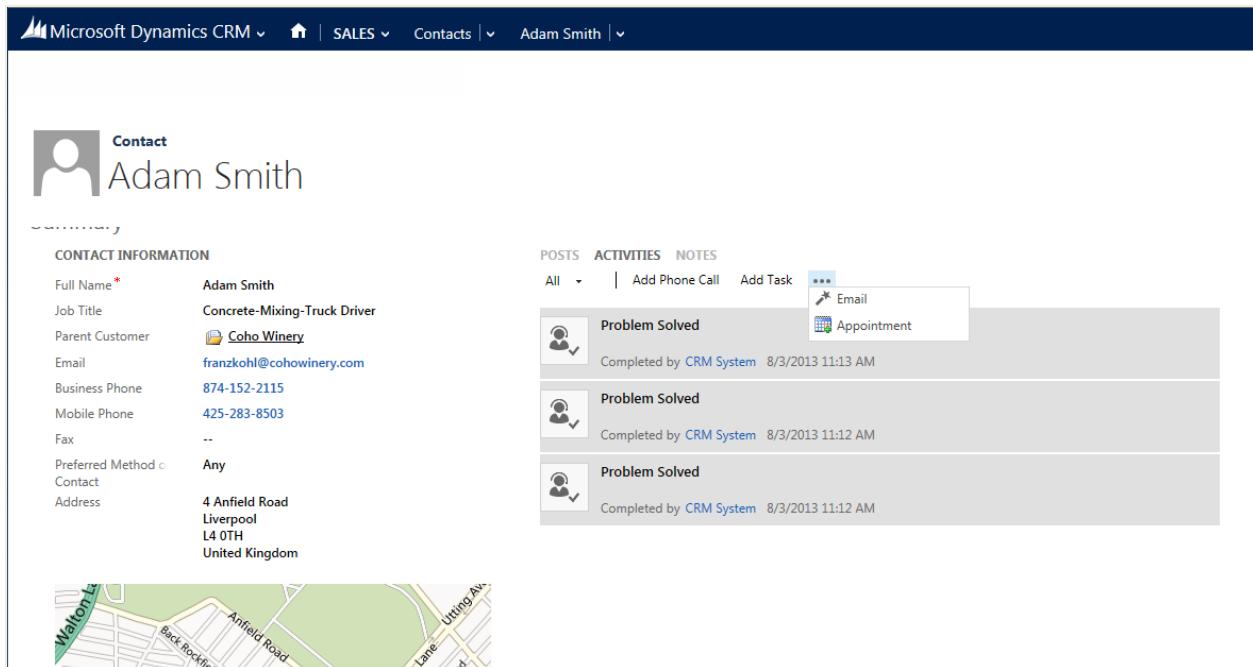
Click or tap a field to see what changes you can make.

When you're working on an opportunity, most fields are editable right inline.

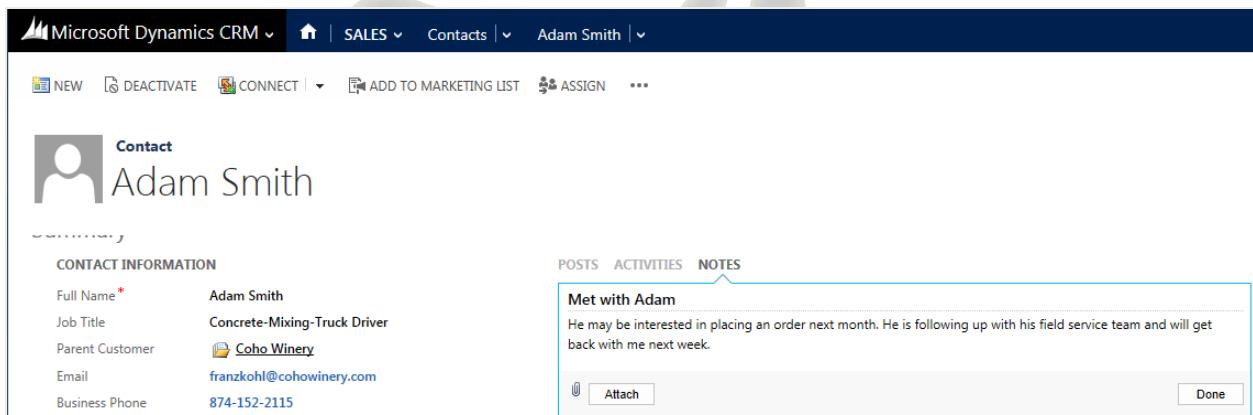



STAKEHOLDERS	
Name ↑	Role
Aidan Delaney	Champion Decision Maker Economic Buyer End User Influencer Stakeholder Technical Buyer

Need to call or email a contact? Click or tap the person's email address or phone number. Or, click or tap Activities to see more options. You can also click or tap More Commands (...)



To add notes when you're viewing the details for a record, click or tap Notes.



Ownership

In Microsoft Dynamics CRM, record types have two types of ownership:

- User or team: User- owned or team-owned records have an owner and can be assigned to or shared with another user or team.
- Organisation: Organisation-owned records do not have owners and cannot be assigned or shared.

Most record types are user- or team-owned (such as accounts, contacts, opportunities, and quotes). A few record types are organization-owned such as products and services. Custom record types added to the system can be either user- or team-owned or organization-owned.

The actions that a user can perform on a record depend on the security roles that the user has been assigned and the teams to which the user belongs. Owning a record does not necessarily provide rights to perform actions, such as assign, modify, or delete, on the record.

The owner of a record is not necessarily the user who created the record; Microsoft Dynamics CRM maintains separate fields for the user that created the record, the last user to modify the record and the record owner.

You can change the owner or a record by “assigning” it to another user or a team.

Sharing

Sharing is the way Microsoft Dynamics CRM users can give other users or teams access to records as needed.

For example, a salesperson is working on an important opportunity and would like a co-worker to track progress. However, the co-worker does not have access to the opportunity. The salesperson can share the opportunity with the co-worker so that both can monitor progress.

Module 4 – Working with Dynamics CRM Data

Objectives

The key objectives of this module are to provide an understanding of how to view and find records in CRM.

In this module we will cover:

- Quick Find
- Views and Advanced Find
- Data Import and Export

Lesson 4-1 Working with Dynamics CRM Data

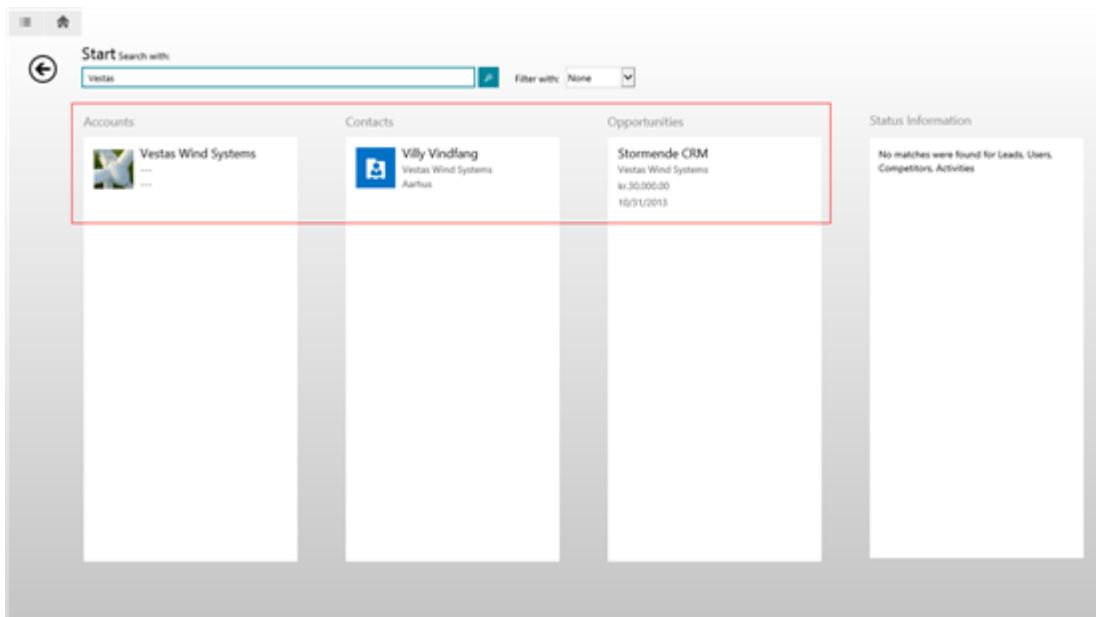
Search

In Quick Find you are able to search against one entity at a time.

The ability to search across multiple entities at once is new with this. When you perform a multi-entity Search, results are grouped by entity and sorted by the order specified in the Quick Find View for the entity.

It is important to understand that this feature uses the underlying Quick Find feature. The only thing that is different is the ability for the app to submit multiple Quick Find queries that are processed in parallel. The results returned for each entity would be the same as if you performed that same Quick Find search for the entity in the web application.

As with any Quick Find query the generated query uses a “starts with” condition. For example: If you search for “Fire”, it would return any results where the searchable columns were found to match records that started with those characters.



Accounts	Contacts	Opportunities	Status Information
Vestas Wind Systems	Villy Vindflang Vestas Wind Systems Aarhus	Stormende CRM Vestas Wind Systems u:30.000,00 10/9/2013	No matches were found for Leads, Users, Competitors, Activities

Views

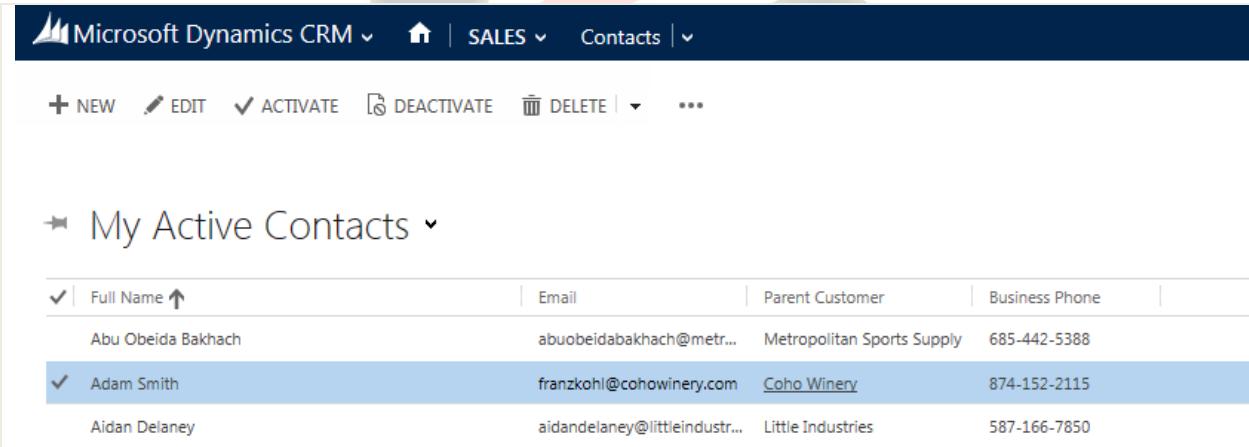
Microsoft Dynamics CRM shows lists of records in views. Each record type has a number of views known as system views.

Each view has a query that determines the records that will be shown in the view.

For example, the view My Active Contacts only shows the active contacts owned by the logged in user whereas the view Active Contacts shows all active contacts in the system.

The definition of each view also includes the fields that will be displayed from each record (column headings), and the default field to use for sorting.

Users can switch between views by clicking on the down arrow next to the view name.



Full Name	Email	Parent Customer	Business Phone
Abu Obeida Bakhach	abuobeidabakhach@metr...	Metropolitan Sports Supply	685-442-5388
Adam Smith	franzkohl@cohowinery.com	Coho Winery	874-152-2115
Aidan Delaney	aidandelaney@littleindustr...	Little Industries	587-166-7850

Users can create new views (known as personal views) specifying the view criteria, for example a list of accounts in a particular city using Advanced Find.

Users can share views with other users and teams.

In the Outlook client users can have multiple views available in tabs.

Advanced Find

Advanced Find is one of the most important tools to power users in Dynamics CRM. Advanced Find lets you create queries against almost any data in CRM.

You can create complex AND/OR conditions and link (join) records

Advanced Find queries can be saved and shared with other users. The saved queries are known as Personal views and are available within the UI in the view lists for the associated record type.

Lesson 4-2 Data Export and Import

Data Export

You can export data to Excel from any view or Advanced Find.

There is a privilege to restrict access to Export to Excel functionality within Security Roles.

You can export to:

- Static worksheet
- Static worksheet for all records in view
- Dynamic worksheet
- Dynamic pivot table

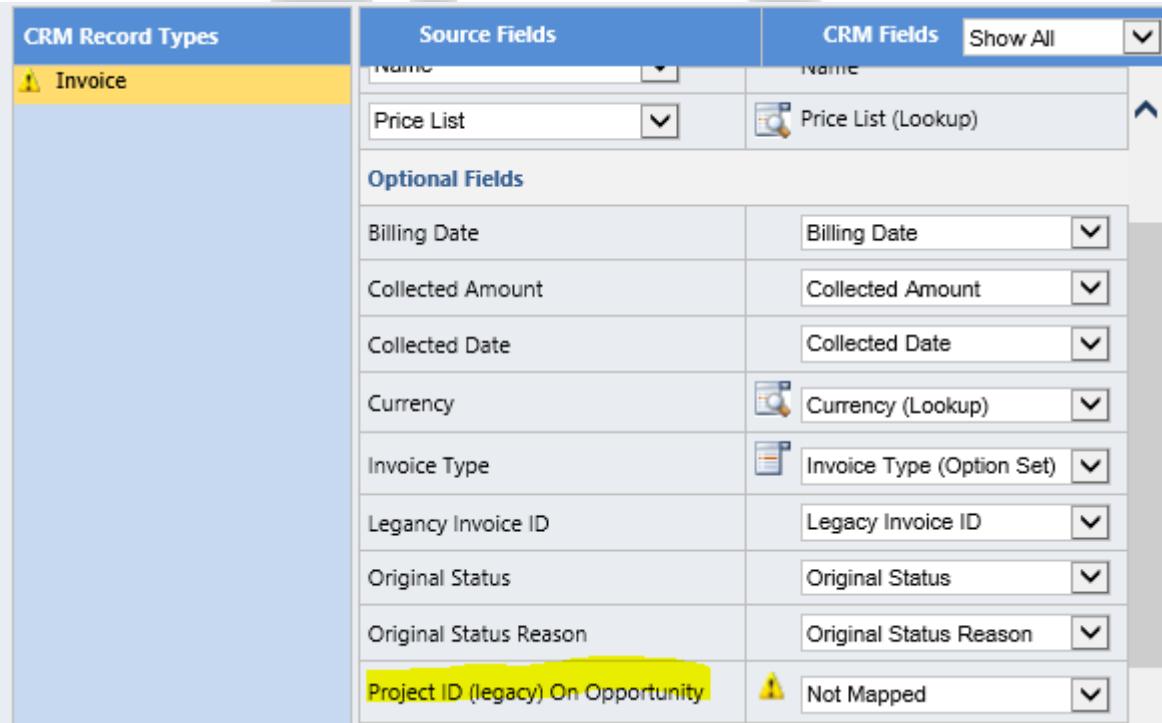
Data Import

You can import data into Dynamics CRM from text, CSV or XML file.

There is a privilege to restrict access to Data Import functionality within Security Roles.

Go to Settings > Data Management > Imports, and create a new Data Import job. The Data Import Wizard should pop up and you can upload your file.

When you go through the data import wizard, if you haven't created a data map for the file already, you will need to manually map the source fields to the CRM entity attributes.



The screenshot shows the 'Source Fields' and 'CRM Fields' mapping interface. The 'CRM Record Types' column on the left highlights 'Invoice'. The 'Source Fields' column lists various fields from the source file, and the 'CRM Fields' column lists their corresponding CRM attributes. A yellow box highlights the 'Project ID (legacy) On Opportunity' field in the source, which is mapped to 'Not Mapped' in CRM, indicated by a warning icon.

CRM Record Types	Source Fields	CRM Fields
Invoice	Name	IName
	Price List	Price List (Lookup)
Optional Fields		
	Billing Date	Billing Date
	Collected Amount	Collected Amount
	Collected Date	Collected Date
	Currency	Currency (Lookup)
	Invoice Type	Invoice Type (Option Set)
	Legacy Invoice ID	Legacy Invoice ID
	Original Status	Original Status
	Original Status Reason	Original Status Reason
	Project ID (legacy) On Opportunity	Not Mapped

If the column headings in the file match the names of the fields in CRM then the import will automatically select the field, otherwise you will need to select the field in CRM you want the data to be placed in.

You submit the job and CRM will process the file using the Asynchronous service.

Module 5 – Working with Dynamics CRM Processes

Objectives

The key objectives of this module are to provide an understanding of the different process in Dynamics CRM.

In this module we will cover:

- Workflows
- Dialogs
- Business Process Flows
- Actions

Lesson 5-1 Working with Dynamics CRM Processes

Processes

There are four process types in Dynamics CRM

- Workflows
- Dialogs
- Business Processes Flows (Guided Business Processes) – new in CRM 2013
- Actions – new in CRM 2013

Process: New Process - Microsoft Dynamics CRM -- Webpage Dialog

https://vigence.crm4.dynamics.com/sfa/workflow/workflowTemplate/workflowTemplatePage.aspx

Create Process

Define a new process, or create one from an existing template. You can create four kinds of processes: business process flows, actions, dialogs, and workflows.

Process name: * [Text Box]

Category: * [Text Box] Entity: * [Text Box]

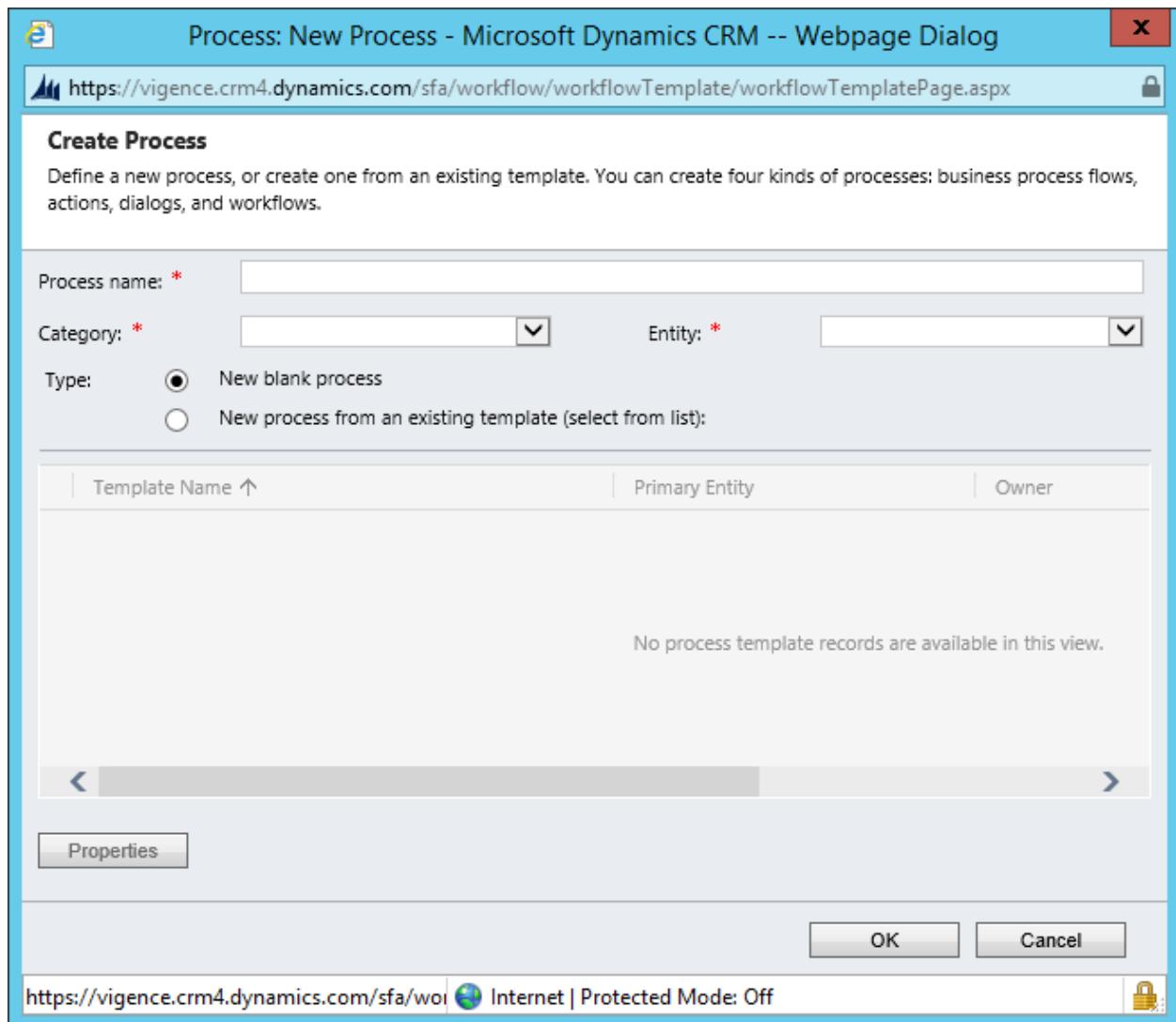
Type: New blank process New process from an existing template (select from list):

Template Name ↑	Primary Entity	Owner
No process template records are available in this view.		

Properties

OK Cancel

https://vigence.crm4.dynamics.com/sfa/wo/ Internet | Protected Mode: Off



Workflows

Use this process to model and automate real world business processes. These processes can be configured to run in the background or in real time and can optionally require user input. Workflow processes can start automatically based on specified conditions or can be started manually by a user.

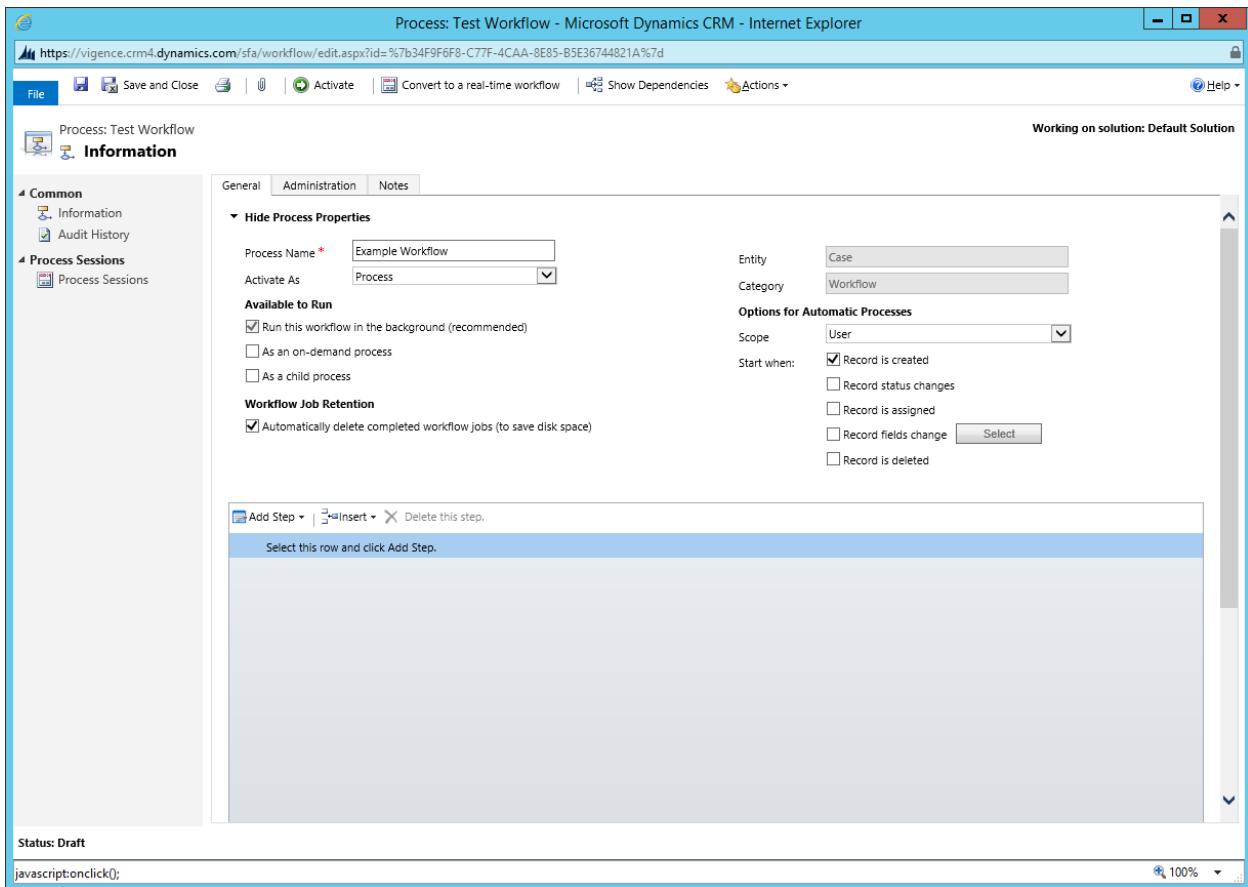
Workflows consist of conditions (If then Else and Wait) and actions (Create record, update record, send email, assign record).

Workflows are triggered by (some) changes (creation of a record, assigning of a record to a user, change of status, updating of a field) to data. Works can be run manually (on-demand).

Workflows are created for a single record type.

Workflows run on the CRM server

In CRM 2011 workflow processes always ran in the background requiring a user to reload the form to see the end result of the workflow. CRM 2013 has introduced the option for processes to run immediately and update the form in real time.



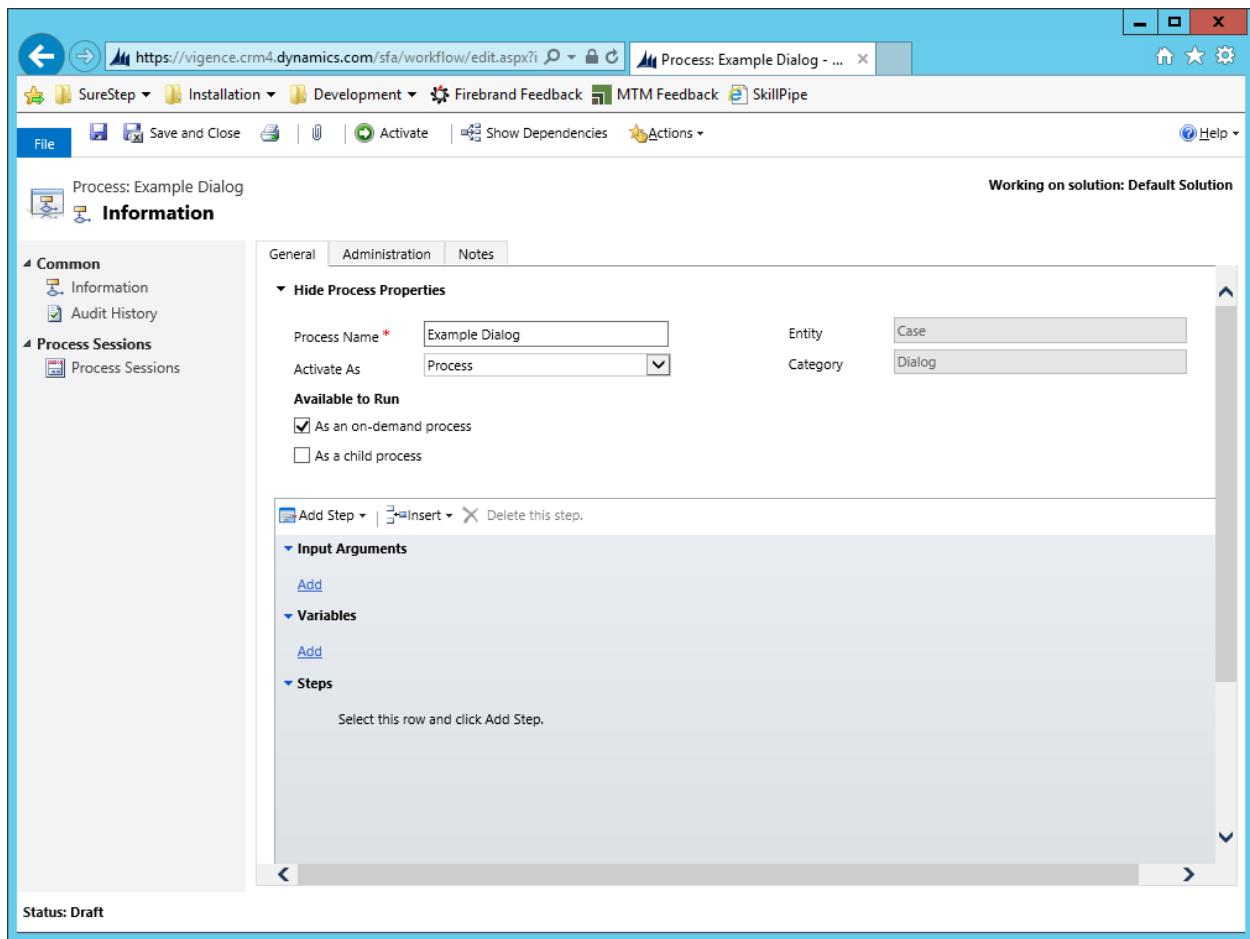
Dialogs

Use this process to create an interactive step-by-step data entry form that requires user input to start and run to completion. When you start the dialog process, a wizard-like interface is presented so you can make appropriate selections or enter data as you progress through each page of the wizard.

Dialogs are wizards that allow you to collect input from a user and then create or update records. They are particularly useful in initial data capture.

Dialogs share the conditions and actions with workflows.

Dialogs consist of Pages with one or more Prompt/Responses to capture user input.

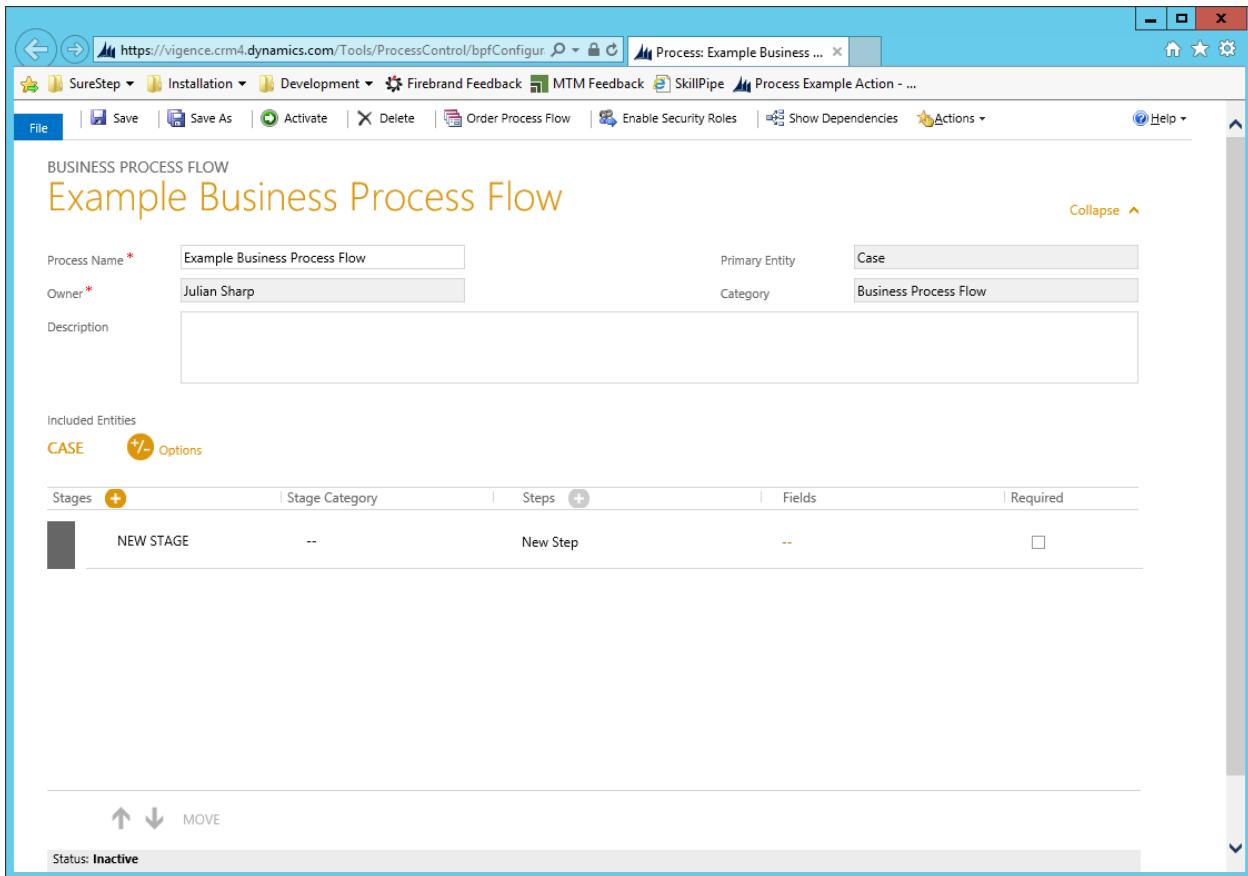


The screenshot shows the Microsoft Dynamics CRM 2015 interface for creating a new process. The title bar indicates the URL is <https://vigence.crm4.dynamics.com/sfa/workflow/edit.aspx>. The main content area is titled "Process: Example Dialog" and has tabs for "General", "Administration", and "Notes". Under "General", there's a section for "Hide Process Properties" where "Process Name" is set to "Example Dialog", "Entity" is "Case", and "Category" is "Dialog". There are checkboxes for "Activate As" (set to "Process") and "Available to Run" (with options "As an on-demand process" checked and "As a child process" unchecked). Below this are sections for "Input Arguments", "Variables", and "Steps", each with an "Add" link. The status is shown as "Status: Draft" at the bottom.

Business Process Flows

Use this process to create a visualisation of the business process flow. Users are guided through various stages of the sales or customer service processes. At each stage, you complete specific steps and then move to the next stage. You can customize the process flow by adding or removing steps, changing the order stages, or adding new entities to the process flow.

Multiple processes can be added to each record type - think sales process for inside sales vs. outside sales. A sales organization can make sure each required step in each pipeline phase is completed before moving to the next pipeline phase.



BUSINESS PROCESS FLOW

Example Business Process Flow

Process Name*

Owner*

Primary Entity

Description

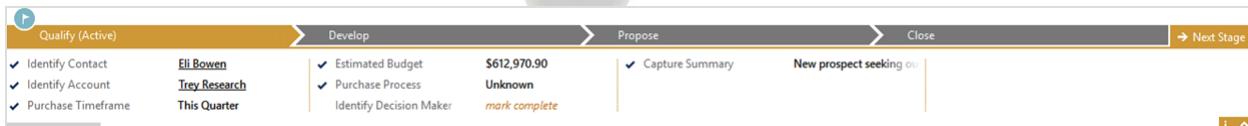
Included Entities **CASE** [Options](#)

Stages	Stage Category	Steps	Fields	Required
NEW STAGE	--	New Step	--	<input type="checkbox"/>

MOVE

Status: Inactive

As a user you will see a process bar at the top of the screen for many of the record types. With business processes, each stage for working with a customer is clearly outlined. Steps to complete your work are easy to follow.



Actions

Use this process to create a new operation that is not available in a stock Microsoft Dynamics CRM installation or to combine multiple disparate operations into a single operation. For example, in the case of a support call centre, you could combine create, assign, and setstate operations into a single new “escalate” operation.

<https://vigence.crm4.dynamics.com/sfa/workflow/edit.aspx?id=c1>

Process: Example Action - ...

SureStep ▾ Installation ▾ Development ▾ Firebrand Feedback MTM Feedback SkillPipe Process Example Action - ...

File Save and Close Activate Show Dependencies Actions Help ▾

Process: Example Action Information

Working on solution: Default Solution

Common

- Information
- Audit History

Process Sessions

- Process Sessions

General Administration Notes

Hide Process Properties

Process Name *	Example Action	Entity	Case
Unique Name *	new_ExampleAction	Category	Action
Activate As	Process	Enable rollback	<input checked="" type="checkbox"/>

Workflow Log Retention

Keep logs for workflow jobs that encountered errors

Hide Process Arguments

Name	Type	Required	Direction

Name *	Boolean
Type *	Entity
Required	<input type="checkbox"/>
Direction	<input checked="" type="radio"/> Input <input type="radio"/> Output
Description	

Add Step | Insert | Delete this step.

Select this row and click Add Step.

Status: Draft

Module 6 – Customer Service Scenarios

Objectives

Provide examples of customer scenarios where the Customer Service capabilities of Microsoft Dynamics CRM can be applied.

Understand and explain the basic record types utilised by the Customer Service functionality of Microsoft Dynamics CRM.

Lesson 6-1 Customer Service Scenarios

To better understand the context of the customer service module, let's review some real life customer scenarios.

Addressing and Solving Customer or Product Issues

Paul Cannon is a customer of Contoso Bicycles. He recently discovered that the suspension on his Contoso mountain bike is defective and is not functioning correctly. Paul contacts Contoso Bicycles to discuss the issue and to obtain help with his bike. The issue is logged in the Mountain Bikes Support Request Queue. Rob is the Mountain Bikes Support Specialist for Contoso Bicycles, and receives the issue through Microsoft Dynamics CRM. Rob will work with Paul to schedule a service activity to repair or replace Paul's suspension.

Receiving and Answering Customer Questions

Jim Glynn is a customer of Fabrikam Furniture. He recently received the new table he purchased through the Fabrikam website. Although Jim tries to assemble the new table, he is not sure if he is assembling the table correctly. Therefore, Jim contacts Fabrikam Furniture to ask questions and to obtain help with his table. The question is received by Sidney, a Customer Support Specialist at Fabrikam Furniture. Sidney uses the Knowledge Base in Microsoft Dynamics CRM to find a frequently asked questions (FAQ) document for the table. Then, Sidney uses the document to help answer Jim's questions.

Collecting and Applying Customer Feedback

Maria is the Products Manager for Tables and Chairs at Fabrikam Furniture. She wants to collect feedback about the at-home assembly process when customers contact Fabrikam. She uses the case management functionality of Microsoft Dynamics CRM to capture the feedback. She is also able to analyze the tables and chairs that are more troublesome for at-home assembly, and the products that are easier to assemble. Maria can also determine the instructions that must be prioritized for editing and review for the at-home sets of tables and chairs assembly.

Lesson 6-2 Record Types

Cases

Cases are the fundamental record type in service management and represent a single incident of service. Different organizations may refer to cases using different terms, including incident, ticket or service request.

A customer can have many cases associated with a record at any point in time. Within Microsoft Dynamics CRM, users have the ability to see open and resolved cases from the customer record. Cases can also have knowledge base articles, subjects, products and entitlements associated with them, or as dependent record types.

Knowledge Base Articles

The knowledge base is a repository of informational articles used to assist customer service representatives in the resolution of a case. A knowledge base article is based on an article template that defines the sections found in the article as well as any formatting that might apply. In some organizations, the knowledge base is also used to provide Microsoft Dynamics CRM users with information about the company, product questions and answers, and any other kind of information that can be used to better equip employees to better handle customer inquiries, requests or issues.

In addition to locating articles and associating them with cases, knowledge base articles can also be sent via email to a customer. These articles can be sent either via Microsoft Dynamics CRM's interface or through Microsoft outlook.

Entitlements

Entitlements are similar to contracts that are still available in Microsoft Dynamics CRM. However, entitlements, while they are similar to contracts in that they can be used to show the level and type of support a customer is entitled to, they do, however, allow greater flexibility which we will get into later.

Entitlement Channels

Entitlement channels can specify the type of service a customer is entitled to. There are five different entitlement channels: Phone, email, web, Facebook, and Twitter.

Service Level Agreements

Service level agreements are used to show a specific amount of time in which a customer is entitled to a response or particular products or services that they are entitled to as part of that service level agreement.

Queues

A queue is a place to organize and store activities and cases that are waiting to be processed. Microsoft Dynamics CRM includes queues and work flow tools designed to improve how incoming comes for sales or customer service or other parts of the business are actually handled. A queue can be thought of as a box where items can go into or picked up by someone to handle. For example, an organization might have a support team who uses an email address of support at Contoso.com. If the support team gets an email sent to this address, an email of the team handles the support case from there and works to resolve the issue for the customer.

Queues in Microsoft Dynamics CRM work the exact same way. While queues are commonly used along with a customer service module, other record types can be configured to use queues. The need to do this is defined by the organization and managed by a Microsoft Dynamics CRM administrator.

Subject Tree

The subject tree is a hierarchical list of subjects an organization can use to classify service cases and other records within the application. The subject tree is presented as a lookup field on the default case form and it's often used to classify cases.

Products

Products within Microsoft Dynamics CRM are found in the product catalog and can be related to a particular customer service case and can help to provide a more detailed view of cases, resolutions, and customer feedback at the product level. It is important to note that while products can be associated to a case to better categorize particular types of cases, there is no transactional aspect of cases that can leverage products for pricing or invoicing. In addition to the use of products along with cases, it is optional and might not be applicable to all organizations.

Goals

In addition to reporting on and analysing the information contained within Microsoft Dynamics CRM, organizations can use goal management features to establish and track progress against target values for key performance indicators. For service management, these might include metrics such as resolved or in process cases.

The Scheduling module

Microsoft Dynamics CRM includes a module for service scheduling. This module is technically part of the overall customer service module, but some organizations might not find it applicable to their business and will choose to not leverage that functionality. For those that do, there's a wide array of features and functionalities that can be used.

The scheduling module allows users to find qualified resources that are available to provide specific services to customers. For example, if a customer contacts a Microsoft Dynamics CRM user asking when they can have someone come to their location to provide a specific service, the user can create a service activity, and from there identify the service and the time frame they would like the service to be provided.

The scheduling module has a built-in scheduling engine that will search all resources, including facilities and equipment that are needed to provide the service and have availability to do so. Once the scheduling engine finds matches based upon that criteria, the Microsoft Dynamics CRM user selects those options and schedules the service.

There are many types of organizations that can find use in this type of module, including professional services, healthcare providers, or types of organizations that schedule resources to provide services to their customer.

Lesson 6-3 Service Module Configuration

This lesson provides the definition and examples for each primary term that is used throughout the Service Module setup. This includes some items for Customer Service and some items for Service Scheduling.

Settings

Within Settings there is a section called Service Management that is used for setup of the service module.

Case Based Settings



Queues

Create and manage service queues, and manage the membership of private queues. Establish criteria for automatic case creation.



Routing Rule Sets

Create or delete case routing rules. Change existing rule information, such as conditions, order, and actions.



Parent and Child case settings

Specify the information to be inherited from a parent case to child cases. Define case closure cascade settings between parent and child cases.



Automatic Case Creation Rules

Create and manage automatic case creation rules for CRM queues. Set up automatic case creation for email and social records that get added to a queue.



Subjects

Create and manage information in a subject tree. This helps to categorize an organization's cases to identify frequent requests and problem areas.

Queues are used as a repository for any item that needs to be worked on.

Routing rule sets automatically route cases to specific users or queues based upon certain criteria.

Parent and child case settings specifies information that is inherited from a parent to a child case and whether the child cases are automatically closed.

Automatic case creation rules determine when a case will automatically be created and in which queue it will go into.

Subjects are used to set up a categorization hierarchy that can be associated with your organization's products, literature, cases, and knowledge based articles, for example, if you are a company that supported different software products and different versions of a product, you could set up different types of software as part of the subject tree and then multiple versions under each of those subjects.

SLA Settings



Service Level Agreements

Create and manage service level agreements (SLAs), and associate them to a customer service schedule. Define failure and warning violation time, and the actions associated with SLAs.



Entitlements

Create and manage entitlements, and associate them with a customer. Define and manage entitlement terms of service for multiple channels.



Holiday Schedule

Create and manage a list of holidays for the customer service schedule. Associating the holiday schedule with a service schedule determines SLA time calculations.



Customer Service Schedule

Create and manage customer service schedules for the organization.



Service Configuration Settings

Set system-level service settings for your organization.

Service level agreements defines the level of support that a customer is entitled to, and they're used in conjunction with entitlements to determine to warn users that a case is close to expiring and when it already has expired.

Entitlements are an updated and more enhanced version of contracts in many ways that will allow you to define a number of hours or number of cases that a customer is entitled to.

Holiday schedules allow you to show when your company will be closed for the holidays so that service level agreement timers will not continue to be counting down.

Customer service schedule allows you to set up when your customer service personnel are actually available. This will be 24/7 or you can choose specific hours available during certain days.

Service configuration settings set system level configuration items such as disabling SLAs on cases.

Service scheduling



Business Closure

Create a list of holidays and other times when the business is closed.



Services

Add new services for service scheduling. Change service information and deactivate existing services.



Facilities/Equipment

Add facilities and equipment for service scheduling. Change information about resources or delete existing resources.



Resource Groups

Add new groups and new members to existing groups for service scheduling. Update group information and delete groups or group members.



Sites

Create new sites or office locations where service operations take place. Add and remove resources, change site information, or delete sites.

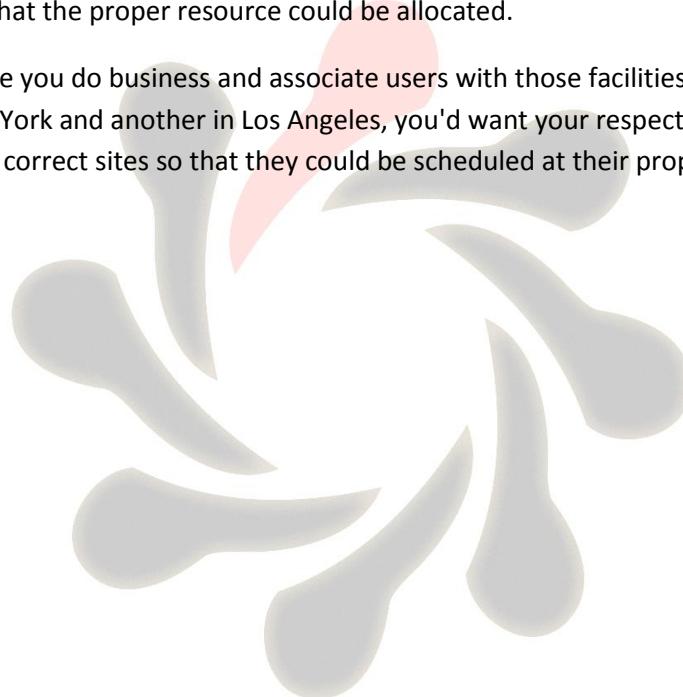
Business closures have been replaced with holiday schedules. This is still available, however, for Legacy uses.

Services allow you to set up the types of services which you'll perform. For example, if you are a software consulting firm, you may enter a service for demonstrations and another for software development.

Facilities and Equipment capture different types of equipment required for different services. For example, if you were doing car repairs at your business, you could schedule different equipment for an oil change compared to a tire rotation.

Resource groups are different skill sets within the application. In the same example for demonstrations and software development, you would want to associate different users with each of these services so that the proper resource could be allocated.

Sites are places where you do business and associate users with those facilities. For example, if you had an office in New York and another in Los Angeles, you'd want your respective employees associated with their correct sites so that they could be scheduled at their proper location



Module 7 – Case Management

Cases are the basic record type in service management. They represent a single incident of service.. Different organizations may refer to cases using different terms, including incident, ticket, service request, and many others. A customer can have many cases associated with their record at any point in time.

Within the application, users have the ability to see open and resolved cases, depending upon their security roles. Cases can have many other record types tied to them, such as knowledge base articles, products, entitlements, and many others.

In addition to these related entities, users can track communications or activities against these cases. This module will explore the details of working with a case record type within Microsoft Dynamics CRM.

Objectives

The objectives of this module are to:

- Explore the steps that are required to create a new case
- Discuss the case to resolution process and how it can be used effectively
- Examine the effects of activities and the procedures to use the knowledge base

Lesson 7-1 Creating Case Records

Case records can be created in many ways, including the following:

- Cases can be created manually
 - Quick Create
 - Case Form
 - Phone Support
- Cases can be created by converting an activity record, such as a telephone call or an email message. The main advantages of this method are to preserve the information that is contained in the activity and to maintain a record of the originating activity.
- Cases can be created automatically by a workflow process.
- Cases can be created by a dialog process, in which a series of prompts are presented to a Microsoft Dynamics CRM user and the responses provided are used to automatically create a case record
- From email automatically using case creation rules
- From a social post



Figure 1 - Case form

Adding Posts, Activities, and Notes

In the Collaboration Area of the Case form, users can enter and manage Posts, Activities, and Notes. The collaboration area is an easy way to determine what occurs with the case and the types of internal and external collaboration that has already occurred.

Posts

Posts are used for internal collaboration that relate to a record in Microsoft Dynamics CRM. If the organization is using Yammer, this can be integrated with Microsoft Dynamics CRM and used in the Post area instead. When users view and interact with Posts, they can create new, same as, or reply to existing posts. This functionality resembles other types of social media tools that are available online. However, this is more an internal, organization-wide social networking tool that is used to have a better collaboration on customer relationship management records. If there is a particular case that the user wants to follow, the user can also do this. How to follow a case is covered in detail later in this module.

Activities

In a case, users can create, view, and manage Phone Calls, Task, Appointments, and Email messages. Although the user can create an activity the same as in the application, the user can also create a Phone Call activity by clicking the Phone Number in the Customer Details pane of the Case form. If the user has Skype or Lync installed and configured, this automatically dials that number by using the respective application.

Notes

In notes, users can add text that describes the customer's issue, suggestions, and the steps that are used to resolve the problem, or any additional information about the case. Notes appear with the current note at the top of the list. Notes are time and date stamped automatically, and the person who created the note is also listed. Notes can also be used to attach documents directly to a case. The default maximum size of an attachment is 5 megabytes (MB).

Although you can increase this to 9 MB, this might be a limitation for some organizations. The alternative is to implement the integration between Microsoft SharePoint and Microsoft Dynamics CRM as a way to track documents that have a case that is in a structured manner.

Converting Activities into Cases

In some cases the information that is required to create a case is already contained in an activity, such as an email message, telephone call, or appointment. In these situations it is easier to convert that information into a case than it is to create a new case and re-enter the information.

The Convert Activity command is used to convert the following activity type records into cases:

- Appointments
- Email Messages
- Faxes
- Letters
- Telephone Calls
- Service Activities
- Tasks
- Custom activity types

Automatic Case Creation

Case creation rules can be used to automatically create cases based upon certain criteria from emails.

Make sure that you have the Customer Service Manager, System Administrator, or System Customizer security role or equivalent permissions.

When a case creation rule is activated, a corresponding workflow is created automatically. If you create or assign a rule, you must have permissions to perform the same action on workflows. The case creation rule is applied and a case is created in context to the permissions that the owner of the case creation rule has.

1. On the nav bar, choose Microsoft Dynamics CRM > Settings.
2. Choose Settings > Service Management > Automatic Case Creation Rules.
3. To create a new case creation rule, choose New.
4. Type or modify information in the fields.

- Name. Type the name of the queue the rule is defined for.
- Source Type. Select Email to indicate that cases will be created automatically from email messages.
- Queue. Select the queue that the rule applies to. For example, if you want to convert email messages and then send them to the Support queue, select that queue here.

You can associate only one rule per source type to a specific queue. If you're creating a rule to convert an email to a case, make sure you specify an email address for this queue. Otherwise, automatic case creation for email won't work.

5. In the Specify Conditions for Case Creation section, select the conditions for creating the case automatically. You can add multiple conditions here and arrange them in the desired order. The conditions are considered in the same order. Only one item that has conditions matching the incoming email is applied.
 - Create cases for email from unknown senders. If you select this check box, all email messages from unknown senders (a sender whose email address is not present in any CRM records) are converted to cases. A contact record is also created for this unknown sender
 - Create case if a valid entitlement exists for the customer. If you select this check box, Microsoft Dynamics CRM creates a case only if an active entitlement exists for the customer.
 - If the sender of the email is a contact with a parent account, Microsoft Dynamics CRM creates a case if the contact's parent account has a valid entitlement, and the contact is listed in the Contacts section of the entitlement or if the Contacts section is empty (which means the entitlement is applicable to all contacts for the customer).
 - Create cases for activities associated with a resolved case. If you select this check box, Microsoft Dynamics CRM creates a case if the email is related to a resolved case. If the email is related to an active case, a new case won't be created.
 - Create case when the case associated with the activity is resolved since. If you select the Create cases for activities associated with a resolved case check box, select the duration here. Microsoft Dynamics CRM creates a case only if the case is resolved earlier than the duration you specify. If the incoming email is related to a case resolved later than the specified duration, Microsoft Dynamics CRM only associates the incoming email with the existing resolved case; a new case won't be created.
 - Under Specify Autoresponse Settings, select the Send automatic email response to customer on case creation check box if you want to automatically send email responses to the sender of the email after a case for the email is created.

Select email template to respond to customer. If you select the Send automatic email response to customer on case creation check box, select an email template (global email template or email template of case entity type). If you don't select a template, an automatic response won't be sent.

6. Choose Save.
7. In the Specify Case Details section, define the conditions for creating a case and specify the case properties.
 - o In the Specify Case Details section, choose +, and define the conditions for creating a case and specify the case properties.
 - o In the Conditions section, specify when the case should be created.
 - o In the Case Properties section, set the properties for the case.

By default, the Title field of the new case is set to the subject of the email and the Customer field is set to the sender of the email. If the sender of the email is a contact with a parent account, the Customer field is set to the parent account, and the Contact field is set to the sender of the email.

Once a case is created, the incoming email is removed from the queue.

Lesson 7-2 Managing Case Records

Routing Cases

Use routing rules in Microsoft Dynamics CRM to automatically route the cases to the right people on the right time without any manual intervention. You can also use routing rules to route cases that are escalated to specific queues.

When you create and activate a routing rule set, internally a corresponding workflow is also created. Whatever action you do on the routing rule set, like creating or assigning the rule, you must have privileges to perform the same action on workflows. For the rule to work, you must have sufficient privileges to run a workflow. The routine rule set is applied in context of the privileges that the owner of the routing rule set has.

Only one routing rule set can be active at any point of time. If you try to activate another rule when one rule is already active, it will deactivate the currently active rule. You can activate or deactivate only the rules that you own.

Apply a routing rule set

An active routing rule set automatically applies to all automatically-created cases.

To manually apply the rule to existing or manually-created cases, in the list of cases, select the cases that you want to route using this rule, and on the command bar, choose Apply Routing Rule.

Parent and Child Cases

You can manage multiple cases more efficiently if you use parent and child cases in Microsoft Dynamics CRM. When you need to track a case where work needs to be done by other departments or when you need to track the same issue for multiple customers, you can open a primary case called the parent case, and then create secondary cases called child cases.

For example, if you get a service request to install new electrical and gas connections, this requires work to be done separately by the gas and electric department. In this situation, you can open two child cases, one for the gas and the other for the electric department. The original case is marked as the parent case. Once the child cases are resolved, you can then close the parent case.

Similarly, you can create parent and child cases when multiple customers call in about the same issue, for example, a network outage. Instead of creating a new case for each customer, you can create a parent case to track the main network outage with the Network Operations team, and then create child cases when customers call in about the issue.

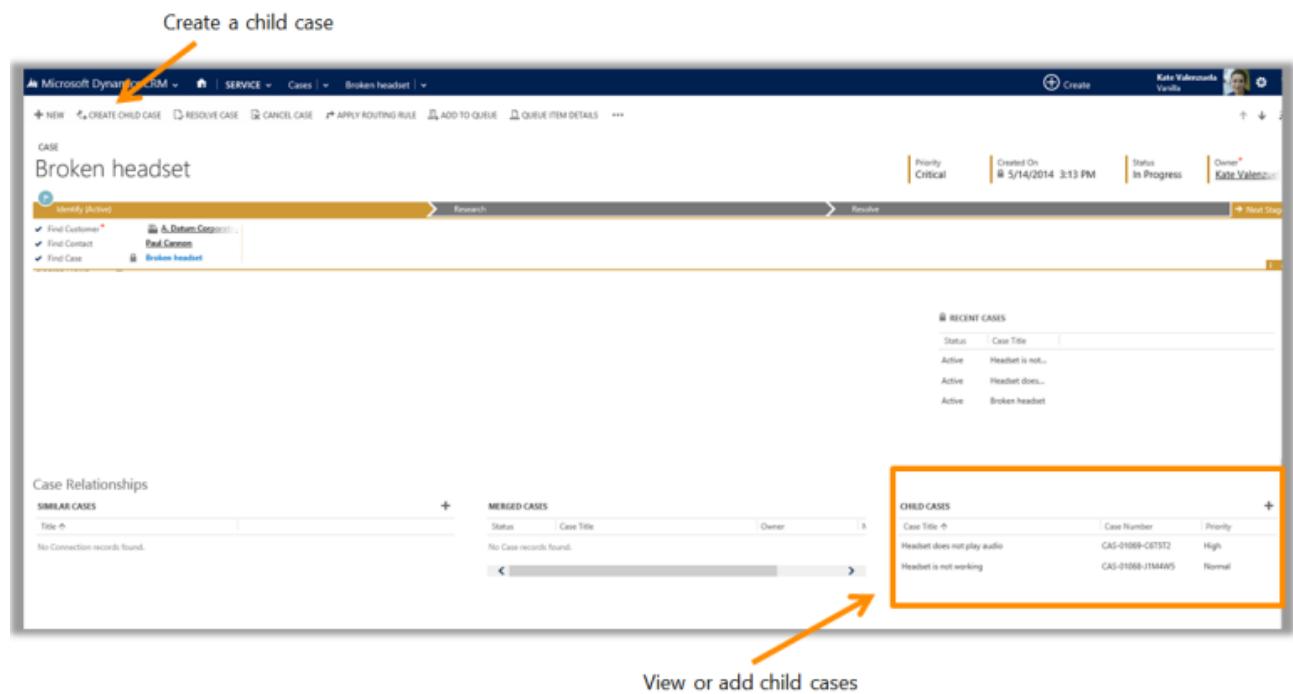


Figure 2 - Child Cases

Merging Cases

Eliminate redundancies between similar cases in Microsoft Dynamics CRM by merging them into one case. When a customer opens multiple cases about the same issue (through different support channels) or when multiple customers from the same account call in about the same issue, you can merge those cases into one case so everything's visible in one place.

For example, when a customer or multiple customers from the same account submit a case on the web and also call in about the same issue, you can merge the cases into one case instead of keeping track of multiple cases.

When a case is merged, the state of the case is changed to canceled and the status is changed to merged. This is because it is merged into another case and all of the open case activities, emails, and attachments are now associated with the case it was merged into. By default you can merge up to 10 cases at a time.

A few things to remember when you merge cases with parent and child relationships:

- When you merge a case that has child cases, then those child cases become child cases of the parent case they were merged into.
- You can only merge a child case into another child case if both of the child cases have the same parent case.

Lesson 7-3 Resolving Cases

Find a solution from similar cases

The Similar Cases area of the case form lets users search for other resolved cases with the same Subject value. When the application returns the results, the user can view related Posts, Notes, and Activities that might help the user resolve the case. When the user selects a case or several cases whose resolution steps might help resolve the case the user is working on, the window creates a Connection record that links the open case to the record or records that the user selects as possible resolutions.

To add a similar case to an open case, follow these steps.

- Click the Add a Connection button. This button resembles a “plus” symbol (+).
- On the Find Similar Cases window, search for related cases and view their activities, posts, and notes to determine whether it is a solution.
- After the case is found to associate as a solution, click Found Solution.

Resolving Cases

Cases can be resolved in many ways. Sometimes the issue could be resolved without having to do research or use other resources. However, sometimes the CSR must perform research on the issue to determine how other CSRs resolved similar issues by checking the knowledge base. Sometimes the issue might have to be escalated.

A case cannot be resolved until all activities that are related to the case, such as telephone calls, letters, appointments, or email messages, are completed. This prevents anyone from accidentally closing a case before all workflow or mandated activities are finished.

An organization can use Microsoft Dynamics CRM to increase the collection of data that surrounds interactions with customers. When a case is resolved, the total time that is spent on a case is either input manually or is calculated from the total of all activity durations for the case. This data can be used by companies to determine the issues that require longer resolution times. Comparing this data with the subject of the calls can help identify the typical trends, and issues with products and services.

After all the activities that are associated with the case are resolved, the status of the case can be changed to Resolved.

Case Resolution Activities

After all related activities to a case are resolved, the case can be resolved. After the case is resolved, an activity type named Resolution Activity is created. This activity is found in the closed activities

that are associated with the case. The Resolution Activity displays the case's resolution. It also shows how much time is spent on the case that is displayed as "Billable" time.

Resolve a case with a parent and child relationship

Depending on your settings, a case with a parent and child relationship can be closed in one of the following ways:

- When all the child cases are resolved, you can then close the parent case.
- When you resolve the parent case, it will then resolve all the active associated child cases.
- A parent and child case can be closed independently of each other. This is the default setting

Deleting and Cancelling Cases

Sometimes, a customer might contact the organization and require that a case is created in Microsoft Dynamics CRM. However, there are occasions when the customer changes its mind and no longer needs assistance. Users of the application have two choices—Cancel or Delete the case.

Although a case can be deleted, doing this removes all activities, notes, and attachments that are linked to the case. Additionally, this is a permanent action. Therefore, the record of the customer's issue is lost. Unless you are sure that the record will not be needed in the future, a better choice is to cancel the case. Also, many organizations configure the security roles in Microsoft Dynamics CRM so that users cannot delete cases. This helps avoid incorrect deletions.

Reactivating Cases

The customer service representative worked with a customer, resolved the issue, and closed the case. Now, the customer called back and the issue is related to the earlier, resolved case. Instead of opening a new case, the user can reactivate the original case.

Lesson 7-4 Subject Tree

The subject tree is central to service management. Service management cases are always associated with a subject. Similarly, Knowledge Base articles are associated with a subject from the tree.

The subject can also be used to determine routing or case assignment by using workflow or other processes. Finally, the subject tree is used in reporting to categorize and view Knowledge Base articles and information about cases.

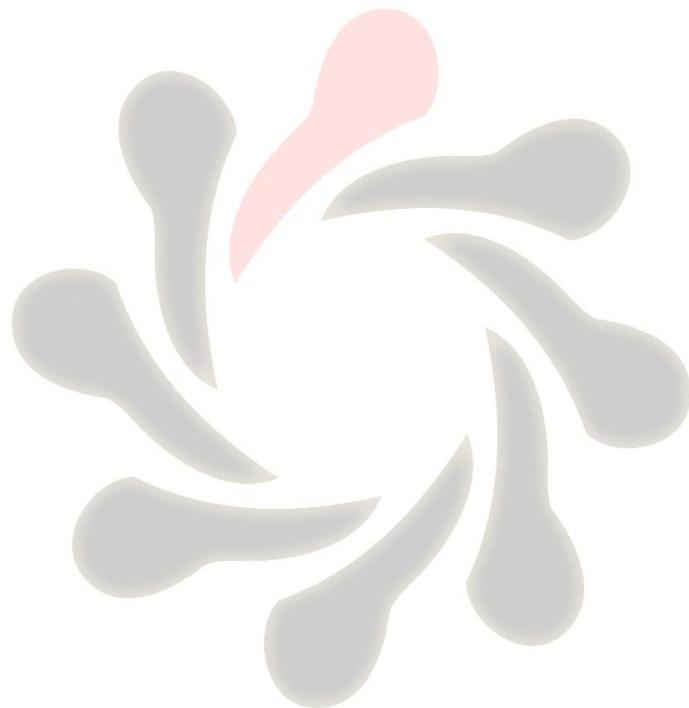
The subject tree is a hierarchy of subjects or categories that provides a structured approach for grouping and managing information. The hierarchy is unique to the organization and has no information until the subject tree is created. You should work with the organization to carefully assess its case management goals and processes and how it currently routes and handles cases. Use this information to design a subject tree that meets the organization's needs.

Subjects cannot be deactivated.

Subjects are used with:

- Cases
- Articles

- Product
- Sales Literature



Module 8 – Knowledge Base

Most customer service organizations use a knowledge base to provide customer service representatives (CSRs) with the information that they must have to answer questions about a product or service. In Microsoft Dynamics® CRM, the Knowledge Base provides a central repository for an organization's information, stored as Articles and organized by Subject.

The knowledge base provides the following benefits for storage of information:

- Stored in a central location
- Consistently formatted
- Visible to all in the organization
- Searchable by full text or keywords

Microsoft Dynamics CRM provides the tools and templates to create, edit, and publish browser-based content about an organization's products and services.

This module explains the knowledge base and discusses how organizations can browse, locate, and share information in the repository. This course starts by creating article templates and then discusses other activities that are related to knowledge base management, such as publishing and un-publishing knowledge base articles, and searching and using the information that is contained in knowledge base articles.

Objectives

The goals of this module are to:

- Explain the Microsoft Dynamics CRM Knowledge Base, Knowledge Base concepts, and the life cycle of Knowledge Base articles.
- Create Knowledge Base article templates.
- Create and submit Knowledge Base articles.
- Approve, reject, and publish Knowledge Base articles.
- Find information in the Knowledge Base

Lesson 8-1 Article Templates

All Knowledge Base articles are based on Article Templates. A template provides structure for articles and determines how the article is displayed. An important benefit of article templates is that they enforce the consistent presentation of important information.

By default, Microsoft Dynamics CRM contains four templates on which articles can be based: These templates include the following:

- Procedure
- Question and Answer
- Solution to a Problem
- Standard Knowledge Base Article

These built-in templates can be modified, and additional templates can be created.

Article Templates

Templates are made up of titled sections where text is positioned when the article is created. Each titled section provides a description box where the template author can enter the instructions to guide the user who creates the article on the type of information that should be entered in the article.

Users who have sufficient security permissions to access article templates can do so.

Deactivating and Deleting Templates

When an article template is created and saved, its status is set to Active. Active article templates can be deactivated or deleted.

Remember the following when deactivating or deleting article templates:

- Deactivating an article template has no influence on any published knowledge base articles that are based on that template.
- When an article template is deactivated, no new articles can be published that are based on that template.
- An article template can be deleted. However, an article template can only be deleted if there are no articles based on the template

Lesson 8-2 Creating, Approving and Publishing Articles

A user with sufficient security privileges can create and manage articles from the article grid

Articles with a status of either **Draft** or **Unapproved** are by default not visible to most users. Articles with a status of **Published** are by default visible to all users within an organization

Article Approval Process

A built-in work process is used to create knowledge base articles. The article experiences the following stages:

1. When an article is first saved, it has a status of **Draft**. Draft articles can be edited, and they can be submitted for approval.
2. When a draft article is submitted for approval it has a status of **Unapproved**. Unapproved articles can be edited, and they can be approved or rejected.
 - a. If an unapproved article is approved, its status changes to **Published**, and it is visible to the whole organization and appears in search results.
 - b. If an unapproved article is rejected, its status changes back to **Draft** and it is available for editing.
3. When an article is approved, it has a status of **Published**. A published article cannot be edited. It can be unpublished, and then its status value returns to Unapproved.

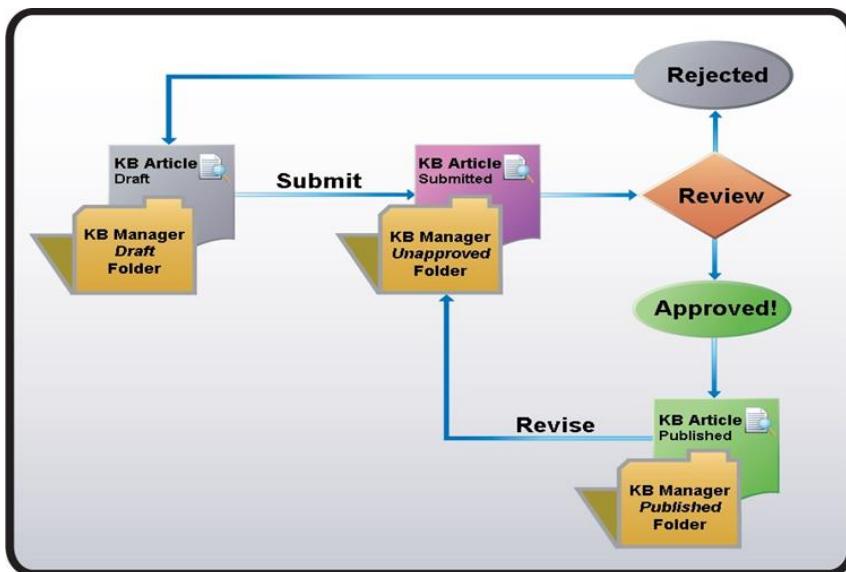


Figure 3 - The Knowledge Base Life Cycle

Lesson 8-3 Using and Searching the Knowledge Base

By default, when an article is published, it is visible to all members of an organization through a grid that is similar to the grids for other record types in Microsoft Dynamics CRM. In addition to standard functionality that is available through the Ribbon, Knowledge Base articles have a special Search Tools tab that is designed specifically to search for articles.

Knowledge Base articles can be accessed in the following ways:

- Through Articles under Service
- Through Advanced Find
- From a Case form

Users who have permissions to publish Knowledge Base articles can access and search articles through the Service area. This is identical to how all other users can access and search articles through the Service Area.

Search Fields Available in the Knowledge Base

Whether the knowledge base is being searched from the Service Area or from a case record, the search experience is the same. One or more search criteria can be specified to find the article that is related to the information that the user is seeking.

There are four text fields used to search articles. These fields include the following:

- Full Text Search: Searches the complete Knowledge Base based on the value that is entered in the Search For field.
- Keyword Search: Limits the search to the data that is entered in the Keywords field of the data article.
- Title Search: Limits the search to the Title field of the articles in the Knowledge Base.
- Article Number Search: Limits the search to the system-generated article number that is created when an article is created.

The alternative to searching any of these text fields is to use the Subject Browse method to search for articles. The articles can be browsed by subjects.

Cases and Knowledge Base Articles

Many customer service organizations use knowledge base articles to help resolve cases. Microsoft Dynamics CRM contains many features that are used for this important functionality. This lesson shows how to search knowledge base articles from case records. The case records can provide important information to customer service representatives as they work to resolve cases.

Searching Articles from Case Records

Knowledge base articles are frequently used by customer service representatives as they work to resolve customer cases or issues. Microsoft Dynamics CRM includes a convenient built-in search capability that is available from the Case form.

Sending Knowledge Base Articles

With Microsoft Dynamics CRM, articles in the Knowledge Base can be easily shared in an email message to help resolve customer issues. There are several options that can be used to send articles depending on how the article is being accessed. Whether a user works in the knowledge base, the case, the CRM email activity, or the Outlook client, an article can be inserted into the body of the email message and the article can be shared with contacts, leads, accounts or other users.

Options for emailing an article

- From a Case Record
- From the Knowledge Base (using View in HTML)
- From an Email Activity (CRM)
- From Outlook

Module 9 – Queue Management

Objectives

The goals of this module are to:

- Explain the differences and the details of Default/System Queues and Personal Queues.
- Create and maintain Queues and Queue Items.
- Work with Routing Queue items. This includes Adding, Working on, and Releasing.

Lesson 9-1 Queue Management

Queues can be used to manage work items, such as cases, activities or other record types. By default, Microsoft Dynamics CRM users have personal queues that can be used to route important activities and records assigned to each user. Additionally, shared queues can also be used to support service management in a team-based collaborative environment. Cases are frequently routed to queues as part of an automated service management process. This lesson will focus on how to create, manage, and use queues in the Customer Service module of Microsoft Dynamics CRM.

Understanding System Queues and Personal Queues

Queues are containers for work items, such as cases, activities or other record types. Both users and teams have default queues and these can be used for routing important items. Additionally, shared queues can be created by users who have sufficient security permissions. These shared queues can be made visible to all users in an organization, or the share queues can be secured so that only certain users or teams have access to the items they contain.

When users and teams are added to the system, each new record is configured by using a "default queue". Although most record types in Microsoft Dynamics CRM can be customized to support queues, only cases and activity record types are preconfigured with support for queues.

Create and Maintain Queues

Some of the most important tasks involved in managing Microsoft Dynamics CRM queues include the following:

The default queues for each user and team are automatically created when the user and the team records are created. Users who have sufficient security permissions can create additional queues for collaborative queue item management.

A queue can have an associated email alias. System settings can be used to specify whether a queue with an email alias is approved to accept incoming email items.

When a queue is created it has a status of Active. Queues can be deactivated, and can also be reactivated when this is necessary.

If it is necessary, queues can be deleted. However, a queue cannot be deleted if it contains queue items.

Adding Cases and Activities to Queues

Case and activity record types are automatically enabled for queue routing. By default, for example, when a user must send a case to a queue, such as a support queue, the functionality that is required to manage this process is already available in the Microsoft Dynamics CRM interface.

Work with Queue Items: Routing

Organizations can use both personal and shared queues to support their sales and service processes. For example, a sales manager might route cases to a shared queue, and then inspect queue items and select some queue items to be routed to a user's personal queue. Routing records from one queue to another queue lets organizations manage their business operations as it relates to their customer relationship management strategy.

In Microsoft Dynamics CRM, routing a record from one queue to another queue can be done manually. This is outlined in the Add a Case to a Queue demonstration. Or, items can be routed by using Workflows or a Dialog box.

Work with Queue Items: Work On

A queue item has a Worked By field that can be used to assign the working responsibility for a queue item to a user. Assigning a user or a team to the Worked By field (by clicking the Work On toolbar button) does not change the owner of the underlying record. After the tasks that are required by the Worked By assignee are performed, the queue item can be released. You release the queue item by clicking Release on the command bar.

Work with Queue Items: Release and Remove

Queue items can be Removed from a queue at any time by a user who has sufficient security permissions. When a user removes a queue item this does not affect the record. Do not confuse this with the Delete command on the queue toolbar, because this removes the item from the queue and it also deletes the original record.

Releasing an item from the queue removes the person's name who is currently working on the record. For Example, Connie Watson will be on vacation for two weeks, and she wants to either give her Coho Winery cases to someone specific or release the cases so that other people on the Tier One Support team who manage the queue can work on these cases. In this scenario, Connie will release the cases, and remove her name as the person who works on the cases. Now, other people will know that the cases are available so that they can start to work on the cases.

Work with Queue Items: Queue Item Details

The Queue Item Details form is a form that can be customized and is designed specifically to display and manage information about the queue item, not the original record.

Module 10 – Entitlements and SLAs

Microsoft Dynamics CRM provides many features organizations can use to manage services they provide to their customers. In this module you'll learn about entitlements and Service Level Agreements and how they can be used along with other record types within the application to accommodate service management functions.

Objectives

In this module we will cover:

- Understanding Service Level Agreements or SLAs
- Understanding and explaining the components of entitlements.
- Creating and managing entitlement templates.
- Creating and managing entitlements.
- Understanding the role of entitlement channels.
- And associating entitlements with cases and understand the case resolution process when entitlements are used.

Lesson 10-1 SLAs

Service Level Agreements also known as SLAs are a way of tracking and defining what should happen when a case is opened within Microsoft Dynamics CRM 2015.

In this lesson, the objectives are:

- to gain a working knowledge of Service Level Agreements
- to understand how and why to use them.

What is an SLA?

Service Level Agreements help meet service levels when providing support. In other words, within these SLAs we can define when should somebody, by what time period should somebody follow up on a support case and what's an acceptable level of that follow-up time.

We can track indicators like first response time and resolution time for every case. We can have configurable interfaces to model different KPIs or Key Performance Indicators based upon different case attributes. And finally, through Service Level Agreements, we can define actions when KPIs are not met.

For example, what happens if we don't hit the first response time? Is the case escalated? Is somebody emailed? Is the customer notified? Is the case rerouted to another queue or another user?

Define service level agreements (SLAs)

Define the level of service or support that your organization agrees to offer to a customer by using service level agreements (SLAs) in Microsoft Dynamics CRM. Include detailed items to define metrics or key performance indicators (KPIs) to attain the service level. KPIs help you get a timely warning on your team's issues while providing support.

You can associate an SLA with an entitlement so that when an entitlement is added to a case, the associated SLA is also applied.

Alternately, you can set up a default SLA for the organization.

Standard vs. enhanced SLAs: What's the difference?

Microsoft Dynamics CRM lets you create two types of SLAs: Standard and Enhanced. Enhanced SLAs have some additional capabilities that the standard SLAs don't have.

With an enhanced SLA, you can

- Pause an SLA when the case is on hold, so that the time the case is on hold isn't considered in SLA calculations.
- Add success actions to an SLA. For example, you may want to send communication internally or outside your organization when the SLA has succeeded. Success actions are initiated only when the success condition is met on time, not when it is breached.
- Track SLA statuses and times right on the case form by default. These details are tracked through the SLA KPI Instance record type.

Create a standard SLA

1. Make sure that you have the Customer Service Manager, System Administrator, or System Customizer security role or equivalent permissions.

When you activate an SLA, a corresponding workflow is also created. Whatever action you do on the SLA, you must have permissions to perform the same action on workflows. The SLA is applied in context to the permissions that the owner of the SLA has.

2. Go to Settings > Service Management.
3. Go to Service Level Agreements.
4. To create a new SLA, on the command bar, choose the New button.
5. Fill in your information:
 - Name.
 - Applicable From. Select the case field that specifies the date and time from which the SLA items will be calculated. For example, if you choose the Created On field, the calculations for service level agreements will start from the time the case is created.
 - Business Hours. Select a customer service schedule record that defines your support organization's business hours. This is useful in the SLA time-tracking calculations. If a business hours record (customer service schedule) isn't selected, the work hours are considered as 24 x 7.
 - SLA Type. Select Standard.

- Allow Pause and Resume. Select Do Not Allow. Because standard SLAs do not support pausing and resuming of SLAs, you can set this field to Allow only when you're creating an enhanced SLA.

6. Choose Save.

7. To add SLA details, in the SLA Details section, choose the Add button

You add SLA details to define the key performance indicators (KPIs) or metrics for the service level agreement. You can define any KPI as per your organization's requirements. For example, a KPI could be that all cases for standard customers must be resolved within five days of case creation.

Define success criteria and the failure and warning actions that need to be taken when a service level metric isn't met for a customer case.

SLA KPIs are performance indicators that you'd like to track, for example First Response or Resolve By. SLA items refer to SLA KPIs based on specific conditions. You can add multiple SLA items and arrange them in the order that works for you. For any given KPI, only the first SLA item that matches the conditions in the Applicable When section is applied.

8. Fill in the information in the New SLA Item form:

- Name. Type a meaningful name.
- Related Case Field. Select a field of DateTime type of the case record that this SLA item refers to. For example, if you are creating a KPI for sending the first response within a specified time, select the First Response By option from the drop-down box. If required, ask your system customizer to create new fields of type DateTime.
- When a case record is created or updated, in the case record this field is set to the date and time when the failure time will be reached for the respective SLA item. For example, select First Response By in Related Case Field, and set Failure After to 2 hours from case creation. If the case is created at 09:00, the First Response By field in the case record will be set to 11:00, assuming the business hours are 24*7.
- In the Applicable When section, define the conditions under which the KPI will be applicable. The condition can be based on case or related entity fields.
- In the Success Criteria section, specify the conditions to define when the KPI will be considered as met. For example, the conditions could be:
- Under SLA Item Failure, in the Failure After drop-down box, select when the SLA items will be considered as failed. For example, if you select 1 hour, the KPI will be considered as failed if the first response is not done within 1 hour of case creation. 1 hour is calculated based on the value in date/time field that you select in the Applicable From field of the SLA record.
- In the Failure Actions section, choose Add Step and specify the actions that will be taken when the success criteria isn't met and the case has exceeded the specified failure time. For example, to mark the case for escalation when the KPI has failed, choose Add Step > Update Record. Then select Case, and choose Set Properties.

Now in the case record, change the value of the Is Escalated field, and close the case form.

- Under SLA Item Warning, in the Warn After drop-down box, select when a warning is to be raised for the KPI nearing violation.
- In the Warning Actions section, choose Add Step and specify the actions to be taken when the KPI reaches the warning time. For example, to warn the case owner about the KPI nearing violation, choose Add Step > Send Email. Then select Create New Message, and choose Set Properties. Now in the email record, specify the email details, and close the email form.
- The time for failure and warning is calculated after considering the business hours selected in the SLA record. If a business hours record (customer service schedule) isn't selected, the work hours are considered as 24 x 7.

9. Choose Save and Close.

Create an enhanced SLA

1. Make sure that you have the Customer Service Manager, System Administrator, or System Customizer security role or equivalent permissions.

When you activate an SLA, a corresponding workflow is also created. Whatever action you do on the SLA, you must have permissions to perform the same action on workflows. The SLA is applied in context to the permissions that the owner of the SLA has.

2. Go to Settings > Service Management.
3. Go to Service Level Agreements.
4. To create a new SLA, choose the New button.
5. Fill in your information

- Name
- Applicable From. Select the case field that specifies the date and time from which the SLA items will be calculated. For example, if you select the Created On field, the calculations for service level agreements will start from the time the case is created.
- Business Hours. Select a customer service schedule record that defines your support organization's business hours. This is useful in the SLA time-tracking calculations. If a business hours record (customer service schedule) isn't selected, the work hours are considered as 24 x 7.
- SLA Type. Select Enhanced.
- Allow Pause and Resume. Select Allow if you want the SLA to pause during the time the case is on hold. You can set the case statuses that will be considered "on hold" in the Service tab of System Settings dialog box. [System Settings dialog box - Service tab]. You can set this field to Allow only when you're creating an enhanced SLA.

6. Choose Save.
7. To add SLA details, in the SLA Details section, choose the Add button .

8. Fill in your information in the SLA Item form:

- Name. Type a meaningful name.
 - SLA KPI. Select the key performance indicator the SLA item is about. For example, if you are creating a KPI for sending the first response within a specified time, select the First Response By KPI option from the drop-down box.
 - For example, select First Response By KPI in the SLA KPI field, and set Failure After to 2 hours from case creation. If the case is created at 09:00, the Failure Time field of the SLA KPI Instance record is set to 11:00 assuming the business hours are 24*7.
 - By default, there are two options available in the drop-down box. If you want to track other KPIs, for enhanced SLAs ask your system customizer to create new case fields (of type lookup) that refer to the SLA KPI Instance entity.
 - In the Applicable When section, define the conditions under which the KPI will be applicable. The condition can be based on case or related entity fields.
 - In the Success Criteria section, specify the conditions to define when the KPI will be considered as met. For example, the conditions could be:
 - In the Success Action section, choose Add Step and specify the actions that you want CRM to take when the success criteria is met before the violation time. For example, choose Add Step > Change Status. Then, in the first drop-down box, select Case, and in the next drop-down box, select Information Provided. This option is available only if you're creating enhanced SLAs.
 - Under SLA Item Failure, in the Failure After drop-down box, select when the SLA items will be considered as failed. For example, if you select 1 hour, the KPI will be considered as failed if the first response is not done within 1 hour of case creation. 1 hour is calculated based on the value in date/time field that you select in the Applicable From field of the SLA record.
 - In the Failure Actions section, choose Add Step and specify the actions that will be taken when the success criteria are not met and the case has exceeded the specified failure time. For example, to mark the case for escalation when the KPI has failed, choose Add Step > Update Record. Then select Case, and choose Set Properties. Now in the case record, change the value of the Is Escalated field, and close the case form.
 - Under SLA Item Warning, in the Warn After drop-down box, select when a warning is to be raised for the KPI nearing violation.
 - In the Warning Actions section, choose Add Step and specify the actions to be taken when the KPI reaches the warning time. For example, to warn the case owner about the KPI nearing violation, choose Add Step > Send Email. Then select Create New Message, and choose Set Properties. In the email record, specify the email details and close the email form.
9. The time for failure and warning is calculated after considering the business hours selected in the SLA record. If a business hours record (customer service schedule) isn't selected, the work hours are considered as 24 x 7.

Set the SLA as default

Make an SLA a default one if you want it to apply to all the cases that don't have an SLA applied through an entitlement. This is useful when a customer wants a service level agreement without an entitlement. You can't apply an SLA to a case unless it's set as the default or it's associated with an entitlement.

To set an SLA as default, select an active SLA from the list, and choose Set as Default on the command bar.

You can only have one default SLA at a time

Disable the SLA

During maintenance activities or when you're importing cases and you don't want the SLAs to apply to the cases, you can disable SLAs for the organization. A system administrator can disable SLAs from the System Settings.

How is the SLA applied?

When a case is created, the SLA is applied (default or through entitlement) and the related case field values are updated. When the case is modified and any of the case field values change, that is, when the fields that are added in the Applicable When conditions of the SLA change, the SLA is applied again. For example, if the priority of the case changes from Normal to High, and according to the SLA the first response should happen soon, the SLA is reapplied to make sure the KPIs are tracked based on the updated values.

When the SLA is applied again, all the SLA items are evaluated based on the updated case fields and the failure or warning actions are initiated if the time has been exceeded. This happens even if the failure or warning actions were already initiated before the case was updated. To avoid this, you can request that your system customizer add a custom field to the case entity (to track if the failure/warning actions were already taken) and add it to the Applicable When condition so that the actions aren't initiated multiple times.

Track SLA status and details

You or the CSR working on the case can see the SLA details right on the case form

Case form with standard SLA applied

Only the failure time is tracked and saved on the case record.

You can request the system administrator or customizer to add a timer to the case form. The timer shows the time remaining to meet the SLA or the time elapsed since the SLA failed

Case form with enhanced SLA applied

When an enhanced SLA is applied to a case, a related SLA KPI Instance record is created for each SLA KPI that is tracked for that case. In the Enhanced SLA Details section of the case record, you'll see a timer and also the SLA KPI instances for the case with their statuses and failure and warning time.

When a service rep puts a case on hold, the status of the SLA KPI Instance is set to Paused. You can see the time for which a case was on hold and the last time the case was put on hold. These details are not available on the case form by default, but your system customizer can add these fields on the case form for you. The on hold time is the time for which the case was set to a status that you defined as On-Hold statuses in the System settings dialog box.

When the service rep resumes a case, the status of the SLA KPI Instance record is updated. The following details are updated in the record if the SLA isn't violated:

- Failure time
- Warning time
- Total time the case is on hold

If the service rep puts the case on hold after the warning time, then the warning time isn't updated when the case is resumed.

Lesson 10-2 Entitlements and Entitlement Templates

Define what kind of support your customers are eligible for by creating entitlements in Microsoft Dynamics CRM. With entitlements, you specify the support term based on number of hours or number of cases. The customer's support level can vary based on the product or service that the customer has purchased. Customers who've purchased different products can be entitled to different support levels. This information helps the customer support agents verify what the customers are eligible for and accordingly create cases for them.

Create an Entitlement

1. Make sure that you have the Customer Service Manager, System Administrator, or System Customizer security role or equivalent permissions.
2. Go to Settings > Service Management.
3. Choose Entitlements.
4. To create a new entitlement from a template, choose + New > From Template. In the Select Template dialog box, choose the entitlement template, and choose Select.
To create a new entitlement from scratch, choose + New > Blank Entitlement.

5. Fill in your information.
 - Name. Give the entitlement a meaningful name.
 - Primary Customer. Choose the customer you are creating this entitlement for.
 - Start Date. Choose the date from which the customer will be entitled for support.
 - End Date. Choose the date until which the customer will be entitled for support.
 - Restrict based on entitlement terms. To make sure no cases are created when the entitlement term is over, choose Yes. When you choose Yes, a customer service agent won't be able to create a case when Remaining Terms is less than 0 OR when the term remaining for a channel is less than 0.

- SLA. Choose an SLA record to associate the service levels or key performance indicators for the support you are providing with this entitlement.

Under Entitlement Terms, specify the term details for the entitlement:

- Allocation Type. Choose whether the entitlement is for number of hours or number of cases.
- Decrease Remaining On. Choose whether to decrease the remaining term on case creation or resolution.
- If you choose to decrease the remaining term based on case creation:
 - Creating or updating a case with the associated entitlement decreases entitlement terms
 - Cancelling a case with the associated entitlement increases entitlement terms
 - Reactivating a cancelled case with the associated entitlement decreases the entitlement terms
- If you choose to decrease the remaining term based on case resolution:
 - Resolving a case with the associated entitlement decreases the entitlement terms
 - Reactivating a resolved case with the associated entitlement increases the entitlement terms.
- Total Term. Specify the total amount of support the customer is entitled for with respect to the allocation type. For example, if the allocation type is number of cases and you specify 100 in Total Term, then the customer is entitled for support up to 100 cases.
- The Remaining Term shows the total number of hours or cases remaining for the customer's entitlement. The value decrements every time a case is created or resolved (depending on what you select in Decrease Remaining On) against the entitlement.

6. Choose Save.

Entitlement Channel Term

The Entitlement Channel section specifies the support channel through which the customer can reach the organization and seek support.

Use this section to define the channels your customers are entitled to, and track the customer support term for each channel. For example, you can add phone and email as your channels through which you'll offer support. If you want to restrict support through the phone channel to 80 hours and email to 20 hours, create individual entitlement channel records and add their total terms.

You must save the entitlement record before you can add entitlement channels to an entitlement.

1. In the Entitlement Channel section, choose +.
2. Specify the total terms that you want to allot to the particular channel.

The remaining term is auto-calculated and shows the total number of hours or cases remaining for the customer's entitlement.

Associate a product with the entitlement

If you want the entitlement to apply to a specific product for a customer, associate the product to the entitlement.

If you don't add a product, the customer will be entitled to support for all the products.

Associate a customer contact with the entitlement

To let only certain contacts of a customer claim the entitlement for a specific product, associate the contacts with the entitlement.

If you don't add a contact, all the contacts for the specified primary customer will be entitled to support.

All active entitlements for a customer appear in the Active Entitlements section of the customer record.

Activate or deactivate an entitlement

Before you can start applying an entitlement to a case, you must activate it.

If the start and end date of the entitlement fall in the future, the status of the entitlement is set to Waiting. On the start date, the status automatically changes to Active. If the end date is in the past, the entitlement is set to Expired.

When an entitlement is active, you can't edit it. To deactivate an entitlement so you can edit it, on the command bar, choose Deactivate.

Cancel an entitlement

If the entitlement is no longer valid, you can cancel it.

Renew an entitlement

To renew a cancelled or expired entitlement, open the entitlement, and then on the command bar, choose Renew.

The current entitlement will be set to Closed and a new entitlement will be created.

The start date of this new entitlement is set to the current date and the end date is set to current date + number of days between (End Date – Start Date). The data in other fields is copied from the old entitlement.

Lesson 10-3 Entitlement Templates

Quickly create other entitlements prefilled with the basic information like the start and end date, service level agreement (SLA), allocation type, and total term by using an entitlement template in Microsoft Dynamics CRM. For example, create a template for a standard entitlement, and then apply this template for every standard customer in your organization

Create an Entitlement Template

1. Make sure that you have the Customer Service Manager, System Administrator, or System Customizer security role or equivalent permissions.
2. Go to Settings > Service Management.
3. Choose Entitlement Templates.
4. To create a new entitlement template, choose + New.
5. Type or modify information in the text boxes.
 - Entitlement Template Name
 - Start Date. Select the date from which the entitlement will be valid.
 - End Date. Select the date until which the entitlement will be valid.
 - Restrict based on entitlement terms. To restrict creating case when the entitlement term is over, select Yes. Otherwise, Select No.
 - SLA. Select an SLA record to associate the service levels or key performance indicators for the support you are providing with this entitlement.

Under Entitlement Terms, specify the term details for the entitlement.

- Allocation Type. Select whether the entitlement is for number of hours or number of cases.
- Decrease Remaining On. Select whether to decrease the remaining term on case creation or resolution.
- Total Term. Specify the total amount of support the customer is entitled for with respect to the allocation type. For example, if the allocation type is number of cases and you specify 100 in Total term, then the customer is entitled for support up to 100 cases.

6. Choose Save.

Lesson 10-4 Entitlements and Cases

Associate entitlements to cases

In a case record, in the Entitlement field, choose the Lookup button, and select an entitlement. The inline lookup shows only the active entitlement for the customer of the case.

The Entitlements section in the case record lists all the active entitlements for the customer.

Lesson 10-5 Timer Control

Add a timer control to the Case form to track time against an SLA

You can add a timer control to the Case form to help customer service representatives gauge the amount of time they have to complete a task—typically associated with a service level agreement

(SLA). The timer control initially displays a count-down timer to show the time remaining to complete the task.

The timer control can show any of the following, depending on the actions of the customer service representative (CSR) and what you specify when you set up the timer control:

- If the CSR completes the task within the time remaining, the control shows the word Succeeded.
- If the CSR doesn't complete the task within the time remaining, the control shows the word Expired.
- As the timer counts down, the colour changes to yellow as the time remaining nears non-compliance. If the time remaining expires, the timer shows the word Expired. Then the timer colour changes to red and the timer starts counting up to show the elapsed time since the task should have been completed. This behaviour is optional.
- If a condition causes the milestone to be cancelled, the control shows the word Cancelled. This behaviour is optional.
- If either of the required fields in the Timer Control dialog box do not have a value in the record, the control shows the words Not Set.

APPLICABLE SLA	
First Response By	4/7/2014 10:27 AM
Resolve By	4/7/2014 12:27 PM
First Response due	! 0h 43m 24s
Resolve by due	! 2h 43m 24s

Time remaining for both of these SLAs is nearing non-compliance.

Module 11 – Service Scheduling

This module provides an overview of the service scheduling features of Microsoft Dynamics® CRM. The organizations that use service scheduling require a complex combination of resources. Service scheduling considers the availability of employees, facilities, and equipment to make sure that the resources are available to deliver service activities for customers.

Some benefits of Service Scheduling include the following:

- Scheduling firmer appointments and improving service quality
- Preventing over-scheduling with predictable workloads for employees
- Making sure of reliable time estimates for customers and clients

Basic service scheduling concepts and service scheduling terminology will also be introduced in this module.

Objectives

The objectives are:

- Explain common scenarios where the Scheduling Module can apply.
- Define the context of the basic elements of the Scheduling Module.
- Identify the important role and of the Service Activity Scheduling Engine and Scheduling Process.
- Show how to create and modify Services and Selection Rules for the resources that are required to perform a service activity.
- Include customer preferences when service activities are scheduled.
- Describe how important sites are, and how to associate resources to a site. Also describe how to enforce same-site restrictions on a resource selection rule.
- Configure resources and build selection rules to perform capacity scheduling.
- Describe how to create and manage service activities.

Lesson 11-1 Service Scheduling Scenarios

Every organization is unique, and Microsoft Dynamics CRM service scheduling can be customized to fit the unique service scheduling requirements of an organization. This section contrasts four service scheduling scenarios to suggest the range of options that are available.

Individual Worker

The individual worker scenario is a situation where a single worker must be scheduled to meet with clients, customers, or other appointments.

Frequently, scenarios such as this have the following characteristics:

- Individual workers meet clients one-on-one.
- The only facility required is the worker's office.
- Scheduling shared conference rooms or other resources might not be required.

Several examples of a single service worker scenario include the following:

- Tax consultant
- Public accountant
- Attorney

Shift Work and Skills

The shift work and skills scenario is a business that has workers who have to be scheduled, have different skill sets and work in different time shifts. Some scenarios of shift work and skills service businesses include the following:

- Several workers have different skills sets, credentials, or working licenses. Not all workers can do all services.
- Workers might work different shifts.
- Each shift worker has his or her own workspace. For example, the day shift worker and the evening shift worker can use the same workspace, equipment, and other facilities because the day and evening workers will not be there at the same time.
- Other specialized equipment is usually not required.

Some examples of shift work and skills service businesses include the following:

- Car and bicycle repair, body shops and oil change facilities
- Barber shops, salons and other personal services
- A blood donation centre

Complex Schedule

The complex schedule scenario is a business that has workers who must be scheduled, have different skill sets, work and use specialized equipment, and are located at different sites. Some scenarios that are found in a complex schedule service business include the following:

- Several workers have different skills sets, credentials, or working licenses. Not all workers can do all services.
- Workers work different shifts.
- Workers are located in different business sites.

- Workers have requirements where they can only deliver the services to one subset of the sites.
- The scheduling of shared resources, such as specialized equipment is required.

Some examples of complex schedule service businesses include the following:

- A dentist office complex with one or more dentists, dental assistants, and technicians with several certifications, and specific equipment requirements.
- Multiple service facilities in different locations where scheduling is centralized.
- A hospital emergency room facility.

Out-Going Services

The out-going service scenario is a business that has workers who must be scheduled, have different skill sets, work and use assigned equipment, and work on location. Some characteristics frequently found in the out-going service scenario include the following:

- Several workers might have different skill sets, credentials, or working licenses. Not all workers can do all services.
- Workers might be working in small teams.
- Workers might be working different shifts.
- Workers do their job on location at the customer site.
- Certain workers might be assigned their own equipment, such as a service van.
- The scheduling of shared resources, such as specialized equipment might be required.
- Travel time between jobs might be considered during scheduling.

Job site closeness must be considered during scheduling. For example, you would not schedule a worker to travel across town from one job site to another if another worker is closer.

Some examples of out-going service businesses include the following:

- Construction
- Maid and facility maintenance services
- Landscaping services
- Carpet installation, cable installation
- Electric and gas utility maintenance and repair

Lesson 11-2 Service Scheduling Terminology

This lesson focuses on the definitions and the background for the basic elements of the Scheduling module.

Elements of Service Scheduling

Service

A type of work, such as a maintenance activity, performed for a customer by one or more resources. Services are schedulable activities.

Selection rule

A set of criteria that specifies which personnel, equipment, facilities, or resource groups are required to perform a service, or how to select these resources, based on parameters like quantity and capacity.

Resource

Users, facilities or equipment, or teams that can be scheduled and have work schedules.

Resource groups

Groups of resources that can be scheduled interchangeably.

Site

The location of a resource. Use sites to make sure that the customer and the resource are in the same location.

Work hours

The hours that a resource is available for scheduling.

Capacity

The number of service activities a resource can deliver at the same time.

Service activity

A schedulable appointment to provide a service to a customer. A service activity uses one or more resources to perform a service at a specific time and place. An appointment is a schedulable activity that does not use services and does not require a resource with work hours.

Service Calendar

The Service Calendar is a view of the scheduled appointments and the service activities for the organization. The service calendar lets users and schedulers view and compare how the resources are allocated based on day, week or month. On the service calendar, the service activities can be rescheduled, cancelled, or tracked if the customer does not arrive for the appointment.

Lesson 11-3 Service Scheduling Process

Some elements involved in Service Scheduling include the following:

- Define the availability of the staffing and, or resources
- Define the service offerings
- Define the resource schedule limitations
- Schedule the service

The following topic shows the steps that are required to complete service scheduling in Microsoft Dynamics CRM.

Time Zones Considerations

Some organizations' sites might exist in multiple time zones. The service appointment has a time zone, also known as the corresponding appointment location.

When you work with time zones, consider the following:

- Appointment times
- Time conversion

Generally, the organization considers the appointment time where the customer visits or the location for the appointment. Therefore, the appointment time might be the customer's time zone for out-going service calls.

Organizations consider the target site's time zone when the organization converts the time into the local time when it provides the appointment time information. For example, the scheduler can communicate local time information to the customer.

Use the Set Working Hours dialog box to schedule the times when a resource will be available. Set the working hours, breaks, and time zone, and then divide the working hours and add the restrictions for when the resource's services can be scheduled.

Resources and Work Schedules

When work schedules are being set up, the service administrator can consider the users, the facility, and the equipment schedules when he or she searches for the availability to schedule service activities. Work schedules must be defined in Microsoft Dynamics CRM for each resource that will be involved in providing the service activities.

Service administrators must specify the dates, work days, and the work hours that resources will be available. Additionally, the service administrator must specify whether the resource will have the same schedule every day, or if the schedule will differ, and whether the resource observes business closures.

When you work with schedules, you can use the Weekly Schedule form to set the resource's working hours, working days, date ranges, and the time zone.

The scheduling administrator sets a recurring schedule that can be the same each work day or different each work day.

By default, when the users are created or upgraded, the users have a 24-hour day, 7-day week work calendar. However, the users are not linked to the business closures calendar. In Microsoft Dynamics CRM, a billing day is based on the work hours that are set up in personal options. For example, if the start time is 08:00, and the end time is 17:00, the work day has nine billable hours.

As part of setting Working Hours for the resource, the scheduling administrator can decide whether the resource must observe business closures or not.

Resource Groups

Resource groups are used to determine the resources that are required to perform a specific service. Resources can be grouped by many criteria, such as the skill based classification. When you define the required resources for services, select the resource group instead of individual resources.

When you work with resources, you can use groups to provide the following services:

- Let users build more sophisticated organizational structures.
- Let organizations create, organize, and manage the workforce, facilities, and equipment that participate in the scheduling process.
- Help organizations create a dynamic grouping of resources.

The resource group Bike Repair Technicians includes two users—Chris Perry and Matthew Pereira. When a Bike Repair service is scheduled, you can select Chris Perry or Matthew Pereira to perform the service.

Lesson 11-4 Resources, Services and Selection Rules

This lesson provides a review of the resources and the resource groups in Microsoft Dynamics CRM. The lesson also shows how to create services, and how to create resource selection rules for those services.

Resources

In Microsoft Dynamics CRM, "resources" are people (CRM users), facilities (such as a room or a hall, where a service activity can be performed), and equipment. Individual resources have work schedules that define when they are available to work.

Users – In Microsoft Dynamics CRM, all people in an organization who access the system are entered as users in the application. Additionally, user records are used as schedulable resources for the services that the company provides. On each user record, work hours, time off, and service restrictions can be defined. This information is used by the Scheduling module to find the available resources based on the services' selection rules.

Facilities/ Equipment – For some organizations, there are definable, tangible resources, such as classrooms, tools, vehicles, computers, and so on that must be reserved when specific types of

services are being scheduled. On the other hand, when Facilities/ Equipment records are created, there can also be other uses for these records. Consider a consulting company. Sometimes services must be scheduled for customers and the work must be outsourced. In this scenario, contractors to whom work is outsourced could be entered as “Facilities/Equipment” records and then the contractors can be scheduled. When the Scheduling module is used in Microsoft Dynamics CRM, organizations must define the resources that must be reserved. Additionally, this record type can also track work hours, time off, and service restrictions the same as the user records

Capacity Planning

In Microsoft Dynamics CRM, when you schedule services, you can set up the services and resources to consider the different-sized facilities or the experience levels of the users. This is known as capacity scheduling. Capacity is a quantified unit that the organization defines.

For example, capacity in a bicycle repair shop can be defined as how many bikes the shop can accommodate at the same time. If a repair bay can accommodate four bike-repair stations, the repair bay can accept four bikes for repair or inspection at the same time.

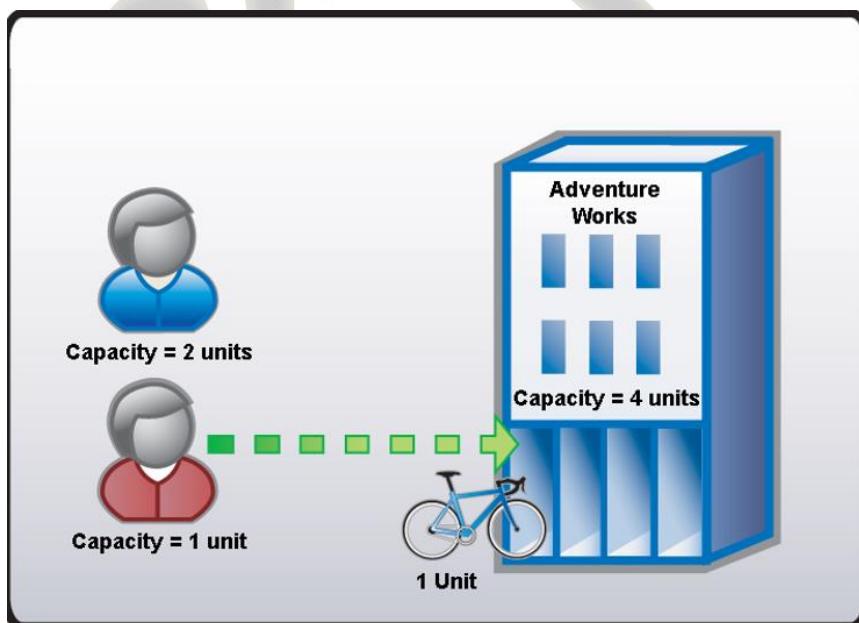


Figure 4 - Capacity Planning

Capacity can also measure skill level. For example, a junior bike technician can perform one bike inspection every hour, and a senior technician can perform four bike inspections every hour. Therefore, if two bikes must be inspected in one hour, it will take two junior technicians, or one senior technician to perform the inspections in half the time.

If the organization wants to make sure that a resource is fully used before another resource is scheduled, you can set an option to check for the resources that are the least busy or most busy. The default is to select the next available resource at random. For example, to make sure that a technician is scheduled for as much time as he or she can be scheduled for before another technician is scheduled, select the Most Busy option.

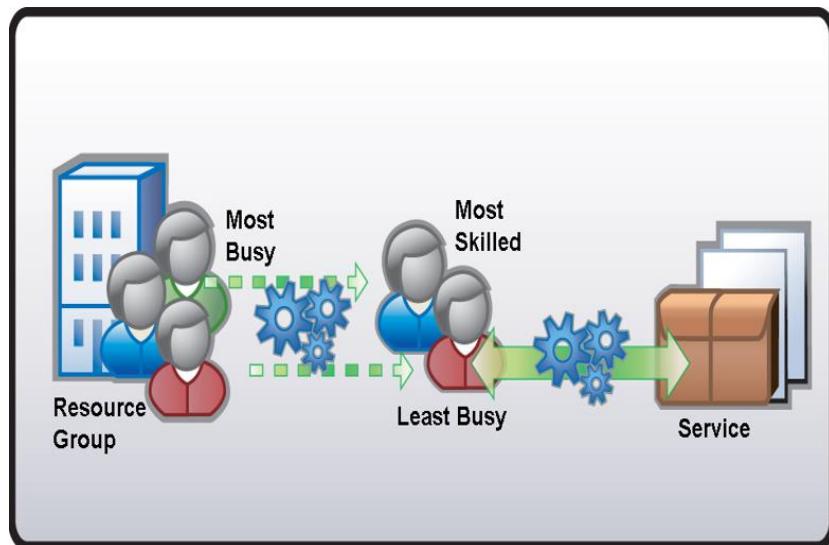


Figure 5 - Capacity Scheduling

Sometimes to effectively manage the capacity, service specific limits might have to be set in Microsoft Dynamics CRM. For example, one such generally used limit is "No more than one appointment at a time." This limits how much a specific resource can produce.

Another example would be as follows: "Only schedule these types of services during these specific time ranges." Or, "Schedule no more than one service during a specific time range."

Set Work Hours and Service Restrictions

Set the hours this resource can be scheduled for services and any service restrictions that apply.

Type	Capacity	Start	End	Add Break
Work Hours	1	12:00 AM	12:00 AM	

Total: 1 day, Working: 1 day, Breaks: 0 minutes

Select the time zone
Time Zone: (GMT-08:00) Pacific Time (US & Canada)

Help OK Cancel

Figure 6 - Capacity Scheduling Resources

Services

A service is a type of work that is provided to a customer and performed by a single resource or more resources. For example, bike repair or tax consultations are services. When a service is

defined, information such as the default duration, the default time between services that are being offered, and a description of the service are entered in the application. What makes the service the important component of the Scheduling module are the rules that are defined that control how the service is scheduled.

Selection Rules

Selection rules can consider a combination of many factors. These include the following:

- Which resources can deliver a service: For example, a Bike Repair service might require a single technician combined with a repair bay. A Bike Repair Certification Seminar might require a combination of an instructor, a registrar, and a suitable training location.
- The schedule of required resources: Resources can be scheduled on a least busy, most busy or random basis. A least busy scheduling requirement will cause the resources that have the most availability to be suggested first. A random scheduling requirement will cause a resource's current schedule not to affect whether the requirement is suggested for a service delivery.

Whether the resources are from the same site or business location: For example, a selection rule could specify that a bike repair technician who is located at Facility A can only be scheduled for services that are delivered to that location.

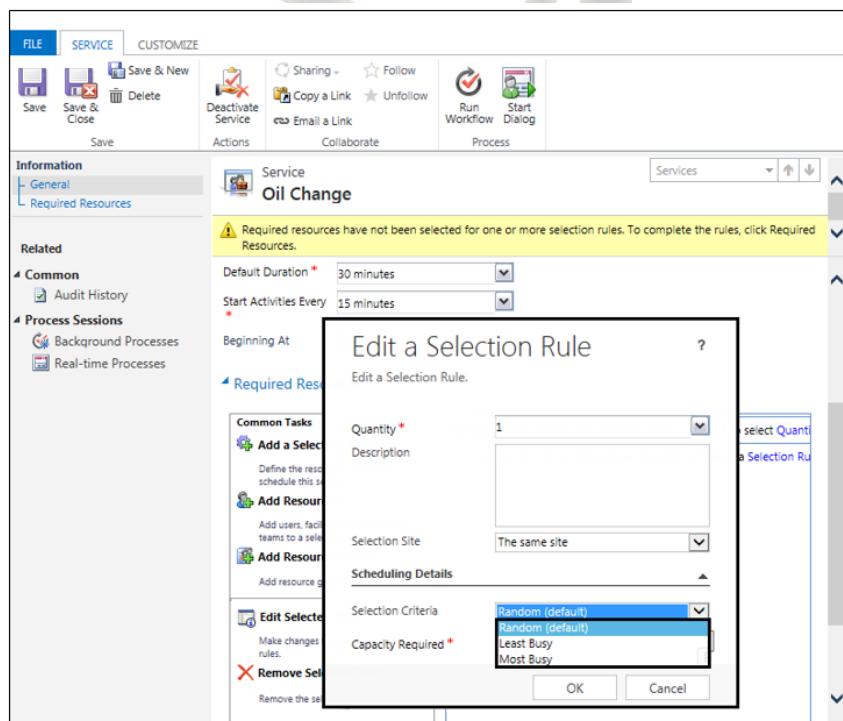


Figure 7 - Edit Selection Rule

Include Customer Preferences

Personalised customer service can be provided for customers by recording the customers' preferences about services and service times. In Microsoft Dynamics CRM, the account and contact record types are known as the customer record types. The default account and contact forms have Service Preference sections in which a customer's preference can be recorded for the following:

- Preferred Time
- Preferred Day
- Preferred Service
- Preferred Facility/Equipment
- Preferred User

If preferences are recorded for a customer, the scheduling engine can consider the preferences when it schedules a service activity.

Understand Sites and Same-Site Requirements

Frequently location is important in the delivery of service activities. For example, some customers might prefer that a service is delivered to their site. However, sometimes a service might require a specialized resource for its delivery and the resource might only be available at the service provider's site. This makes the delivery of the service at the customer's site impractical or impossible.

In Microsoft Dynamics CRM, resources (users or facilities/equipment) can be associated with sites. If resources are associated with sites, a Same-Site criterion can be applied to a service's selection rule. If this feature is used, the scheduling engine will then only suggest combinations of resources that satisfy the same-site rule. Some common scheduling scenarios include the following:

- A physical facility, such as an auto repair shop's service bay, is difficult or impossible to move, and can be associated with a specific site. A same-site requirement in this scenario will notify the scheduler that services that require such a resource must be delivered at a specific site.
- A human resource, such as a trainer or a technician, might have limited ability to travel, or an organization might want to minimize travel expenses. In these scenarios, same-site requirements can be used so that the scheduling engine only suggests combinations of resources that do not require travel to different sites.

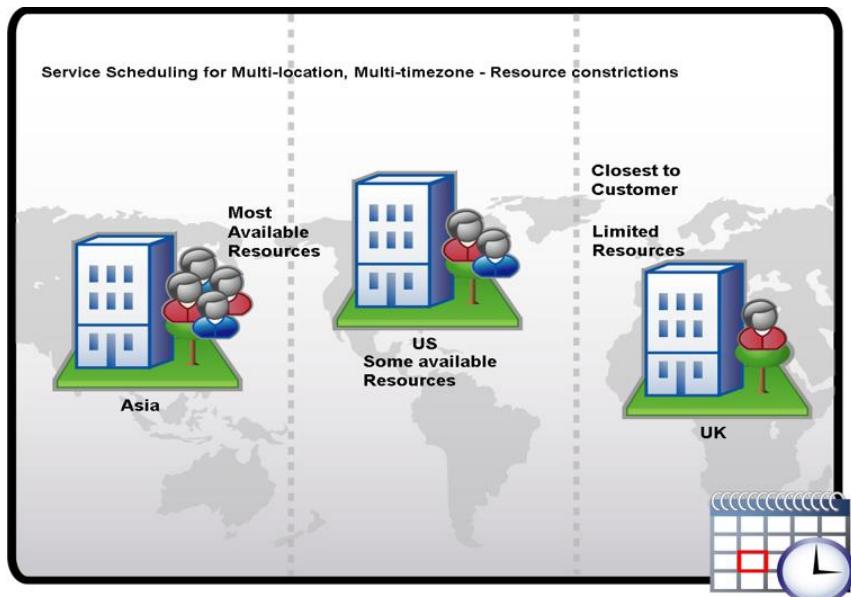


Figure 8 - Schedules and Sites

Manage Business Closures

The business closure function is used as an easy way to list company holidays and other business closures. The closures can be applied to resource schedules and used to perform availability searches to determine when service activities are being scheduled.

The business closure function lets organizations plan when resources are available to be scheduled for work by the scheduling engine. It also lets the service engine avoid suggesting time periods during business closures. This function is also used so that the following actions can occur:

- Resources are not scheduled during business closures.
- Closures do not have to be listed independently on each resource's calendar.
- Resources that have the "do not observe business closures" option selected on their working schedules are the only resources that are not affected.
- Let the scheduling administrators define business closures that block availability on resource calendars.
- The name of the closures appears on the monthly calendar and the service calendar.

Lesson 11-5 Explain the Service Activity Scheduling Engine

This lesson explains the role of the scheduling engine. The lesson also includes a demonstration on how the scheduling engine can help schedule services that have complex scheduling requirements.

Sometimes Microsoft Dynamics CRM service activities can resemble appointment activities, as follows:

- Both can be scheduled events on the Microsoft Dynamics CRM service calendar.

- Both can be synchronized to a user's Microsoft Office Outlook calendar to provide a comprehensive view of a user's schedule.

However, sometimes service activities are more complex than appointments and can be more valuable to organizations that have complex scheduling requirements. To be able to use service activities and the service calendar to their full advantage is to know the role of the service activity scheduling engine.

Service Activities and the Scheduling Engine Scenario

Contoso is a bike manufacturer, and its customers are mainly bike stores who resell Contoso products. Contoso wants to conduct a series of certification seminars in several cities, targeted to bike technicians that work for resellers of its bikes. For a seminar to be delivered successfully, each seminar requires a combination of resources:

- At a minimum, one group of trainers must be scheduled to conduct the seminar.
- One registrar must also be present, to greet and sign-in attendees and to provide on-site service throughout the seminar.
- A seminar kit that includes training manuals, other materials and laptop computers that will be used by attendees must be packaged and sent to each seminar location.

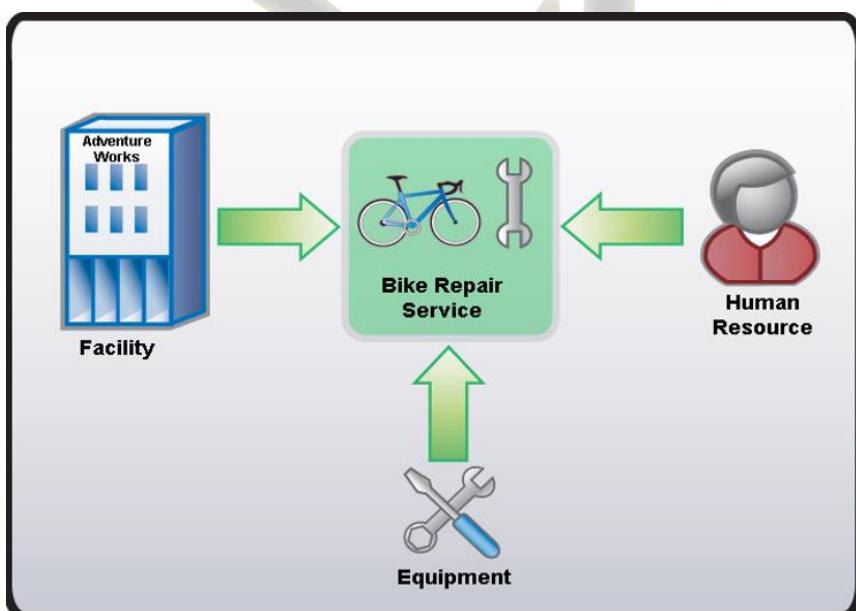


Figure 9 - Scheduling Engine

To manage and plan the seminar, the scheduling manager creates resource groups for trainers, registrars, and seminar kits. Resources are assigned to the groups and work hours that are configured for each resource that is verified. A service is created that is named Bike Tech Certification Seminar, and the resource selection rule is configured.

After the planning tasks are completed, service activities for this service can be scheduled. Additionally, the scheduling engine will guarantee that only the available combinations of the required resources will be scheduled.

The Role of the Scheduling Engine

Service activities can be created the same way other activities can be created. For example, by selecting a customer record in the data grid and then clicking Service Activity on the Add tab.

When the steps to start the scheduling engine are completed, the scheduling engine examines the resource selection rules that are associated with the service. Additionally, the scheduling engine will find the time periods in which several resources that are required to perform the service are available. However, the scheduling engine will not automatically schedule a service activity. Instead, the scheduling engine provides the user who is scheduling the activity the option to select from all available times in which the following criteria are satisfied:

- None of the required resources are scheduled for another service activity.
- If resources are configured to observe business closures, no times during business closures will be suggested.
- Customer preferences for resources and services will be considered

Service Activities and the Microsoft Dynamics CRM Client for Outlook

Service Activity records can also synchronize. However, the service activity records will only synchronize for users who are scheduled as the resources that provide the service activity. Therefore, if a new service activity is created and another user is selected as the resource to provide the service activity, the record will synchronize to the selected resource's Outlook schedule, and not to the user who created the service activity. This differs from how Appointment activity types synchronize, because appointments that are created by a certain user will synchronize to the user's Outlook.

The difference in the behaviour is used for a common scenario for service scheduling. In this scenario, one scheduling manager or more scheduling managers perform the scheduling for multiple resources. This scenario shows why service activities do not synchronize to the Outlook calendar of the user who creates the activity (the owner). If the service activities do synchronize, then the scheduling manager's service activity is moved to Outlook. Then, the scheduling manager has problems distinguishing between his or her own appointments and the appointments that are created for a service delivery resource

Lesson 11-6 Working with Service Activities and the Service Calendar

Several ways exist to create service activities. Additionally, several customers (accounts and contacts) can be associated with a single service activity.

The service calendar helps users by displaying the organization's scheduling commitments and activities. Also, the service calendar can be used to do the following:

- View, edit, and create items on the calendar.
- Easily differentiate between many types of scheduled activities.
- Select several views to filter the items to display on the calendar

Use the Service Calendar

The service calendar in the Service area can be used to view and schedule service activities and appointments for the organization. In the calendar, users can perform the following tasks and activities:

- View the organization's daily, weekly, and monthly schedule of appointments and service activities.
- View work schedules and service schedules for several resources.
- Create new appointments and schedule service activities.
- Change the status of an existing service activity.
- Search for conflicts in the schedule

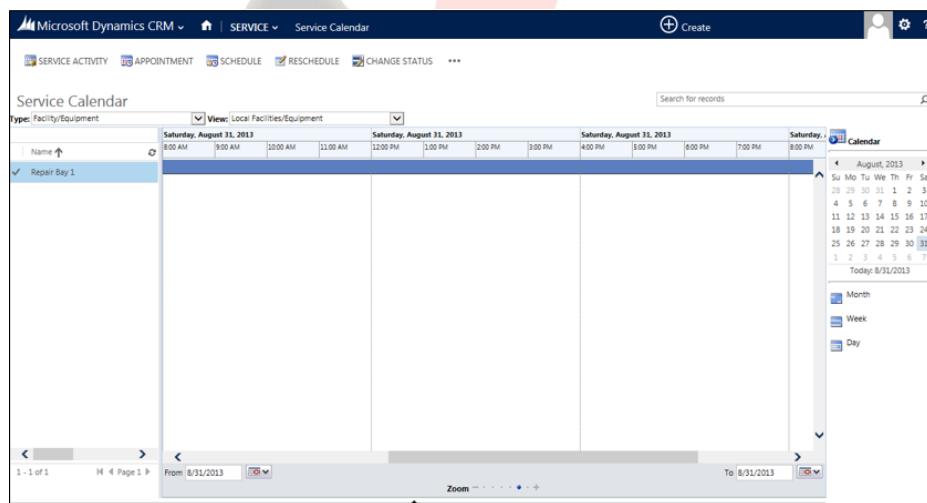


Figure 10 - Service Calendar

The service calendar resembles the data grids that are available for most record types. The service calendar includes drop-down lists that are used to filter information. The Type drop-down list is used to select the record type for which to view the schedule. Available record types include the following:

- Service Activity
- Appointment
- Resource
- User
- Facility/Equipment

The View drop-down list has several predefined System Views that can change, depending on the value that is selected in the Type list. System administrators or users who have the appropriate security roles can add custom views and customize system views.

Use the Calendar Pane

The Calendar pane appears on the right side of the calendar. To change the date, click a date in the Calendar control. Use the arrows on either side of the month to change the month that is displayed.

In the Calendar pane, users can change the number of days that are displayed in the linear calendar by clicking any of the following options:

- Today – For the daily schedule
- Month – For the monthly schedule
- Week – For the schedule for the 7-day week
- Day – For the daily schedule for a single user, selected day

Use the Zoom scale to change how much of the calendar can be viewed. For example, users can set the calendar to display a whole week, or several hours. To view more of the calendar, click a tick mark that is closer to the plus end of the scale. To view less of the schedule, click a tick that is closer to the minus end of the scale. Users can select specific date ranges to view in the From and To lists. The image displays the Calendar Pane.

Use the List Pane and the Calendar Pane Together

To the left side of the calendar pane, you can view scheduling information in a list format for any records that are included in the current view. For example, if Service Activity in the Type drop-down list and All Service Activities in the View drop-down list are selected, the list pane displays a list of all service activities for the time period that is selected.

When the users work with the service calendar, they can arrange the screen several ways to allocate more screen space to specific items. Some examples follow:

- Click the small up arrow immediately underneath the Help button on the upper-right side of the Internet Explorer window to hide the ribbon. Click it again to show the ribbon.
- Click the small right arrow on the Calendar icon to minimize the calendar area at the right side of the screen.
- Use the separator bars between the List Pane and the Navigation Bar, and between the Calendar Pane and the List Pane, to arrange the screen.

As the screen display is rearranged by using the methods that are described, the users can always update the browser to restore the default view of the service calendar.

Service Activity Conflicts

If the users are scheduling and they receive a message that states that a conflict exists, the users can select another time, or use the service activity.

The users can identify service activities or appointments that have conflicts by clicking Show Conflicts on the Actions toolbar on the Service Calendar. The users can reschedule any Open or Scheduled service activity.

Viewing Details for Resources, Appointments, and Service Activities

The users can view the resources, appointments, and service activities for anyone in their organization. In the Type list, select Resources, and then in the View list, select the resource view.

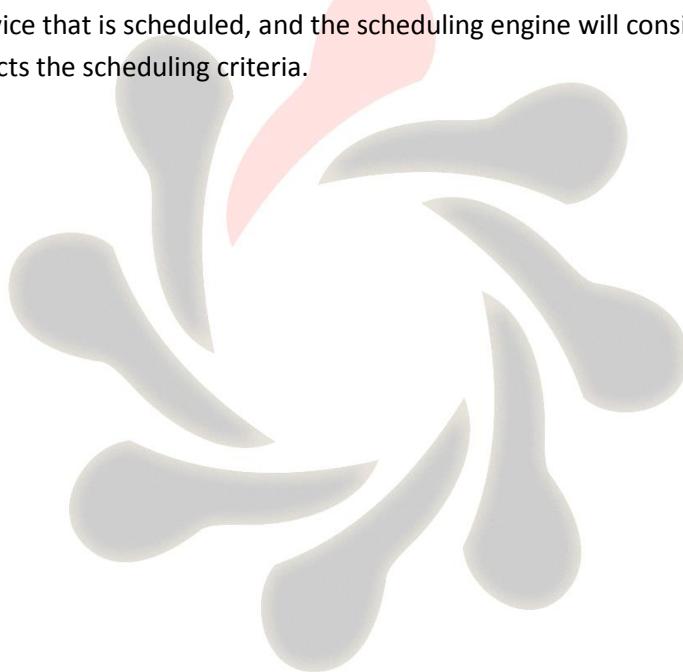
To find a specific resource, in the Search for records box, enter the first few letters of a name to search for a particular resource. The linear calendar displays the resource's schedule.

Lesson 11-7 Close, Cancel, or Reschedule a Service Activity

If a service activity is completed, it can be closed and marked for billing. If the service activity is not completed, it can be cancelled. If the customer wants to reschedule the activity, the users can search for a new timeslot.

Reschedule

The steps for how to reschedule a service activity resemble how to schedule a service activity. The user can adjust a service that is scheduled, and the scheduling engine will consider any new information that affects the scheduling criteria.



Module 12 – Sales Management Concepts

Objectives

Provide examples of customer scenarios where the Sales capabilities of Microsoft Dynamics CRM can be applied.

Gain a conceptual understanding of Microsoft Dynamics CRM Sales Management.

Describe the role of the core record types used in Microsoft Dynamics CRM Sales Management.

Lesson 12-1 Sales Scenarios

To better understand the context of the sales module, let's review some real life customer scenarios.

Existing Customer

Contoso has a large list of customers who have an established relationship with them. Their customer base consists of companies and individuals. For the companies they service, they provide business related products and services and actively market to and sell to these companies. Within Microsoft Dynamics CRM, they are tracking this type of customer in the Accounts area. Contoso's other type of customers are individual people (they refer to these as their residential customers). Contoso also markets, sells to and provides customer service to them as well. Within Microsoft Dynamics CRM, they track their residential customers within the Contacts area. Although these two different types of customers each consume Contoso's products and services, they are both considered customers within Contoso's Microsoft Dynamics CRM deployment.

New Customer

A salesperson at Contoso has received an incoming call from an individual regarding a new product sale. The salesperson looks for the individual's Contact record in Microsoft Dynamics CRM but the customer record does not exist. The salesperson also asks the new customer for their company information, but is also unable to find the Account record in Microsoft Dynamics CRM. The salesperson from Contoso gathers required Contact and Account information from the new customer to create the new records in Microsoft Dynamics CRM.

Prospect

Contoso's marketing team attends an annual trade show to market their services and products to prospects every year. The marketing team's goal is to acquire as many prospective customers known as Leads in Microsoft Dynamics CRM. Lead records in Microsoft Dynamics CRM can then be added to marketing campaigns or contacted individually for potential business. Once a Lead becomes a customer this record can then be qualified into one or all of the following:

- Account
- Contact
- Opportunity

Core Record Types

To understand how the various elements of the Microsoft Dynamics CRM Sales module fit together, as well as how they might fit into an organization, it is important to understand the basic terminology used throughout the application. Additionally, it is important to understand the intention of each of the primary record types used.

This lesson defines the basic terminology used within the Sales module and contextualizes each of the primary record types to better help organizations understand the full scope of the module and its components.

Customer

Within every organization, there are people or organizations of people that are serviced. Whether the organization is a retail store, consulting organization, not-for-profit organization, or a telecommunications company, some entity receives goods or services. Within Microsoft Dynamics CRM, the recipients of products and services are called "customers."

Businesses and organizations differ greatly, so the definition of customer may change from one to the next. Within Microsoft Dynamics CRM, there are two types of customer records: Accounts and Contacts.

Accounts

Accounts are records that track organizations. In a business-to-business (B2B) sales or support scenario, accounts represent customers. An account can be a company, government entity, non-profit organization, club, or any other organization. Accounts tracked in Microsoft Dynamics CRM commonly include the following:

- Customers
- Vendors
- Partners
- Reseller

Contacts

Contacts are records that track people. A contact can be a customer, consultant, service provider, or other individual. In business-to-business scenarios where "customers" refer to accounts, a contact generally represents an employee of the account. In business-to-customer (B2C) scenarios, a contact is generally the customer. Microsoft Dynamics CRM can also track organizational hierarchies through the use of sub-contacts. This feature tracks professional relationships within an organization.

Lead

In Microsoft Dynamics CRM, a "Lead" represents potential—for example, a potential sale or a potential contact or account with which an organization might do business. Many organizations implement lead qualification processes, during which leads are contacted, more information is gathered, and at some point a decision is made about the lead's status. Generally, Leads should be

considered temporary records, with the goal of converting them to some combination of account, contact, or opportunity records at the end of the qualification process.

For example, if a salesperson meets someone at a tradeshow and gets a business card, he or she might not know if this person is a viable customer. It is only after the salesperson has called this person or has followed up in some way that he or she can determine if this person's needs align with what the salesperson and the organization can deliver. Once this is determined, the salesperson can determine whether the lead merits more attention. Viable customers are qualified. Others are disqualified.

Opportunity

In Microsoft Dynamics CRM, an “Opportunity” is a qualified potential sale. An Opportunity record is used to track a qualified potential sale through the sales closing process. A qualified potential sale indicates that the potential customer has been contacted and information has been gathered about interest. The organization has determined the likelihood of the customer buying and decided that the potential is worth pursuing.

Opportunities can track very detailed information about a potential sale, including the following:

- Competitors for the opportunity.
- Products selected from the product catalog.
- Estimated revenue, estimated probability of closing the deal and the estimated close date.
- Which record the opportunity belongs in. Opportunities always must be associated with a customer record, which in Microsoft Dynamics CRM can be either an account or contact.
- All activities involved in closing the sale. This can include phone calls, letters and faxes sent, appointments, and emails sent. In addition, organizations can track a series of notes about the opportunity.

In many sales organizations, potential sales are reported through the use of a sales pipeline. Sales managers use sales pipelines to determine where they might be at the end of a period of time in terms of sales numbers by product, region, or salesperson. Opportunity records within Microsoft Dynamics CRM help to populate that sales pipeline.

Quote

Microsoft Dynamics CRM, “Quotes” help inform potential customers about the products and prices associated with the opportunity. Another way of understanding a quote within the application is to think of it as a proposal or an estimate. A quote that a customer accepts automatically converts to a sales order. If a customer accepts a presented quote, a sales representative can use Microsoft Dynamics CRM to create an order with the information contained in the Quote record with a single click. Additionally, from within the application, Microsoft Dynamics CRM users can quickly revise quotes and even track a history of the quotes presented to a customer.

Order

In Microsoft Dynamics CRM, an “Order” is placed when customers confirm requests for the product or service. Organizations receive and process orders, which then convert to invoices and revenue. Microsoft Dynamics CRM can record these customer orders.

Additionally, some organizations integrate the sales order process into an accounting application such as Microsoft Dynamics AX, Microsoft Dynamics NAV, Microsoft Dynamics GP, or Microsoft Dynamics SL. Commonly, within an integrated environment, organizations have Microsoft Dynamics CRM users create sales orders within the Microsoft Dynamics CRM and then submit them into the accounting application. This illustrates how companies can leverage the application to support and streamline their entire sales life cycle and fulfil their customer relationship management strategies.

Invoice

In Microsoft Dynamics CRM, “Invoices” are requests for payment from a business to its customers. Invoices are related to orders. Depending on the payment terms, an invoice can be generated from an order after it is fulfilled or when it is placed. It is important to note that although there is functionality that supports invoices and sales orders within Microsoft Dynamics CRM, it should not be considered to be an accounting application. As such, many organizations leverage the invoicing functionality but only in integrated situations where the invoices are flowing from the accounting application into Microsoft Dynamics CRM as read-only records.

Sales Territories

Microsoft Dynamics CRM uses Sales Territories to group users into one territory with a common manager for a specified territory.

The members that belong to one territory cannot be assigned to another.

A territory can be used, for example, when a new lead has been created, a workflow can be used to assign the lead to a specific territory. The specified manager of the territory can then assign the leads to a salesperson.

Product Catalog

Within Microsoft Dynamics CRM, organizations can track and manage the list of products and services they provide their customers. Additionally, they can establish different levels of pricing options and discounts based on various organizational criteria. For organizations that transact in multiple currencies, Microsoft Dynamics CRM can track pricing for each product in different currencies and with different pricing options. There are four primary components of the product catalog within the application: Products, Units of Measure, Price Lists, and Discount Lists.

Module 13 – Leads and Opportunities

Cases are the basic record type in service management. They represent a single incident of service.. Different organizations may refer to cases using different terms, including incident, ticket, service request, and many others. A customer can have many cases associated with their record at any point in time.

Within the application, users have the ability to see open and resolved cases, depending upon their security roles. Cases can have many other record types tied to them, such as knowledge base articles, products, entitlements, and many others.

In addition to these related entities, users can track communications or activities against these cases. This module will explore the details of working with a case record type within Microsoft Dynamics CRM.

Objectives

The objectives are:

- Examine the Lead to Opportunity process and the roles of these records
- Converting Leads
- Understand Lead record management
- Understand how Competitors are used

Lesson 13-1 Understand the Role of Lead and Opportunity Records

In Microsoft Dynamics CRM, a lead represents potential: a potential sale, for example, or a potential contact or account with which an organization might do business. Many organizations implement lead qualification processes, during which leads are contacted, more information is gathered, and at some point a decision is made about the lead's status. Generally, leads should be considered temporary records, with the goal of determining their viability to be a customer. This process of determining viability is referred to as Qualifying and Disqualifying.

For example, if a salesperson meets someone at a tradeshow and gets a business card, he or she might not know if this person is a viable customer. It is only after the salesperson has called this person or has followed up in some way that the salesperson can determine if this person's needs align with what the salesperson and the organization can deliver. Once this is determined, the salesperson can measure how viable the prospect is. If it is a viable customer, the lead would be Qualified. If it is not a viable customers, the lead would be Disqualified. If qualified, the lead would be converted into some combination of Account, Contact, or Opportunity records at the end of the qualification process.

Deciding to Use Leads

Not all organizations use leads. Some organizations deal with opportunities, that is, qualified prospective sales. Organizations that depend on mass demand generation processes such as advertisements, road shows, and cold calling prospect lists likely use leads. Businesses that have demand generation methods or those that engage in mass marketing campaigns may benefit from

lead management because this process helps businesses sift through the data and helps sales departments focus their efforts in the best direction.

To decide whether to use leads, determine the following about the organization:

- Invests substantial time and money in generating lists of possible customers. For example, the organization sends mass mailings or conducts cold calling.
- Keeps lists of people who are the correct demographic, but for whom it has limited information (such as limited contact information).
- Has a process or team dedicated to sifting through these possible customers and contacting them or otherwise filtering them to identify good prospects.
- Needs to manage lists of potential customers that must not be mixed in with the Accounts and Contact lists.

If any of these considerations apply, then the organization may want to use leads. Even if the organization does not have large lead generation initiatives, ask if management wants to track the effort that Sales spends tracking and working with prospects. If so, consider using Microsoft Dynamics CRM's lead management features.

Use leads to store large amounts of low-value information, such as prospecting lists or attendees from trade shows. Leads are also useful for separating the marketing and sales departments' data sets. In this scenario, marketing qualifies the lead and converts it to an account, contact, and opportunity to further engage sales people.

In Microsoft Dynamics CRM, an opportunity is a qualified potential sale. An opportunity tracks a qualified potential sale through the sales closing process. A qualified potential sale indicates that the potential customer has been contacted, information has been gathered about interest, and the organization has determined the likelihood of the customer buying and decided that the potential is worth pursuing.

Opportunities can track very detailed information about a potential sale, including the following:

- Competitors for the opportunity.
- Products of interest to the opportunity from the product catalog.
- Estimated revenue, estimated probability of closing the deal, and the estimated close date.
- The associated customer record. Opportunities must always be associated with a customer record, which in Microsoft Dynamics CRM is either an account or contact.
- All activities involved in closing the sale. This can include phone calls, letters and faxes sent, appointments, and emails sent. In addition, organizations can track a series of notes about the opportunity

Lead Form

Microsoft Dynamics CRM uses forms that are “process-driven.” The new design allows users to follow a step-by-step process to make sure the correct information is gathered for different record types. The stages in a process can be modified to a specific organization’s needs. The Lead to Opportunity process form also has an auto-save feature where the record is automatically saved

each time a field is updated. The form is saved when users click away from the form. The record can still be saved manually by clicking the Save icon in the bottom right corner of the process form.

Key Changes to Lead Form

There are two fields in the Business Process ribbon that affect the Lead to Opportunity conversion;

The Existing Contact and Existing Account fields in the default Qualify stage provide a user the ability to see if the lead already exists as a Contact or Account within Microsoft Dynamics CRM.

The Existing Contact field looks at the First and Last Name of the lead to find a match.

The Existing Account field looks at the Company Name populated on the lead form to find a matching account.

A number of sub-grids have been added to the Lead form:

- Stakeholders (using Connections)
- Competitors

Convert Activity Records to Leads

Typically, users can generate leads with several methods and sources. For example, leads can be obtained from websites, inquiries, referrals, networking, and responses to marketing campaigns, or from purchased lists. The more information known about leads, the more likely they will become an opportunity and, eventually, a customer.

Users can track activities with leads, such as sending and receiving email messages. Microsoft Dynamics CRM tracks the status of these activities and retains the activity history so users can view the open and closed activities for leads.

Disqualified leads remain in the database for business-reporting purposes, for example, to later analyse the success of different list sources or assess how much time the sales force spends prospecting leads.

Email to Lead Conversion

One way leads can be created within Microsoft Dynamics CRM is by converting an email to a lead. This can be done in both the Microsoft Outlook interface as well as in the web client. This is helpful for organizations that have new lead information sent to them via a subscription service or perhaps from a company website.

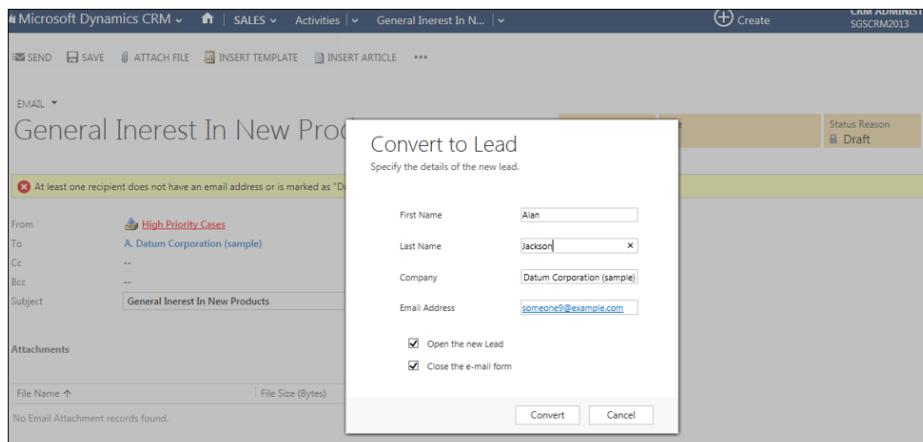


Figure 11 - Email to Lead Conversion

Email is the only type of activity that can be converted to a Lead,

Lesson 13-2 Qualifying and Disqualifying Leads

When it is determined that the lead is no longer a viable customer, the lead must be disqualified. The lead can be deleted. But if it is disqualified, the details of the lead remain in the system. This way, the lead can be reactivated and qualified at any time. If the lead is deleted, the related information is lost.

Leads can be disqualified for multiple reasons such as the following:

- A lead is not interested in the company's products or services.
- The lead needs a product or service that the company does not provide.
- There is potential that doing business with this company or person might not be in the best interests of either party.

For example, different departments may qualify or disqualify leads based on current promotions and marketing campaigns. Leads may not meet the qualifying process for the current campaign, but they may meet the qualifications for future sales or marketing campaigns. By disqualifying them instead of deleting them, you retain the records for future reactivation.

Qualifying

When it is determined that a lead is qualified, the process to qualify the lead is as simple as clicking the Qualify button on the lead record. However, understand that qualifying a lead can result in an Account, Contact, and/or Opportunity record being created.

The following values on the lead form control the outcome of the qualification process:

- **Existing Contact:** If this existing contact value is populated and the company and existing account values are not, then the opportunity that is created is associated directly with the existing contact.
- **Existing Account:** If the existing account is populated, the opportunity that is created is associated with the existing account.
- **Title:** This becomes the title of the opportunity that is created.

- **Name:** If the name is populated, and the existing contact is not, this becomes the full name of the new contact. Additionally, if the existing contact value is empty and the company field is populated, this contact is associated with the new account. However, the opportunity is still associated with the account.
- **Company:** If the existing account is blank, this becomes the name of the newly created account.

Disqualifying

While disqualifying a lead is as simple as clicking the Disqualify button on the lead form, the user must select a reason why the lead is being disqualified. The list they are presented is a default list which can be changed by an administrator or customizer.

Again, it is very important to understand the importance of disqualifying a lead rather than deleting it. If a lead is deleted, not only is the lead record completely removed from the database, but all communications (activities), posts, and notes are also removed from the system. As such, if that lead ever becomes a viable customer again, all information regarding those notes and activities will be gone. This might result in a negative customer relationship management experience.

Reactivating

If a previously disqualified lead becomes a viable prospect then you can click on the Reactivate button on the lead form.

Lesson 13-3 Opportunity Management

In Microsoft Dynamics CRM, qualified leads, such as those that have estimated revenue associated with them, become opportunities. When a prospect or customer expresses qualified interest in buying the business' products or services, that prospect or customer is considered an opportunity.

This is an important part of the sales process because this is where the sales team spends most of its time and effort. The process of working on an opportunity may include several customer interactions. How well the sales team manages this stage can mean the difference between a win and a loss.

Working with opportunities can involve several tasks:

- Tracking the products in which the customer is interested.
- Tracking activities related to the opportunity.
- Tracking competitors.
- Sending literature to the customer.
- Assigning and sharing opportunities.
- Moving opportunities through a sales process workflow.

To sell effectively, sales people need to know what interactions have occurred with a customer, what touch points have taken place, and what needs to happen next. Proactively reaching out to customers helps move the sale forward. Phone calls, emails, faxes, and meetings are important interactions. For sales people to have a complete view of the opportunity, they must track the

various activities that take place with the customer. Microsoft Dynamics CRM allows users to record and relate different types of activities to an opportunity.

Creating Opportunities

With Microsoft Dynamics CRM, users can create opportunities manually or by converting a lead or an activity to an opportunity. If your organization uses leads, you will often convert leads into opportunities. In other situations, you may create a new opportunity for an existing account or customer, or create an opportunity based on an activity that has occurred, such as an email.

Key Fields on Opportunity

The opportunity form in Microsoft Dynamics CRM contains the key following fields:

- Account: Lookup for an Account record associated to the opportunity.
- Contact: Lookup for a Contact record associated to the opportunity.
- Price List: The appropriate price list for organizations that use them.
- Revenue: The method for calculating estimated revenue.
- Est. Revenue: Estimated revenue. The value of the opportunity. This value is used for forecasting.
- Est. Close Date: The date when the sale is expected to close. This date is used for forecasting.

Probability is not on the form in CRM 2015.

Neither Account nor Contact are business required fields in CRM 2015.

User-Provided and System Calculated Pricing

When creating an Opportunity record, users can select System-Calculated or User-Provided for the Revenue field. This is an important distinction and has implications for how Opportunity records interact with quotes, orders, and invoices. The following are important characteristics to understand when comparing system-calculated and user-provided pricing methods:

- If System Calculated is selected, an Opportunity record can be saved without specifying a price list. However, Opportunity Products cannot be added to an opportunity (in the Line Items section of the form) without first specifying the price list. And since the Est. Revenue field is calculated as the total of all opportunity product records for the opportunity, opportunity products must be added in order to reflect a value in the Est. Revenue field.
- When User Provided is selected, opportunity products and write-in products can still be added, but their pricing is not be used when determining the value of the opportunity.

Changing Opportunity Status

In Microsoft Dynamics CRM, when an opportunity is created it resides in an Open status. When a customer reaches a buying decision, Opportunity records can be closed in one of two ways:

- Close as Won indicates a successful sale, and changes the status value to Won.

- Close as Lost indicates a decision not to buy, and changes the status value to Lost.

Opportunity records with status values of either Won or Lost are read only. If closed opportunities require changes, they can be reopened.

Deleting Opportunities

Users with sufficient security privileges can delete Opportunity records. However, it is important to realize that deleting an Opportunity record also deletes any associated activities and notes. As a general rule, it is better to close opportunities as lost rather than delete them.

Open Opportunity Status

In Microsoft Dynamics CRM, Opportunity records are saved with a default status value of Open. Open opportunities are conventionally used to represent potential sales and often have sales processes associated with them. You can modify Open opportunities as needed.

Won Opportunity Status

In Microsoft Dynamics CRM, when an opportunity is marked as Won, this indicates that the customer has placed an order or has signed a contract for services. It is important for an organization to define what it means when an opportunity is “Won” because it helps dictate how the organization uses the application as it relates to managing opportunities.

Lost Opportunity Status

When opportunities are lost, it is important to change the status of the opportunity. This takes the opportunity out of the sales pipeline and allows sales people and sales managers to focus on closing other opportunities.

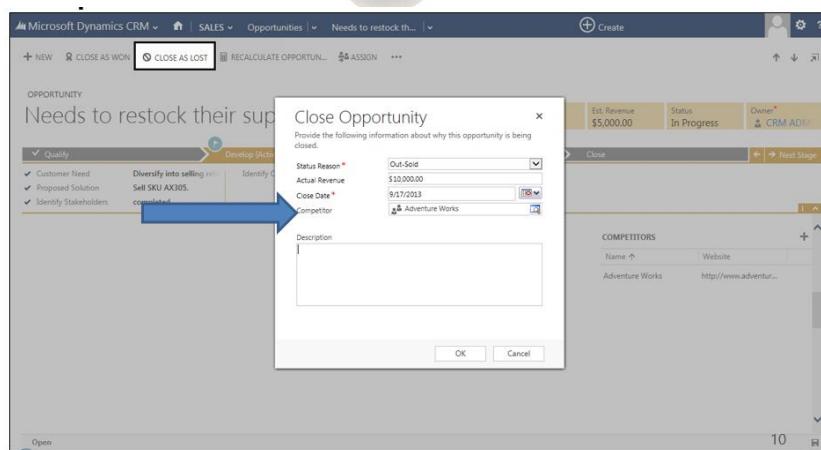


Figure 12 - Closing an Opportunity

Resolution Activities

When an opportunity is either won or lost, a special type of activity is generated called a “Resolution Activity.” This resolution activity helps other non-sales-related users see what kinds of activities beyond phone calls, emails, and appointments (for example) are taking place regarding a particular customer. Users can open these activities and see information regarding when the activity took

place, the actual sales value, why they might have lost an opportunity, or the competitor to whom it was lost.

Connecting with Other Records

Microsoft Dynamics CRM provides the ability to connect opportunities with other related records in the system. When opening up an existing Opportunity record in the Navigation Pane, click the drop-down arrow next to the record name to view the related entities.

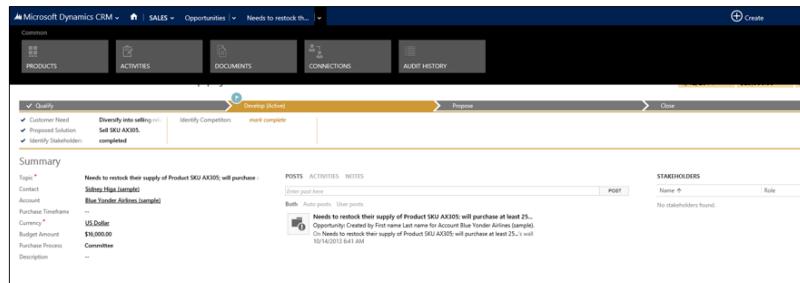


Figure 13 - Opportunity Related Records

Related entities to the Opportunity record include the following:

- Products: View existing products that are part of the Opportunity. For example, the customer might be deciding to purchase a Mountain Bike as part of this Opportunity. This would be seen and managed within this section.
- Activities: View existing activities or create a new activity for the Opportunity record.
- Documents: Add a document location associated with the Opportunity record by specifying a URL of an existing SharePoint folder.
- Connections: Add to the record an individual who has a certain role or relationship to the record.
- Audit History: View the edit history of the Opportunity record. This also captures the date and time of the modification, along with the old and new values of the specified fields

Lesson 13-4 Sales Literature

The Microsoft Dynamics CRM “Sales Literature” system is a central repository for an organization's sales information. It provides the sales team with access to sales literature, product brochures, articles, discounts, pricing structures, and so on. Sales literature can serve a number of useful purposes in Microsoft Dynamics CRM:

- It can be associated with products, competitors, or both. Organizations can make relevant sales literature simpler to find by including a product catalog, the competitors' module, or both, and then associating the literature with a specific opportunity through the products or competitors associated with the opportunity.
- It can be associated with a marketing campaign. For example, a product launch campaign might have a product flyer attached to the campaign or a special offer pricing sheet.

- Documents can be attached to sales literature -- such as Microsoft Office Word files, PDF files, or other file types -- and can be easily emailed to clients by using the Microsoft® Outlook® client.

Sales Literature Attachments

In Microsoft Dynamics CRM, a “Sales Literature Attachment” is where actual documents can be attached.

Attach Sales Literature to Email

After sales literature records have been added to Microsoft Dynamics CRM, users can easily attach them to emails and have each of the sales literature attachment appear as attachment on the email.

Microsoft Dynamics CRM and SharePoint: Which to Use for Sales Literature?

Many organizations already have a significant library of documents stored and managed in Microsoft® SharePoint® document libraries, and may wonder how the Microsoft Dynamics CRM Sales Literature features should be used in conjunction with SharePoint. We recommend a "best tool for the job" approach, and provide some feature comparisons in the following table.

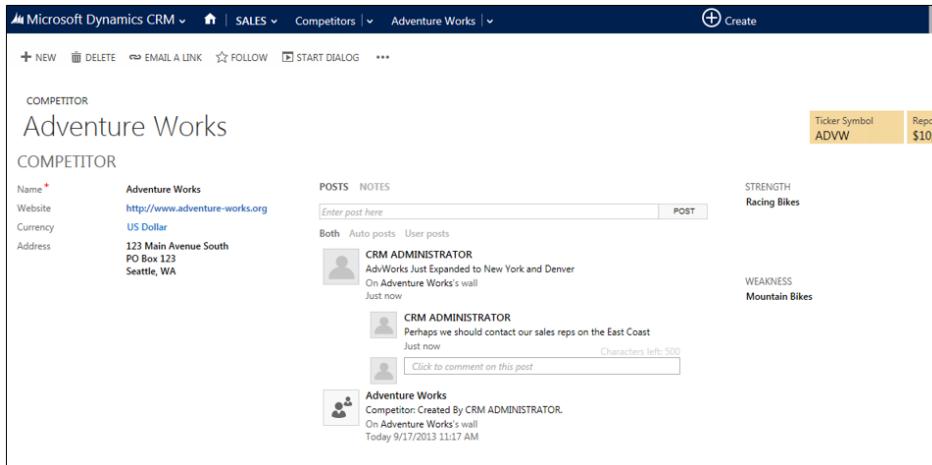
Microsoft Dynamics CRM	Microsoft Office SharePoint
Neither versioning nor check-in/check-out capabilities exist for sales attachments	Powerful and flexible versioning and check-in/check-out capabilities
Sales literature can be easily attached to activities associated with accounts, contacts, and other Microsoft Dynamics CRM record types. These can be tracked as part of the comprehensive client history.	Powerful searching capabilities including searching on keywords and metadata
Sales literature can be associated with marketing campaigns, products, competitors and other Microsoft Dynamics CRM record types	Can be associated with almost any kind of Microsoft Dynamics CRM record

These complementary feature sets suggest using SharePoint for the collaborative document creation and management tasks, and as the repository for a document's version history. However, a client-ready published version of a document might be attached to Microsoft Dynamics CRM sales literature, in order to take advantage of Microsoft Dynamics CRM's more highly structured data and its built-in ability to attach that sales literature to customer activities such as emails.

Lesson 13-5 Competitors

Microsoft Dynamics CRM includes a “Competitor” record type so that an organization can compile information about its competitors. This information provides the organization's sales staff with a powerful tool to compete effectively, close more sales opportunities, and strengthen customer relationships.

Tracking competitors can be an important part of the sales process. The more information that a team has about the strengths, weaknesses, opportunities, and threats presented by the competitor, the more likely the team is to win sales against that company.



The screenshot shows the Microsoft Dynamics CRM Competitor form for 'Adventure Works'. At the top right, there are buttons for 'Create' (+), 'New' (+), 'Delete' (-), 'Email a Link', 'Follow', 'Start Dialog', and 'More'. The main title is 'COMPETITOR Adventure Works'. Below it, there's a section for 'COMPETITOR' with fields for Name (Adventure Works), Website (<http://www.adventure-works.org>), Currency (US Dollar), and Address (123 Main Avenue South, PO Box 123, Seattle, WA). To the right, there are sections for 'POSTS' (with a text input field 'Enter post here' and a 'POST' button) and 'NOTES' (with a text input field 'Enter note here' and a 'POST' button). On the far right, there are sections for 'STRENGTH' (Racing Bikes) and 'WEAKNESS' (Mountain Bikes). Ticker Symbol 'ADWW' and Repo '\$10.' are also displayed. The bottom of the form shows a wall feed with posts from 'CRM ADMINISTRATOR' and 'Adventure Works'.

Figure 14 - Competitor Form

Connecting Competitors to Opportunities

Competitors can be associated with the products and sales literature in situations where the competitor might carry the same products or provide the same services as the company using Microsoft Dynamics CRM.

When a company tracks opportunities, knowledge about competition can be the difference between winning and losing. This knowledge can help the sales team better position their services and products against the competition, thus improving their chances of winning.

Additionally, by using competitor records and either indicating that you are competing against them during the sales process or indicating which one you lost the opportunity to, default reports such as the Competitor Win/Loss report within Microsoft Dynamics CRM provide a sales team a great deal of additional insight into which competitors they do well against and which ones they do not.

Module 14 - Product Catalog and Sales Order Processing

This course describes the role of the product catalog in Microsoft Dynamics CRM and the benefits of using it. It shows the tasks that are required to configure a product catalog, including setting up and maintaining unit groups, products, and price lists and new product features of CRM 2015.

Objectives

The goals of this module are to:

- Identify the features and benefits of the product catalog
- Create and maintain unit groups for the product catalog
- Add products to the product catalog, and describe the use of kit products and substitute products
- Create price lists and for different customers, marketing campaigns and offers
- Creating Product Bundles
- Viewing Products in hierarchical charts
- Working with Currencies
- Sales Order processing

Lesson 14-1 Product Catalog

The product catalog is the central location for storing information about an organization's products and services. Products are the items sold by an organization, and are at the core of the product catalog. They can be either physical inventory items or services, and they are assigned to price lists as price list items.

Organizations that configure their product catalogs can realize many significant benefits, including the following:

- Sales opportunities associated with price lists can use system-calculated pricing, and sales professionals do not have to perform complex manual pricing calculations.
- With system-calculated pricing, information on an Opportunity record can be used to automatically create corresponding Quote, Order, and Invoice records.
- Different price lists can be maintained for different customers, or for different groups of customers; opportunities created with these lists automatically reflect any custom pricing rules.
- Price lists can be associated with marketing campaigns, and opportunities created from campaign responses automatically inherit any special price offers from the campaign.

Product Catalog

There are four primary components of the product catalog within the application: Products, Units of Measure, Price Lists, and Discount Lists.

Products - represents the type of product that a company might keep in inventory or a product that is custom built, or it could even represent a service provided to a customer. For example, if a beauty salon used Microsoft Dynamics CRM, its products could include various hairstyling and hair cleaning products.

Additionally, the company's list of products might also include various services such as haircuts, colouring, and spa services. Products can also be associated with Opportunities, Quotes, Orders, and Invoices. So, if a salesperson placed an order within Microsoft Dynamics CRM, he or she could indicate the quantity and pricing of each item or service provided to a customer.

Units of Measure - lists the ways in which the product is packaged for sale, such as the units of measure in which the product or service is sold. The unit group includes a unit for how an organization receives the product from its vendor or manufacturer and units for how it packages and sells the product.

Price Lists – defines the prices that are charged for the product under certain circumstances. Organizations can have multiple price lists to accommodate seasonal variations, specials, or different markets to which they sell (such as government, commercial, and education.)

Discount List - allows an organization to offer a product or service at different sales prices, depending on the quantity purchased. Discount lists of different types (based on amounts or percentages) can be created, and different discount amounts and percentages for various quantity ranges can be specified. In this way, customers purchasing 50 units can be charged a different price than those who purchase 500 units of the same item.

Creating the Product Catalog

To appreciate the benefits of using product catalogs in Microsoft Dynamics CRM, it is important to understand the activities involved in configuring and maintaining them.

The following sequence is used by many organizations to configure, maintain and use the product catalog:

1. Set up unit groups: Unit groups contain the units used to sell the products and services by and at what price.
2. Set up products: Create the product and enter core pricing information.
3. Set up price lists: Create the price list and the price list items to specify the sales price of each packaged version of the product.
4. Classify products and bundles into families.
5. Use in sales and marketing processes: Price lists can become an integral part of many important organizational processes. For example, sales teams can use them to automate the sales process, marketing can use them to manage campaign special offers, and management can use them to maintain control over pricing and profitability.

Discount Lists are an optional component of the product catalog that can be used to create volume discounts based on the amount of product purchased.

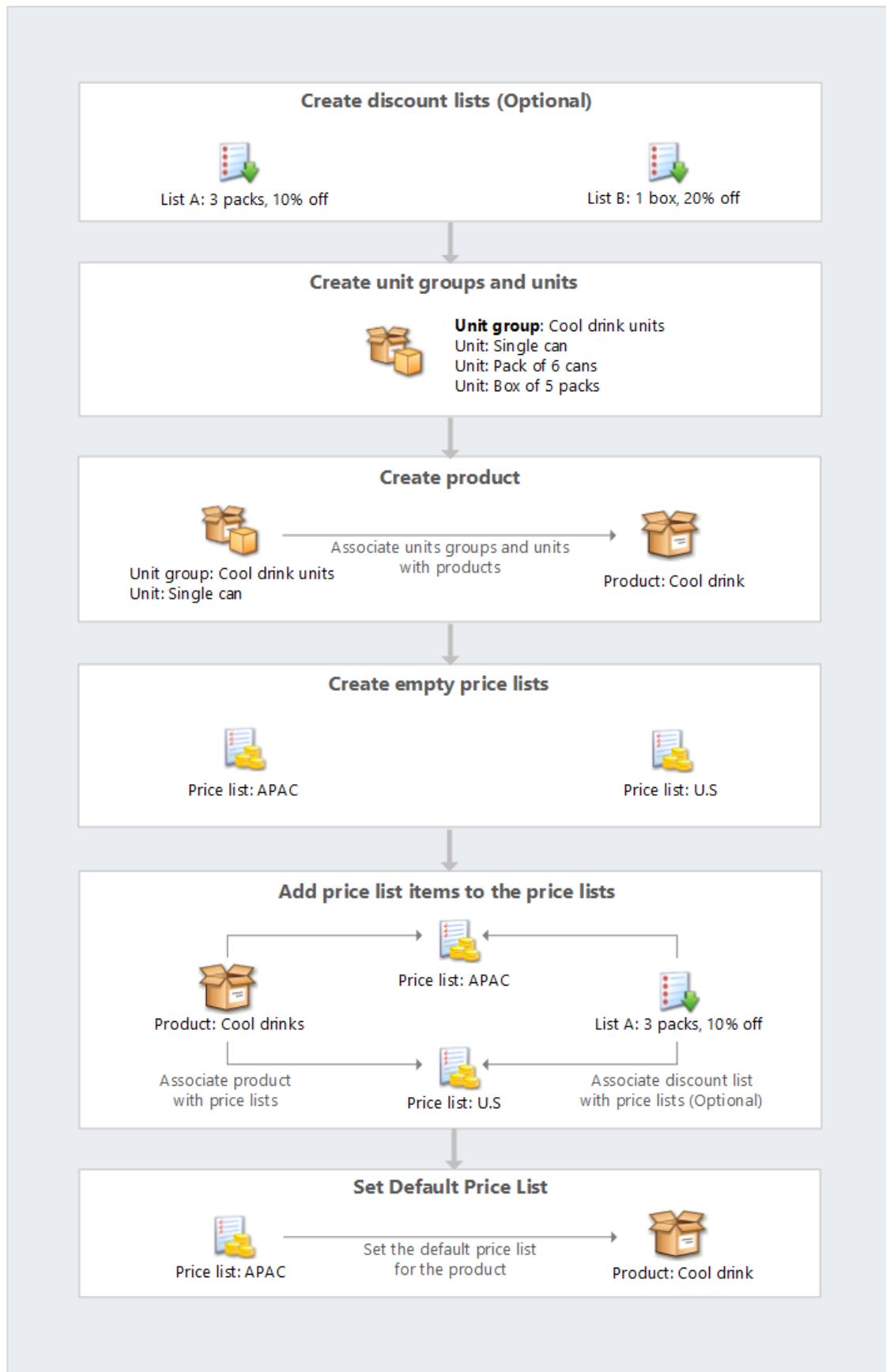


Figure 15 - Setting up the product catalog

Unit Groups

A unit group is a compilation of the ways or measurements in which a product is available. The unit group includes a unit for how the product is received from its vendor or manufacturer, and units for how the product is packaged and sold. (A product can be received and sold using the same unit.) Before products or services can be added to the product catalog, applicable unit groups must be created.

A unit group contains a list of the increments in which a product is sold. Each of these is considered a unit. In the case of physical items, an organization might use units such as "each" to reflect the individual item, or a dozen, or a case. For services, the units might be an hour, week, or project. Units are named to reflect the quantity they contain.

Primary Unit

When a new unit group is created, it is given a name and the primary unit is specified. The primary unit is important because it serves as the basis for all other units.

In the case of products, the primary unit is often the lowest common measurement in which the product is sold.

Adding and Maintaining Products

The product is the item the organization is selling. It can be a physical inventory item or a service. A product can be created as a single item, or a kit can be created that includes a group of products. Additionally, if a replacement product is available, the product can be added as a substitute product.

When adding a product to the catalog, specify the ways it can be packaged and the default packaging method. In addition, enter the following information:

- ID: The ID can be numbers, letters, or characters but must be unique.
- Name: A descriptive name for the product.
- Cost and pricing information: The cost, to the company, of purchasing or manufacturing the product and the standard price that the company charges its customers for the product.
- Unit Group: A unit group must exist for this product before adding the product to the catalog. The unit group must contain at least one unit to be used as the default unit for the product definition.
- Decimals supported

The cost and pricing information is important because when the price list for this product is created, Microsoft Dynamics CRM allows for prices to be specified as percentages of the pricing information. For example, for a 50 percent markup and cost of \$10 U.S. Dollars (USD), then the price is \$15 USD.

Products can also be grouped together as part of a Product Family and Bundle.

Creating, Maintaining and Using Price Lists

Multiple price lists can be created in Microsoft Dynamics CRM. Each price list contains basic information such as its name and some descriptive text. More importantly, price lists contain price list items, one for each product added to the price list.

Products added as price list items to a price list can be sold at a price different than the list price in the product catalog.

Pricing Methods

When adding price list items to a price list, some of the most important information to provide is in the Pricing section of the Price List Item form. The first required field in that section is the Pricing Method field. The available options are as follows:

- **Currency Amount:** Use this to ignore a product's list price in the product catalog and to enter a different price manually for this price list.
- **Percent of List:** Use this to calculate a product's price in the price list as a percentage of its list price.
- **Percent Markup: Current Cost:** Use this to add a percent markup on top of the current cost entered in the product catalog. This is also available for the Standard Cost field.
- **Percent Margin: Current Cost:** Use this for the price offered in the price list to yield a percentage margin of the current cost. This is also available for Standard Cost

Lesson 14-2 Product Bundles and Families

A product catalog is a collection of products and their pricing information. The product catalog in Microsoft Dynamics CRM also supports product taxonomy that lets sales managers:

- Hierarchically organize products and product bundles into product families.
- Define configurable properties for products to reduce the number of individual product records or stock keeping unit (SKUs) they would need to manage. The sales people can pick from these properties when they're working on opportunities, quotes, orders, or invoices.
- Group products and services into bundles to create attractive packages for customers
- Define product relationships such as upsell and cross-sell products so sales people can see these products as recommendations at the time of building orders.

All these capabilities will help your sales agents quickly find products, see their properties, and also suggest other products to the customers, and consequently increase sales.

Product Family

Make it easier for sales agents to find products and services in a product catalog by creating a product family and classifying similar products in it. A product family lets you group and categorize products, making it easier for you to manage them.

With product families, you can:

- Categorize your products in whichever way is most meaningful for your organization.
- Create child products and product bundles within a product family. Product bundles allow you to sell multiple items together.
- Create as many levels of product families as you want by creating a family within a family

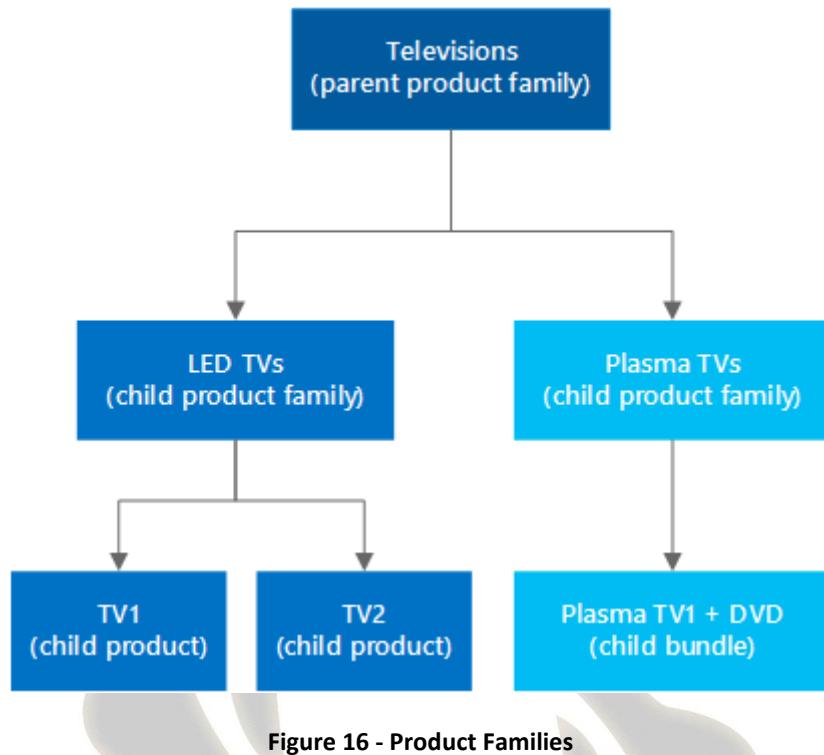


Figure 16 - Product Families

View product hierarchy

A product hierarchy gives you a visual snapshot of the products your organization sells. It makes it easy to see what products are available to sell and how they are connected. With this information at your fingertips, you can take whatever actions you need to on any product from a single place and improve your chances of a sale.

1. Go to Sales > Products.
2. In the list of products, open a product, product family, or bundle whose hierarchy you want to see, and on the command bar, select **View Hierarchy** 

You'll see the product in a tree structure and a visual organization of all products in the hierarchy

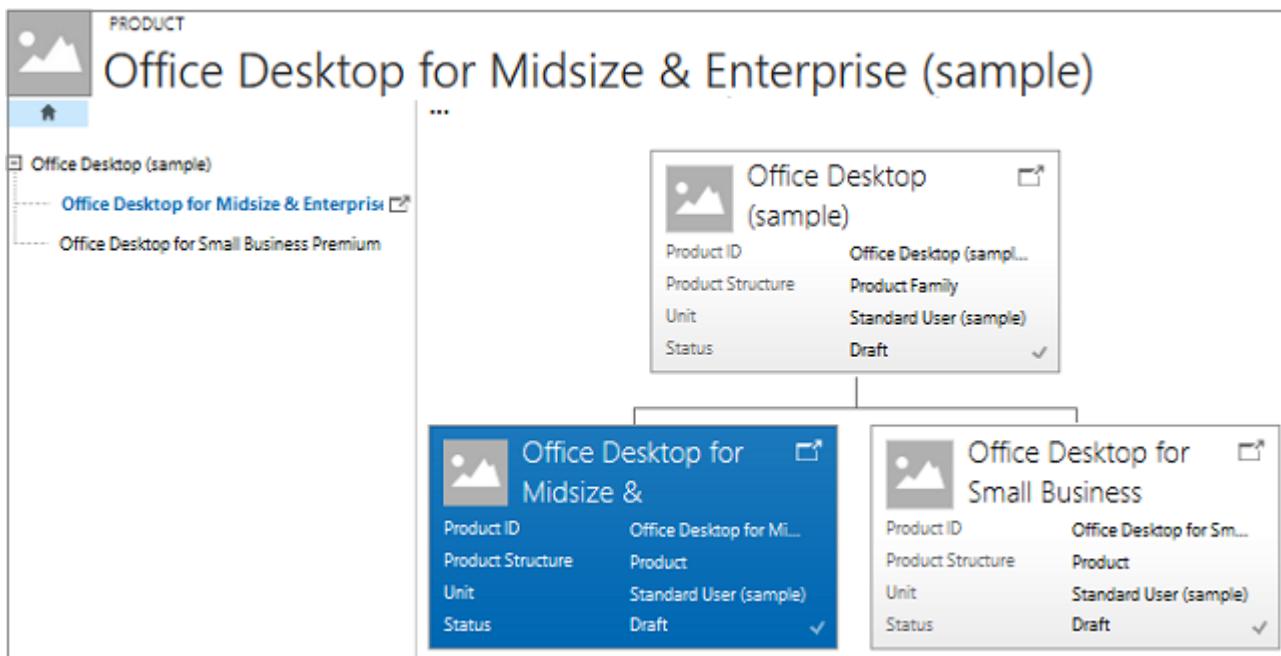


Figure 17 - Product Hierarchy

Product Bundles

Encourage customers to buy more products instead of a single product by combining products in a bundle. Bundles replace the older kit functionality in Microsoft Dynamics CRM. Kits have been deprecated, so we recommend that you start using bundles instead.

This list highlights the differences between kits and bundles:

- You can't sell the products in a kit individually or separately, but you can mark certain products in a bundle as optional, and sell them individually.
- You can't see individual products added in a kit when you create an opportunity or order, but you can see the products in a bundle.
- You can create nested kits (kits within a kit), but you can only add products to a bundle; you cannot add product families, kits, or other bundles to a bundle.

Similar to a kit, a bundle is a collection of products that is sold as single unit. Product bundling is useful in cases like:

- Pairing a top-selling product with a less popular product
- Grouping products in a way that customers get more benefit from the full line of products, for example Microsoft Office Suite or a digital camera with lenses

Create a product bundle

1. Make sure that you have the Manager, Vice President, CEO-Business Manager, System Administrator, or System Customizer security role or equivalent permissions.
2. Go to Settings > Product Catalog.
3. Choose Families & Products.

4. Choose Add Bundle.
5. Enter information, noting any restrictions or requirements as needed.
6. Choose Save.
7. In the Bundle Products section, choose , and select products that you want to add to the bundle. The Product Association page opens.
8. Fill in your information. Use the handy tooltips as a guide.
 - Bundle. The bundle you're adding the products to is selected by default.
 - Product. Choose the Lookup button and select a product you want to add to the bundle.
 - Quantity. Choose the quantity of product you want to add to the bundle.
 - Required. Choose whether this product is required or optional. If you select a product as optional, you can sell the bundle without the product.
 - Unit. Select the unit in which you want to sell the product
9. Choose Save and Close.
10. To change properties of an individual product in the bundle, choose Customize corresponding to the product, and change the values as required.
11. If you've added this bundle to a family, the bundle will inherit the properties from its parent family. To change the bundle's property, open the property and choose Override.
12. In the Additional Details section, choose , and add a price list item.
13. In the Product Relationships section, choose , and select a related product.

Pricing of bundles

Typically, the pricing of products in bundles is different than the individual products. You can set a total and potentially discounted price for the bundle or if the bundle has optional products, add those products to the price list as price list items. Then the total for a bundle in an opportunity is calculated by adding up the prices for each price list item, including optional bundle products that your customer selects. If you don't add an optional product in the price list, its price will be considered as zero.

Product Properties

Simplify product management and classification by adding properties that help distinguish products from one another. Adding well-defined properties to products cuts down on the time spent by your agents trying to find products with the right specifications or properties for your customers when they're building orders.

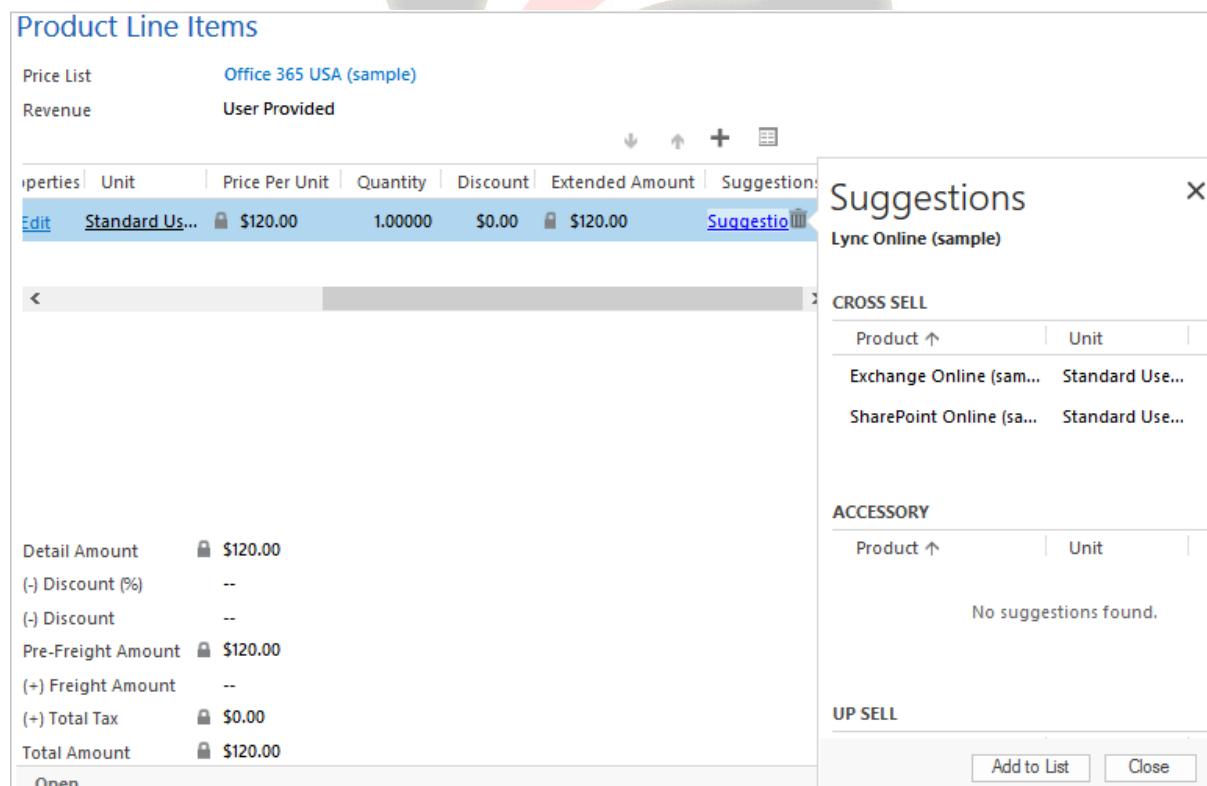
A property of a product could be its size, colour, or component and so on. Properties are added at the family level. You can add properties only to a family, and only when it is in a draft or under

revision state. The child products, bundles, and families inherit the properties from their parent family.

Related Products

Improve your opportunities to increase sales by adding related products as suggestions for up-sell, cross-sell, accessories, or substitutes. Defining related products will help your sales agents with their recommendations to customers. You can add related products to a product or product bundle, but not to product families.

The related products are displayed as suggestions to your sales agents during opportunity or order management. These suggestions help your sales agents recommend related products and bundles/kits to the customers, and increase product sales. You can define the following relationships for a product: Accessory, cross-sell, substitute, and up-sell.



The screenshot shows the Microsoft Dynamics CRM interface for managing product line items. On the left, a grid displays product details such as Price List (Office 365 USA (sample)), Revenue (User Provided), and various financial fields like Price Per Unit (\$120.00), Quantity (1.00000), Discount (\$0.00), Extended Amount (\$120.00), and Suggestion (\$120.00). Below the grid, there are summary fields for Detail Amount (\$120.00), Pre-Freight Amount (\$120.00), Total Tax (\$0.00), and Total Amount (\$120.00). To the right, a modal window titled "Suggestions" is open, showing three categories of related products:

- CROSS SELL:** Lists "Exchange Online (sample)" and "SharePoint Online (sa...)" both associated with "Standard Use...".
- ACCESSORY:** Shows a message: "No suggestions found."
- UP SELL:** Contains two buttons: "Add to List" and "Close".

Figure 18 - Product Suggestions

Publish a product or bundle

When you're ready to sell a product or bundle, publish it to make it available to the sales agents so they can build orders or create opportunities for customers.

By default, product records are created in Draft state, and are available to your sales agents only after you publish it.

For products that do not have a parent product family, you can create them directly in an Active state using a system setting, so that you don't have to publish those after creation.

Create products in active state

Use the settings on this page to configure system-level settings for the sales area of Microsoft Dynamics CRM.

To set the products to active state by default after creation, choose Yes for Create products in active state setting. This option applies only to products that don't have a parent product family. To create products in the Draft state, choose No.

Define default price list for territories

Make sales agents' job easier by adding default pricelists for territories or customer segments the agents are managing. When sales agents are working on opportunities, they see the default price list. Sales agents can later select other price list that they've permission on. You can have one price list as the default for multiple territories.

1. In the price list record, in the Territory Relationships section, choose the Add Record button .
2. In the Connection form, in Name, choose the Lookup button, and select a territory.
3. Choose Save & Close.
4. In the price list form, choose the Auto Save button .

When the sales agents set or change the customer for an opportunity, if a default price list is added to their territory (customer segment), it is shown.

Product versioning

At times, opportunities run for extended period. During this period, the associated product may change or retire. In such cases, the opportunity must still be taken through to completion.

When you revise a product and change the properties, CRM automatically creates a new version of the product and copies the product details from the existing product to the newer version. The new product version has all the details including price lists, product relationships, and properties. The already-created opportunities with the older version of product can continue to refer to the older version of the product. The opportunities that are created after the product is revised or retired will refer to the current (newer) version.

Clone a product

When you're creating a new product, family or bundle, save time by cloning an existing one. This creates a copy of the original record with all the details except for the name and ID. If the product, bundle or family has any properties, they're also copied to the cloned record

Lesson 14-3 Currency

Microsoft Dynamics CRM is a multicurrency system, in which each record can be associated with its own currency. You can perform financial transactions like opportunities, quotes, orders, and invoices in multiple currencies

For organizations that transact in multiple currencies, such as Yen, Peso, Euro, or Dollar, Microsoft Dynamics CRM provides Currency records to manage conversion rates.

Subsequently, when pricing models are set up within the product catalog or when opportunities, quotes, orders, or invoices are created, these Currency records can accurately track pricing as it relates to the transaction.

Additionally, the multi-currency functionality within Microsoft Dynamics CRM tracks all transactions in a base currency (for easier rolled up reporting and analysis) as well as the transactional currency.

Lesson 14-4 Sales Order Processing

Quotes

One way you might increase your sales is to add all products that your customer might need to your quote. Your Microsoft Dynamics CRM system might offer product bundles or product families to make it easier for you to choose products for upsell and cross-sell.

Most sales begin with a price quote, which eventually becomes an order.

You'll probably edit a quote multiple times as a sale progresses. Initially, you create a draft, and then you need to activate it when it's ready to go to a customer.

When the customer accepts the quote, you create an order. Otherwise, you close the quote as revised, cancelled, or lost.

You can create a quote in the following ways:

- Create a quote from an opportunity
- Create a quote

Orders

Microsoft Dynamics CRM, an order can originate from a customer's acceptance of a quote, or you can place an order without an accepted quote, depending on the situation.

One way that can help you increase your sales is to add all products that your customer might need to your order. Your CRM system might offer product bundles or product families to make it easier for you to choose products for upsell and cross-sell. If you've already prepared a quote for your customer, you can create an order from that quote.

You can create an order in the following ways:

- Create an order from a quote
- Create an order

Invoices

When a customer places an order, you can create an invoice to bill them for the upcoming sale.

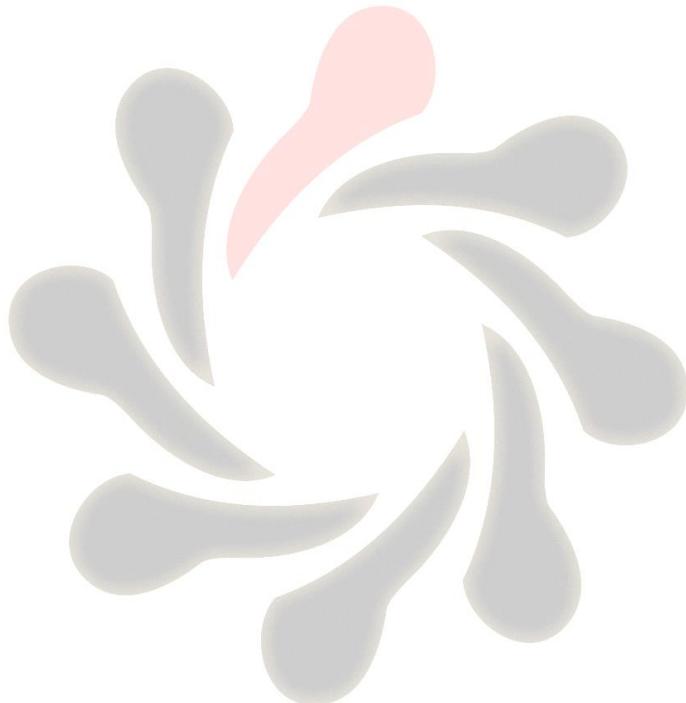
Typically, you convert an order into an invoice. However, you can also create an invoice that does not originate from an order.

You can create an invoice in the following ways:

- Create an invoice from an order
- Create an invoice

Sending Quotes to the Customer

Because quotes, orders, and invoices all may involve the physical delivery of goods or services associated with a sale, the default forms for these record types all have detailed shipping and address information. The pre-configured reports available for printing or emailing a quote, order, or invoice also display this detailed shipping and address information if it is filled out when the records are created.



Module 15 – Goals

Objectives

The goals of this module are to:

- Create and manage sales goals for individuals, teams, and the organization.
- Configure fiscal periods.
- Define Parent and Child Goal Records.
- Work with individual Goal records.
- Create rollup queries

Lesson 15-1 Goal Metrics

Microsoft Dynamics CRM uses two record types known as Goal Metrics and Goals. These record types combine to provide a powerful, flexible set of goal management features. Goal management allows organizations to track individual, team, and organizational progress toward specific goals

Use Goal Metrics to specify the following basic information:

- The type of data in which the goal is defined. For example, a sales goal metric is often defined as a Money data type.
- The record type and field for which goal targets are entered and actual and in-progress values are tracked. These are referred to as Rollup Fields. A typical goal metric for sales is defined for the Opportunity record type, and defines actual sales as Opportunity records with a status of Won.

In Microsoft Dynamics CRM, Goal Metrics are the measurement component underlying the configuration of Goals. Goal Metrics define, at the lowest level, the what and the how of measuring the actual versus in progress against a Goal Target.

Predefined Goal Metrics

Microsoft Dynamics CRM includes three predefined Goal Metric records to base goals on and to view as examples of how to configure goal metrics. These are the following:

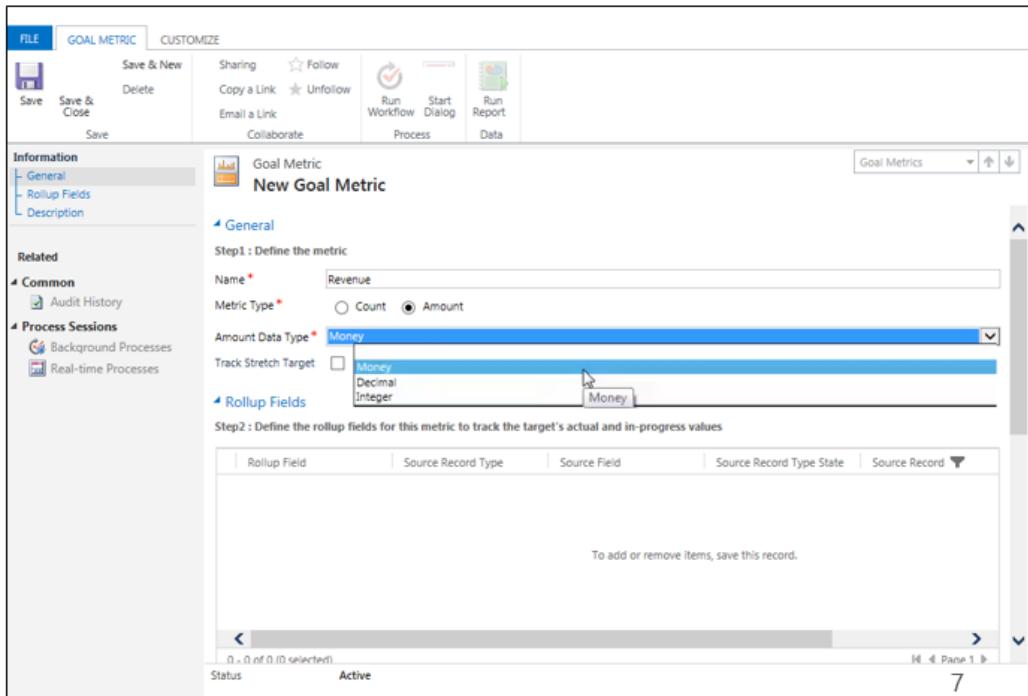
- No. of Cases: Create goals for the number of service management cases resolved in a time period.
- No. of Product Units: Create goals for the quantity of Opportunity Products included in open or won opportunities in a time period.
- Revenue: Create sales goals, defined in terms of open and won opportunities for a time period

Creating a Goal Metric

Step 1 – Create Goal Metric record

- Provide a name for the goal metric in the required Name text field.
- In the required Metric Type field, select Count or Amount.

- If Amount is selected as the metric type, the Amount Data Type field is then required. It can have one of three possible values: Money, Decimal, or Integer.



The screenshot shows the Microsoft Dynamics CRM interface for creating a new Goal Metric. The top navigation bar includes FILE, GOAL METRIC, and CUSTOMIZE. Below the navigation is a toolbar with Save & New, Save & Close, Delete, Sharing, Follow, Copy a Link, Unfollow, Email a Link, Collaborate, Run Workflow, Start Dialog, Run Report, Process, and Data buttons. The main area is titled "Goal Metric" and "New Goal Metric". Under the "General" tab, the "Name" field is set to "Revenue" and the "Metric Type" is selected as "Amount". The "Amount Data Type" dropdown is open, showing "Money" as the selected option. The "Track Stretch Target" checkbox is checked. The "Rollup Fields" section is expanded, showing a table with columns for Rollup Field, Source Record Type, Source Field, Source Record Type State, and Source Record. A message at the bottom of the table says "To add or remove items, save this record." The status bar at the bottom indicates "Status: Active" and "Page 1 of 4".

Figure 19 - Goal Metric

Step 2 – Create Rollup Field(s)

Add Actual and optionally In-Progress rollup fields supplying the following:

- Source Record Type
- Source Field
- Source Record Type state
- Record Type
- Date Field

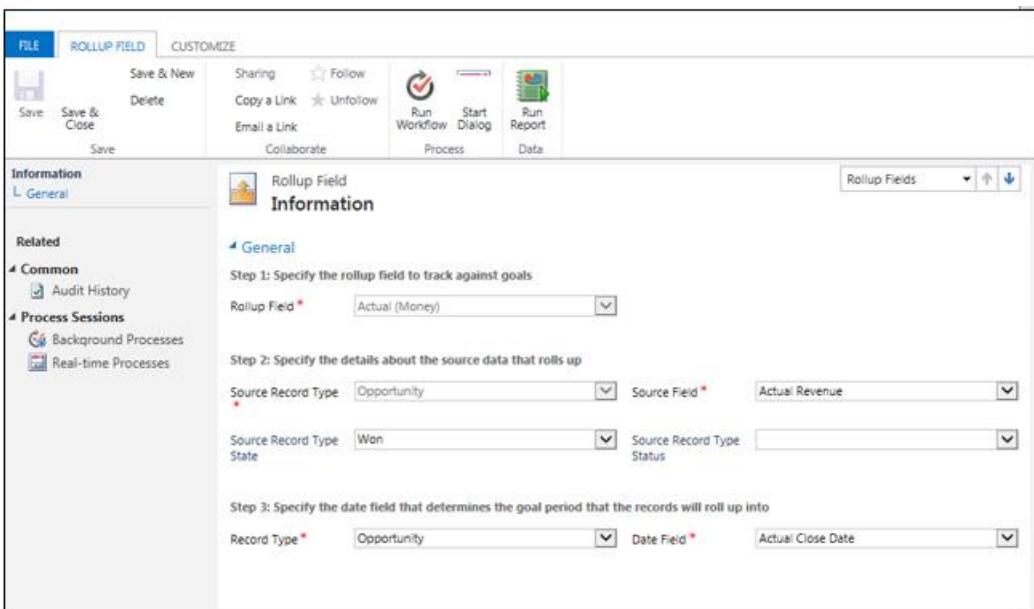


Figure 20 - Rollup Field

Lesson 15-2 Goals

After Goal Metrics are defined, Goals are created. Goals contain more specific information than goal metrics, including the following information:

- The **Goal Metric** on which the goal is based.
- The **Goal Owner** –the user or team to which the goal is assigned.
- The **Fiscal Period** for which the goal is created.
- The **Target Value** of the goal for the fiscal period

Parent and Child Goals

In Microsoft Dynamics CRM, goals can be related to each other as parent and child goals. For example, each member of a sales team may have an individual sales goal, and the sales team may have its own goal. In this example, the goal owned by the sales team can be the parent goal of each of the members' individual goals, which are then referred to as child goals.

A Child goal must have the same:

- Fiscal Period
- Goal Metric

as its Parent Goal.

Rollup Queries

When you define a Goal record, the fields in the Goal Criteria section of the form determine how actual and in-progress amounts are rolled up against the goal. These are described as follows:

- Roll Up Only From Child Goals: If the only values that contribute to the rollup calculations are Child records, select Yes. Otherwise select No.

- Record Set for Rollup: If the only values that contribute to the rollup calculations are records owned by the owner of the goal, select Owned by goal owner. Otherwise select All.
- If All is selected for Record Set for Rollup, you must select Rollup Queries for the actual and in-progress goals.

If All is selected, a criterion other than the owner must be used to determine which records are rolled up. A rollup query is created to perform the data section and added to the goal.

- The Goal Metric specifies how the status values of a record map to a goal's in-progress or actual values.
- The Time Period fields on the Goal record specify how the date fields on a record determine which time period it should count toward in-progress or actual values.
- The Goal Criteria fields on the Goal record specify everything else about which records should contribute to the in-progress and actual values.

Configure Fiscal Periods

Before creating goals in Microsoft Dynamics CRM, you may need to configure Fiscal Year settings.

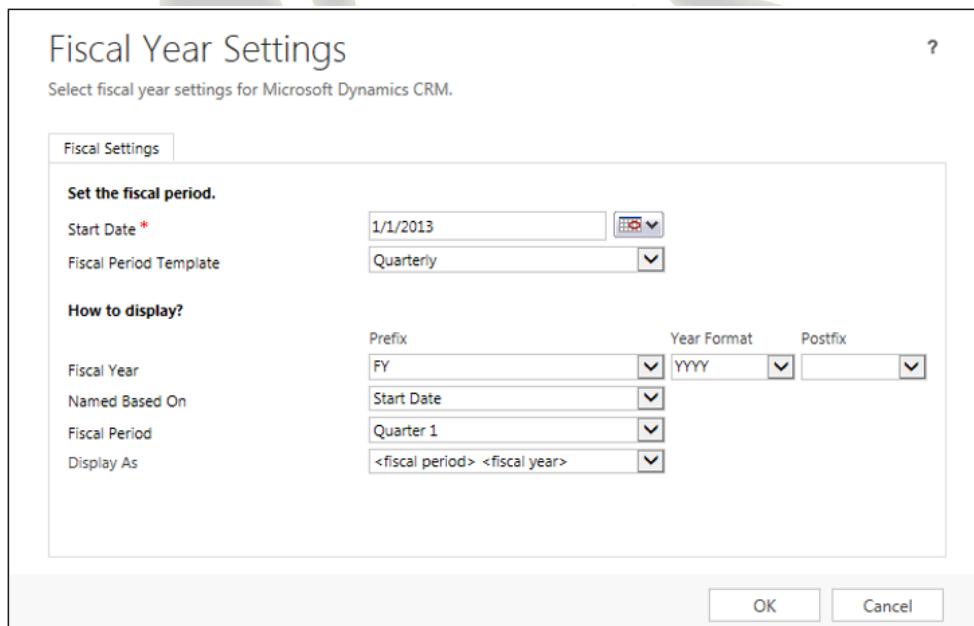


Figure 21 - Fiscal Year Settings

Module 16 – Analysis and Reporting

Microsoft Dynamics CRM provides a number of tools to analyse and report on sales-related information, including the following:

- Lists, Views and Charts: Use for specific analysis of information.
- Sales Reports: Access a number of readily available reports to help evaluate the efforts of the sales force, including sales history, sales productivity and sales forecasting.
- Custom Reports: Create custom reports with the Report Wizard.
- Advanced Find: Advanced Find allows users to perform complicated and comprehensive searches for all types of information, including searching for information from different types of records and viewing the combined data. The searches and results can be saved for later use.
- Export to Excel: Export information to Microsoft® Office Excel® as static or dynamic worksheets and as dynamic pivot tables, and then use Excel's capabilities to manipulate the data and perform complex analyses.
- Charts and Dashboards: Visualize important sales information. Charts present a visual display of information, drawing information from a specific view of a Microsoft Dynamics CRM record type. Dashboards can display one or more charts, for several different record types, and can also combine information from custom HTML pages, external web sites, and other resources.

Objectives

The objectives are:

- Use Lists, Views and Charts to obtain important sales information.
- Use sales reports to review potential opportunities, forecast revenue, and analyse sales productivity.
- Create and share personal charts and system charts.
- Work with and create dashboards

Lesson 16-1 Reports

Running Built-in Reports

Microsoft Dynamics CRM provides many options for reporting. There are several pre-configured reports specifically designed for sales and service. You can also use the Report Wizard to create custom reports.

Sales History Report

The Sales History report displays a column chart of information from closed opportunities (records with a status Won or Lost). You can see the information grouped by several different categories, including the following:

- Customer industry
- Customer territory

- Opportunity close date
- Opportunity owner

Sales Pipeline Report

The Sales Pipeline report includes revenue that opportunities are expected to generate. By default, all opportunity records with a status of Open are included in the Sales Pipeline report. The report displays a bar chart of expected revenue. You can use the Group By drop-down lists in the report viewer to see expected revenue distributed across such categories as the following:

- Estimated close date
- Opportunity rating
- Opportunity owner

While, SQL Server Reporting Services can be used to create custom reports with advanced features not available in the Report Wizard, building custom reports with SQL Server Reporting Services is beyond the scope of this course

Service Activity Volume Report

Use this report to review the patterns in service activity volume. The report displays the duration or the number of service activities, grouped by services, resources, time periods, and other criteria.

Case Summary Table Report

Use this report to determine the types of cases that are being opened and resolved. You can select how data is grouped in both the rows and columns in this report.

The Case Summary Table has the following structure:

- Horizontal Groups are the categories by which the report will summarize case data across the top of the table.
- Vertical Groups are the categories by which the report will summarize case data down the left side of the table.

Neglected Cases Report

Use this report to identify cases that have not been contacted recently. The report displays a chart of cases that have had no changes to activities, notes, or the case itself, and no scheduled activities, within the specified number of days.

Top Knowledge Base Article Report

Use this report to identify the most frequently used Knowledge Base articles. The report displays a chart grouped by the subject of the article or case, or by the product associated with the case

Lesson 16-2 Charts

Microsoft Dynamics CRM has two kinds of charts, with the following characteristics:

- A Personal Chart can be created by any user. By default, it is only visible to the user who created it. Personal charts can be shared with other users or teams.

- A System Chart is visible to all users, and some record types (including accounts, opportunities and leads) come with preconfigured system charts. Only users with sufficient security privileges can create a new system chart.

Charts provide a visual way for users to understand and put perspective on the Microsoft Dynamics CRM data they interact with. Within the interface many charts can be created, with some examples following.

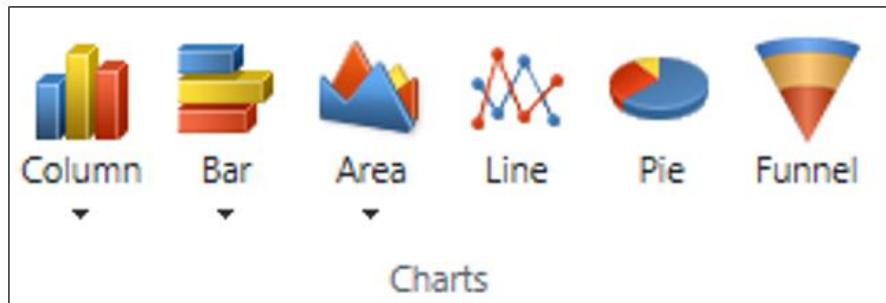


Figure 22 - Chart Types

- Column chart
- Bar chart
- Line chart
- Pie chart
- Funnel chart
- Multi-series chart
- Comparison chart (Stacked chart)
- Area chart

Lesson 16-3 Dashboards

Microsoft Dynamics CRM dashboards are a powerful feature that allows you to see at a glance all of the most important information needed to make key business decisions.

Dashboards are web pages that contain several sections, each of which can display one of several different components such as charts and lists. In addition to charts and lists, dashboards can include the following components:

- Web Resources, which can include custom HTML pages. For example, you might include a custom HTML page with information from an external application such as an ERP system.
- IFrames, which can be used to integrate external web pages into a dashboard. For example, you might display a Bing Map in an IFrame and dynamically pass geo-coding data to it to present a map of your accounts by location.

Dashboards can present a virtually unlimited variety of visualizations of important sales information: Lists or charts, data from any record type, records owned by you, your team members, or users across your organization.

Sharing Dashboards, Charts and Advanced Find Queries

In Microsoft Dynamics CRM personal Dashboards, Charts and Advanced Find Queries can be shared with other users and teams in the organization

If sharing a dashboard with personal charts or views, each chart and view also needs to be shared individually.



Module 17 – Social Engagement

Social Engagement is a separate cloud service but is integrated with the base Dynamics CRM functionality

Lesson 17-1 Social Engagement

Microsoft Social Engagement is a service that your organization can use to monitor social media channels. Use Microsoft Social Engagement for target account tracking, competitive intelligence, and social buying signals. Using Microsoft Social Engagement will help gain a true understanding of your customers and your business across the social web. Microsoft Social Engagement will help you spot emerging trends in people's comments, whether they're positive, negative, or neutral. You can drill down into the data and see who is mentioning you, where they posted the comment, and exactly what they said.

Microsoft Social Engagement offers hosted online services available to a wide variety of customers and is comprised of the following social capability components within the software application:

Social Media Monitoring – ability to listen to and monitor publicly available social communications across public and managed networks administered by third parties.

Social Analytics – ability to identify, compute, and project queries related to publicly available documents and posts.

You can create new searches, add charts and dashboards containing social insight

Available social media channels,

Microsoft Social Engagement covers a set of sources where public posts were published. Currently, the following sources are available:

-  Blogs: Full coverage of blog posts on Tumblr.com and broad coverage of blog posts from WordPress.
-  Twitter: Full coverage of public Tweets on Twitter.
-  Facebook: Public status updates without age restriction or geographical restriction from Facebook users as well as posts and comments on Facebook pages.
-  Videos: Video posts published on YouTube.
-  News: News posts from news publishers. This source can find posts in English, French, German, Spanish, and Portuguese.

Create and run search to listen for keywords

To help you get up and running quickly with Microsoft Social Engagement, a system administrator sets up lists of common search terms (also referred to as "search topics") for your organization in advance. Everyone shares and can select from the same pre-set lists of search terms to listen for on social networks like Facebook and Twitter.

However, if you want Microsoft Social Engagement to monitor different search terms, you can use a wizard to set up your own searches.

Creating searches on a social engagement dashboard

You'll use a wizard to set up your own search terms to monitor on social networks, and to select the charts or visuals you want to include on a dashboard.

1. Go to Sales > Dashboards.
2. Choose **New**.
3. Choose the layout to use for the dashboard, and then choose **Create**.
4. Type a name for the dashboard.
5. To start the wizard, choose the **Social Engagement** button () on the dashboard.
6. On the **Set up Social Insights** page, choose **Search topic** > Create a new search topic. Complete the fields on the screens.

To group this search by the type of record (for example, accounts, competitors, or contacts), in the Select a category for this search topic drop-down list, select the record type.

In the Keywords to search for field, enter the terms to search for, separated by commas. Social Engagement finds exact matches, but the terms aren't case-sensitive. For best results, include variations on the terms (for example, "phone" and "phones").

In the Keywords that must be INCLUDED in results field, enter additional terms that are required in results. These additional terms will narrow your search (think "AND").

In the Keywords that must be EXCLUDED from results field, enter terms you don't want in results. Use exclusions to avoid overwhelming your results with irrelevant keywords (think "NOT").

7. Choose **Next**.
8. From the Visual name drop-down list, select the name of the chart or visual. Each one includes a brief description to help you find the one you want.
9. Choose **Finish**.
10. Choose **Save**, and then choose **Close**.

Create search for an account or other type of record

If you want to monitor emerging trends on social media for an account, you can use a wizard to set that up.

You can also add Social Engagement charts or visuals to contacts, competitors, or other types of records.

1. Go to Sales > Accounts.
2. You'll see a list of accounts. You may need to scroll to see the whole list.
3. Choose the account you want.
4. To start the wizard, choose Configure Social Insights.
5. On the Set up Social Insights page, choose Search topic, and then choose Create a new search topic. Complete the fields on the screens.

To group this search by the type of record (for example, accounts, competitors, or contacts), in the Select a category for this search topic drop-down list, select the record type.

In the Keywords to search for field, enter the terms to search for, separated by commas. Social Engagement finds exact matches, but the terms aren't case-sensitive. For best results, include variations on the terms (for example, "phone" and "phones").

In the Keywords that must be INCLUDED in results field, enter additional terms that are required in results. These additional terms will narrow your search (think "AND").

In the Keywords that must be EXCLUDED from results field, enter terms you don't want in results. Use exclusions to avoid overwhelming your results with irrelevant keywords (think "NOT").

6. Choose Next.
7. From the Visual name drop-down list, select the name of the chart or visual. Each one includes a brief description to help you find the one you want.
8. Choose Finish.

Create a Social Engagement dashboard

You'll use a wizard to set up the search terms to listen for on social networks like Facebook and Twitter, and to select the charts or visuals you want to include on a dashboard.

People in sales, service, or marketing can create their own dashboards. CRM admins can create dashboards to share with the entire organization.

To start the Social Engagement wizard, follow the steps for your role.

1. Go to Sales > Dashboards or Settings > Customizations and then Choose Customize the System > Dashboards.
2. Choose New.
3. Choose the layout to use for the dashboard, and then choose Create.
4. Type a name for the dashboard.
5. To start the wizard, choose the Social Engagement button () on the dashboard layout.

6. On the Set up Social Insights page, choose Search topic, and then choose Next.
7. In the Search topics list, select the list of terms to listen for, and then choose Next.
8. From the Visual name drop-down list, select the name of the chart or visual. Each one includes a brief description to help you select the one you want.
9. Choose Finish.
10. Choose Save, and then choose Close. If you're the CRM admin, on the command bar, choose Publish so that other people can use the dashboard.

Add a Social Engagement chart or visual to an account or other type of record

You'll use a wizard to set up the search terms to listen for on social networks like Facebook and Twitter, and to select the charts or visuals you want to include for an account.

You can also add Social Engagement charts or visuals to contacts, competitors, or other types of records.

1. Go to Sales > Accounts.
2. You'll see a list of accounts. You may need to scroll to see the whole list.
3. Choose the account you want.
4. To start the Social Engagement wizard, choose Configure Social Insights.
5. On the Set up Social Insights page, choose Search topic, and then choose Next.
6. In the Search topics list, select the list of terms to listen for, and then choose Next.
7. From the Visual name drop-down list, select the name of the chart or visual. Each one includes a brief description to help you find the one you want.
8. Choose Finish

Create alerts¹

Active alerts send email to a defined group of recipients if a post or a change in trend matches your filters. You can choose from two alert types:

- Trend alert: You'll receive an email notification if the volume of posts for any sources exceeds the statistical expectation. Trend alert notifies you only if there are significant changes in post volumes that match the filters you defined for an alert.
- Post alert: You'll receive an email notification if any new posts match the selected filters. Important posts are delivered directly to your inbox. With this option you can stay up-to-date on the topics that matter most to you.

¹ Required CRM 2015 Update 1

To set up alerts directly from within your analysis, click or tap Add alert in the filter section. If you create an alert from your analysis, active filters marked in an orange colour apply to your alert configuration. Alerts that you create are visible only to you. Other recipients of the alert that you added to the alert configuration won't be able to see or edit your alert configuration **Enable or disable social engagement**

By default, social engagement is enabled and social data is received.

You can enable or disable your ability to receive social data in Microsoft Dynamics CRM.

1. Go to Settings > Administration.
2. Choose System Settings.
3. Under Disable Social Engagement, select Yes to stop receiving social data in CRM. To receive data, select No.
4. Choose OK.

If you disable social engagement, you can no longer create or update social data in CRM. If you try to convert a social activity to a case while social engagement is disabled, you'll get an error message. The error occurs because the Convert To Case action tries to update the social activity Regarding field. The same error occurs if you try to assign a social activity record or a social profile record to another user.

Appendix 1 – What's New in CRM 2013 and CRM 2015

Objectives

In this module we will cover:

- What's New in CRM 2013
- What's New in CRM 2015
- What's New in CRM 2015 Update 1

Lesson A1-1 What's New in CRM 2013

Microsoft Dynamics CRM 2013 and CRM 2014 SP1 new features include:

New UI and Navigation

The CRM user interface has been redesigned. The new menu bar replaces CRM 2011 Navigation pane and designed to ease user navigation, free up screen space and create a consistent look and feel across desktop and touch enabled mobile devices. The CRM 2011 ribbon has been replaced by a simpler single line action bar with a “more actions” drop down list freeing up screen space for more data, charts and information on forms. Commands are related to what you are working on and change based on data and record opened.

Quick Create form

This very basic form allows you to quickly enter a record. For example, if you're on the phone with a Lead and want to quickly capture their name and phone number in CRM without having to navigate to the lead entity. You can customise these forms to include the type of information you would want to quickly enter.

Quick View forms

This feature allows you to bring in data from related entities. For example, if you are working on a Case record and want to view basic Account information on the Case form, you can use a Quick View form to do that. This is a read only mode view.

Business Rules

This provides an intuitive way to write simple code that was otherwise reserved for someone with development / coding experience. You can do things like set field values, show/hide fields, set required/recommended fields and validate field data.

Business Rules were introduced in CRM 2013 and have been enhanced in CRM 2015 with OR conditions.

Business Process Flows

A new visual process display can be made available that guides the user through pre-defined processes. Multiple processes can be added to each record type - think sales process for inside sales

vs. outside sales. A sales organization can make sure each required step in each pipeline phase is completed before moving to the next pipeline phase.

Business Process Flows were introduced in CRM 2013 and have been enhanced in CRM 2015 with branching.

Real time / Synchronous Workflows

Processes in CRM 2011 always ran in the background requiring a user to reload the form to see the end result of the workflow. CRM 2013 now introduces processes that run immediately and update the form in real time.

Auto Save

Once you've created a record, this new feature automatically saves information on your form triggering every 30 seconds as well as when you leave the form. This batch updates any changes made to the form without having to remember to hit the Save button. This is a system wide setting, so you either use Auto Save on all forms or you don't.

Role-Based Security Teams (owner Teams) and Access Teams

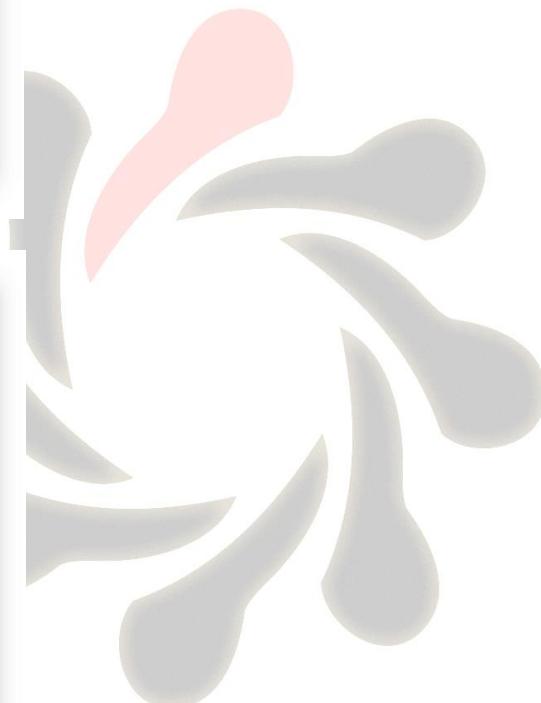
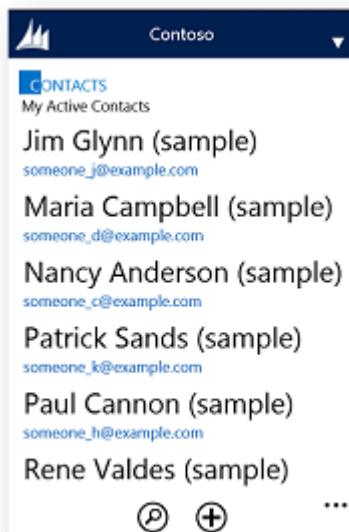
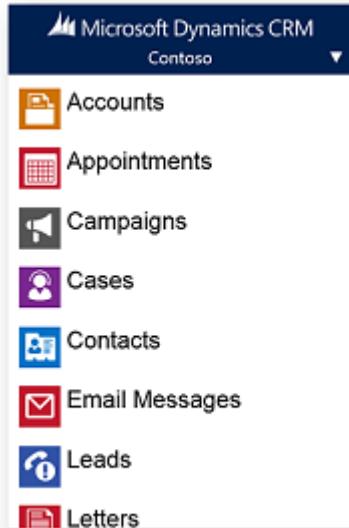
With a record-based access team, CRM users can be added to a specific record and give them access. The access team is a new type of team that doesn't own records, but, has access to records. Unlike with owner teams, you can create one or more access teams to work on the same records and have team members with different levels of access rights to the record.

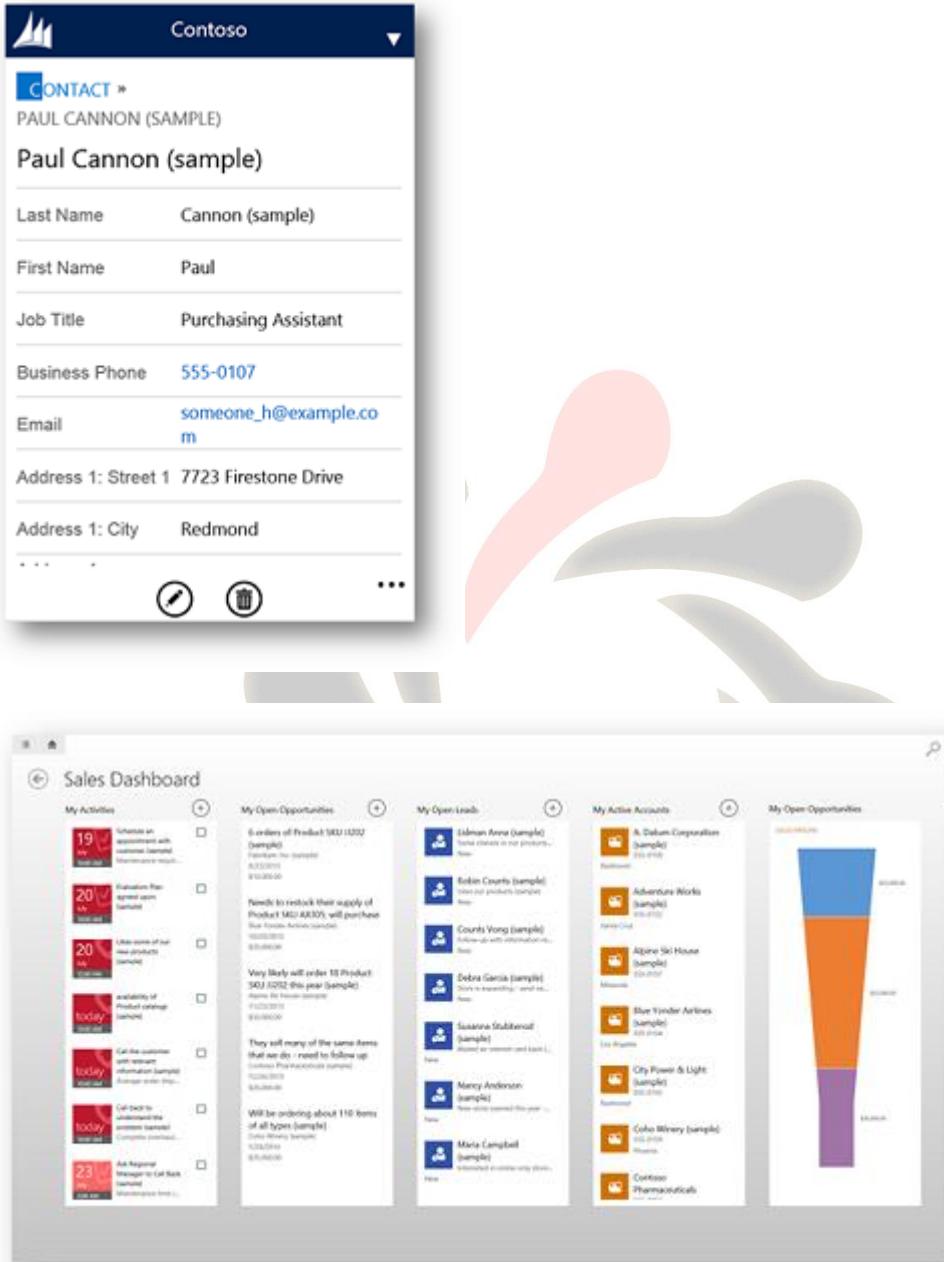
Native Mobile Apps

MoCA otherwise known as "Mobile Client Application". MoCA refers to the (free) mobile app that can be downloaded to your phone, tablet, or even desktop.

This new mobile app renders your existing CRM forms as mobile forms. These mobile forms are limited and are restricted to 5 tabs or 75 fields and 10 lists, whichever one comes first. Iframes are not supported.

Global search is supported in the mobile client so you can now search across multiple entities, whereas, in the full web client the 'Quick Find' only searches within a specific entity.





The image shows two screenshots of the Microsoft Dynamics CRM 2015 application. The top screenshot displays a contact record for 'PAUL CANNON (SAMPLE)' with fields for Last Name (Cannon (sample)), First Name (Paul), Job Title (Purchasing Assistant), Business Phone (555-0107), and Email (someone_h@example.com). Below this is an address section with Street 1 (7723 Firestone Drive) and City (Redmond). The bottom screenshot shows the 'Sales Dashboard' with sections for 'My Activities' (a grid of tasks like 'Schedule an appointment with customer (sample)'), 'My Open Opportunities' (a list of opportunities like '6 orders of Product SKU 1000 (sample)'), 'My Open Leads' (a list of leads like 'Edelman Anna (sample)'), 'My Active Accounts' (a list of accounts like 'A. Datum Corporation (sample)'), and a large 'My Open Opportunities' funnel chart.

Other new features

- Database encryption: database encryption is enabled for a set of default entity attributes that contain sensitive information, such as user names and email passwords. This feature can help organizations meet FIPS 140-2 compliance.
- Get started pane: removed in CRM 2013 to provide further screen space for information
- Popups: there are no more pop ups in CRM 2013/2015.
- Inline Editing: you can now click or tap a field to update info for a record right inline. No flipping to another screen.

- Yammer Integration: users can participate in social conversations directly within Microsoft Dynamics, through the Yammer web and desktop applications as well as apps running on Microsoft (Windows Phone), Apple (iOS) and Google (Android) mobile devices
- Skype & Lync Integration: enabling direct dialling from any phone number field in Dynamics CRM
- Bing Maps: integrated Maps Integrated dynamically show the map for the primary record address
- Server Side Synch: Server-Side Sync is used to integrate emails, activities and tasks with CRM. Server-Side Sync does the same work as the Email Router and more. Currently, Server-Side Sync will only work in the following scenarios:
 - Microsoft Dynamics CRM Online → Microsoft Office 365
 - Microsoft Dynamics CRM On-Premise → Microsoft Exchange On-Premise
- Base and extension table merge: In CRM 2013 the entitynameBase and entitynameExtensionBase tables are merged into a single entitynameBase table. This can improve overall performance of CRM
- Fetch XML expanded with Left Outer Join
- One image field per entity

Lesson A1-2 What's New in CRM 2015

Microsoft Dynamics CRM 2015 new features include:

- Multi-Entity search in web application: No longer just the Tablet app
- Create product families: Boost selling effectiveness with the ability to bundle products and recommend related products for cross-selling/up-selling opportunities.
- Use sales hierarchies: Manage and report on your sales data in a way that maps to your business. New hierarchical visualizations and roll-ups bring real-time territory and forecasting data to your fingertips.
- Mobile sales improvements: Increase field sales productivity with flexible, role tailored dashboards and analytics, personalized home pages and the ability to navigate by hierarchy.
- The CRM 2015 version of the tablet app also includes improved support for disconnected scenarios
- Access CRM records on the go via voice commands: Cortana is now part of Microsoft Dynamics CRM! For customers with Windows Phone 8.1, you can now use conversational voice commands to seamlessly create follow-up appointments, tasks, and phone calls; quickly find information; view your customer lists; and more.

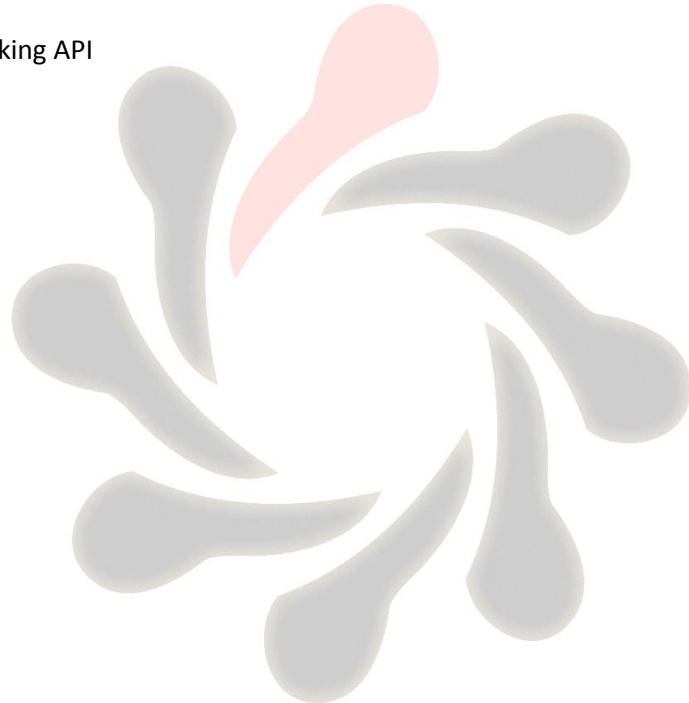
- Enhanced sales processes: Guide sellers toward desired outcomes with enhanced branching logic within your sales processes. Increase impact via automation of business processes and enforcement of business rules across all devices.
- Expanded case management functionality: Enable agents to provide differentiated levels of support with flexible Service Level Agreements (SLAs). Gain insight into service effectiveness with the ability to track and analyse key metrics like SLAs and thresholds.
- Microsoft Social Engagement availability for Microsoft Dynamics CRM Online customers and on-premises CRM customers
- Improvements in CRM for Outlook: Set up CRM for Outlook quickly and easily with the completely redesigned Configuration Wizard.
- With Microsoft Dynamics CRM 2015 for Outlook, users can sync assigned tasks and appointment attachments. Admins can control synchronization between pairs of fields, which provides confidence about where data is coming from and how it's shared.
- Customizable help: Personalize the user assistance by tailoring the in-product Help content to match the specifics of your Dynamics CRM implementation. You can modify what displays under the Help question-mark icon at either an entity-specific or organization-wide level.

Lesson A1-3 What's New in CRM 2015 Update 1

Microsoft Dynamics CRM 2015 Update 1 new features include:

- Improved navigation and UI
- Immersive Excel experience
- Excel export completely redesigned
- Embedded OneNote
- Track email by folder
- Social sales
- Mobile sales
- Integrated Parature knowledge base
- Server-based authentication with CRM Online and SharePoint
- Colour scheme / logo to match your brand
- New behaviour of the Date and Time data type
- Channel Engagement Framework
- Rollup fields across all activities / activity parties

- Clear fields with Business Rules
- Move back a stage in Business Process Flows
- Call Actions from workflows
- Alternate keys for CRM records
- Remodelled Navigation bar
- CRM Online Storage Management and Service Health at Instance level
- Change Tracking API



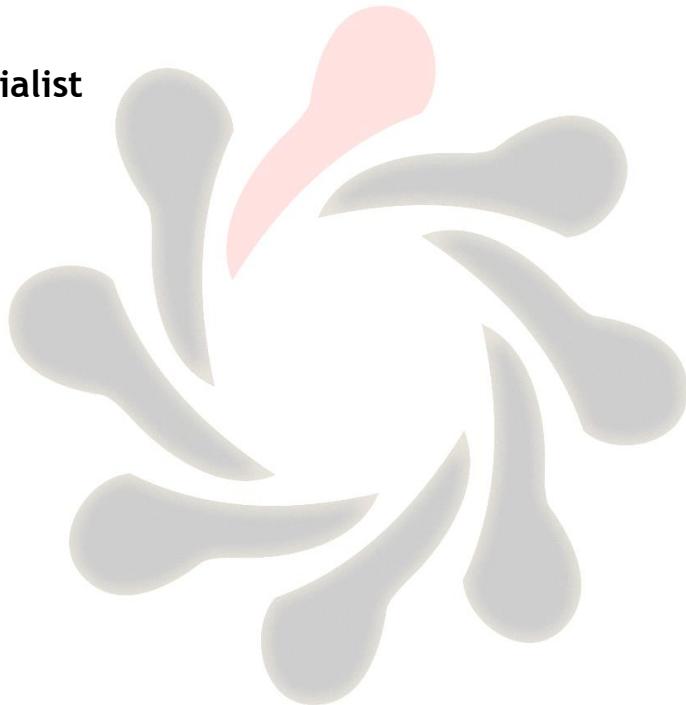


Microsoft

Dynamics CRM 2015 Customisation

Microsoft Specialist

Courseware



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Module 0 - Course Content and Plan

Objectives

This course describes the techniques required to customise Microsoft Dynamics CRM to meet the needs of businesses. The topics covered include security; creation and configuration of entities; design of forms views and charts; auditing and solutions.

What this course covers

- Security in Dynamics CRM
- Changing the Dynamics CRM Schema
- Changing Forms and Views
- Charts and Dashboards
- Business Process Flows
- Business Rules

What this course does not cover

- Extending Dynamics CRM with C# or JavaScript
- Changing the Navigation Bar (Sitemap) and Action Bar (Ribbon)
- Reporting in Dynamics CRM
- Workflows and Dialogs

Course Plan

This course takes 2.5 days to complete and helps prepare for the Microsoft Dynamics CRM 2015 Customisation and Configuration certification exam

Course Modules

1. Introduction
2. Security Model
3. Customising Entities
4. Customising Fields
5. Managing Relationships
6. Customising Forms
7. Configuring Business Rules
8. Customising Views
9. Customising Charts and Dashboard
10. Additional Security Options
11. Business Process Flows



Resources

Dynamics CRM Online

This course uses a Dynamics CRM Online Trial.

Exam

The MB2-707 Microsoft Dynamics CRM Customization and Configuration exam is a Microsoft certification exam and is taken online in one of the testing rooms off the Firebrand reception and refreshments area.

Id

You will need two forms of id; one with a photo id e.g., a passport or driving license and the other with your signature e.g., a debit/credit card.

Exam Format

The exam has 48 multiple choice questions and you are allowed 90 minutes.

Exam Preparation

There are currently no practice tests available to prepare for the exam.

Skills Measured

This certification exam measures your ability to configure Microsoft Dynamics CRM 2015 using the tools provided within the Dynamics CRM user interface including security, the schema, the user interface as well as planning the development and managing solutions.

Manage solutions (10-15%)

- Plan for customization
 - Define xRM; differentiate configuration, customization, extending, and development; design appropriate customizations; identify documents in the Microsoft Dynamics CRM implementation guide
- Manage solutions
 - Understand business requirements, understand the benefits of solutions, create solutions, export managed and unmanaged solutions, import solutions, describe default solution, specify a publisher, work with multiple solutions, describe solution components
- Manage customizations
 - Describe component dependencies; describe customization concepts for entities, fields, forms, views, and charts; publish customizations

Manage security (10-15%)

- Understand security concepts

- Describe business units, describe Microsoft Dynamics CRM security features, identify privileges and access levels for security roles, describe security role interaction with business units
- Manage access
 - Create and maintain users, create owner teams, describe owner teams and sharing, manage security roles for users and teams, differentiate owner teams and access teams, create access team templates, add access team subgrids to forms
- Work with field-level security
 - Identify entities for which field-level security is available, create field security profiles, define field permissions, add field permissions, assign field security profiles to users and teams
- Manage auditing
 - Enable entity-level auditing, enable field-level auditing

Customize entities (10-15%)

- Create custom entities
 - Describe entity customization concepts; create custom entities; configure display names, plural names, and schema names; configure entity ownership; create custom activity entities; set primary fields
- Manage custom entities
 - Configure entity properties including display areas, communication and collaboration options, fixed properties, data services options, Microsoft Outlook options, mobile options; modify custom entities; delete custom entities; identify dependencies

Customize fields (10-15%)

- Create and maintain fields
 - Describe field customization concepts, create fields, describe ways new fields can be created, delete custom fields
- Configure field properties
 - Identify field data types; identify field display formats; configure the requirement level field property; configure searchable, audit, and field security field properties; identify properties that can be changed for existing fields
- Manage special fields

- Configure local and global option sets, configure status and status reason fields, describe dependencies, create calculated fields, describe the purpose of rollup fields, create rollup fields

Manage relationships (10-15%)

- Describe entity relationships
 - Identify different relationship types; describe one-to-many, many-to-many, and manual many-to-many relationships; describe special many-to-many relationships such as marketing list members, queue items, and follows; identify supported and unsupported relationships; identify cascading behaviours such as Assign, Share, Unshare, Re-Parent, Delete
- Manage entity relationships
 - Create entity relationships, map fields, manage connections and connection roles, work with relationship hierarchy visualization

Customize forms (10-15%)

- Understand form customizations
 - Describe tab and section structure; add form fields; add subgrids; add social, activity, and notes controls; add other components and controls; preview form customizations
- Create and edit forms
 - Copy existing forms or create new forms, configure quick create forms, create nested quick create forms, create quick view forms
- Manage multiple forms
 - Identify scenarios where multiple forms are useful, specify form order, assign roles to forms
- Manage mobile forms
 - Describe mobile forms for Microsoft Dynamics CRM for tablets, describe how forms are displayed to the user in the Microsoft Dynamics CRM for tablets app, describe considerations when designing mobile forms

Customize views (10-15%)

- Work with system views
 - Differentiate between system, public, and personal views; describe view columns and view filtering; configure multi-entity search; differentiate between multi-entity, advanced find, and quick find search; identify associated views; configure lookup views; configure quick find views
- Create and configure custom views

- Copy existing views, create custom views, build queries, add fields to views, arrange fields, configure field properties, sort fields, set the default public view, share views, disable views, delete views
- Manage custom views
 - Set the default public view, share views, identify entities for which hierarchical views are available, create hierarchical views

Customize charts and dashboards (5-10%)

- Understand chart concepts
 - Identify design considerations for charts, differentiate between personal and system charts, identify limitations of the chart designer tools in the user interface
- Create and configure charts
 - Create system charts and personal charts, describe chart types and options, add series and categories, choose chart views for chart preview, identify fields available for use in charts, include fields from parent entities in charts
- Reuse charts
 - Export and import charts, identify steps to update chart XML, convert personal charts to system charts, convert system charts to personal charts
- Create, configure, and manage dashboards
 - Differentiate between personal and system dashboards, configure dashboard components, create lists (views), display charts on dashboards, manage security roles for dashboards

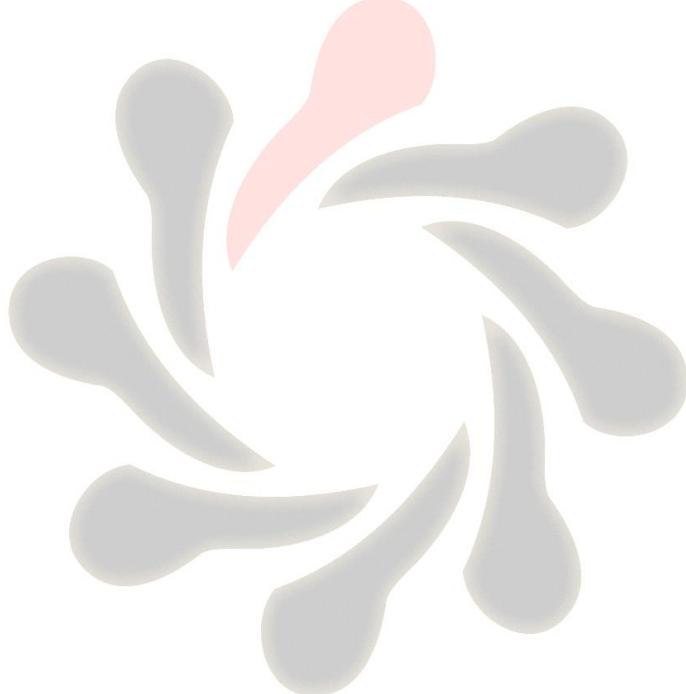
Configure business process flows and business rules (10-15%)

- Understand business process flow concepts
 - Describe the purpose of business process flows; differentiate between different types of processes; identify business process flow components including steps and stages, built-in business processes, custom business processes, entities that participate in business processes, and spanning entities
- Create and manage business process flows
 - Create business process flows, define stages and steps, describe role-based business processes, describe branching logic for guided processes, describe use cases for the client API for business process flows
- Create and manage business rules

- Identify use cases for business rules; differentiate between client-side and server-side logic; create business rules; configure business rule conditions; apply AND/OR, IF...ELSE, IF....THEN logic in business rules; identify business rule actions; enable business rules for forms

Feedback

You will need to complete two sets of feedback at the end of the course. One is for Firebrand and is available on your PC; <http://www.firebrandtraining.co.uk/feedback>. The other is for Microsoft and your instructor will give you the link to the KnowledgeAdvisors MetricsThatMatter website that Microsoft uses for feedback.



Module 1 - Introduction

This course explains how Microsoft Dynamics CRM can be customized to let users record and retrieve structured information that is relevant to the organization and the processes that you have to manage.

This module explains how to use Solutions to manage your work and also introduces some important terminology and concepts that are used when you build the xRM implementation.

Objectives

The objectives are:

Describe how to use a Solution to keep related changes together.

Discuss the importance of using Publishers and prefixes to help identify the source of changes.

Define important terminology for components that you might have to customize.

Lesson 1-1 Customisation or Development

Microsoft Dynamics CRM 2015 can be adapted to suit your organization's requirements in several ways. You can make big changes with "point and click" customization of the system, but for some business requirements you might have to use other methods, such as writing JavaScript to manage client-side behaviour of forms, building Workflows to automate your processes or creating .Net plugins for the most complex tasks.

Some ways that you can alter the behaviour of Microsoft Dynamics CRM and define the records and features that are presented to users might be considered configuration, customization, extending or development. This lesson describes some methods that are available to create a Microsoft Dynamics CRM system to suit a particular set of requirements, and details the approaches that are covered in this training.

Customization vs Configuration

The focus of this course is about how to change the way Microsoft Dynamics CRM works to suit your business requirements by using "point and click" methods. These methods require only the tools that are provided in the user interface (UI), and might equally be described as customization or configuration. Therefore, these terms are used interchangeably in this course.

This type of customization is distinct from extending or development which requires external software tools to create new components such as .net plugins or JavaScript functions, or updating components by directly editing the associated XML in an exported solution package. Although these components and changes might be included in a Solution alongside other customizations and might be referred to in certain areas during this course, there is no training included about how to create such extensions.

When you plan, implement and customize your system we recommend that you review the “Microsoft Dynamics CRM Implementation Guide”. This guide is separated into several documents to help with your planning efforts. These documents include the following:

- Planning Guide
- Installing Guide
- Operating and Maintaining Guide
- Administration Guide
- Reporting Guide
- **Customization Guide** (new for Microsoft Dynamics CRM 2013)

XRM Application Framework

Microsoft Dynamics CRM 2015 includes a declarative development of relational business applications that have flexible data models and dynamic services. ISVs building Extended CRM applications on Microsoft Dynamics CRM 2015 use the .NET Framework and other common Microsoft platform technologies such as

- Web Server (IIS)
- Windows Workflow Foundation (WF)
- Windows Communication Foundation (WCF)
- SQL Server

The XRM application framework is the common foundation used by both the core CRM applications built by Microsoft and the Extended CRM applications built by ISVs and partners. For example, an insurance agency or finance firm could use Microsoft Dynamics CRM 2015 in a traditional sense but could also benefit greatly with an extended CRM application to manage policies, documents and interoperate with other industry standard applications. These applications all take advantage of the following high level features of the xRM application framework:

- Models that consist of multiple domains that automatically include data, presentation, workflow and security to name a few.
- Business application services that include extensible client experiences, multi-tenancy, robust web services that all adapt to the current application’s published model.
- Enterprise scalability and a platform that provides a proven commitment to backward compatibility and early adoption of key Microsoft technologies (for example .NET).
- Running in the cloud with CRM Online and interoperability with other Microsoft Cloud products such as Windows Azure.

Extended CRM applications can be fast to build with point-and-click customizations and drag-and-drop user interface (UI) designs.

Sometimes more than point and click customizations are needed to resolve issues. In this instance developers must extend the solution to include custom code which is the focus of the MCRMD extending course.

Developers work mostly with tools such as Microsoft Visual Studio to interact with and extend services. End-users interact with the application by the use of a familiar browser based interface or through the CRM client for Microsoft Outlook. Generally, applications built that use Microsoft Dynamics CRM 2015 work the way that they are expected to work.

CRM applications that use dynamic service capabilities can adapt to changing business needs. For example, when a new attribute is added to the model it is immediately available in the UI, from the web services and also available for reporting and workflows. Typically, in a traditional application this would have required some effort to accomplish.

Declarative Design Model

Microsoft Dynamics CRM 2015 contains a declarative model. This means that when the application is designed to meet specific business processes, the customizer and developer do not have to spend time creating events which perform basic create, read, update, and delete (CRUD) actions. These actions include designing a security model for the form, designing a form structure, or developing code to perform navigational and interaction events.

All these actions are abstracted from the events and the complexity of this is performed in the background by the XRM framework. This provides developers and customizers more time focusing on the specific business processes and scenarios.

The model contains the building blocks for an application; and by itself it is only a collection of related objects. However, the interaction between those objects is used to implement more extensible logic such as the quote-to-order-to-invoice processing and pricing logic.

Four-layer architecture

Microsoft Dynamics CRM has a conceptual 4-layer architecture.

Presentation

The Presentation layer is your browser, or Outlook, or mobile client.

Application

The Application layer is quite light and displays the ASPX pages you see through the browser.

The Application layer is where any JavaScript, you have added to the form, is executed. The Application layer also enforces field settings such as:

- Min/Max values
- Mandatory fields
- Field length
- Data Types validation

Platform

The Platform layer is probably the most important from the perspective of this course.
The platform performs a number of key functions including:

- CRM Business Logic
- Custom Business Logic
- Security
- Workflows
- Data Imports
- Duplicate Detection

The Platform uses the Metadata extensively e.g. to convert user queries into SQL statements.

The Platform is also where the web services reside.

Data

The data layer is the SQL Server database for your organisation.

In Dynamics CRM Online and Partner Hosted deployments you will not have direct access to SQL Server.

In an on-premise deployment, access to SQL database is restricted to Filtered Views that is a) read only and b) enforces data security model.

You should never access the SQL database directly to create or amend data or tables within the database. You are allowed to create indexes but nothing else, no stored procedures or triggers.

Extensibility Platform and Features

The extensibility platform is the core of both Microsoft Dynamics CRM 2015 and Microsoft Dynamics CRM Online. When using Microsoft Dynamics CRM SDK, developers are building on top of this system.

When developing an application that uses Microsoft Dynamics CRM, developers use web services to communicate with the underlying XRM framework layer. Microsoft Dynamics CRM uses a metadata driven architecture to provide the flexibility to create custom entities and additional system entity attributes. This architecture is also used to make upgrades and make the transportation of solutions easier. By doing this you can make changes in the data structure without having to change code in Microsoft Dynamics CRM.

The XRM framework also controls access to data through security, controls access to the database, and raises events for workflow processes and custom business logic implementations (plug-ins). The platform layer provides for both incoming and outgoing email processing through the Microsoft Exchange Server.

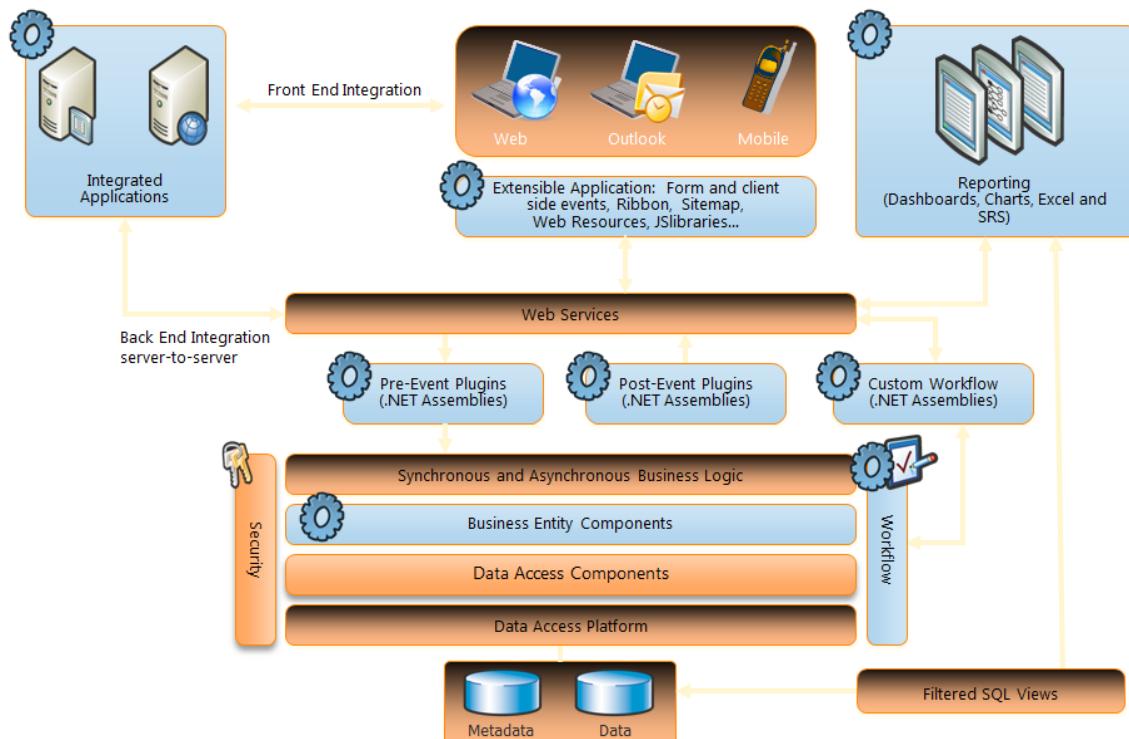


Figure 1 - Extensibility points

Lesson 1-2 Microsoft Dynamics CRM Solutions

Solutions in Microsoft Dynamics CRM let you package together a set of custom components that work with one another to provide functionality that some or all users must have. This lesson describes how to create and use Solutions to organize your customization, and to deploy your changes from a development or test system to a live production environment.

Why use Solutions?

To customize Microsoft Dynamics CRM to suit a specific scenario, you must first understand the organization's requirements. Typically, a business analyst will conduct meetings and workshops with key people. The business analyst will determine how users carry out their jobs, the data that they work with and how they must measure progress and performance for their processes.

These discussions will result in a set of business requirements. These must then be translated into a proposed set of changes that will provide a solution to those requirements. This involves discussions between the business analyst and the technical experts who can deliver the necessary customizations. Sometimes this might be the same person, especially in smaller organizations.

Requirements might be separated into different phases, or for different areas of the business. Each set of requirements that is grouped together will have a proposed solution.

In Microsoft Dynamics CRM, a Solution is a way to organize the customizations that you make to the system to meet a specific set of business requirements. By doing this, you can deliver a whole set of changes at the same time. This might include many new or modified components, especially for your initial "go live." Additional Solutions might have some

incremental changes for later phases of a project, as you roll out the use the system to more departments or add more complex functionality.

Solutions provide the following benefits to help you manage changes:

- You can work on just the components that you must have without any distraction or confusion from everything else in the system.
- It might be easier to record the changes that you are making if you can detail each Solution separately and then relate each Solution to the original requirements, instead of just having one large document.
- When your Solution is ready, it can be exported with all the necessary components packaged together, and then your Solution can be imported into another system for testing or to use in production.
- Your exported solution package will only contain the components that you have selected to be added. Therefore, your solution package will be smaller and more manageable than if you export the whole system Solution.
- You can save this exported solution package as part of your change control records.
- An earlier Solution can be used to help roll back certain unwanted changes in some circumstances.

Note: Even if you only have one Microsoft Dynamics CRM system (on-premises or Microsoft Dynamics CRM Online), you will still benefit from many of the advantages of using Solutions to manage your customizations. For example, you can use different Solutions and Publishers for different sets of requirements, to update version numbers to align with your documentation, and to export your Solution to keep a record of its contents or to roll back to a previous state.

Default Solution

When an Organization is created in Microsoft Dynamics CRM, the system creates a Solution named the Default Solution that contains all the components in the system. You can modify the components of the system directly in the Default Solution, or create new Solutions for your customizations. The Default Solution can be exported from the application and then imported into another Microsoft Dynamics CRM Organization.

However, working in the Default Solution approach can become more difficult as your system becomes more complex. You will always have all the components of the system to browse through, although you might only need some items for the requirements that you are working on. This also means that the exported solution packages will grow larger as you add more elements to the system. It also becomes difficult to determine the components that have changed from one version of your Default Solution to the next version.

Note: You cannot export the Default Solution as a Managed Solution, and you cannot deploy a complete Default Solution from Microsoft Dynamics CRM on-premises to Microsoft Dynamics CRM Online or the other way around. You can deploy a custom Solution between two Microsoft Dynamics CRM 2015 systems that use either platform.

Publishers and Prefixes

Before you create a Solution, you must first create a Publisher for the Solution. This Publisher shows other customizers of your system who created the Solution and the customizations the Solution includes, and also specifies a short prefix for many new components that you create.

When you create an entity, field or relationship in any Solution that is linked to this Publisher, the prefix that you define is added before the schema name that is used internally in the system for that component. This makes sure that two customizers who use different prefixes for their Publishers will always create unique components that will not conflict when their Solutions are deployed to the same system, even if they name the components the same.

The prefix that you define should describe who is doing the changes, and possibly on behalf of whom. This means that your new components will always indicate who created the components and why. For example, if you work at Adventure Works Cycles and build a Solution to meet the requirements of the sales division, you might use a prefix of “awcsales”. The “awc” means that these are in-house customizations instead of customizations that are created by an external partner and “sales” will help later when you try to recall why a specific new field is added, and you will know which business requirements document to refer to, or who to ask.

Note: the prefix can be no more than eight characters.

If you export your Solution as a Managed Solution, the publisher is especially important. After your Solution is imported into your target system, only Solutions with the same publisher will be able to update those components.

When you modify an Option Set to add new items, the Option Value Prefix number provides the default integer values for these items, to help avoid conflicts between options that are added by different customizers. We recommend that you accept this default value in your new Publisher. You can choose to override the offered values for any particular Option Set item if you must. More information about how to create and modify Option Sets can be found in the “Customizing Fields” module.

Creating Solutions

We recommend that you create a new Solution for each separate set of business requirements that you are trying to meet, instead of customizing the Default Solution directly.

Anything that you add or modify in your Solution will update the Default Solution in any case. This also means that other customizers can view and build on your work as you configure the system.

Note: Any Solution that you create will be Unmanaged solutions. A Solution only becomes a Managed Solution when it is exported, and then imported into a target system. If you delete a Managed Solution, it will delete all the components that the Solution includes, and any related data from custom entities in the Solution.

Version Numbering

Solutions have a version associated with them. When you export a solution the version is appended to the filename.

Using the version field helps you track which changes are at each of your organisations; this is especially useful if you have separate organisations for Development, Staging, Test, Training and Production.

We recommend following the Microsoft versioning i.e. four numbers that are separated by decimal points, in the form major.minor.build.revision, such as 7.0.12.3. If you use only one number such as “1”, the system will add three zeros after this number so that it is displayed as “1.0.0.0”.

Work with Multiple Solutions

Your new Solution is a container for a set of components that work together to provide the functionality for which you are asked. To modify the components, you can create new components in your Solution, or add existing components from the system to your Solution.

Even when you are working in your own Solution, any components you create or modify are changed in the Default Solution, because your Solution only contains references to these components, not copies of the components. This means that if you delete the Solution that you are customizing this removes the “wrapper” around the components - the components remain in the system.

It also means that if two customizers work on the same item in two separate Solutions on the same system, each customizer will be able to view the other customizers’ changes. Additionally, both sets of changes are present in any solution package that the customizers export. You might consider this an advantage because any interaction between those changes can be viewed and tested. However, you could also consider this a disadvantage, if one set of changes is incomplete when the other set of changes is deployed to another system. You have to consider how to handle such situations if you have several people who work directly on the same system at the same time.

One alternative is for customizers to work on separate systems and then deploy to a single staging system and then deploy to your live environment. The disadvantage of this approach is that it could lead to some duplication of effort, or conflicts in the functionality that are not discovered until the Solutions are brought together.

When you receive an updated set of requirements that build on work that you have already completed, you can choose to reuse the same Solution and update the version number, or create a whole new Solution.

If the changes are minor, such as those changes that are in response to feedback that is received from user acceptance testing before you deploy to the production environment, you should use the existing Solution and update to a new version number.

You might want to use a new Solution if the original Solution has many components that no longer have to be updated. A new Solution would be easier to manage if the new requirements include updates for only a few elements or you must create new components, such as in a second phase of the Microsoft Dynamics CRM project.

Solution Components

You can create or add many components to your Solution. Some components make up the metadata that describes how the components work together and how the components are presented to users. Other components represent more directly how data is stored in the SQL database. The changes or additions to entities, fields, relationships and option sets that are made by using the user interface (UI) tools or the application programming interface (API) affect the schema, without having to make changes directly in the SQL database.

Other Solution components store the definition of UI components, such as forms, views, charts and dashboards. Security Roles, Processes and plug-ins describe how the system operates and behaves. You can also include, for example, templates for email messages, Contracts, and knowledge base Articles in your Solution.

Together, these components form your complete Solution, and provide the features that you are building by using the Microsoft Dynamics CRM platform.

Adding New or Existing Components to your Solution

To add components to a Solution, follow these steps.

1. Navigate to Settings > Solutions and then double-click your Solution in the list to open it.
2. Click Components in the solution explorer navigation pane on the left side to view a list of all the components in your Solution.
3. Click the drop-down arrow on the New button and then select a component type to open a form for a new component of that type.
4. Click the drop-down arrow on the Add Existing button and then select a component type to add. In the dialog box that appears, select a specific component of that type to add a reference to that component in your Solution.
5. Or, select a node from the solution explorer tree and then click the New or Add Existing buttons to add a component of that type. For example, click Dashboards and then New to create a new Dashboard.

Removing Components from your Solution

To remove a component from a Solution, you must first select the component on the main list or on the relevant node of the solution explorer. You can then select to delete or

remove the component. When you select Remove, this removes the reference from your Solution. However, the component remains in the Default Solution. When you select Delete, this tries to remove the component from the whole system. Some components cannot be deleted, such as system entities (those that are built into the system, such as the Account or Contact entity) or the System Administrator Security Role. A component that depends on another component cannot be deleted.

What Cannot be included in a Solution?

Some changes you make to the system cannot be added to a Solution. Exceptions include:

- Users
- Teams
- Business Units
- Queues
- Goals
- Subject hierarchy
- anything that relates to the product catalog

because these are data records, and they must be created independently in each Organization that you use.

If you have views, reports or custom code that uses these types of records, you should make sure that they have matching names in all systems, and rely on the record names for any queries or references. To save time and reduce the risk of human error, you might choose to create some records by using the Import Data Wizard or similar methods. Then, you can include GUIDs for the records in your import file to make sure that these records are identical in all systems and that any view, report or custom code that references these records is reliable. A detailed discussion about how to import data is not part of the scope for this course.

Export and Import Solutions

After you have completed a set of customizations, you can export your Solution. This exported solution package is a compressed file that has a zip file name extension (.zip). The .zip file contains several XML files and other types of content such as .xaml, .dll and image files, depending on the components in the Solution. You should keep a copy of this solution package in a secure location as part of your change management process.

Typically, you will work on changes in one Microsoft Dynamics CRM Organization and then export a solution package to import into another Organization (this might be on the same server or in a different environment). This might be your production system, or you might have an additional Organization that is set up for user acceptance testing (UAT) or training before you release new features for the users. You might perform several revisions and changes to a Solution before it is signed off as meeting the original requirements.

To export your Solution, select any top-level component node in solution explorer, or on Information or Components, and then click Export Solution in the ribbon. You can also navigate to Settings > Solutions, select your Solution in the list and then click Export in the toolbar.

The Export Solution wizard guides you through the process, checking dependencies and asking you for additional settings that you might want to include. Make sure that you select the correct Package Type, as shown in the “Export Solution Wizard - Select Package Type Step” figure.

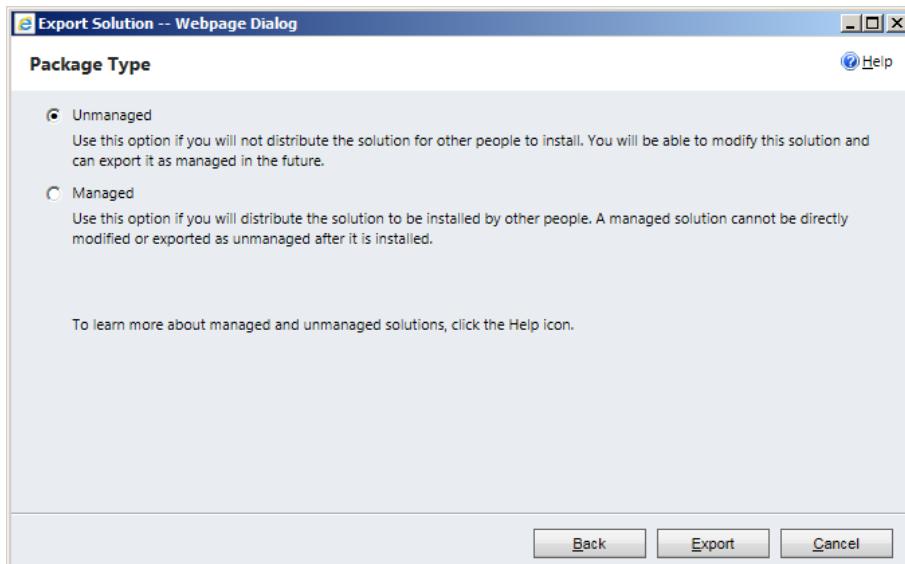


Figure 2 - EXPORT SOLUTION WIZARD - SELECT PACKAGE TYPE STEP

For internal changes that are being deployed from one system to another, you should usually select to export your Solution as **Unmanaged**.

Managed Solutions are used to distribute customizations, for example if you work for an Independent Software Vendor (ISV) that creates Microsoft Dynamics CRM add ons to sell to your customers. Managed Solutions have features that make it easier for a software vendor to control what happens to its Solution after deployment, and it can also help to protect the software vendor's intellectual property.

Only during the export process can you determine whether a Solution is managed or unmanaged. If you export a managed Solution, we also recommend that you export an unmanaged copy. This helps make sure that you can import that copy if your original environment fails for any reason. Then, you can make more changes, whereas the components of a managed Solution could be locked down by using managed properties to prevent any changes that might interrupt the functionality of the Solution.

Importing Unmanaged Solutions

In the import of an unmanaged Solution, all the changes are written in the system, and the changes can be viewed in the Default Solution. The Solution that is in the system only holds references to these components. If the system that you import into differs from the system that you built in the Solution, the differences will appear in your components.

Referring to the Solution in the new system after it is imported is not an accurate record of what transported. For example, if the target system already had some custom fields on the Account entity, and the Solution file includes the Account entity, then when you refer to the imported Solution, although the custom fields are not transported with this Solution, the custom fields are visible. The prefixes on custom components help identify changes that belong to the same Solution. However, the only accurate record of what is imported is the solution package compressed zip file.

You cannot uninstall an unmanaged Solution but you can delete it. Deleting a Solution does not reverse the import process, because the imported changes are incorporated completely into the system. If you delete an unmanaged Solution, no components are deleted, regardless of whether the Solution is created in this system or the Solution is imported.

When several Solutions are imported that contain changes to the same components, the last Solution that is imported overwrites previous changes in the system. If Solutions are imported to a test environment, and then imported to a production environment, make sure that you import all Solutions in the same order or the results might differ.

Importing Managed Solutions

If you import a managed Solution, no changes are made to the system components. The Solution keeps the definitions of its components separately, and the application displays a combined version of the Default Solution, all managed Solutions, and any other additional unmanaged changes that are made. This means that when you delete a managed Solution it deletes all the components that are imported, and leaves the system the same as before the Solution is imported. This lets you import a managed Solution with the confidence of knowing that you can remove the Solution later, if this is necessary.

Note: A detailed discussion about how to use managed Solutions, configure managed properties and understand layering and the co-existence of multiple Solutions is not in scope for this training course, and is more appropriate for developers, instead of customizers.

Microsoft Dynamics CRM Versions and Solutions

You cannot import a Solution that is exported from a source environment that has a later major or minor version of Dynamics CRM itself than the target, to prevent issues where the Solution does not work as expected. For example, a system that is running Microsoft Dynamics CRM version 7.0.0.809 could not import a Solution that is created in a system that is running version 7.1.0.0 because the minor version number of the target (0 in this case) is earlier than the source (1 in this example).

Only the major and minor version numbers are relevant (the first two numbers), not the update rollup or build (the last two numbers).

This feature will only support different minor versions. You cannot export a Solution from Microsoft Dynamics CRM 2015 to use on a Microsoft Dynamics CRM 2013 system, however you can import a Solution from Microsoft Dynamics CRM 2013 to use on a Microsoft Dynamics CRM 2015 system.

Lesson 1-3 Introduction to Entity Customization

A common business requirement for any custom database application is to store additional types of data that do not match the model of the existing system. This might be something simple, such as pieces of data about an existing type of record, such as a Contact, or a more complex requirement to manage information about a whole new class of objects, such as projects, buildings or funding applications.

This lesson introduces important terminology for this type of customization work that is used in the rest of the course. It also describes how some of these parts are stored in a Solution, and some considerations for how components depend on one another.

Entities, Fields, Forms, Views, and Charts

In Microsoft Dynamics CRM, some components are frequently customized together. These are the building blocks of how data is structured, stored and retrieved in your system.

An entity is a type of record, such as Account, Case, Product or Goal Metric. When you create an entity, the Microsoft Dynamics CRM platform creates a table in the SQL database to store records that users create, and each record is stored in a row of that table.

However, the term “entity” is used in Microsoft Dynamics CRM instead of “table” because the concept of an entity also includes other metadata that describes how records are displayed to users. When you expand an entity node in the solution explorer, other nodes shown below the entity, and in an exported solution package the nodes are inside the section of the XML for that entity.

The components that are shown under the entity node include the following:

- Fields
- Forms
- Views
- Charts
- Relationships
- Business Rules

Although these components are discussed in more detail in later modules, they are defined here to make sure that these terms are clearly understood.

Fields

Fields each store one piece of information about a record. In the SQL database, each field is a column in the table for the entity. However, other properties about how a field is displayed and used are stored as XML metadata. For a user, a field is either a column in a view or a control on a form. When you create an entity, several system fields are automatically added to it. You can add more fields to store data of different types that are important to your business processes, such as text, or numbers. Developers will usually

refer to fields as attributes because of how they are referred to in code. However, this term is not used in the UI.

Forms

Forms define the UI for a single record for data entry and retrieval, and the way most users will input data and read detailed information about a single record. Forms describe the layout of fields, sub-grids and other components, and event handlers to control the behaviour of scripts. You can create multiple forms to display records in different ways for users according to the requirements of their role.

Views

Views are lists of multiple records that are filtered to show only those rows the user wants visible, and to show the columns for the specific details that the user must have. When you create an entity, the Microsoft Dynamics CRM platform creates several views that you can modify. You can also create additional views if you must do so. The user selects the best view for the data he or she wants to be visible. A view that is created through customization is not related to an SQL view.

Charts

Charts in Microsoft Dynamics CRM describe the layout of a visualization of some data, and are always used with a view. The view filters the rows (the columns of the view are ignored) and the chart then displays data about those records in the way that you have configured it, such as a column or line chart. Several charts are included already for some entities and you can modify or add to these. When you create an entity you have to create any charts that you must have. You can create many charts by using the UI tools, or modifying the XML definition for more control over the presentation of the chart.

Relationships

Relationships between this entity and other entities. 1:N, N:1 and N: Relationships are available. Relationships are discussed in the Managing Relationships module.

Business Rules

Business Rules let a system customizer who has no programming skills apply conditional logic to a form. For example, based on the value in a specific field, another field might become required, or read-only, or be automatically completed with a calculated value.

Business Rules replace the need for simple JavaScript and are discussed in module 7.

Remove Entity Components from a Solution

When you add an entity to a Solution, the form, view, chart and field nodes are also added to the solution explorer. You cannot remove individual subcomponents from the Solution directly, only the whole entity.

Note: If you delete a custom component, such as an unwanted field or view, this is removed from the whole system. When you export the solution package this component is

not mentioned anywhere in the XML because it no longer exists when the package is created.

When you import a Solution that does not include a component, the component is not deleted from the target system. This enables support for the import of Solutions from different sources that do not have the same components. This means that any components that you delete from the development system must also be deleted in the target systems individually because the components will not be mentioned in any exported solution package. You must maintain good documentation and follow clear change management processes to make sure that the deletion of components is replicated in all the environments.

Publish Customizations

When you configure the Microsoft Dynamics CRM system, you will make several changes before you have something to test. For example, you might create a new field. However, the field must be added to a form before users can enter data, and you might also want to include the field in a view. Instead of making every individual modification visible to users, you save the changes that you make and then publish all the changes when you are ready.

This means that other users of the system will not experience something that is unexpected until you are ready to show the finished set of changes. There are also performance benefits to this approach, because the client software does not have to fetch the definition or the data for UI components every time that the components are accessed, because the client software can cache this. When you publish changes, this updates the database so that the client is aware that there is a new version available and it will fetch that updated definition.

When you publish changes to an entity, this includes all changes to forms, views, charts and fields for the entity. You cannot publish only one subcomponent such as a form or view by using the tools in the UI. To publish changes to an entity, select the entity node in the solution explorer and then click Publish in the ribbon at the top of the screen. Or, if you have a form that is open for editing, you can click the Publish button and this publishes all changes for the entity, not just the form.

To publish components other than entities, select the node for that type of component, and then select the individual item in the list (only entities appear in the solution explorer as an expandable hierarchy). Click Publish in the menu bar that is located at the top of the view.

You can publish more than one component at a time by selecting the Components node of the solution explorer, and then selecting multiple items of the same type inside the list and then clicking Publish in the toolbar.

To publish all customizations that you have made to the system at the same time, you can select any item in the solution explorer except for an entity node, and then click Publish All Customizations in the ribbon.

Note: If you use Publish All Customizations, all saved changes are published, for all components in the whole system, not just those in the Solution. If you have more than one person making changes to the system this might mean changes are made visible before they are ready. When you can, publish each of your changes individually.

Some components do not have to be published. For example, Security Roles are immediately updated and enforced as soon as they are saved, whereas processes must be activated before they can be used.

When you create a component or subcomponent, it is published when you first save it. Therefore, the component or subcomponent can be used elsewhere before you publish your overall set of changes. You should pay additional attention to this when you create custom activity entities. The custom activity entities are immediately visible to other users. Also notice that if you use Save As to create a copy of components, such as views or dashboards, then this means that the saved version is visible immediately. Although at that point, the saved version is a copy of the original version until you modify it, save the new version, and then publish your changes.

Component Dependencies

Before you can delete a component from the system, you must make sure that no other components depend on it. If you try to delete a component without first removing these dependencies, the delete operation will fail and an error message is displayed. Generally, there is a dependency when one component is referenced or displayed by another. A dashboard depends on the views and charts that are used on the dashboard. These views and charts depend on several fields, and on the entity or entities that they receive data from.

To check what dependencies exist for a component, select the component in the solution explorer and then click Show Dependencies. The results show the dependent components that depend on the component that you selected, and the required components on which this component depends, as shown in the “Dependencies for a Custom Entity” figure.

Event: Dependencies

Dependent components

You cannot delete this component while the following components depend on it.

Display Name ↑	Name/Id	Component Type	Parent Entity
business_unit_crmdemo_event	business_unit_crmdemo_event	EntityRelationship	Event
crmdemo_event_AsyncOperations	crmdemo_event_AsyncOperations	EntityRelationship	System Job
crmdemo_event_booking	crmdemo_event_booking	EntityRelationship	Booking
crmdemo_event_BulkDeleteFailures	crmdemo_event_BulkDeleteFailures	EntityRelationship	Bulk Delete Failure

1 - 14 of 14 (1 selected) Page 1

Required components

When you import a solution, the required components must already be present on the target system or included within the solution being imported. You cannot delete the following components because this component requires them.

Display Name ↑	Name/Id	Component Type	Parent Entity
crmdemo_Event_16	crmdemo_Event_16	Web Resource	
crmdemo_Event_32	crmdemo_Event_32	Web Resource	

Figure 3 - DEPENDENCIES FOR A CUSTOM ENTITY

Also consider that if you delete a custom entity, this also deletes all data records for that entity. This is discussed in more detail in the “Customizing Entities” module. More information about the dependencies for some specific component types is available in the relevant modules in this course.

Dependent Components

The dependent components dialog box lists the other system components that prevent you from deleting the component that you are checking. In the “Dependencies for a Custom Entity” figure, the Booking entity depends on the Event entity because there is a relationship between the two entities. This relationship must be deleted before you can delete the Event entity. In this case, the relationship is part of the Booking entity as a lookup field. If this field is located on a form and in a view for Bookings, then it must be removed from the form and the view before the field and the relationship can be deleted.

To delete one item, you might have to track back through several layers of dependencies to achieve your goal.

Required Components

The required components list shows the components that are required by the component that you select to show dependencies for. However, these required components will not prevent you from deleting the entity. The “Dependencies for a Custom Entity” figure shows that the Event entity depends on two Web Resources. In this example, the required components are custom icon images that are displayed in the application, for example in a mixed-item view such as a Queue.

If you have already deployed the Event entity to your production system one time, together with these Web Resources, you do not have to keep the Web Resources in your Solution to export every time. If this is a new entity, then you must make sure that the required components are included in your solution package otherwise the import of the Solution will fail.

When you add an existing component to your Solution, you might receive a message like the one that is shown in the “Missing Required Components Dialog When Adding Components to a Solution” figure. You can select whether to include the components or not. However, you cannot select to include only some components that are offered. If you do not include these dependencies and you try to import your Solution into a system where they do not exist, the import will fail with errors. Many times the required components are system entities that you know must be part of another system. Therefore, you can safely ignore this warning if you have not customized those entities.

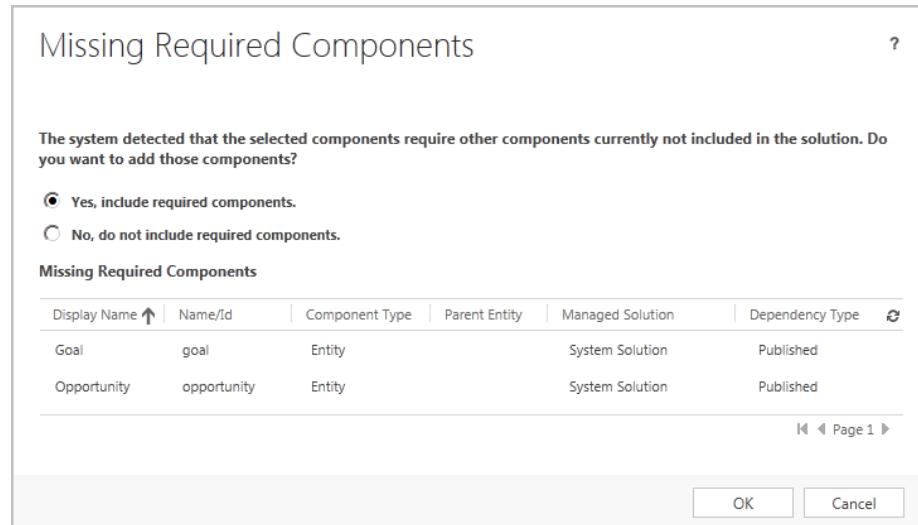


Figure 4 - MISSING REQUIRED COMPONENTS DIALOG WHEN ADDING COMPONENTS TO A SOLUTION

Module 2 - Security Model

To configure a Microsoft Dynamics CRM installation, you start by creating the Business Units and Security Roles that define the organizational structure. When Microsoft Dynamics CRM is installed, the setup creates a root Business Unit that represents the primary organizational unit for the implementation that includes a set of default Security Roles.

Additional Security Roles can be configured to specify the privileges that will be granted to users who do different jobs, in different areas of the organization.

After the organization structure and security model is configured, users are created and Security Roles are assigned to provide the privileges they require. Users can also be grouped into Teams that can be used to share records or personal views, charts and dashboards, and are also used to refine the security model.

Objectives

The objectives are:

- Explain how Business Units form an organizational hierarchy in Microsoft Dynamics CRM.
- Identify the differences between the root Business Unit and other Business Units.
- Review the guidelines that control the maintenance of Business Units.
- Explain how the privileges and access levels are defined in Security Roles to control access to records and application features, and differentiate between entity-based privileges and task-based privileges.
- Identify the five access levels that are used in Security Roles.
- Discuss how to use the default Security Roles.
- Define the relationship between Security Roles and Business Units.
- Review the best practices for how to configure a security model.
- Discuss the reason for Teams and how Teams are managed.
- Describe the differences between Owner Teams and Access Teams.

Lesson 2-1 Microsoft Dynamics CRM Security Features

The security model in Microsoft Dynamics CRM provides access to records and features of the application. Users can access records and perform actions on those records that are appropriate to their job function. A key objective of any security model is to prevent unauthorized access or modifications to data.

In Microsoft Dynamics CRM, the security rights that you configure also have a direct effect on the way the system behaves and is displayed to the user. If a user does not have access

to a specific entity or application feature, references to the entity or feature are not visible in the user's interface. By limiting access to only the areas a user must have, you can help make the Microsoft Dynamics CRM user experience easier.

Microsoft Dynamics CRM uses a role-based security model to define the permissions that are suitable for a specific job role that is then assigned to Users or Teams. This model uses a combination of Business Units to define a hierarchy of Users and Teams, and Security Roles to define the privileges the Users and Teams should be granted.

Lesson 2-2 Business Units

Business Units form a hierarchy that contains groups of Users and Teams, and the records the Users and Teams own. The hierarchy provides security boundaries to control the scope of the User permissions. This means that permissions can be granted to records so that users can perform different actions on records that are owned by other Users or Teams in their Business Unit from the actions that they can perform on records that are located in another Business Unit.

Business Units are also helpful when you consider your reporting requirements. Depending on the access levels that are granted to Users to read records, sometimes a single report can be used by several users in different Business Units to receive the results that they must have. This occurs because the records that are reflected in the report are filtered to only include the records that the user has access to. If users have access to records for the whole Organization you can use Business Units in the queries of your report to filter or categorize results.

When you plan a Microsoft Dynamics CRM deployment, it might be helpful to refer to an organization chart of the company structure. However, you do not have to replicate this in your Business Units. We recommend that you create only the Business Units that you must have to meet the security or reporting requirements of the business.

Business Unit Hierarchy

There is always at least one Business Unit in Microsoft Dynamics CRM. The first Business Unit is generated by the deployment process when the Organization is created. This Business Unit is called the root Business Unit. By default, although this Business Unit has the same name as the Organization, the name can be changed.

Some Microsoft Dynamics CRM installations only require a single Business Unit, and you can configure the security model to meet the Business Unit's requirements. Larger organizations might require separate Business Units in which to organize their users and achieve the goals of their security requirements. Frequently, these Business Units are created to reflect the operational reporting hierarchy of the business separated by geography or function, or a combination of both.

The root Business Unit is the upper-level node of the Microsoft Dynamics CRM organizational hierarchy, and can represent the corporation or the holding company of all Business Units in the organization. The root Business Unit has the following characteristics:

- There is only one root Business Unit.

- The root Business Unit is created by the Microsoft Dynamics CRM Server Setup program (or Deployment Manager if this is a second or later Organization in a multi-tenancy deployment).
- The root Business Unit cannot be assigned a parent Business Unit because it is and must remain the upper-level Business Unit in any organizational hierarchy.
- The root Business Unit cannot be deleted or disabled.

All other Business Units are descendants (directly or indirectly) of the root Business Unit. Business Units can represent subsidiaries, divisions, or departments in the business. However, the Business Unit can also represent group users who have other commonalities, such as skills or responsibilities. The key is to make the structure support the access and reporting requirements, instead of copying the organization chart.

Except for the root Business Unit, Business Units can be moved, or disabled and deleted. The conditions that must be met before you can delete a Business Unit are described in the “Disable, Enable and Delete Business Units” topic later in this lesson.

In this course, the following Business Unit hierarchy is used for Adventure Works Cycles:

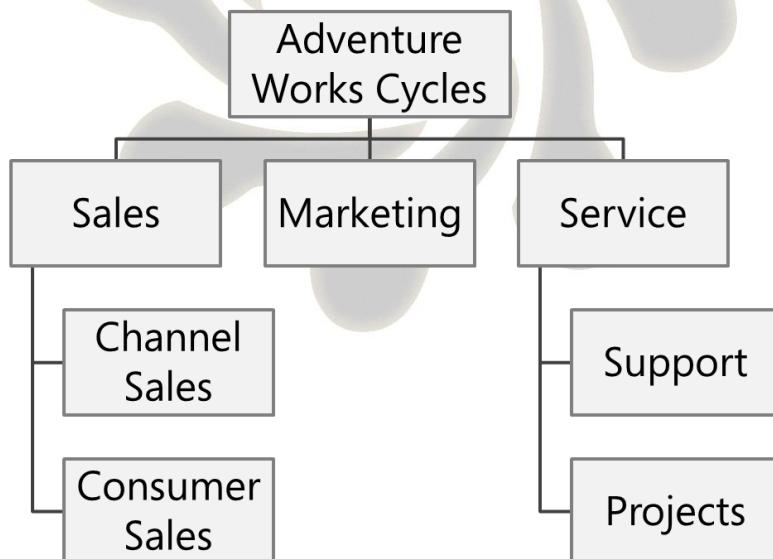


Figure 5 - ADVENTURE WORKS CYCLES BUSINESS UNIT HIERARCHY

In this example, Adventure Works Cycles is the root Business Unit, and it has three child Business Units:

- Sales
- Marketing
- Service

The Sales Business Unit has two child Business Units:

- Channel Sales

- Consumer Sales

The Service Business Unit has two child Business Units:

- Support
- Projects

Creating and Modifying Business Units

The Parent Business field is required for any Business Units that you create. Only the root Business Unit does not have a parent.

You can change the Parent Business Unit of any Business Unit (other than the root Business Unit) to reorganize your structure. When you do this, the following rules apply:

- When a Business Unit is reassigned to a new parent, all its child Business Units move with it, together with any associated Users, Teams and Facility/Equipment records.
- You cannot create circular relationships. For example, setting A to be the parent of B; B to be the parent of C; and C to be the parent of A.

When you move a Business Unit you might have issues with the Security Roles that are assigned to a User or Team. Specifically, if an inherited Security Role is assigned to one or more of the Users or Teams that belong to the Business Unit that is being moved then the Security Role will be removed from the Users or Teams. Only Security Roles that are locally defined directly in the Business Unit that is moved will remain. You should always confirm the Security Roles of users and teams in Business Units that are moved.

Disable, Enable or Delete Business Units

A Business Unit (except the root Business Unit) can be disabled, for example, if the Business Unit temporarily stops operation. However, the organizational structure remains in the Microsoft Dynamics CRM database for history, or so that it can be re-enabled if the operation starts again. Disabling a Business Unit disables all child Business Units and all Users who are attached to these Business Units will be unable to connect to Microsoft Dynamics CRM. Any other users who have privileges through their membership of Teams in disabled Business Units will not have those privileges.

Note: Although the Users of a disabled Business Unit cannot access Microsoft Dynamics CRM, the User records are not removed or disabled.

If a Business Unit plans to reorganize, you can create a new Business Unit, configure Security Roles, Users, Teams and Facility/Equipment records that the new Business Unit will require, and then immediately disable the Business Unit. Then, when the reorganization occurs, you can enable the Business Unit.

Note: Although users who are assigned to a disabled Business Unit cannot access Microsoft Dynamics CRM, no data that is associated with the Business Unit is deleted or lost. If a disabled Business Unit is enabled, each enabled user who is assigned to that Business Unit can access the application again.

Similarly, when you enable a Business Unit this also affects the Users who are assigned to the Business Unit and to the child Business Units (that are also enabled). Consider the following:

- All enabled users who are assigned to a Business Unit that is enabled can access Microsoft Dynamics CRM.
- A disabled user is not enabled when his or her Business Unit is enabled.

Before you can permanently delete a Business Unit, you must disable it. You must also remove any child Business Units, Users and Teams. You can do this by reassigning the Business Units, Users and Teams individually to a new parent Business Unit, or deleting the child Business Unit, this is deleted for you by the system when you delete the Business Unit. Before you delete a Team, you must consider reassigning any records that are owned by the Team.

Facility/Equipment records and Resource Groups do not have to be removed beforehand and will be deleted when the Business Unit is deleted. If you want to keep these resources, you must first move the resources to a different Business Unit.

Best Practice: You should disable Business Units instead of deleting them when they are no longer part of the structure of your organization. A disabled Business Unit can be enabled again if the requirements of the organization change. Remember - deletion is irreversible.

Lesson 2-3 Security Roles

This lesson describes how to configure the privileges in a Security Role. The lesson also describes how the permissions are applied in relation to a User's position in the Business Unit hierarchy.

Role Based Security

Microsoft Dynamics CRM gives users access to the records and features that the users must have to do their jobs by using a role-based security model.

Users and Security Roles

Each User must be assigned one or more Security Roles to access the system. Users receive their permissions to work on records or use features based on the combination of Security Roles they are assigned and the Business Units to which the users belong.

The layering of multiple roles and permissions that are assigned directly or indirectly to the User is an easy way to give the User permissions based on his or her primary or secondary job role, or a temporary role such as a project team member.

Teams and Security Roles

Teams can be defined to group users together from one or more Business Units for reporting purposes, or to grant the Users the permissions that are given to the Team. If a Team has one or more Security Roles, then the Users who are members of the Team can use these privileges and the permissions from their own Security Roles. Users can share a record with a Team, or assign a record to a Team to own the record directly (if the Team

has at least read access to the entity). In both cases, all Team members have the same level of access to the records that the Team is granted through the share or Security Roles.

Security Roles and Business Units

When Microsoft Dynamics CRM 2015 is first installed, it includes 15 Security Roles. These Security Roles are intended to provide the permissions that might be required for different job roles, such as Salesperson or Marketing Manager.

A Security Role is created in and remains in a Business Unit. The default Security Roles are created in the root Business Unit. When a Security Role is created in a Business Unit the Security Role is copied to the child Business Units of that Business Unit and to the child Business Units of the child Business Units, and so on in the hierarchy. These copies are called inherited roles and cannot be modified or deleted. If the original role is modified, the role configuration is copied to the inherited roles again so that the roles are always an accurate replica of the original.

A Solution can only contain Security Roles that are created in the root Business Unit. When a solution package is imported, all Security Roles in the solution package are created in the root Business Unit of the target system, or update an earlier version of the same role that already exists. Then, inherited roles are created or updated in all Business Units in the target Organization (because they are all child Business Units under the root, directly or indirectly).

Users and Teams can only be assigned to a Security Role in their own Business Unit. Therefore, the inherited roles make it easier to assign the same privileges to Users in different Business Units without having to create and maintain matching roles.

Note: If you create a Security Role in a parent Business Unit with the same name as an existing role in a child Business Unit, the inherited role will still be created that has the same name. Therefore, you will have two roles with the same name that might have completely different privileges defined. You can also create two roles in two Business Units that are in parallel parts of the hierarchy, again with different privileges. In both cases, this could lead to confusion, and could lead to users being granted privileges that they should not have, or lead to users being prevented from doing things that they need for their jobs. We recommend that you create all Security Roles in the root Business Unit and use inheritance to create copies in other Business Units, to avoid such issues when this is possible.

The default roles can be used to set up Microsoft Dynamics CRM quickly to assign privileges to users without having to first create roles. This might be suitable for smaller organizations that do not have the skills or experience to configure their own roles, or for internal demonstration and “proof of concept” testing in the early stages of your project or on a development system. The security permissions that are included in the default roles might not provide security levels that match your business requirements for your production system. If this is the case, you have the following options:

- Modify the default roles before you assign the default roles to Users and Teams.

- Make copies of the default roles, by using the default roles as templates as a starting point.
- Create new Security Roles, adding the privileges you must have.

Best Practice: We recommend that you create copies of the default roles and configure the copies to meet your exact security requirements instead of assigning the default roles directly to Users and Teams. This also means that you keep the default roles in their original state as a reference to compare to if you make an error when you modify the copies. If you have separate development, test and production systems, you might also choose to delete the default roles in your production system (other than System Administrator, and probably System Customizer), and only use the roles that you have created, modified and tested. Using a naming convention such as prefixing with an abbreviated version of your organization name might help to identify the roles that are tested and approved for use in production.

System Administrator role

You can modify all default roles except for the System Administrator role. The System Administrator role has the following special properties:

- The role provides all privileges to all entities and features at the Organization access level (some exceptions exist that are only applied at the User level, such as access to Saved Views, User Charts, or User Entity UI Settings).
- As you add custom entities, the System Administrator and System Customizer roles are automatically granted privileges to these entities, at the Organization level.
- At least one User must have the System Administrator role. You cannot remove the System Administrator role from the only user who has this role, and you cannot disable that User account. By default, the User who installed Microsoft Dynamics CRM is added to the system and given the System Administrator role. However, you can remove the System Administrator role from this person if you assign the System Administrator role to another user first.
- Users who have the System Administrator role are also members of the System Administrator Field Security Profile. Field Security is discussed in the “Additional Security Options” module.

You can create a copy of the System Administrator role and customize the role so that it creates a role that has “nearly” administrative privileges. The copy of the role will not have the special properties that are described here.

Privileges and Access Levels

The security permissions that are defined in each Security Role consist of privileges that describe the actions that are allowed at a selected access level that describe where the privilege applies. The permissions are displayed in the form by using a series of icons, the key for which is included on the Security Role form as shown in the “Security Role Core Records Tab Entity Privileges” figure.



Figure 6 - SECURITY ROLE CORE RECORDS TAB ENTITY PRIVILEGES

Privileges

Privileges are the basic security unit in Microsoft Dynamics CRM. Privileges define the actions that the user can perform in the system. In each Security Role, some privileges relate to the actions that a user can perform on records of different entities, and other privileges are miscellaneous privileges that relate to the features of the system that apply globally.

Entity Privileges

Every Security Role includes a grid that shows the privilege for every combination of each entity and the actions that can be performed on its records. Some examples of privileges include ReadAccount, CreateContact and WriteCase. The security privileges that apply to most entities and the actions they control are described in the following table:

Privilege	Description
Create	The user can create records of the entity
Read	The user can read records of the entity
Write	The user can update data for records of the entity
Delete	The user can delete records of the entity
Append	The user can attach this entity to other records
Append To	The user can attach other records to this entity
Assign	The user can make other Users or Teams the owner of this entity
Share	The user can share records of the entity with other Users or Teams

These privileges can be granted at different access levels to define the records of the entity that the user can perform that action against. Organization-owned entities do not have privileges for Assign or Share. These privileges only apply to entities that are owned by Users or Teams.

Access Levels

Access levels indicate the records of each entity on which the User can use a privilege. For Organization-owned entities such as Sales Literature, (Knowledgebase) Article, Currency,

Service and Site there are two access levels—None and Organization. For User or Team-owned entities there are five levels. These levels describe where the owner of the record must be located in the Business Unit hierarchy in relation to the User who tries the action for the action to be permitted. These five levels are described in the following table.

Access Level	Description
None	The user does not have the privilege
User	The user has the privilege for the records they own, and for the records that are shared with the user (either directly or through Team membership)
Business Unit	The user has the privilege on all records that are owned by members of his or her Business Unit. However, the user does not have the permission on records that are owned by members of child Business Units.
Parent:Child Business Unit	The user has the privilege on all records that are owned by members of his or her Business Unit, and all records owned by members of child Business Units to any depth
Organization	The user has the privilege on all records in the organization

You can change the access level that is defined for each privilege by clicking the icon for privilege. This increases the level incrementally until it reaches Organization, and then the level starts again from none.

You can also click the labels to modify a whole row or column at one time. This is sometimes known as the entity (row) or privilege (column) shortcut method. If you click the entity name or next to the entity name, this increments the lowest access levels for that entity until all the levels are the same, and then the levels cycle round together.

Also, if you click on the privilege label, the lowest access levels are brought up to a common level one step at a time, then cycle round. For example, you can use these methods to quickly grant Organization access to all privileges for the Campaign entity, or remove the delete privilege from all entities on the Service tab of the Security Role form. A combination of the shortcut methods and then some individual adjustments will usually be the fastest way to achieve the configuration that you want to configure.

Note: There are some privileges for which some levels are not available. For example, some entities such as User, Team and Facility/Equipment can have privileges that are set to anything except User level because these entities are not user owned because they are “owned” by Business Units. Compare this to Saved Views and User Charts that can only be set to none or User level (these are not entities, although they are shown in the grid together with entities, and have the same set of possible actions).

Miscellaneous Privileges

Each Security Role also includes miscellaneous privileges that relate to application features, such as Print, Merge, Export to Excel and Go Offline. These privileges have only two levels that represent an on or off setting because these privileges do not relate to

records, they apply to features globally. Some miscellaneous privileges are shown in the “Security Role Core Records Tab Miscellaneous Privileges” figure.

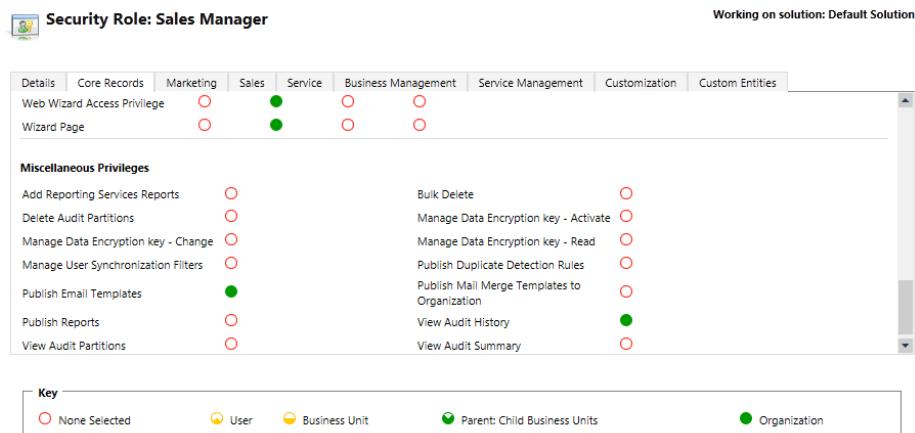


Figure 7 - SECURITY ROLE CORE RECORDS TAB MISCELLANEOUS PRIVILEGES

Note: Some privileges that are listed in the Miscellaneous Privileges section in a Security Role form are related to records and therefore have the usual five access levels. Most notably, on the Sales tab the privileges that relate to the override of pricing on Opportunity, Quote, Order and Invoice, and enable deletion of these same records are all defined in relation to the owner of the records the same as for the usual entity privileges.

Although privileges describe the general actions that you can take, frequently you will find that combinations of privileges are required to achieve certain things. For example, having the create privilege on Opportunities is not enough to create an Opportunity. You must also have Read privileges or Opportunities will not be visible in the navigation areas of the application. Also, if you do not have Write privileges on an Opportunity, you cannot edit the Opportunity after you create and save the record.

As a guide, the UI reflects current privileges - buttons are not shown for actions that a user does not have privileges to perform.

If a user is assigned two or more Security Roles, the privileges are additive, and the highest access level applies (so this is a least restrictive security model). For example, if one Security Role grants an access level of User for the read privilege on the Account entity, and the other has an access level of Business Unit, the user will be granted the privilege at the Business Unit level.

Create and Copy Security Roles

If an existing Security Role does not meet your business requirements, you can modify the role directly, or copy the role to a new role first. If you create a copy, you can modify the copy of the role without affecting any existing users until you assign the role to Users (and optionally remove other roles that the Users have). You could choose to delete the replaced roles completely to make sure that the roles are removed from all Users. If you modify an existing role, any users who are assigned to that role will have their privileges

updated as soon as you save the role (or import an updated version of the role if you made the changes in a different system and deployed the changes in a solution package).

When you create a copy of a role, you can specify a new name. However, you cannot specify a new Business Unit. The copy will be in the same Business Unit as the original role. If you have to create a variant of an existing role to use in only some Business Units, you can create a copy of an inherited role. In every case there is no link between a copy and the original. The changes to the original are not reflected in the copy.

Copying a role has the advantage that you can directly compare the copy and the original as you make or document your changes. This is helpful if you start from one of the 15 customizable default roles.

You can choose to create a completely new role instead of copying an existing role. This is usually a better choice if you want to create a role that has only a few privileges specified to use as an additional role layered over the main Security Role that is assigned to a User.

For example, you might want to grant the miscellaneous privilege Export to Excel to some Users from different departments who do not share a Security Role. By creating a new role that contains only this privilege, you can grant this role to the Users in addition to the roles that the users already have. You could also assign this Security Role to a Team that is created especially for assigning this privilege, and add the Users to that Team. This might make it easier to identify who has the role by only having to examine the Team membership instead of having to use Advanced Find.

Note: Security roles cannot be moved from one Business Unit to another. If you create a Security Role in an incorrect Business Unit, you must delete the Security Role and re-create the Security Role in the correct Business Unit.

Lesson 2-4 User Management

Microsoft Dynamics CRM offers many features that make user management easy, and separates the management of security in Microsoft Dynamics CRM from how the user signs in to the system. Sometimes large organizations can have many staff members that join or leave the organization, or transfer between departments, or are promoted to a new job role, and this can make managing the users' permissions in Microsoft Dynamics CRM an ongoing daily administration.

Additionally, an organization's size and internal policies and procedures can determine how the users are managed. For some organizations, user-management might be the responsibility of a central administration function at the corporate level. For some organizations, the task is performed by a system administrator or business manager at the location or department level.

User Administration

If you use Microsoft Dynamics CRM Online, the users will sign in by using an account that you created through the online administration platform. These accounts might use Windows Live ID if you have an existing Microsoft Dynamics CRM Online deployment that is upgraded to Microsoft Dynamics CRM Online 2015, or the Microsoft Online Subscription Program (MOSP) if you have a new deployment. All customers are being migrated from

Windows Live ID to the MOSP platform over time. This provides a single authentication platform for all Microsoft subscription-based services including Microsoft Office 365 and Microsoft Exchange Online.

If you run Microsoft Dynamics CRM 2015 on-premises, then the User accounts will usually be linked to Active Directory user accounts, although you can use other authentication providers in an internet-facing deployment. In either case, when you create a User account in Microsoft Dynamics CRM on-premises, you select an existing account from the authentication provider to link it with, you cannot just create a new user from nowhere, because Microsoft Dynamics CRM does not provide a password management or an authentication mechanism.

Whichever platform you use, the users will sign in to Microsoft Dynamics CRM by using their credentials for the appropriate authentication provider, and this allows the users to access Microsoft Dynamics CRM. After the users are signed in the Microsoft Dynamics CRM security model applies to the User account, regardless of how the users are authenticated, based on the Business Unit the users belong to, the Security Roles assigned to the Users and the Teams that the Users are a member of.

A User record in Microsoft Dynamics CRM contains additional information about the user, such as where the user is located, the user's email address and job title and who the user's manager is. The Manager selected for a User record must be located in the same Business Unit as the User, or located in a Business Unit that is above the User's Business Unit in the hierarchy. The Manager field is optional. However, if you use this field, it can be helpful when you create reports and queries, or to automatically escalate processes that are behind schedule.

Microsoft Dynamics CRM provides the following user maintenance functionality:

- Create Users
- Enable and Disable Users
- Identify managers for Users
- Create Teams
- Delete Teams
- Assign Users to Teams
- Assign Security Roles to Users and Teams
- Move Users and Teams between Business Units

Assigning Security Roles to Users and Teams, and moving Users between Business Units are described in the “Managing Security Roles for Users and Teams” lesson later in this module.

Note: A detailed discussion of how to add and maintain Users is not part of the scope of this course. This is because this administration is performed after the system is configured

and deployed, and is usually performed continuously by IT staff members who are not system customizers. More information about how to add and manage users for on-premises and online environments can be found in the “Microsoft Dynamics CRM Implementation Guide.”

When Users are signed in to Microsoft Dynamics CRM, the Users can maintain some personal information on their own user accounts if their assigned Security Roles grant them with the necessary privileges. The default Security Roles below “management” level do not allow User update as a default setting. However, you can add the appropriate privileges, if you must have Users maintain their own records, for example to update their own address and telephone numbers.

Disable a User

When Users are added to Microsoft Dynamics CRM, the Users’ accounts are automatically enabled. You cannot delete Users in Microsoft Dynamics CRM. However, you can disable a User account if a member of the staff has left the organization. When you disable a User account, the associated user cannot sign in to Microsoft Dynamics CRM, and he or she no longer requires a user license. The records that are owned by the User are still available in the system and you must consider the best way to reassign the records (especially the active records) to an enabled user to make sure that there is a follow up on the records and that the business process continues.

If you disable a User record, you also have to determine whether any workflows or other processes refer to that User, for example routing Cases to the User or sending an email message in the User’s name. Although these workflows will continue to work in most scenarios, the business process that they represent will not be followed correctly. The User might be referred to explicitly in some processes (all high priority Cases for a certain subject are always assigned to a specific technician), or implicitly (all Cases for a Customer are routed to the Customer’s preferred service representative that is defined on the Account record).

Lesson 2-5 Team Management

A Team is a group of users who work together for a long time, such as a department of an organization, or temporarily such as a project team. Use of Teams in Microsoft Dynamics CRM is optional. There is no requirement that an organization must create their own Teams or do anything with the default Teams.

Some advantages of using Teams include the following:

- Information can be shared more quickly to a Team instead of individually sharing the information with each member of the group.
- Sharing information with a Team implicitly shares the information with the Team members, and this is dynamically applied as Users are added and removed from the Team.
- Security Roles can be granted to an owner Team and those roles are used by Team members in addition to their own (with some important considerations that are

discussed in the lesson “Managing Security Roles for Users and Teams” later in this module)

- Teams can be used for querying and reporting, for example a User might want to create a view of all records of an entity that are owned by any User in a particular Team, or any Team the User is also a member of, or any Team that they are the Administrator (manager) of. These queries can be built to work dynamically, for any User to view records that relate to their Teams, instead of selecting Teams by name.
- If an owner Team has a Security Role granting at least User level read access to an entity, the Team can own records for that entity. This can be used to route work to a Team (manually or through automated processes) instead of to a named individual.
- The Team can be linked to a Queue, specifically so that incoming work that is received by the Team can be automatically added to the Team’s Queue. This would mean that any member of the Team will see those work items in their view of Items Available to Work On. The Team members do not have to individually monitor several different views or Queues if they are a member of several Teams (although the Team members can select one Queue at a time if they must check the Queues or views separately).

Owner Teams and Access Teams

In Microsoft Dynamics CRM 2015, there are two types of Teams—owner Teams and access Teams. Owner Teams can be assigned Security Roles and therefore own records, access Teams cannot have Security Roles and cannot own records, although records can be shared with the access Teams. Although an owner Team can be converted to an Access Team, you cannot do this the other way round. Access Teams are mainly intended for use with Access Team Templates that are discussed in more detail in the “Additional Security Options” module.

Default Teams

When you create a Business Unit a Team is automatically created in the Business Unit that has the same name as the Business Unit. This is known as the default Team for the Business Unit. The default Team includes all the Users who are in the Business Unit and is maintained automatically when Users are added to or removed from the Business Unit.

You cannot modify the membership of the default Team. However, you can assign Security Roles to the default Team. This can be a useful approach for assigning the same Security Roles to all Users in a Business Unit.

Note: A Security Role that is assigned to a Team can be used by members of the Team. However, the access levels are in relation to the Team, and not the User. Specifically, the “User” access level relates to records that are owned by the Team, and not any User member. This is discussed in more detail in the “Managing Security Roles for Users and Teams” lesson later in this module.

A default team cannot be deleted, renamed, moved to another Business Unit, or have its membership modified. A default Team can be converted to an Access Team if you want to make sure that no Security Roles are assigned to the Team, because this would grant the privileges to Users indirectly. Although this is not a recommendation, you should be aware of this option because it might suit your security policies and requirements. You cannot reverse this process and convert back to an owner Team.

Creating Teams

When you create or manage Teams other than default Teams, some considerations to remember include the following:

- Every Team is associated with one Business Unit.
- Teams can contain Users as members. Teams cannot contain other Teams (there is no “nesting” model).
- Teams can be Owner Teams or Access Teams. If you want to assign Security Roles to the Team, select Owner. You can convert an Owner Team to an Access team but not the other way round.
- Users can belong to more than one Team.
- Users can be added to and removed from Teams.
- Although a Team is associated with a particular Business Unit, its members can include any users in the Organization, regardless of their Business Unit.
- Sharing a record with a Team effectively shares the record indirectly with each User in the Team.

Manage Team Membership

You can add Users to a Team from either the Team or User record, depending on whether you are adding one user to many Teams, or many users to one Team. You can use either of the following approaches:

- For a Team record, each User record that will be added to the team can be selected.
- For a single User account in Microsoft Dynamics CRM, each Team in which that User should be a member can be selected.

Lesson 2-6 Teams and Sharing

Sharing gives another User or Team specified access to a single record. This feature is useful when you want selected Users from other Business Units to work on records that they do not have access to. Sharing applies to individual records instead of all records of a specific entity, and sharing is granted by any User who already has access to the record, instead of by a System Administrator assigning Security Roles to Teams or Users. When you share a record, access is configured for the same privileges that are defined in Security

Roles, except that the depth of the access (such as User, Business Unit, or Organization) is not relevant because the share applies to individual records.

Sharing a record with a Team is equivalent to sharing with all the Users in the Team, and is less work for the User when he or she grants the shared access. Sharing with Teams also works dynamically as Users are added to or removed from the Team. Because shares are stored as records in the SQL database (in the PrincipalObjectAccess table) to describe who has access to a record, when the records are shared with Teams this provides better system performance than when the records are shared with Users. This occurs because fewer records are created in the table so then the table can be queried more efficiently. We recommend that you train and encourage the users to use Teams for sharing when this is possible.

To share something with all users in a Business Unit, select the default Team for the Business Unit. This helps make sure that all users in the Business Unit have access, and no other users.

Share Views, Charts and Dashboards

Users can share their personal views from the Saved Views section of the Advanced Find dialog box. Personal charts can be shared from the More Actions menu of the chart pane, and personal dashboards can be shared from the More Commands menu of the command bar.

On the command bar, the More Commands button is displayed as an ellipsis (...) that you can click to display a list of further commands to use. The list of command available on this menu depends on the context of the type of entity being viewed and the current user's privileges. The tooltip for this ellipsis button displays MORE COMMANDS as shown in the "More Commands Button on the Command Bar" figure.

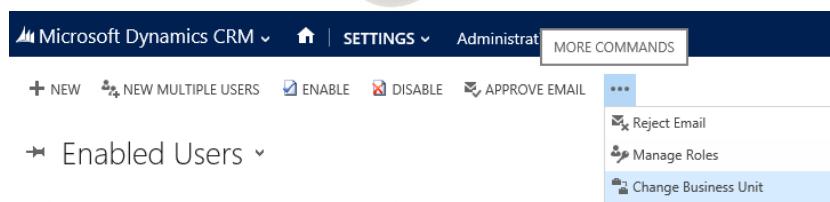


Figure 8 - MORE COMMANDS BUTTON ON THE COMMAND BAR

This lets a user who has the correct skills create the components one time and then share the components with their colleagues. Doing this gives the users the advantage of using these components without having to create the components for themselves. In most cases sharing the components with a Team requires the least administrative effort to share and maintain, and usually meets the requirements to share a specific view, for example, with other people who perform a similar job.

Depending on the permissions that are granted through the share, the original creator can keep control of the changes, and allow other users to only use (read) the components, or change the components. Make sure that the Users understand that the components that are shared in this manner are not copies, and that these components are a single view, chart or dashboard that they all use. If one user wants a different variation, the user must

create his or her own copy before he or she makes changes that will affect their co-workers.

You might also want to remind Users to only share items such as views with users who will benefit from having these items. By doing this, the users will avoid their list of available views for an entity containing many entries they do not need. If the permission to share the component has not been shared, users cannot remove the items they do not want.

Sharing Records

Users can share records with other users and teams. This functionality is not easy for users to follow and the use of Access Teams and Access Team Templates is the preferred way to share records.

When you grant permissions through record sharing or through access teams, consider the following guidelines:

A User must have at least the User level for a privilege through a Security Role before a share granting the corresponding permission will take effect and allow access.

- The Append privilege that is assigned through sharing applies to both the Append and Append To privilege in Security Roles.
- Sharing a record with a Team effectively shares the record with all Users in that Team at the time of access. Therefore, this grants access to Users who are added to the Team later, and removes the access from Users who are no longer in the Team.
- When a record is shared with a Business Unit's default Team, this effectively shares the record with all Users in that Business Unit

Note: Privileges that are granted by sharing a record do not apply unless the recipient has at least the User level access for that permission through his or her Security Roles. This means that a User cannot have more privileges to a shared record than the user has for his or her own records of that entity. Sharing extends the user's rights to records from anywhere in the Organization outside the user's usual access level, it does not change the privileges that the user has for the records. For example, if a record is shared with a User, granting permissions to delete the record, but the user does not have the delete privilege for his or her own records for that entity, then the delete permission is ignored. Other privileges that are shared at the same time will still be considered individually.

Lesson 2-7 Manage Security Roles for Users and Teams

After you create the Security Roles that are required by your organization the next step is to assign the roles to Users and Teams.

Assign Security Roles to a User

You can one or more Security Roles to a User using from within Settings->Administration.

If you select a single User, the Manage User Roles dialog box will show the roles that the User already has and you can add or remove roles here.

If you select more than one User, then the Users' current roles will not be shown, even if they have the same roles assigned. Therefore, you can only use this method to add more roles to multiple users at the same time, and not to remove roles.

Assign a Security Role to a Team

You can assign one or more Security Roles to an Owner Team using from within Settings->Administration.

Move a User or Team to a Different Business Unit

Every User and Team in Microsoft Dynamics CRM belongs to a single Business Unit. You can move a User or Team to a different Business Unit because of reorganizations or job role changes.

When a User or Team is moved to a different Business Unit all the Security Roles are removed. After you move a User, you must assign new Security Roles to the User. The Security Roles must be assigned from the roles that belong to the User's new Business Unit. Until you do this, the User might be unable to sign in to Microsoft Dynamics CRM.

In most cases, the User cannot sign in to Microsoft Dynamics CRM after the User is moved to a new Business Unit. However, there are some circumstances, such as if the User is a member of a Team that has a suitable role, the User can still sign in to Microsoft Dynamics CRM. However, the user might be unable to perform all the functions he or she is required to perform, because the User's permissions will be related to the Team's position in the hierarchy. Specifically, the User cannot manage his or her personal settings, or work with his or her saved views and charts. We recommend that you do not rely on Team membership to provide the basic privileges required to sign in and operate Microsoft Dynamics CRM, and instead reassign suitable roles to the User immediately after the User is moved.

If you move a Team that has a Security Role assigned, the members of the Team that rely on that role for access will no longer have those permissions. For the Users to have those permissions, appropriate roles must be assigned to the Team, or roles must be assigned to the Users individually, or the Users must be added to another Team that has the roles that the Users must have.

If you make significant changes to the Security Roles, you might have to add and remove many roles from multiple users and assign new Security Roles to the Users so that the Users do not use the earlier Security Roles. Because you cannot use the Manage Roles feature to remove roles from more than one User at a time, this can be time-consuming. Depending on how many Users have to be modified, and whether the Users all have similar roles or different combinations, it might be fastest to move the users temporarily to a new Business Unit and then back again. If you do this, all the Users roles will be removed. Then, you can use the Manage User Roles dialog box to add one or more roles to multiple users at one time. However, by doing this, many Users will not have a role for a short time and will be unable to use Microsoft Dynamics CRM. Therefore, you should plan to do this outside the usual working hours.

Lesson 2-8 Hierarchy Security

The hierarchy security model is an extension to the existing Microsoft Dynamics CRM security models that use business units, security roles, sharing, and teams. It can be used in conjunction with all other existing security models. The hierarchy security offers a more granular access to records for an organization and helps to bring the maintenance costs down. For example, in complex scenarios, you can start with creating several business units and then add the hierarchy security. This will achieve a more granular access to data with far less maintenance costs than a large number of business units may require.

Manager hierarchy and Position hierarchy security models

Two security models can be used for hierarchies, the Manager hierarchy and the Position hierarchy. With the Manager hierarchy, a manager must be within the same business unit as the report, or in the parent business unit of the report's business unit, to have access to the report's data. The Position hierarchy allows data access across business units. If you are a financial organization, you may prefer the Manager hierarchy model, to prevent managers' accessing data outside of their business units. However, if you are a part of a customer service organization and want the managers to access service cases handled in different business units, the Position hierarchy may work better for you.

Manager hierarchy

The Manager hierarchy security model is based on the management chain or direct reporting structure, where the manager's and the report's relationship is established by using the Manager field on the system user entity. With this security model, the managers are able to access the data that their reports have access to. They are able to perform work on behalf of their direct reports or access information that needs approval.

For a non-direct report, a manager has the Read-only access to the report's data. For a direct report, the manager has the Read, Write, Update, Append, AppendTo access to the report's data. To illustrate the Manager hierarchy security model, let's take a look at the diagram below. The CEO can read or update the VP of Sales data and the VP of Service data. However, the CEO can only read the Sales Manager data and the Service Manager data, as well as the Sales and Support data. You can further limit the amount of data accessible by a manager with "Depth". Depth is used to limit how many levels deep a manager has Read-only access to the data of their reports. For example, if the depth is set to 2, the CEO can see the data of the VP of Sales, VP of Service and Sales and Service Managers. However, the CEO doesn't see the Sales data or the Support data.

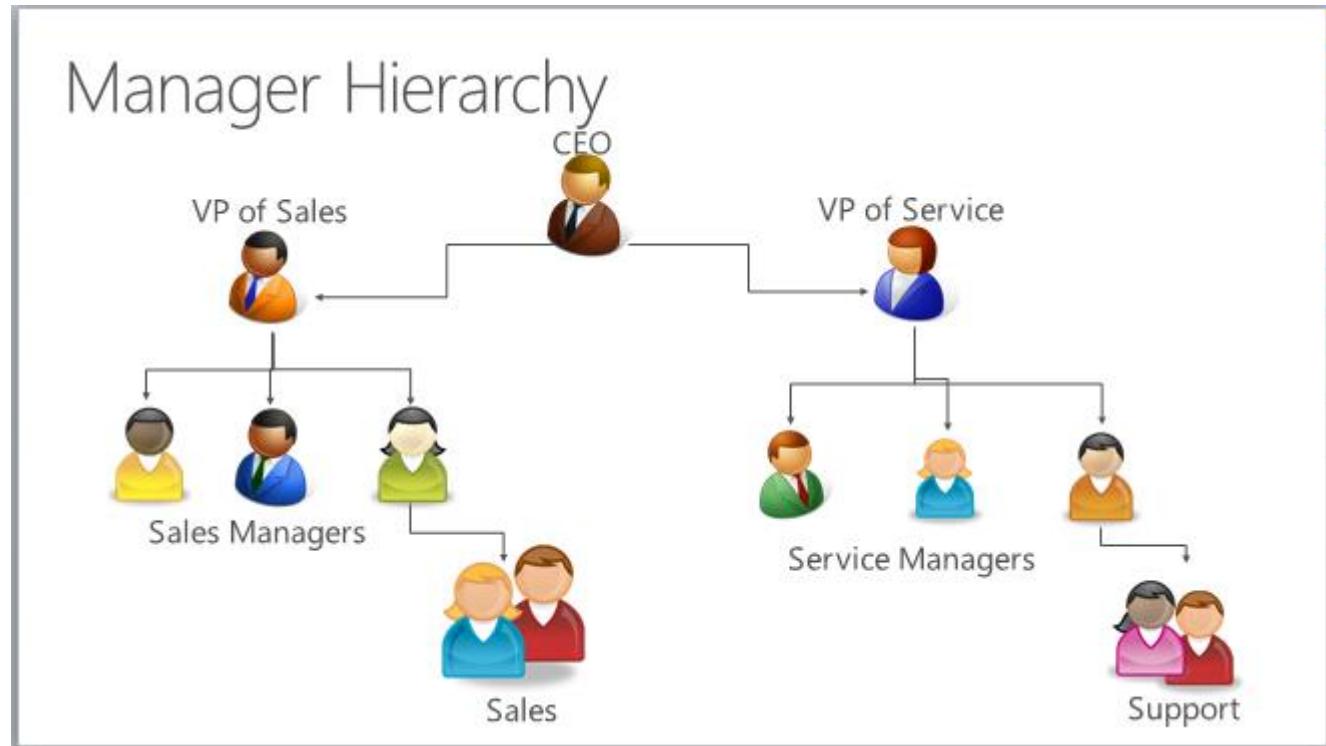


Figure 9 - Manager Hierarchy

It is important to note that if a direct report has deeper security access to an entity than their manager, the manager may not be able to see all the records that the direct report has access to. The following example illustrates this point.

- A single business unit has three users: User 1, User 2 and User 3.
- User 2 is a direct report of User 1.
- User 1 and User 3 have User level read access on the Account entity. This access level gives users access to records they own, the records that are shared with the user, and records that are shared with the team the user is a member of.
- User 2 has Business Unit read access on the Account entity. This allows User 2 to view all of the accounts for the business unit, including all of the accounts owned by User 1 and User 3.
- User 1, as a direct manager of User 2, has access to the accounts owned by or shared with User 2, and any accounts that are shared with or owned by a team that User 2 is a member of. However, User 1 doesn't have access to the accounts of User 3, even though his direct report may have access to User 3 accounts.

Position hierarchy

The Position hierarchy is not based on the direct reporting structure, like the Manager hierarchy. A user doesn't have to be an actual manager of another user to access user's data. As an administrator, you will define various job positions in the organization and arrange them in the Position hierarchy. Then, you add users to any given position, or, as we also say, "tag" a user with a particular position. A user can be tagged only with one

position in a given hierarchy, however, a position can be used for multiple users. Users at the higher positions in the hierarchy have access to the data of the users at the lower positions, in the direct ancestor path. The direct higher positions have Read, Write, Update, Append, AppendTo access to the lower positions' data in the direct ancestor path. The non-direct higher positions, have Read-only access to the lower positions' data in the direct ancestor path.

To illustrate the concept of the direct ancestor path, let's look at the diagram below. The Sales Manager position has access to the Sales data, however, it doesn't have access to the Support data, which is in the different ancestor path. The same is true for the Service Manager position. It doesn't have access to the Sales data, which is in the Sales path. Like in the Manager hierarchy, you can limit the amount of data accessible by higher positions with "Depth". The depth will limit how many levels deep a higher position has a Read-only access, to the data of the lower positions in the direct ancestor path. For example, if the depth is set to 3, the CEO position can see the data all the way down from the VP of Sales and VP of Service positions, to the Sales and Support positions.

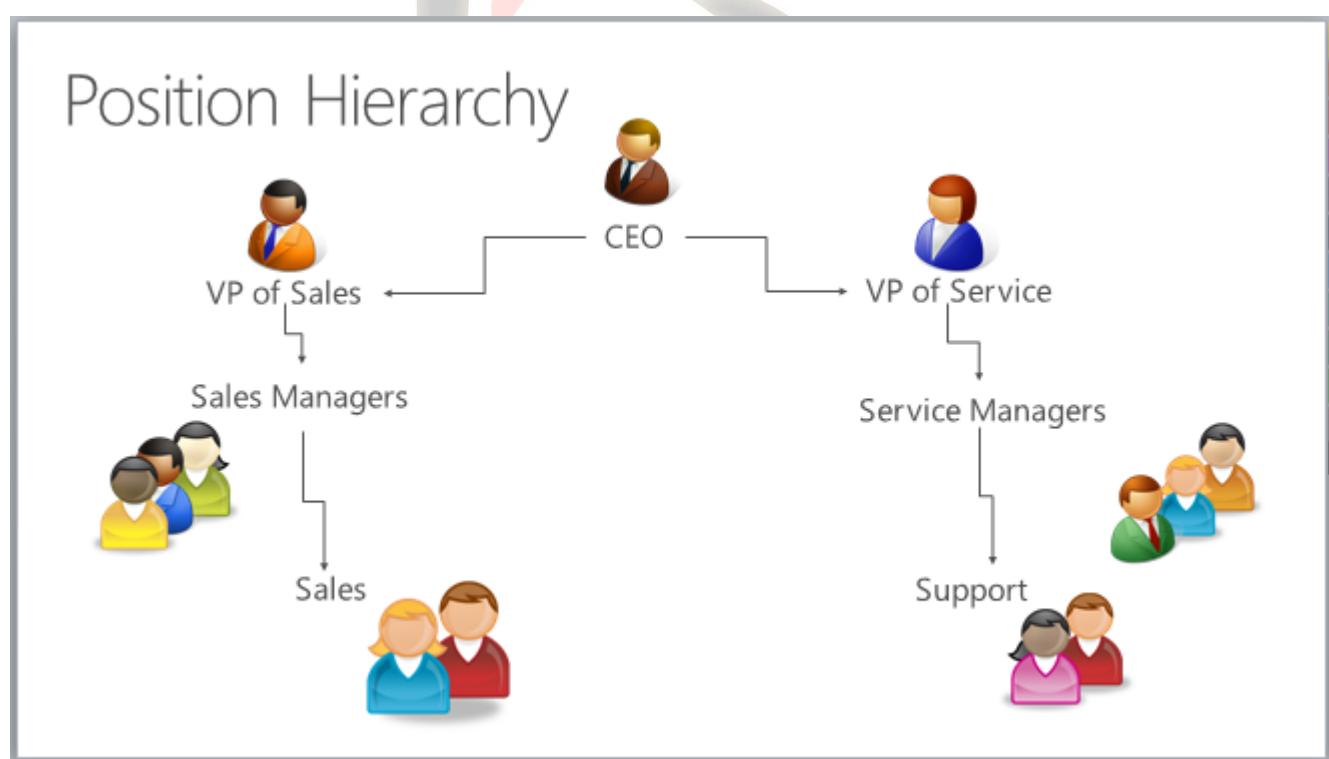


Figure 10 - Position hierarchy

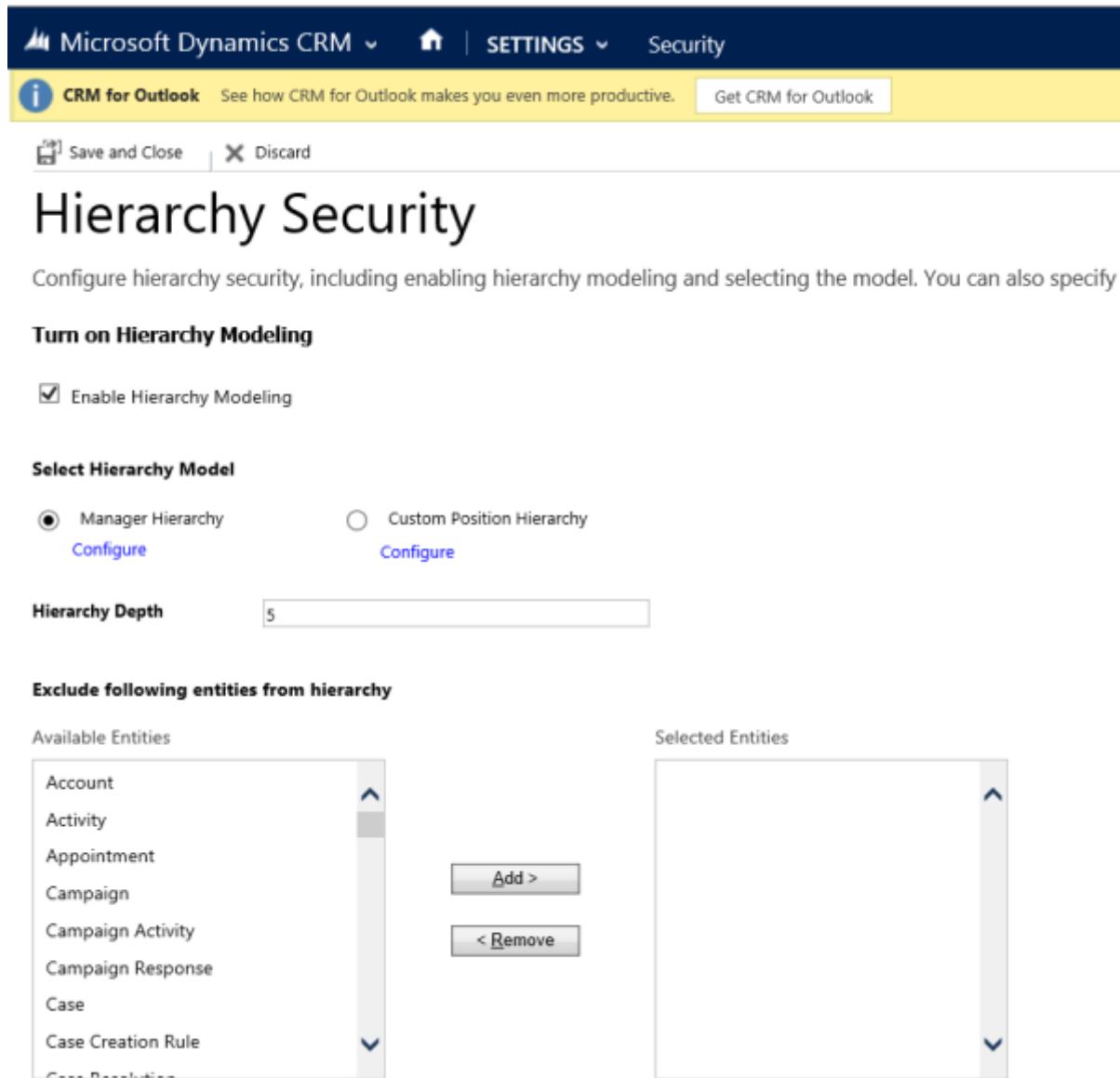
Set up Hierarchy Security

To set up the security hierarchy, you must have an Administrator security role.

The hierarchy security is disabled by default. To enable:

1. Go to Settings > Security.
2. Choose Hierarchy security and select Enable Hierarchy Modeling

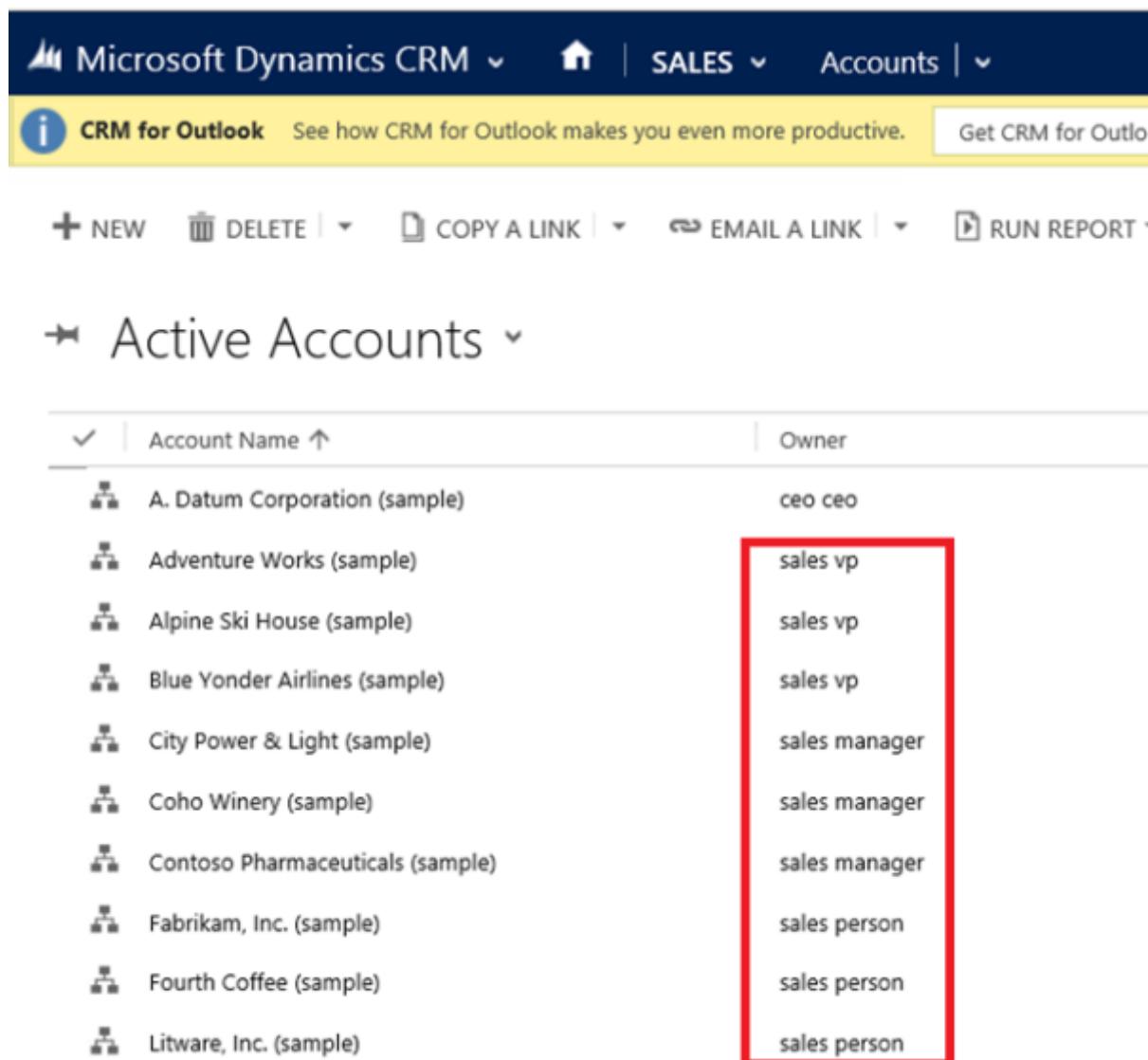
After you have enabled the hierarchy modeling, choose the specific model by selecting the Manager Hierarchy or Custom Position Hierarchy. All system entities are enabled for hierarchy security out-of-the-box, but, you can exclude selective entities from the hierarchy. The Hierarchy Security window shown below:



The screenshot shows the 'Hierarchy Security' configuration page in Microsoft Dynamics CRM. At the top, there's a navigation bar with 'Microsoft Dynamics CRM', a home icon, 'SETTINGS', and 'Security'. Below the navigation is a yellow banner for 'CRM for Outlook'. The main content area has 'Save and Close' and 'Discard' buttons. The title 'Hierarchy Security' is displayed prominently. A sub-section titled 'Turn on Hierarchy Modeling' contains a checked checkbox for 'Enable Hierarchy Modeling'. Another section, 'Select Hierarchy Model', shows 'Manager Hierarchy' selected with a radio button, and 'Custom Position Hierarchy' with a 'Configure' link. A 'Hierarchy Depth' input field is set to '5'. The 'Exclude following entities from hierarchy' section features two lists: 'Available Entities' (Account, Activity, Appointment, Campaign, Campaign Activity, Campaign Response, Case, Case Creation Rule) and 'Selected Entities' (empty). Buttons for 'Add >' and '< Remove' are between the lists.

Figure 11 - Hierarchy Security

Set the Depth to a desired value to limit how many levels deep a manager has a Read-only access to the data of their reports. For example, if the depth equals to 2, a manager can only access his accounts and the accounts of the reports two levels deep. In our example, if you log in into CRM not as an Administrator, who can see all accounts, but, as the VP of Sales, you'll only be able to see the active accounts of the users shown in the red rectangle, as illustrated below:



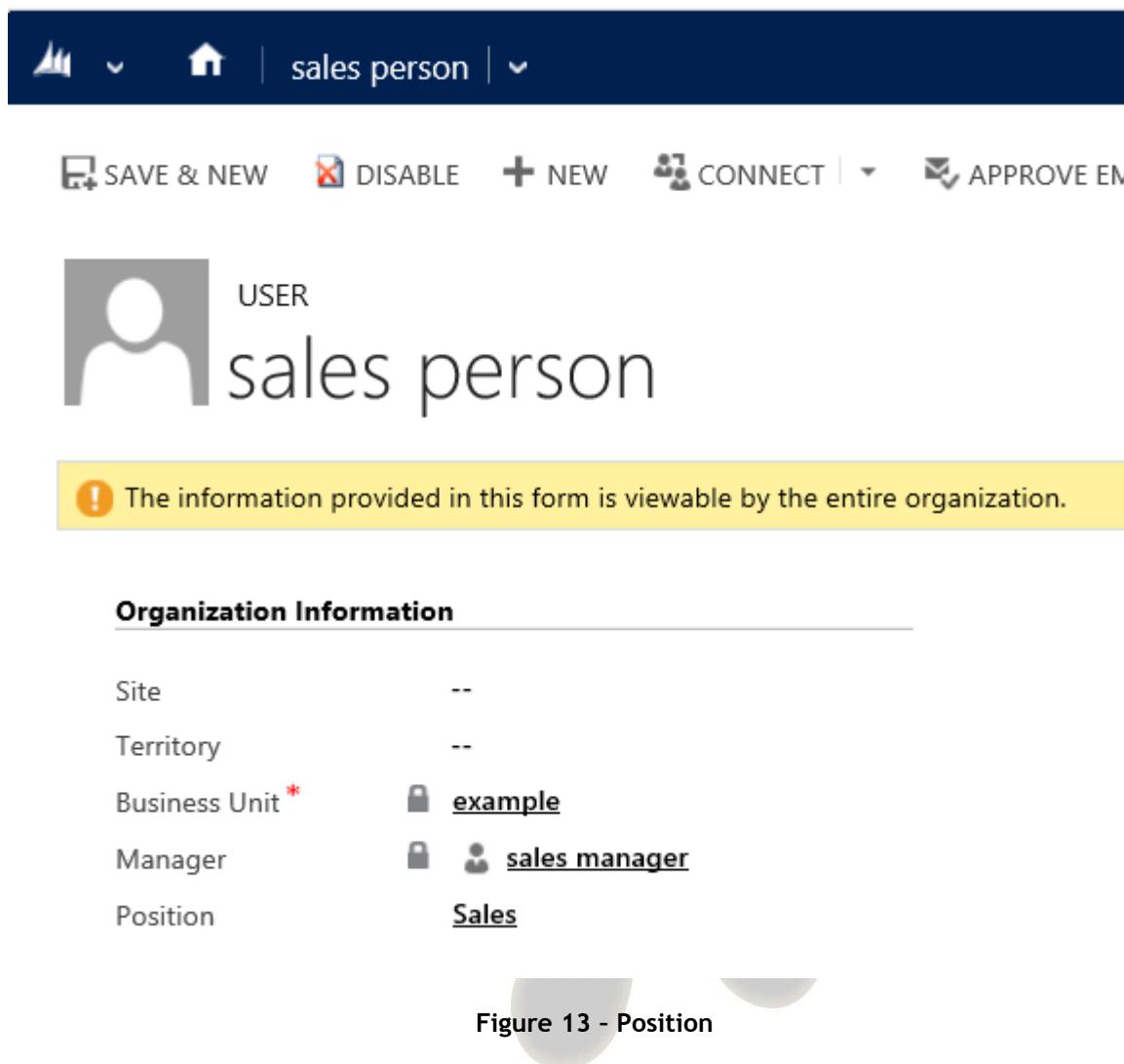
The screenshot shows the Microsoft Dynamics CRM 2015 interface for the Accounts module. At the top, there's a navigation bar with the CRM logo, a home icon, and links for SALES and Accounts. Below the navigation is a yellow banner for 'CRM for Outlook'. The main area has a toolbar with buttons for NEW, DELETE, COPY A LINK, EMAIL A LINK, and RUN REPORT. The title 'Active Accounts' is displayed with a dropdown arrow. The data grid lists ten sample accounts, each with a small tree icon and its name in parentheses. To the right of the account names is the 'Owner' column. The first five accounts in this column are highlighted with a red box: 'A. Datum Corporation (sample)' is owned by 'ceo ceo'; 'Adventure Works (sample)' is owned by 'sales vp'; 'Alpine Ski House (sample)' is owned by 'sales vp'; 'Blue Yonder Airlines (sample)' is owned by 'sales vp'; and 'City Power & Light (sample)' is owned by 'sales manager'. The remaining five accounts ('Coho Winery (sample)', 'Contoso Pharmaceuticals (sample)', 'Fabrikam, Inc. (sample)', 'Fourth Coffee (sample)', and 'Litware, Inc. (sample)') are all owned by 'sales person'.

	Account Name	Owner
1	A. Datum Corporation (sample)	ceo ceo
2	Adventure Works (sample)	sales vp
3	Alpine Ski House (sample)	sales vp
4	Blue Yonder Airlines (sample)	sales vp
5	City Power & Light (sample)	sales manager
6	Coho Winery (sample)	sales manager
7	Contoso Pharmaceuticals (sample)	sales manager
8	Fabrikam, Inc. (sample)	sales person
9	Fourth Coffee (sample)	sales person
10	Litware, Inc. (sample)	sales person

Figure 12 - Example of hierarchy in action

Set up Manager and Position Hierarchies

The Manager hierarchy is easily created by using the manager relationship on the system user record. You use the Manager (ParentsystemuserID) lookup field to specify the manager of the user. If you have already created the Position hierarchy, you can also tag the user with a particular position in the Position hierarchy. In the following example, the sales person reports to the sales manager in the Manager hierarchy and also has the Sales position in the Position hierarchy:



The screenshot shows the Microsoft Dynamics CRM 2015 user record for a user named "sales person". The top navigation bar includes icons for Home, Sales Person, Save & New, Disable, New, Connect, and Approve. A yellow warning message box states: "The information provided in this form is viewable by the entire organization." The "Organization Information" section contains the following fields:

Field	Value
Site	--
Territory	--
Business Unit*	<input checked="" type="checkbox"/> example
Manager	<input checked="" type="checkbox"/> sales manager
Position	Sales

Figure 13 - Position

To add a user to a particular position in the Position hierarchy, use the lookup field called Position on the user record's form, as shown below

Organization Information

Site	--
Territory	--
Business Unit *	<u>example</u>
Manager	--
Position	<input type="text"/> 

Queue Information

Default Queue	Board Executive Sales Sales Executives
---------------	-------------------------------------------------

Queues I'm a member of

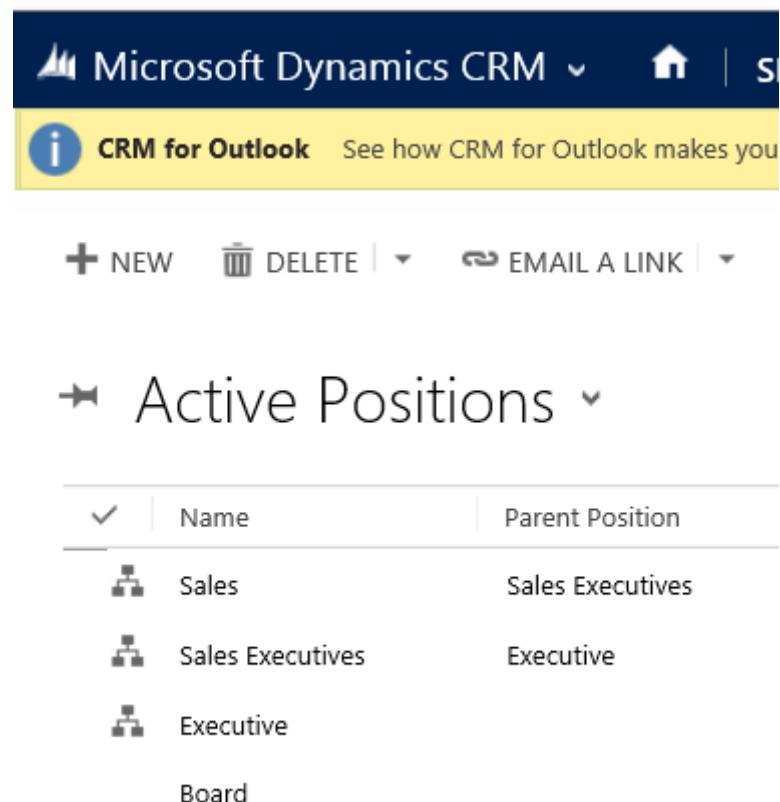
Name ↑	4 results	+ New
Look Up More Records		

Figure 14 - Position Lookup

Create a Position Hierarchy

1. Go to Settings > Security.
2. Choose Positions.

For each position, provide the name of the position, the parent of the position, and the description. Add users to this position by using the lookup field called Users in this position. Below is the example of Position hierarchy with the active positions.

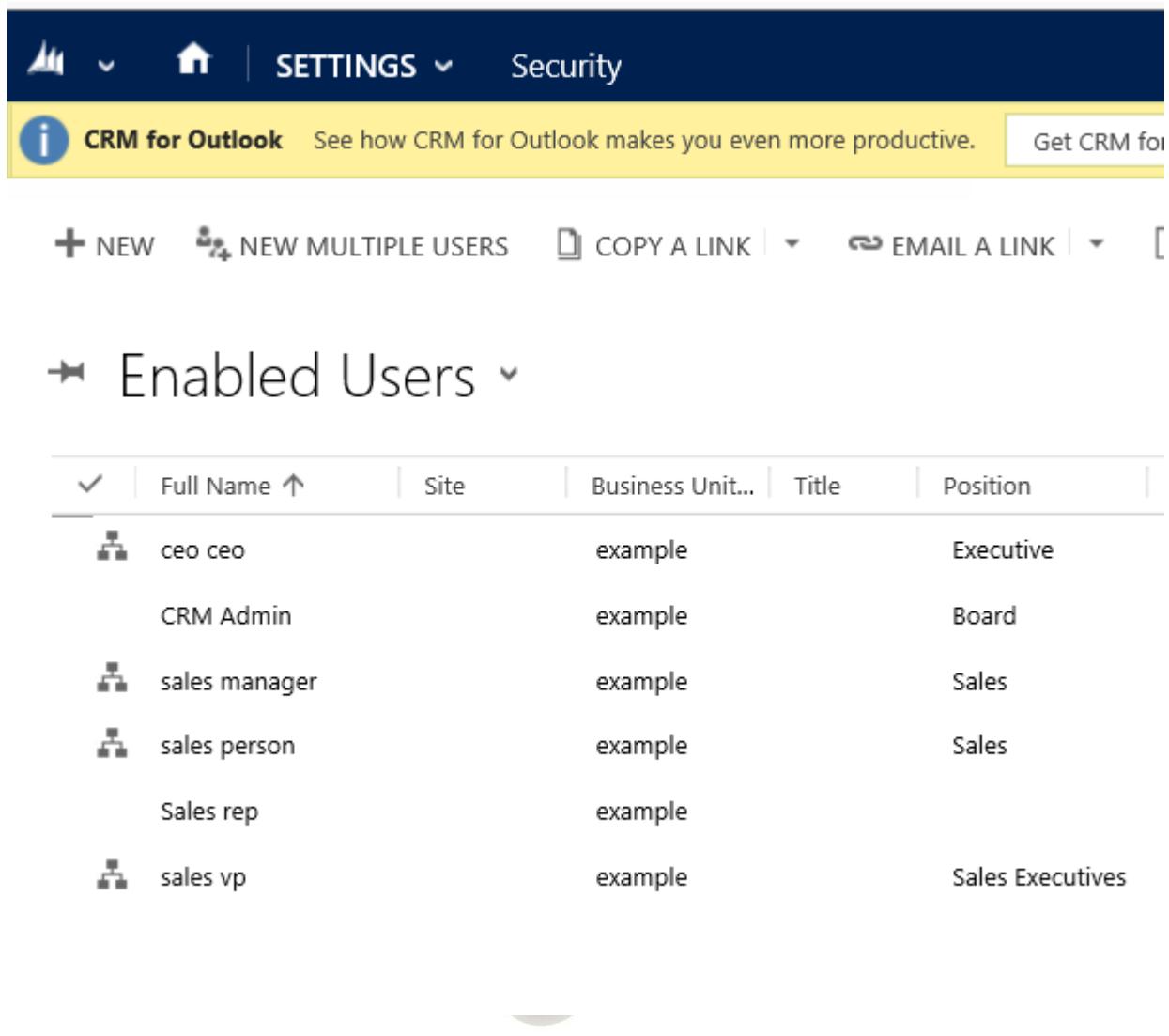


The screenshot shows the Microsoft Dynamics CRM 2015 interface. At the top, there's a dark blue header bar with the Microsoft Dynamics CRM logo and a navigation menu. Below it is a yellow banner with the text "CRM for Outlook" and a message about making you more efficient. The main content area has a title "Active Positions" with a back arrow. Below the title is a table with four columns: a checkmark icon, the position name, and the parent position. The data in the table is as follows:

	Name	Parent Position
	Sales	Sales Executives
	Sales Executives	Executive
	Executive	
	Board	

Figure 15 - Positions

The example of the enabled users with their corresponding positions is shown below:



The screenshot shows the Microsoft Dynamics CRM 2015 interface. At the top, there is a dark blue header bar with icons for settings, security, and navigation. Below this is a yellow banner for 'CRM for Outlook'. The main area has a light blue background and displays a list of users under the heading 'Enabled Users'. The list includes columns for Full Name, Site, Business Unit..., Title, and Position. The data is as follows:

	Full Name	Site	Business Unit...	Title	Position
1	ceo ceo		example		Executive
2	CRM Admin		example		Board
3	sales manager		example		Sales
4	sales person		example		Sales
5	Sales rep		example		
6	sales vp		example		Sales Executives

Figure 16 - Users and Positions

Performance considerations

To boost the performance, we recommend:

- Keep the effective hierarchy security to 50 users or less under a manager/position. Your hierarchy may have more than 50 users under a manager/position, but you can use the Depth setting to reduce the number of levels for Read-only access and with this limit the effective number of users under a manager/position to 50 users or less.
- Use hierarchy security models in conjunction with other existing security models for more complex scenarios. Avoid creating a large number of business units, instead, create fewer business units and add hierarchy security.

Module 3 - Customising Entities

Microsoft Dynamics CRM includes a set of predefined system entities such as Accounts, Contacts, and Cases. However, many organizations require additional entities to be created to meet their requirements. For example, an organization might create entities for recording details of projects, customer feedback, memberships, or buildings. This module describes the different entity types that are available in Microsoft Dynamics CRM, how to create new entities and configure new and existing entities to meet business requirements.

Objectives

The objectives are:

- Define the entity types available in Microsoft Dynamics CRM 2015.
- Describe how to create a custom entity, and a custom activity entity.
- Detail the properties of an entity that can be configured when the entity is created, or modified later.
- Consider how entities can be deleted, and the consequences of performing this action.

Lesson 3-1 Entity Customization Concepts

An entity defines how data is stored for a specific type of record, and the properties that describe where the entity appears in the user interface (UI) and the features that are enabled for use with the entity.

Although Microsoft Dynamics CRM is installed with more than 260 system entities (many of these entities are hidden from the UI), custom entities can be created to suit the requirements of the organization.

Entity Types

There are two types of entities—system entities and custom entities.

System entities are built-in to the system when an Organization is created, and custom entities are created by using tools in UI, or the Software Development Kit (SDK), or by importing a Solution that contains the custom entities.

In a new Microsoft Dynamics CRM installation, more than 90 of the system entities can be customized. However, some system entities cannot be customized. Specifically, the system entities that provide built-in system functionality, such as the System Job entity, instead of the entities that are intended to store data records. Some non-customizable entities are not visible in the UI to customize the system.

Custom entities that you create in your environment can be customized, although custom entities imported with a managed Solution might have some or all customizable features restricted through managed properties.

The system and custom entities that can be customized are described together as customizable entities.

Customizable entities can have their properties changed, can be renamed, can have their forms and views modified, and can be included in Solutions. The only difference between a custom entity and a customizable system entity is that a custom entity can be deleted. If a custom entity is deleted the action is irreversible, and data that is stored in the entity is lost.

Not all properties or components of a customizable entity can be modified. For example, system fields and views that are created by the platform for an entity cannot be deleted. These and other restrictions are described in this course in the related modules.

Entity Ownership

System and Custom Entities can be one of two types of ownership

- User or Team ownership will add a field that is named Owner so records for the entity can be assigned between Users and Teams that have at least User level read privileges to the entity. Internally the owning User or owning Team are stored separately, and the Business Unit they belong to is also stored so there are four lookup fields added that relate to ownership. This use of ownership also means that you can set any of the usual five access levels in Security Roles to control the records that the User can access, depending on where the User and the record are in the Business Unit hierarchy. Most entities that relate to business data are likely to use this level of ownership.
- Organization ownership means the entity does not have an Owner field, or the other related lookup fields, and cannot be assigned to a User or Team. Security Roles control whether users have access to all records or no records, there is no separation by Business Units. Entities that do not have many fields and are used as lookups for categorizing other records might be more likely to use Organization level ownership. For example, a custom entity that is named Country and is used to link Accounts for categorization and reporting, (instead of using an option set) would probably have records that you want all Users to be able to read and append to. Although you might only grant create and write privileges to a small group of users, you might have no reason to separate the countries that the users can work with according to Business Units. Therefore users would work with all Countries or no Countries, and Organization level ownership could be the correct choice in this scenario.

Activity Entities

Dynamics CRM has a set of Activity entities e.g., Task, Phone Call, Email, Appointment.

You can create custom entities that work together with the existing activities in Microsoft Dynamics CRM by selecting to create the entity as an activity. This means the entity will appear in the UI in other locations that the activities are viewed by users, and this might make it easier for users to follow and use.

All activities share many properties in common such as planned start date and actual start date, planned end date and actual end date, duration, subject and description. All activity entities are linked to the ActivityPointer entity that stores these common fields and lets users view lists of all activities together instead of separate views for each type.

There is no definite rule for when you should use an activity entity type. Here are some example scenarios that can help guide your decision making:

1. An entity that represents an activity that occurs on a specific date and time, especially if the activity is planned in advance, and must have some additional information to describe what it is and who is responsible for the activity. A project milestone might fit this description and be suitable as an activity entity.
2. A record that is created to document that an activity has occurred. The record has a short “lifespan” between when it is created and when it is closed. The record of when an article is published or the release of a product or upload of a file to a server might be included in this category. You could use an existing activity, or an activity feed Post record for these activities. However, if you want to report on these activities separately or trigger any automated processes, storing these activities as a separate custom activity might be more suitable.
3. An entity that might have to be related to different records on different occasions, such as a record that relates to an external social media post might be best created as a custom activity. The Regarding field can then be used to link the activity to the record that the social media update is related to, and this might be an Account, Product or Event, for example.

Custom activity entities are controlled by the same Security Role privileges as other activities. As soon as you create or import a custom activity entity it will be available to users who have access to other activities in the system.

For example, consider a custom entity that is named Issue that is used to record noncompliance with internal processes or regulatory rules. This might match some of the criteria to be a custom activity and the Regarding field might be useful to link the Issue to the record it relates to. However, is it most likely that this custom entity must be secured separately so that only selected users can create, read or write these records. Because Security Roles use the same privileges for all activities, this might not be suitable as a custom activity, although you might add many fields an activity can have, such as start dates and end dates. However, you cannot create a field to match the functionality of the Regarding field. Instead, you have to create custom relationships to other entities, or use Connections to link the records.

Lesson 3-2 Create a Custom Entity

Two of the most important properties of an entity are how it will be owned, and whether it is an activity, and these choices cannot be changed after the entity is created.

When a custom entity is first created it is available only to users who have either a security role of System Administrator or System Customizer. Other Security Roles must be modified to let other users view and use the new entity. These Security Roles can be

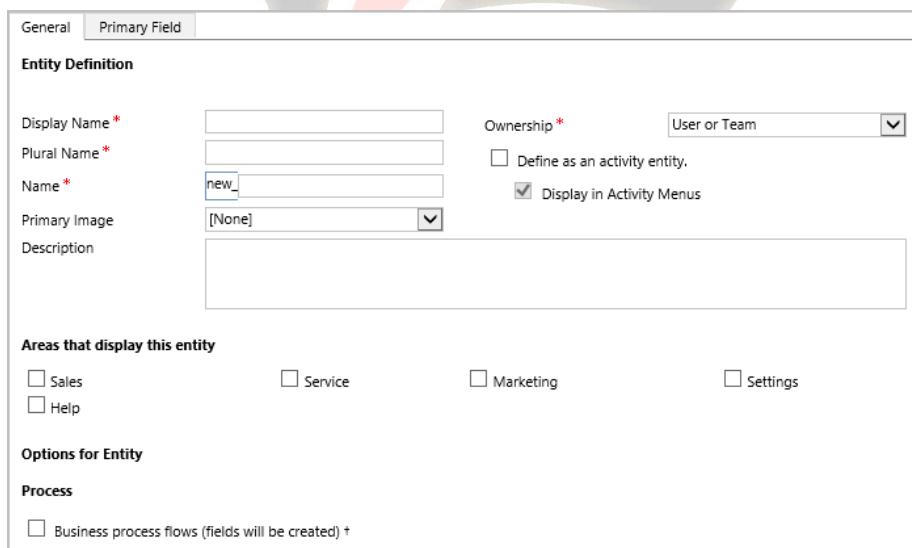
included in the Solution together with the custom entity so that when the Solution is deployed to another system, the roles are ready to be assigned to Users. If the roles already exist in the target system and are being updated, the changes will occur as soon as the Solution is imported.

The new entity form is divided into several sections.

You must complete some required properties before you save the entity. Other properties can be configured later if you prefer. Details for all the properties that are located on the form for a new entity are described in the lesson topics that match the sections of the form.

Display Name, Plural Name, Schema Name

The new entity form is divided between two tabs. On the first tab that is named General, there are several sections to be completed. Descriptions for these sections follow:



The screenshot shows the 'General' tab of the New Entity Form. At the top, there are tabs for 'General' and 'Primary Field'. The 'General' tab is active. Below the tabs, there is a section titled 'Entity Definition' containing the following fields:

- Display Name ***: A text input field.
- Plural Name ***: A text input field.
- Name ***: A text input field containing 'new_'. To its right is a dropdown menu showing '[None]'.
- Primary Image**: A dropdown menu showing '[None]'. To its right is a small arrow icon.
- Description**: A large text area.

On the right side of the 'Entity Definition' section, there are two checkboxes:

- Define as an activity entity.
- Display in Activity Menus

Below the 'Entity Definition' section is a section titled 'Areas that display this entity' with four checkboxes:

- Sales
- Service
- Marketing
- Settings

Below these areas is a section titled 'Options for Entity' with a single checkbox:

- Business process flows (fields will be created) +

Figure 17 - NEW ENTITY FORM - GENERAL TAB

Display Name - Provide the name by which the new entity will be known. For example, if the entity stores the details of events, Event could be entered here.

Plural Name - Enter a plural name for the entity. All views display entity names in plural forms - for example Active Accounts. Therefore, the plural form of the entity name is required.

Name - This is the internal name of the entity and is frequently referred to as the Schema Name. The Name has two parts - a publisher prefix ("new_" by default) and the entity name. Notice that after you save the entity, you cannot change the name again.

Description - A description of the entity. This is an optional field. However, this field helps other customizers know the purpose for the entity, and how it relates to other entities. Some administrators might choose to use it as a change log.

Primary Image

In Microsoft Dynamics CRM 2015, custom entities can be configured to have a single image field, and 24 system entities include an image field. The Primary Image property of the entity is used to turn on the image field so that the image that is contained in the field is displayed at the top of the entity forms.

When this property is turned off, or if the entity has no image field, the value is [None]. To enable the image field, select the other option. This option will be the display name of the image field. For system entities this is Default Image or Entity Image, for custom entities this is the name that you selected when you created the field.

More information about image fields and the system entities that have an image field by default are discussed in the “Customizing Fields” module.

Ownership

For Ownership two options are available—User or Team or Organization. If User or Team is selected, the records that are created for the entity will be owned by one person or a team, and can be reassigned or shared. If Organization is selected, the records that are created for the entity will not have an Owner field and cannot be reassigned or shared. Examples of organization owned system entities include Products, Articles and Competitors. After an entity is saved, the setting cannot be changed.

Custom Activity Entities

There are two custom activity settings:

Define as an activity entity - If this check box is selected, the entity will be used as an activity and can be created in the same manner as Letters, Email messages, Phone Calls and so on. After the entity is saved, this option is unavailable and cannot be changed.

Display in Activity Menus - If the entity is defined as an activity this option can be enabled or disabled. In some cases an organization might want activities to be created automatically by workflow processes instead of manually, or only from a sub-grid of a parent record they should relate to. Therefore this option can be cleared so that the activity cannot be created from the navigation bar, command bar, or activity view menus.

Primary Field

The Primary Field for the entity is specified on the second tab of the new entity form.

Display Name *	Name	Type *	Single Line of Text
Name *	new_name	Format *	Text
Field Requirement *	Business Required	Maximum Length *	100
Description The name of the custom entity.			

Figure 18 - THE PRIMARY FIELD TAB FOR A NEW ENTITY

The Primary Field must be a single line of text field that has a display format of text. However, you can modify all the other properties of the Primary Field on a non-activity entity. The properties of the Primary Field for a system or custom activity entity are always the same. Therefore, these properties cannot be changed for a custom activity entity.

The default properties for a new entity Primary Field are as follows:

Property	Default value for a Non Activity Entity	Fixed value for an Activity Entity
Display Name	Name	Subject
Name	<prefix>_name	Subject
Field Requirement	Business Required	Business Required
Maximum Length	100	200

The Primary Field is used to identify records that are created for the entity. For example, on the account entity the Primary Field is “name” and has a Display Name of “Account Name.”

When a record is referenced in a lookup field, the value of the Primary Field is used for display, although the lookup contains a reference to the primary entity record’s GUIDs. For example, the Customer of a Case will show the Account Name, or the Contact Full Name, depending on the type of customer who is selected. The Primary Field value that is shown in a lookup on a form or in a view is also activated as a hyperlink, and this lets the user directly open the primary entity record by clicking the link.

Best Practice: Do not use the name of the entity as the display name of the primary field. When you create an entity, the primary key field that contains the unique record ID (GUID) has the same display name as the original display name of the entity. If your Primary Field uses the same Display Name, this is allowed because the schema names will be different (the primary key field will be called <prefix>_<entityname>id). When you are trying to use fields in advanced find queries, charts and workflows, for example, the two fields appear identical, and this could lead to confusion and possible errors. It is useful to be able to rely on the fact that the field that has the same name as the entity is the primary key

field in every case. Therefore, we recommend that you select something different, or accept the default value of “Name”.

Areas that Display this Entity

Areas that display this entity - Select the check boxes for the areas of the Microsoft Dynamics CRM navigation bar where the entity must appear. You can select as many areas as necessary. This can be modified after the entity is saved. When this is changed and the entity is published, the changes are written into the Sitemap, and will be visible to users when they next sign in or refresh their browser window (subject to their Security Roles to read the entity as always).

Because the settings are not saved as part of the entity, the settings will not be included in a solution package and would not affect where an entity is displayed to users in the target system when you deploy your Solution.

You can add the Sitemap as a separate component of the Solution to move these settings across, or you could edit these settings for each entity after deployment.

In some cases, a new entity might be created and not displayed in any areas of the main navigation. However, the new entity can still be shown in lists on the forms of other records, or on a dashboard.

For example, a ticketing agency might create custom entities that are named Event and Booking, and select to display the Event entity in the Sales and Marketing areas. The ticketing agency might select not to display Bookings anywhere in the main navigation, and only make Bookings visible through a sub-grid on the forms for Events and Contacts (the attendees making the Booking). All Bookings for an Event would be visible only in the Event or Contact that they relate to, and not in other areas.

Process Options

Business Process Flows were a new feature in Microsoft Dynamics CRM 2013 and have been improved in Microsoft Dynamics CRM 2015. Business Process Flows are used to guide users through their business processes, and request information at each stage. For example, when an Opportunity record is created, the customer’s requirements must be recorded, Quotes produced and issued to the customer, a deal is negotiated, and the process continues according to the requirements of the organization. To enable this feature to be applied to an entity the Business process flows property must be enabled. This option cannot be cleared after it is enabled.

This feature is described in more detail in Module 11 - Business Process Flows.

Communication & Collaboration Options

In the Communication & Collaboration section there are several check boxes that are used to enable or disable several features.

Note: Because some options in this section cannot be turned off after they are enabled, you should be cautious about enabling these options unless you have identified a specific business requirement for these options. Options that are selected might add unwanted

features, buttons or relationships to the Microsoft Dynamics CRM UI that cannot be removed. If you do not have a valid reason to turn on these options, we suggest that you leave these options disabled until you identify a business requirement for the features or relationships that they relate to.

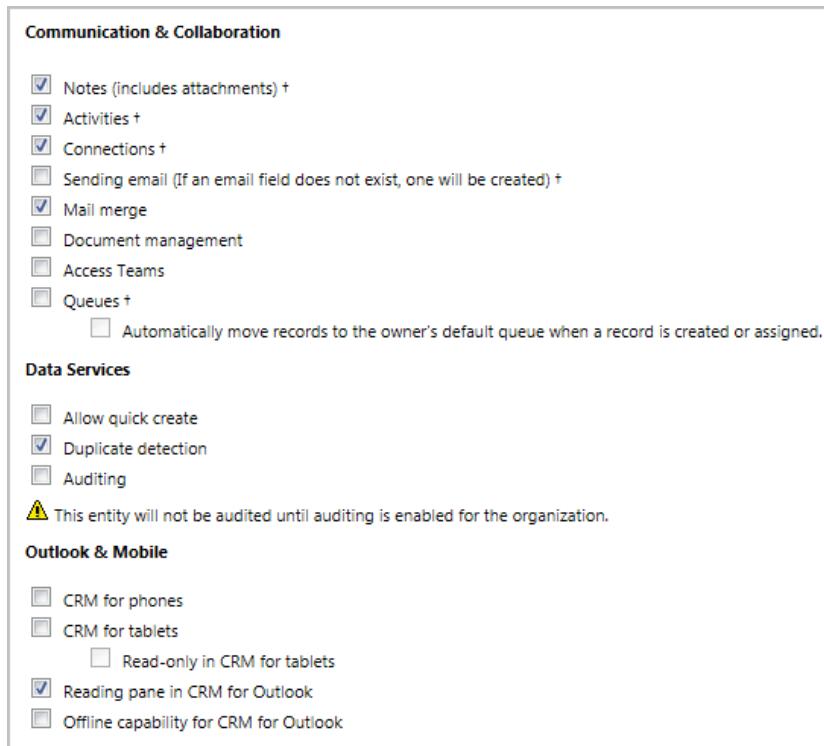


Figure 19 - COMMUNICATION & COLLABORATION SETTINGS

The communication and collaboration settings include the following:

Notes - Select this check box to enable Notes to be created against records of this entity.

Activities - Select this check box so that activities such as letters, phone calls, and custom activities can be created for the entity.

Connections - Select this check box so that records of this entity can be linked to other records by using Connections.

Sending email - Select this check box to enable email messages to be sent to records of this entity. For example, if a Booking entity is created and the customer who makes the booking provides an email address that is stored on the booking record, you can send an email message to the booking—the contact—without having to directly open the related Contact record. If this property is enabled, a text field that is formatted as an email address will be created for the entity if such a field does not already exist.

Mail merge - Select this check box if you must perform mail merge activities for the records of this entity.

Document management - Select this check box if you want to enable Microsoft SharePoint integration for this entity to have document records stored in SharePoint instead of in the Microsoft Dynamics CRM database. Additional configuration must be made to Microsoft Dynamics CRM and Microsoft SharePoint for this feature to be available.

Access Teams - Access Teams are covered in the “Additional Security Options” module. If you need to create Access Teams for the entity this box should be checked.

Queues - Select this check box to enable records of this entity to be routed to Queues. There is a sub-option beneath this check box to Automatically move records to the owner’s default queue when a record is created or assigned.

Properties that Cannot Be Changed

Some settings on the new entity form cannot be disabled after they are enabled. These options are shown with a dagger symbol as shown in the “Communication & Collaboration Settings” figure, and include the following:

- Notes
- Activities
- Connections
- Sending email
- Queues

Data Services Options

The Data Services section of the new entity form includes three settings as shown in the “Data Services Settings” figure.

Data Services	
<input type="checkbox"/>	Allow quick create
<input checked="" type="checkbox"/>	Duplicate detection
<input type="checkbox"/>	Auditing
⚠ This entity will not be audited until auditing is enabled for the organization.	

Figure 20 - DATA SERVICES SETTINGS

Allow Quick Create - Quick Create forms only include selected important fields that let the user quickly create and save a record. Select this check box to enable this feature.

Note: System activity entities such as Task and Phone Call have Allow Quick Create disabled and unavailable. You can enable this property for Custom Activity entities, and if you publish a Quick Create form this can be used to create a custom activity record from a lookup or a sub-grid of another form.

However, system and custom activities that are created by using the “global” create from the Create button on the navigation bar will always use the usual form, not a Quick Create form.

Duplicate Detection - Microsoft Dynamics CRM lets administrators create duplicate detection rules to prevent duplicate records from being created in the system. For rules to be created for an entity, this option must be enabled.

Auditing - Microsoft Dynamics CRM uses auditing for the system, entities, and fields. If the administrator has enabled auditing in the System Settings and the Auditing check box is selected, the system will audit the creation, modification and deletion of records of this entity, and the changes to entity metadata such as the addition of a new field. You can find more information about how to configure auditing in the “Additional Security Options” module.

Outlook & Mobile Options

This section of the new entity form includes four options:

CRM for Phones - Select this check box if this entity is to be available to the Microsoft Dynamics CRM for Phones client.

CRM for Tablets - Select this check box if this entity is to be made available to clients who use Microsoft Windows 8, the Apple iPad and Android tablets. If the check box beneath this check box is selected, these clients will only have read-only access to records of this entity.

Reading pane in CRM for Outlook - Controls whether records of this entity will have a reading pane in Microsoft Outlook. If users want to hide or customize the reading pane, they can do this.

Offline capability for CRM for Outlook - Select this check box if users might need to take an offline copy of records of this entity, using the Microsoft Office Outlook client with offline capability enabled. A user will only be able to do this if they have the Go Offline privilege.

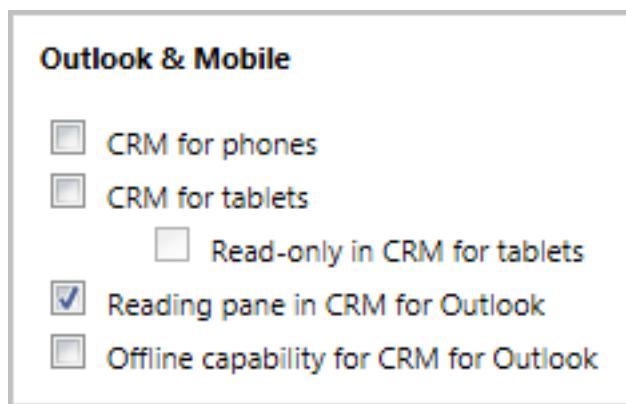


Figure 21 - OUTLOOK & MOBILE OPTIONS

Lesson 3-3 Modifying the Configuration of an Entity

Many properties of system and custom entities can be modified after the entity is created, although there are some settings that cannot be disabled after they are enabled. Entities can be renamed and custom entities can be deleted. This lesson describes changes that can be made to an existing entity.

Limitations of Entity Properties

The following sections detail the properties of a custom entity that can be changed after the entity is saved for the first time. Many of these properties can also be changed for system entities. However, additional restrictions might apply for some entities and especially for activities.

Entity Settings that Can Be Changed After the Entity is Created

Entity settings that can be changed after the settings are created include the following:

Display Name

Plural Name

Primary Image (depends on an image field for the entity).

Description

The areas in which the entity is displayed

- Mail merge
- Document management
- Access Teams
- Allow quick create
- Duplicate detection
- Auditing
- CRM for phones
- CRM for tablets
- Read-only in CRM for tablets
- Reading pane in CRM for Outlook
- Offline capability for CRM for Outlook

Entity Settings that Cannot be Disabled after they are Enabled

Entity settings that cannot be disabled after they are enabled include the following:

- Business process flows

- Notes (includes attachments)
- Activities
- Connections
- Sending email
- Queues

These options are shown with a dagger symbol against them in the Entity form.

Entity Settings that Cannot be Changed after the Entity is Created

Entity settings that cannot be changed after the entity is created include the following:

- Name (schema name)
- Ownership
- Define as an activity entity
- Display in Activity menus

Renaming Entities

Although entities can be renamed in Microsoft Dynamics CRM, it is not easy to do this. To rename an entity the following must be changed:

- Display Name
- Plural Name
- Any reference to the entity name in views (for example, if you rename the Account entity to “Business”, views such as My Active Accounts must be renamed to My Active Businesses)
- Field labels that use the earlier name
- Report names
- Labels that are used in reports
- Messages (these are shown under the entity node in the solution explorer and include some button labels, tooltips and dialog box messages for that entity) [For System entities only]
- Text in Help files

Note: This list is not exhaustive.

If you only have a need to change the most important occurrences of the entity name, you could manually modify some items from the list mentioned here. To do this more thoroughly, you can use the Export Translations feature from the toolbar in a Solution,

modify the labels in the exported file for your base language and then import the modified file to replace the labels. Although this feature is intended to provide labels in alternative languages, it is also supported to use it to modify the base language.

When you use this method, make sure that you avoid a simple find and replace. Also make sure that you consider capitalization and the plural form of the entity name. Check carefully to determine whether the entity name that you are replacing might also be used in other areas such as an error message. For example, an entity that is named System or Event might easily be confused with those words in a more general use.

Delete Custom Entities

If a custom entity is no longer required it can be deleted. When an entity is deleted the operation is irreversible. The entity and data is deleted. Because this involves data loss it might be better to modify security roles so that the entity is available only to the System Administrator role. Although doing this hides the entity and the data from users, the entity is available for retrieval should the requirements change.

Dependencies

Sometimes you cannot delete an entity. Before you delete the entity, you should determine whether the entity has any dependencies because deleting entity X will affect entity Y. For example, if an organization has an entity that is named Event, and related records are created by using an entity named Booking, the Event entity cannot be deleted before the Booking entity.

Entities might also be used by Workflow and Dialog processes, and Reports.

Module 4 - Customising Fields

Many organizations customize Microsoft Dynamics CRM by creating new entities and adding new fields to the database. Doing this greatly expands how Microsoft Dynamics CRM can help support an organization's business processes. The Microsoft Dynamics CRM web application lets users who have no development experience perform these actions by using the web application's built-in customization tools.

Objectives

The objectives are:

- Review the data types that can be used in fields.
- Identify the different display formats that are available.
- Describe the field properties that can be defined for a field.
- Examine the steps that are involved in creating and editing fields.
- Explain how to create, configure and delete option sets.
- Examine the difference between Status and Status Reason fields, and how the Status Reason values can be modified.
- Describe how dependencies can affect field modifications.
- Explain how to delete fields that are no longer required.

Lesson 4-1 Field Data Types and Formats

A field in Microsoft Dynamics CRM is also known as an attribute in earlier versions of the application user interface (UI), and is still known as this in JavaScript and .Net extensions. In the SQL database, a field is a column in the table for the entity.

Fields appear in the UI as controls on a form, and as columns in views and lists (such as on a dashboard or a sub-grid on a form of another record).

Field Data Types

Each field in Microsoft Dynamics CRM requires a Name that is unique in that entity, and a Type that describes the data that can be stored in the field. The field types that you can select in the UI, map to the data type for the column in the SQL database. This determines how much space is required by the field. The available field data types are shown in the following table.

CRM data type	SQL data type	Description	Space (bytes)
Single line of Text	nvarchar(n)	Short text of "n" characters (maximum 4,000)	2 times n
Option Set	Int	Pick-list of options. Either specific to a field or a global list that is available to	4

CRM data type	SQL data type	Description	Space (bytes)
		all fields	
Two Options	bit	0 or 1. Displays Yes or No; True or False or any other two values	1
Whole number	int	Integer Range from -2,147,483,648 to +2,147,483,647	4
Floating Point Number	float	Number with up to five decimal places Range ± 100,000,000,000	8
Decimal Number	decimal	Number with up to 10 decimal places Range ± 100,000,000,000	13
Currency	money	A number representing a currency value with up to four decimal places and in the range ± 922,337,203,685,477	8
Multiple Lines of Text	nvarchar(max)	Text that requires more than one line. Up to 100,000 characters.	2 times the number of characters used
Date and Time	datetime	Stored internally as the Coordinated Universal Time (UTC) date and time. Displayed in recognizable local format and time zone	8
Lookup	uniqueidentifier	A value (GUID) that links to another record	16
Image	uniqueidentifier	A value (GUID) that links to an image record	16

For some data types in Microsoft Dynamics, multiple columns are required in the underlying table. For example, the first time that a currency field is added to an entity, four columns are added (the currency that is being used, the exchange rate, the value and the value that is converted into the base currency for the organization), and additional currency fields create two columns, the value and the value in the base currency.

SQL Database Structure

In earlier versions of Microsoft Dynamics CRM, each entity is stored in two tables in the SQL database, to hold the system fields and custom fields for the entity. A filtered view for every entity provided a single location to query all columns for both tables together, and other data from associated records. For example, the name of a related Customer is included in the filtered view, not just the unique identifier (a “foreign key”) of the related record.

In Microsoft Dynamics CRM 2015, the two tables for each entity are now merged into one table. However, the filtered views remain the same. Therefore, any reports previously written that use these tables as a data source will continue to work without requiring any changes (and so this is the recommended and supported manner in which to perform this action).

Note: Generally, you do not have to have a good understanding of the structure of the SQL database to be able to customize Microsoft Dynamics CRM because this is created and maintained by the application. However, you might need to have a better understanding of the structure if you must analyze and improve performance, for example when you add non-clustered indexes to specific fields.

Microsoft SQL Server has some limitations on how many columns a table or view can contain, and on the maximum length of a single row. In later versions of SQL Server, some of these limitations are bypassed for certain data types by using several methods that are transparent to the user of the database. Although there are still limits imposed by the tables and views, it is difficult to accurately predict exactly how many fields can be added to an entity or how much data a single record can hold. If you plan to add several hundred fields to an entity you should consider whether this is the correct design for your data. Some planned fields might not describe properties of that entity, and might instead be better suited to a child entity. You should also consider the usability and the performance effect of having hundreds of fields on a form.

Field Properties

Each field data type can be displayed in several formats and has different options. The properties and formats for each data type are described below.

Single Line of Text

Typically, Single Line of Text fields are used for text box controls that contain small amounts of data, such as First Name or Last Name.

Type *	Single Line of Text
Format *	Text
Maximum Length *	100
IME Mode *	auto

Figure 22 - SINGLE LINE OF TEXT FIELD PROPERTIES

Format - Single Line of Text fields support several formats shown in the “Single Line Of Text Formats” figure. These include the following:

- Email - Fields that use this format are validated to conform as an email address of the form name@domain.xyz. If a user double-clicks the address in the field, a blank email message will be created in his or her email client with the address filled in.
- Text - This is a format that is used for plain text. The field displays on the form as a single line.

- Text Area - This is a general format that is used for any text. The field displays on the form as a multiline scrolling text box. You can configure the number of lines.
- URL - Stores text as a URL that the user can double-click to start in a separate browser window.
- Ticker Symbol - Formats the text as a link that opens to display a quote for the stock ticker symbol (for example, MSFT.)
- Phone - Telephone numbers that are entered in these fields support automatic dialing through Microsoft Lync.

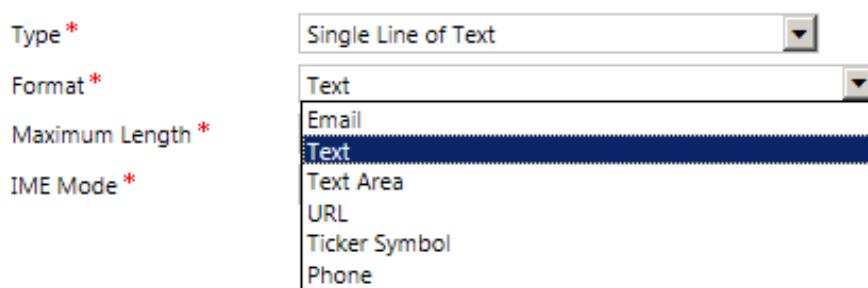


Figure 23 - SINGLE LINE OF TEXT FORMATS

Maximum Length - By default, Single Line of Text fields have a maximum length of 100 characters. You can enter a value between 1 and 4000.

Option Set

Option sets are fields that display a list of options from which a user can select one option. Option sets are referred to by developers and in some other contexts as picklists. Option sets can be local or global in scope. Local option sets are defined in an entity and cannot be used in other entities. Global option sets are defined outside an entity and can be used in multiple entities.

How to create and manage option sets is discussed later in this module.

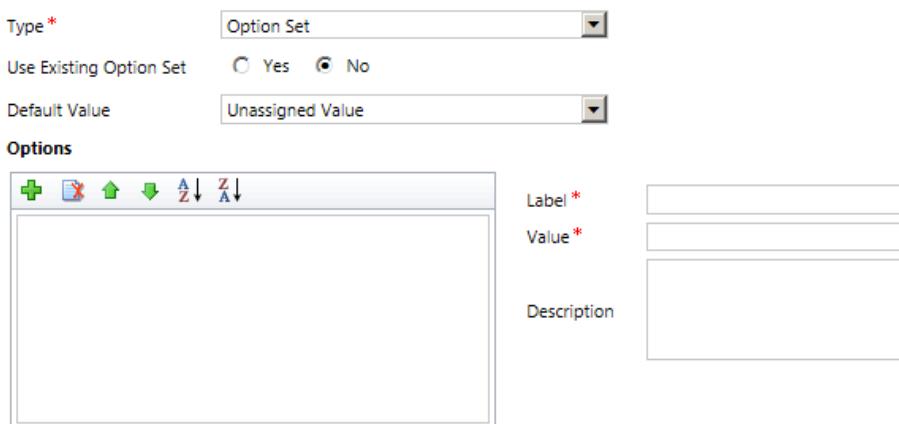


Figure 24 - OPTION SET PROPERTIES

The properties that are available to an option set field include the following:

- Use Existing Option Set - If the value is set to Yes a global option set will be used. An additional property will be displayed on the new field form in which you can select the option set to use. If the value is set to No the option set will be locally defined for this entity.
- Default Value - After options are added to the option set (or after a global option set is selected) a default value can be selected from the list. Unassigned Value means that the field will be blank when a user first opens the form.
- Options - In a local option set this field lets you add options to the option set. The buttons on the menu bar of the options section are used to add to or remove items from the list, or to move items up and down the list, and for the list to be sorted alphabetically in ascending or descending order.
- Label - When a new item is added to an option set it must have a label. The label is what will be presented to the user in the option set field.
- Value - In addition to a Label, each option set item requires a Value. The value is a number, and when a record is saved it is the number that is stored in the database, not the label. The label is stored in Microsoft Dynamics CRM as metadata only once.
- Description - Each option set item can be given a description. The description is not displayed to the user.

Publishers in Microsoft Dynamics CRM have an Option Set Prefix property. This property is used to generate the values of options that are added to option set fields in a Solution that is associated with that Publisher (even if the option set is a built-in option set or originated in a different Solution). If the option set prefix of a Publisher is 54,321 the first option set value that is used will be 543,210,000, then 543,210,001 and so on. The Option Set Prefix is useful, because it can help prevent multiple Solutions from using conflicting Option Set values.

The default Option Set Prefix on the Default Solution is 10,000.

Two Options

A two options field shows two alternative values for the user to select between. Similar to option sets these have labels that are visible to the user. However, the values in a two options field are always stored as a 0 or 1.

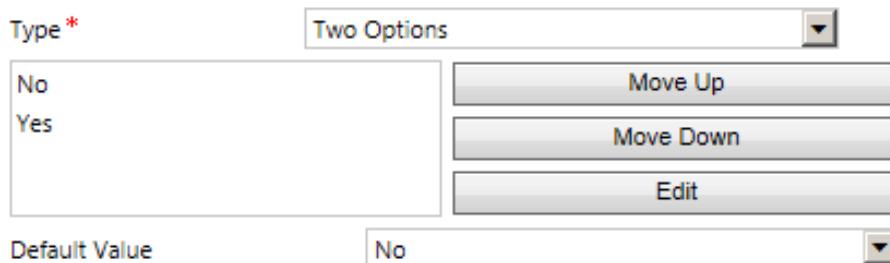


Figure 25 - TWO OPTIONS FIELD PROPERTIES

By default, a two options field has the labels Yes and No. However, these options can be replaced with other options, for example, True or False, Male or Female, On or Off. A default value must be set underneath the list of available choices—a two options field always has a value, “Null” is not a valid option.

Note: A two options field always contains a value of 0 or 1. This is either the default value that is defined for the field, or the value that is provided by the user. If you set the requirement level of a two options field to Business Required, this has no effect because this field cannot have an unassigned value. Therefore, the user is not forced to make a selection. If you have to force users to decide between two options, you must use an option set with the two possible choices, set the default value to Unassigned Value, and the requirement level to Business Required.

If the number of values might have to be extended consider using an option set instead of a two options field. For example, if a two options field is created to hold the genders Male and Female, if a third option of “Unspecified / Other” is required it could not be added unless one of the original values is removed.

A two options field can be formatted in the form editor to be displayed as follows:

- Two radio buttons
- Check box (displayed as a toggle)
- List

The Two radio buttons option is not actually displayed as radio buttons. Instead, the whole label is a button that “toggles” to display one value or the other value when it is clicked. This provides a much larger target for a touch-based device (or indeed for a mouse pointer). When the field does not have the focus it shows the label, the same as a text box or an option set.

When you select the Check box option, the labels of the option values are not displayed on the form. Therefore, we recommend that you consider changing the field label on the form. For example, if a field that is named Event Status is added to the Event entity and has the options Confirmed or Cancelled and is added to the form as a check box, the correct response might not be obvious to the users because only the field label Event Status is displayed next to a check box. You might change the field label on the form to

read Confirmed Event, for example, so that it is clearer which value is represented by selecting the check box.

The List display format is displayed as only the text label of the selected option when the field is not selected (the same as Two radio buttons). The difference is that when the user clicks the field, both available options are visible in a drop-down list and the user can click the option that he or she wants. This might be more useful when the other option is unknown and the user wants to preview the option before the user clicks to toggle the option.

Because the display format of a two options field is a property of the field on a form, the same field can be presented different ways and in many areas of the form, or on different versions of a form. In views, the field is always displayed as the text label for the value and the other formats, such as check boxes cannot be used.

Whole Number

A Whole Number field contains a number that does not have a decimal point. In Microsoft SQL Server this corresponds to an integer.

Type *	Whole Number
Format *	None
Minimum Value *	-2,147,483,648
Maximum Value *	2,147,483,647
IME Mode *	auto

Figure 26 - WHOLE NUMBER FIELD PROPERTIES

The properties available to a Whole Number field include the following:

- Format - Several format options are available:

Type *	Whole Number
Format *	None
Minimum Value *	None
Maximum Value *	Duration
IME Mode *	Time Zone
	Language
	auto

Figure 27 - WHOLE NUMBER FIELD FORMATS

- None - If the Format is set to None the field is displayed as a number.
- Duration - The field displays a list of duration options such as 1 minute, 15 minutes, 2 hours, up to 3 days. The data is stored in the database as whole numbers of minutes. Users can select from the options shown or enter a period of time in minutes, hours or days. The entered value is stored in

minutes, but displayed in an appropriate format. For example, after entering 90, the value is displayed as 1.5 hours. Hours and days can be entered as decimal numbers that equate to whole numbers of minutes. For example “1.25 hours” or “2.4 days” are both valid values to enter. If you work with long durations, we recommend that you make sure that the users understand that a day represents 24 hours, and not an 8 hour working day.

- Time Zone - The field is displayed as a drop-down box that has time zone values.
- Language - The field is displayed as a drop-down box that has language values. Only languages that are installed on the Microsoft Dynamics CRM server are displayed as values in the drop-down box. Internally the language is stored as a number that represents the language, for example 1033 is English, 1036 is French.

- Minimum Value - By default, whole number fields in Microsoft Dynamics CRM can be between 2,147,483,648 and 2,147,483,647. However, you can specify a suitable minimum value that is based on the requirements of the organization. For example, if you must have the whole number field contain a number between 1 and 10, you would set the minimum value to 1. If a user tried to enter a number that is less than 1, an error message displays that reminds the user of the required range of values.
- Maximum Value - If you must have the whole number field contain a number between 1 and 10 you would set the maximum value to 10. If a user tried to enter a value that is more than 10 an error message displays that reminds the user of the required range of values.

Floating Point Number

Unlike Whole Number fields, Floating Point Number fields can contain a decimal point. However, floating point numbers are subject to rounding and are inexact.

Type *	Floating Point Number
Precision *	2
Minimum Value *	0.00
Maximum Value *	1,000,000,000.00
IME Mode *	auto

Figure 28 - FLOATING POINT NUMBER FIELD PROPERTIES

The properties that are available for floating point number fields include the following:

- Precision - This is an option set that offers the numbers 0 to 5 and represents the number of digits that are displayed to the right side of the decimal point.

- Minimum Value - Specify the smallest acceptable value. The smallest possible value is -100,000,000,000.00.
- Maximum Value - Specify the greatest acceptable value. The greatest possible value is 100,000,000,000.00.

Decimal Number

A Decimal Number field can contain a decimal point. However, unlike a Floating Point number, the value is exact and not subject to rounding.

Type *	Decimal Number
Precision *	2
Minimum Value *	0.00
Maximum Value *	1,000,000,000.00
IME Mode *	auto

Figure 29 - DECIMAL NUMBER FIELD PROPERTIES

The properties that are available for Decimal Number fields include the following:

- Precision - This is an option set that offers the numbers 0 to 10 and represents the number of digits that are displayed to the right side of the decimal point.
- Minimum Value - Specify the smallest acceptable value. The smallest possible value is -100,000,000,000.00.
- Maximum Value - Specify the greatest acceptable value. The greatest possible value is 100,000,000,000.00.

Currency

A Currency field contains a financial amount, such as the cost of a product, a salary, or the price of a ticket.

Type *	Currency
Precision *	Currency Precision
Minimum Value *	0.0000
Maximum Value *	1,000,000,000.0000
IME Mode *	auto

Figure 30 - CURRENCY FIELD PROPERTIES

The first time that a currency field is added to an entity Microsoft Dynamics CRM creates four fields. For example, if you add a custom field that is named Price, that has currency as the field type, Microsoft Dynamics CRM creates the following fields:

Field name	Purpose
<prefix>_price	The Price value that is entered by the user
currency	A lookup field to the currency that is used. For example US Dollars, Pounds Sterling, Euro. Only currencies that are configured on the Microsoft Dynamics CRM server are displayed as values in the lookup
exchangerate	The exchange rate that is applied to the record when the record is created or recalculated
<prefix>_price_base	The value in the Price field after it is converted into the base currency of the organization

Each additional Currency field that is added creates only two fields - for example if a Discount field is added Discount and Discount_Base are added to Microsoft Dynamics CRM. An additional currency lookup or exchange rate field is not created.

The properties of a Currency field include the following:

- Precision
 - a number between 0 and 4
 - Currency Precision. This means that the field will store a value to the same number of decimal places as is set in the organization's currency settings
 - Pricing Decimal Precision. This uses the value of the Pricing Decimal Precision setting from the Organization's system settings.
- Minimum Value - Enter the minimum permitted value for the field. The smallest possible value is -922,337,203,685,477.0000.
- Maximum Value - Enter the maximum permitted value for the field. The largest possible value is 922,337,203,685,477.0000.

Multiple Lines of Text

If you have to store a large amount of text, such as a description field, use a Multiple Lines of Text field.

Type *	<input type="text" value="Multiple Lines of Text"/>
Maximum Length *	<input type="text" value="2,000"/>
IME Mode *	<input type="text" value="auto"/>

Figure 31 - MULTIPLE LINES OF TEXT FIELD PROPERTIES

The properties of a Multiple Lines of Text field include the following:

- Maximum Length - The maximum number of characters that can be entered in the field. This can be any number between 1 and 1,048,576.

Date and Time

Date and Time fields store date and time, such as date of birth, start date, and appointment times.

Type *	Date and Time
Format *	Date Only
IME Mode *	auto

Figure 32 - DATE AND TIME FIELD PROPERTIES

The properties of a Date and Time field include the following:

- Format - Two options are available:
 - Date Only - The field will only display a date that uses a calendar picker.
 - Date and Time - The field will be shown as two fields on the form - a date picker and a separate time picker.

Regardless of the format that is used for the Date and Time field the datetime data type is used for the field in the Microsoft SQL Server database. The display format can be changed without data being lost.

Date and Time values are stored in the UTC format. When values are viewed or entered into a Date and Time field they will be formatted according to the time zone of the user as specified in the user's Personal Options.

Lookup

A Lookup field features a button that is clicked to display a list of records for the user to select a suitable related record. A lookup field represents a 1:N relationship, as described in Module 5 - Managing Relationships.

Type *	Lookup
Target Record Type *	Idea
Relationship Name *	awcnpd_idea_prototype

Figure 33 - LOOKUP FIELD PROPERTIES

The properties of a Lookup field are shown in the "Lookup Field Properties" figure and include the following:

- Target Record Type - Select the record type that will be displayed when the lookup button is clicked.
- Relationship Name - Each Lookup field is associated with a N:1 relationship between the entity the field belongs to, and another, known as the primary entity

in that relationship. A name for the relationship can be specified here when you create a Lookup field.

Best Practice: Relationships between entities have several other properties in addition to the name of the Lookup field and the relationship, and these properties significantly affect the behaviour of the Microsoft Dynamics CRM system. We recommend that you create a relationship and give the details for the Lookup field as part of that process, instead of creating the Lookup field first. By doing this, you are less likely to forget to configure these other important options. Relationships and their properties and behaviours are discussed in detail in Module 5 - Managing Relationships.

Image

Image fields were introduced in Microsoft Dynamics CRM 2013. There are eight system entities that have this enabled in the Primary Image property of the entity so that the image is displayed in forms for the entity.

Although you can add one image field to custom entities, you cannot add an image field to any system entity. When you create an image field, you can select the display name. However, the schema name is always set to entityimage (this does not use the prefix from the Solution Publisher). This fixed name prevents any entity from having more than one image field.

The image is shown on the form for a record by using a placeholder, if no image is saved for that record. By clicking the image the user can change and upload the image that he or she wants to use. For example, this might be a picture of a person, a product, or a company logo.

Uploaded images must be 5,120 KB or less and in one of the following formats and file name extensions:

- jpg
- jpeg
- gif
- tif
- tiff
- bmp
- png

All uploaded images are converted to .jpg format and resized to 144 × 144 pixels. You might have to show users how to crop and resize images before images are uploaded to improve the results.

The uploaded images are stored as records of the image entity, and the image field is effectively a lookup that stores the GUID to the record that is created by the upload.

Selecting Between Numeric Data Types

When you select the correct type of number field to use, the decision to use a Whole Number or Currency type should be fairly clear. Deciding to use Floating Point or Decimal numbers requires more thought.

Decimal numbers are stored in the database exactly as they are specified. Floating point numbers store a very close approximation of the value that is converted to a binary representation.

Use decimals when you must store and calculate values that require accurate answers, or where a small error could be magnified by later calculations that are performed (this includes aggregating the values from multiple records). If you expect to use queries that search for values that are equal or not equal to another value, use decimal as the field data type.

Use floating point numbers when you store data that represents fractions or values that you typically query if you are comparing the fractions or values to another value by using greater than or less than operators. If you are performing many calculations with the fields, floating point numbers might give a small performance gain compared to decimals.

Something else to consider would be if the values will be brought into Microsoft Dynamics CRM from another system or database or extracted to another system through any kind of integration code or application. Storing the values in Microsoft Dynamics CRM in the same format as the other application or database will improve performance of the integration code by avoiding the need to convert values back and forth between formats during the data integration process.

This can be especially problematic if a value is copied from one system to another system, and then another value is calculated from the other system and brought back the other way (sometimes this is known as a “round-trip”). Being converted both ways can compound the minor inaccuracies of floating point representation into a much larger error, especially after many such round trips.

In most cases, the difference between decimal and floating point is not noticeable. Unless you must have the most accurate calculations or have integrations to other systems to consider for these fields, floating point numbers should be a suitable selection for most scenarios.

IME Mode

The Input Method Editor (IME) is used to enter Chinese, Japanese and Korean characters. Because these languages use more characters than can be encoded for a regular keyboard they use sequences of base characters to describe single characters or groups of characters. Base characters can be component letters from Hangul syllables, phonetic components for Japanese kanji characters, or various combinations for Chinese characters. The IME mode option can be used to quickly enter these characters and symbols in text boxes. This helps avoid the manual change of mode that would otherwise be required.

Input Method Editors have two states—inactive or active. In the inactive mode, the keyboard works as usual. However, in the active mode the keyboard will accept Chinese, Japanese or Korean characters.

The four modes include the following:

- Auto (default) - The IME mode is not affected.
- Active - All characters are entered in the IME mode. However, the mode can be deactivated. For name-related fields and addresses the default is active.
- Inactive - All characters are entered without using the IME mode. However, the mode can be activated if this is necessary. The default is inactive for date and time fields.
- Disabled - The IME mode is disabled and cannot be activated. For numeric fields, such as currency, whole number, floating point number and decimal the default is inactive.

Lesson 4-3 Field Types

Field types are a new feature introduced in Microsoft Dynamics 2015. There are three options for field types:

- Simple - contains data that is not based on a formula
- Calculated - contains calculations that use fields from the current entity or related parent entities
- Rollup - contains an aggregate value computed from the records related to a record, or a value computed over a hierarchy

A simple is just a normal field with no new additional properties.

The calculated and rollup fields provide the ability to have the field interact with other fields and entities in the system.

The calculated field allows you to calculate values and put the result in a new field. So take Field A, add Field B and place it in Field C.

For a calculated field, the supported data types are option set, two options, whole number, decimal number, currency and the date and time.

A rollup field aggregates values over related records. For example, how many open cases does this account have.

For rollup field, the supported data types are whole number, decimal number, currency, date and time.

Calculated Fields

In Microsoft Dynamics CRM, calculated fields let you automate manual calculations used in your business processes. For example, a salesperson may want to know the weighted

revenue for an opportunity which is based on the estimated revenue from an opportunity multiplied by the probability. Or, they want to automatically apply a discount, if an order is greater than \$500. A calculated field can contain values resulting from simple math operations, or conditional operations, such as greater than or if-else, and many others. You can accomplish all this by using the CRM user interface, no need to write code.

Calculated fields capabilities

The calculated fields comprise of calculations that use the fields from the current entity or related parent entities.

- The expression support is available on the current entity and the related parent entity fields in the Condition sections and the Action sections. The built-in functions include Date and Time (ADDHOURS, ADDDAYS, ADDWEEKS, ADDMONTHS, ADDYEARS, SUBTRACTHOURS, SUBTRACTDAYS, SUBTRACTWEEKS, SUBTRACTMONTHS, SUBTRACTYEARS) and String (CONCAT, TRIMLEFT, TRIMRIGHT).
- A rich conditional support provides branching and multiple conditions. The logical operations include AND and OR operators.
- The visual editing capabilities include modern user interface and intellisense in the ACTION section.
- A seamless integration of the calculated fields with the forms, views, charts, and reports is available in real time.

A few examples of the calculated fields

- Weighted Revenue: Estimated revenue multiplied by probability
- Net Worth: Assets subtracted by the liabilities for a given account
- Contact Number: Phone number for an opportunity based on account or contact
- Lead Score: Single field that provides insights to the quality of a given lead
- Follow Up By: Follow up on an activity by a specified number of days based on priority

Rollup Fields

In Microsoft Dynamics CRM, rollup fields are designed to help users obtain insights into data by monitoring key business metrics. A rollup field contains an aggregate value computed over the records related to a specified record, such as open opportunities of an account. Also, you'll be able to aggregate data from the activities directly related to a record, such as emails and appointments, and activities indirectly related to a record via the Activity Party entity. In more complex scenarios, you can aggregate data over the hierarchy of records. As an administrator or customizer, you can define rollup fields by using the customization tools in the CRM Web application, without needing a developer to write code.

Rollup fields benefits and capabilities

The benefits and capabilities of rollup fields include the following:

- Visual editing is easy. You can create rollup fields by using the Field Editor, just like you do when you create a regular field.
- Wide selection of aggregate functions. You can aggregate data by using the following functions: SUM, COUNT, MIN, MAX and AVG.
- Full filter support for aggregation. You can set various filters for the source entity or related entity while setting multiple conditions.
- Seamless integration with the user interface. You can include the rollup fields in forms, views, charts and reports.
- Rollup fields are solution components. You can easily transport the rollup fields as components between organizations and distribute them in solutions.
- Rollup fields and the calculated fields are complementary to each other. You can use a rollup field as a part of the calculated field, and vice versa.

Some examples of rollup fields include:

- Total estimated revenue of open opportunities of an account
- Total estimated revenue of open opportunities across all accounts in a hierarchy
- Total estimated revenue of an opportunity including child opportunities
- Total estimated value of qualified leads generated by a campaign
- Number of high priority open cases across all accounts in a hierarchy
- Earliest created time of all high priority open cases for an account

Each Rollup field creates two accessory fields with <fieldname>_date and <fieldname>_state suffix pattern. The _date field is of the Datetime data type and _state field is of the integer data type.

Lesson 4-3 Creating Fields

Field Properties

Display Name and Name

The Display Name of a field is used in the following locations:

- Default label for the field when it is added to a form
- Column name when the field is added to a view
- Name of the field in Advanced Find queries

The Display Name can be modified after the field is created.

The Name of a field is used as the column name in the Microsoft SQL Server database. The name cannot be changed after the field is created.

Field Requirement

When fields are added to an entity, you must decide whether users should always provide a value for that field or if entering a value should remain optional. You must assess whether the field is important to how a record will be located in a query, displayed in a report or dashboard, or whether the information is important so that business processes can be followed correctly. By selecting the field requirement level, you can make sure that the users enter values that are required for the correct use of the Microsoft Dynamics CRM system.

Three requirement levels can be specified for fields. These requirement levels are enforced when data is entered in forms. However, these requirement levels are not enforced anywhere else. The requirement levels include the following:

- Optional - The field can be left blank or it can be populated. This is the default setting.
- Business Recommended - The field can be completed. However, ideally it should be populated. For example, on a Contact record the First Name field has a requirement level of Business Recommended. Business Recommended fields are displayed with a blue + symbol next to their label.
- Business Required - The field must be completed. Business Required fields are displayed with a red * symbol next to their label. If the field is left blank and a user tries to save the record an error message will be displayed on the screen and as a symbol and will also show text next to the field.

Note: Requirement levels are only enforced on forms. Other ways of updating data, such as Workflows or Dialogs, plugins, and external integration that brings in data by using the APIs that are documented in the SDK, ignore this property, and the requirement has to be built into the logic that is defined in those processes. The Data Import Wizard gives the user a message if the user has not selected to map data for a required field. However, this requirement level is not enforced. Therefore, the user can create records that might not comply with your requirements.

Business Required fields cannot be removed from forms or entities unless their requirement level is changed to Business Recommended or Optional. Some fields are required by the system for specific entities and cannot be removed, for example, the start and end date and time of an Appointment record.

Searchable

Fields are available for searching in Microsoft Dynamics CRM by using the Advanced Find tool regardless of whether they are displayed on a form. To hide fields that are not used (typically not displayed on any forms), you can change the value of the Searchable

property. Fields that have this property set to No are not displayed in Advanced Find search lists.

For fields that are not used by the business, we recommend that you set the Searchable property to No, to simplify the Advanced Find feature for users.

Field Security

Field security is used to add another level of security that is applied to fields. By default, if a user is a member of a security role that lets the user read an entity, the user can read all fields in that entity. In some cases, you might want to restrict access to specific fields.

For example, if the User entity is customized by adding a Salary field, you might want to prevent the employees who do not work in the Human Resources or Finance departments from viewing the data in the field. To achieve this, the Field Security property can be made available on the field and a Field Security Profile can be created.

Field security is discussed in more detail in Module 10 - Additional Security Options.

Auditing

When this property is enabled, changes that are made to the values in the field will be audited, if auditing is also enabled available for the entity and at the Organization level. Auditing is discussed in more detail in Module 10 - Additional Security Options.

Description

In Microsoft Dynamics CRM 2015, the content of the Description property is displayed as an infotip in the Microsoft Dynamics CRM user interface (UI) when a user points to a field label on a form. If the user has a touchscreen device, he or she can tap the field name to view this same tip. You can use the description property of a field to provide more help or guidance to the user about how to complete the data, or why this field is required. If there is no description, the infotip displays the field label instead (this uses the field label from the form, which might be different from the field name).

Lesson 4-4 Customise Existing Fields

Sometimes organizations have to change the properties of fields to suit their requirements. Some properties can be modified after fields are created, and other properties cannot be modified.

Modify Existing Fields

After a field is created, you can change the following properties:

- Display Name
- Field Requirement
- Field Security
- Auditing

- Description

Properties that cannot be changed after a field is created include the following:

- Name
- Type

Depending on the field data type, other properties can also be modified. These include the following:

- Precision
- Maximum Length
- Minimum Value
- Maximum Value
- Options in Option Set
- Date or Date and Time format

Edit Multiple Fields

If you have to modify the properties of several fields, you can use the Edit Multiple Fields dialog box to modify the following properties:

- Field Requirement
- Searchable
- Auditing

Edit Multiple Fields

Enter your edits in the form, and then click Save. Fields that you don't edit will not be changed.

Field Requirement

Field Requirement

Searchable

Searchable Yes No

Auditing

Auditing Enabled Disabled

 These fields will not be audited until you enable auditing on the entity.

Figure 34 - EDIT MULTIPLE FIELDS DIALOG

Select the fields you want to modify and click on Edit in the menu bar.

Note: You can select to set one, two, or all three properties in the Edit Multiple Fields dialog box. Any settings that you do not specify will be left at their current value for each field.

Lesson 4-6 Option Sets

An option set gives the user a drop-down list from which to select one option. By having the user select from a set of values instead of entering data in a field, this displays the expected possible values, reduces data entry time and prevents data entry errors from being made. For example, by controlling the available values for a field, you will make it easier to create queries, categorize charts and filter reports.

Because the values are stored as integers, option sets are used as an efficient way to store data compared to text fields, even though the result is similar. You can also change labels without having to find and replace values in the dataset. For example, you might rename a service level from "Premium" to "Gold," and if this applies to the business process, you can do this by changing the option in the option set, instead of changing several records.

Microsoft Dynamics CRM also supports multiple languages. You can provide a set of labels for the option sets for the languages that you have enabled for the users. Users can view the label that matches their selected language, instead of having to read text fields in a foreign language that could lead to a misinterpretation of the data.

Local and Global Option Sets

Two types of option sets are available in Microsoft Dynamics CRM – local and global.

A local option set is defined in an entity by creating a field of the option set type and defining its values. A global option set is an additional component that is defined in a Solution and can be used in multiple fields on one or more entities. Each option set field that shares the same global option set will present the same list of options to a user. However, you can configure each field to use a different default value to suit your requirements. You can create a global option set and then create a field to use the global option set, or create a global option set as you create the first field that requires a global option set.

Several benefits exist for using global option sets instead of local option sets for custom fields, and typically require the same effort to create. The benefits of global option sets include the following:

- It takes less effort to maintain a single option set than to keep several separate option sets aligned if the same list is required for more than one entity.
Even if your business requirements do not require another field that uses the same option set, you should consider future customization and that another field might require the same options in the future. For example, you might be requested to add a Service Level field to the Account entity to record the contractual level of support that you provide to customers. Consider that this field could also be useful for the Contract or Case entity in the future.
- You can make a change to a global option set and deploy a change to another system independently from the entities by using the option set.

If you use local option sets, the only way to update a change would be to deploy and publish the entity that contains that field. If there is an incomplete change to other parts of the entity (for example, other fields, forms and views) this might delay you from making a change to the option set, or increase the risk of an untested change being deployed in error.

- By using Workflow and Dialog processes, you can update the value of a field from the value in another field. This includes using a field from an associated record as the “source” field.

When you design the process, in the update record form, an option set field will be filtered to only allow values from another field that share the same option set. For global option sets, this is ideal because it reduces the options available for the source field to only those using the same global option set. For a local option set this filtering effectively means that the local option set cannot be updated to use a value from another field because no other field in the system shares the option set. Instead, you would have to use a set of conditions to determine the value that the source field has and update the target field to the same label. For a list that has many options, this is a time-consuming procedure.

The main advantage of using a local option set is that it controls the scope of the effect on the changes. If you use a local option set and the users who are responsible for that entity and field require a change, you do not have to discuss the effect of the proposed change

with other teams. If you use a global option set and are requested to make changes, this could involve more people, departments and processes.

If you select a global option set every time, someone else might reuse your option set for a different purpose. For example, you might have a field that is named Urgency for a Case that has the values high, medium and low. If a colleague uses this for a field that is named Probability of Purchase for a market research questionnaire entity, it would be difficult for either of you to agree on any changes in future because the two processes are completely independent.

You should consider using a local option set if the data to be stored in a field is specific to the entity and that it most likely will never be used elsewhere, or if you must keep the scope as narrow as possible to avoid incorrect reuse.

Many built-in option set fields use local option sets for historical reasons because these fields existed in versions of Microsoft Dynamics CRM earlier than Microsoft Dynamics CRM 2011. These earlier versions of Microsoft Dynamics CRM do not support global option sets.

You might consider replacing a system field that is common across more than one entity with a global option set. For example, there is a system field that is named Industry on the Lead entity and on the Account entity. To reduce the maintenance of having to keep both these local option sets aligned, you could create a new field on each entity by using the same new global option set. You cannot delete the original system fields. However, you can remove the fields from forms and views, and make them non-searchable and also change the display name to avoid confusion.

Option Sets and Field Mapping

You can configure field mapping to copy values from a record to a new “child” record in a 1:N (one-to-many) relationship. This is used, for example, to copy the address from an Account record to Contacts that are created in the Account form for employees of that company. How to configure field mapping is described in the “Managing Relationships” module.

Option set fields are stored as integers, and when the values are copied from one record to another record by using field mapping, it is the integer values that are copied, not the labels. If you map two option set fields, you must make sure that they have identical or equivalent options, and use the same integers. Mapping between fields that use the same global option set makes sure that this is true by definition. If one or both fields in the mapping are a local option set, the options could be missing or misaligned and this can cause unexpected and unwanted results.

For example, an Event entity has an Option Set that is named Event Type with the following properties:

Label	Value
Product Demonstration	1
User Test	2
Product Launch	3
Market Research Panel	4

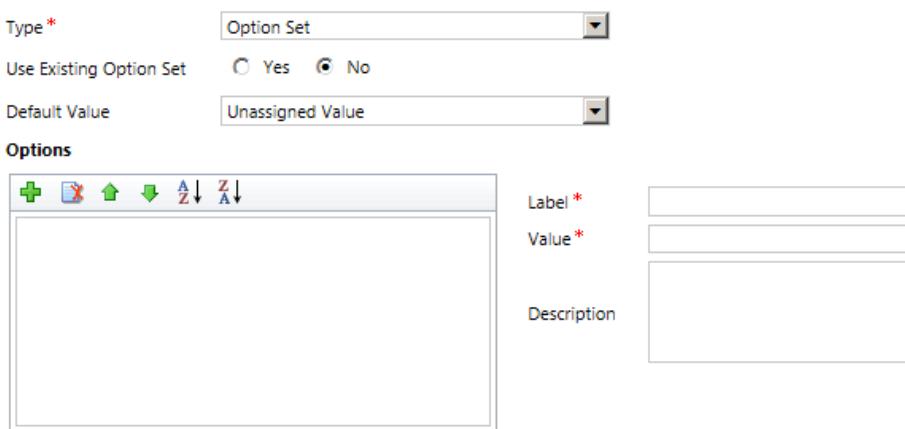
A Booking entity has an Option Set that is named Event Type with the following properties:

Label	Value
Product Demonstration	1
Product Launch	2
User Test	3

A mapping is created between these two fields and a Booking is created from an Event with an Event Type of “User Test” (value = 2). The Event Type is copied to the new Booking record by using a value of 2, and is displayed as “Product Launch.” If the Event had an Event Type of “Market Research Panel,” a Booking for this Event would have no value for Event Type, because the value 4 is not valid. So, the Event Type value is dropped during the mapping process. However, if a Global Option Set is used, then the labels and values would be identical, even if the list of options is modified at a later date.

Create Local Option Sets

To create a Local Option Set, select a type of Option Set and In the Use Existing Option Set field, select No.



The screenshot shows the 'New Field' form in Microsoft Dynamics CRM. The 'Type*' dropdown is set to 'Option Set'. The 'Use Existing Option Set' radio button is selected 'No'. The 'Default Value' dropdown is set to 'Unassigned Value'. Below these settings is a section titled 'Options' containing a grid for managing option items. The grid includes columns for 'Label*', 'Value*', and 'Description'. To the left of the grid is a toolbar with icons for adding (+), deleting (X), moving up (^), moving down (^), sorting (A-Z), and sorting (Z-A). The 'Label*' and 'Value*' fields are mandatory, indicated by red asterisks.

Figure 35 - OPTION SET FIELD PROPERTIES

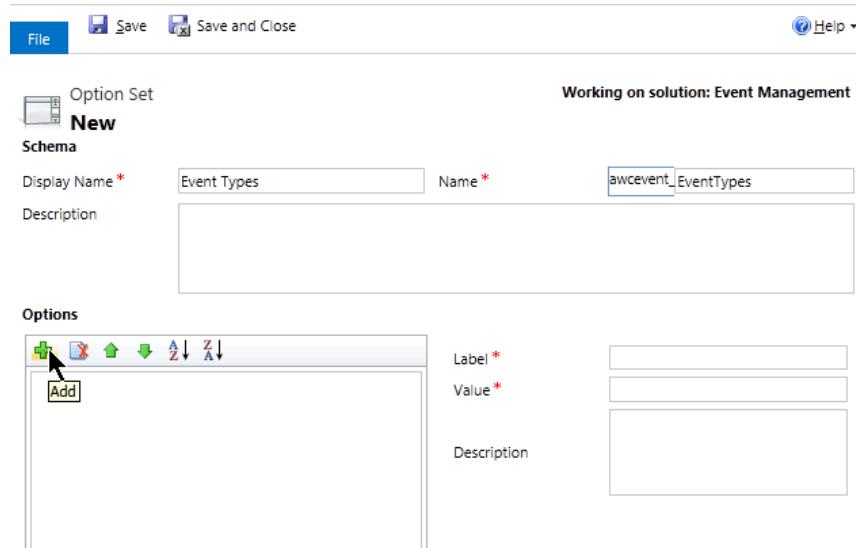
The space at the bottom of the new field form lets you configure the Local Option Set. From the left side to right side the buttons include the following:

- Add a new Option Set item
- Delete an Option Set item
- Move an Option Set item up the list
- Move an Option Set item down the list
- Sort the Option Set items into ascending (A-Z) order
- Sort the Option Set items into descending (Z-A) order

Note: When you sort a view by using an option set column, the values are sorted alphabetically by their label. When option sets are used to sort in charts, the numeric value is used.

Create Global Option Sets

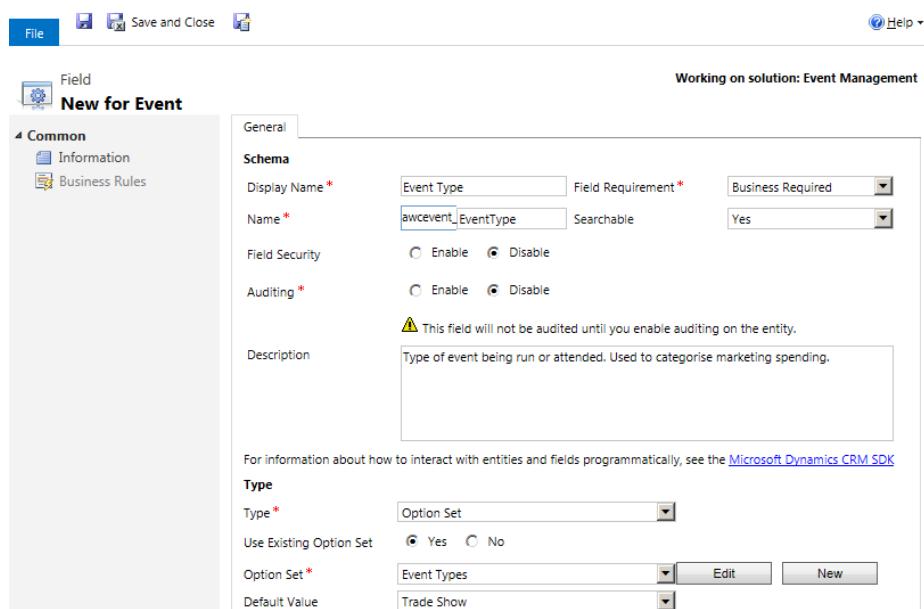
To create a Global Option Set, select a type of Option Set and In the Use Existing Option Set field, select Yes and Select the Global Option Set to be used, or click New to create a new global option set.



The screenshot shows the 'New' screen for creating an 'Option Set'. The 'Display Name *' field is set to 'Event Types'. The 'Name *' field is set to 'awcevent_EventTypes'. Below the schema section, there is a 'Options' area where a new option can be added. The 'Label *' and 'Value *' fields are empty, and there is a 'Description' field below them.

Figure 36 - CREATING A GLOBAL OPTION SET

You can also create a Global Option Set from within the Option Sets node in a solution.



The screenshot shows the 'New for Event' screen for creating a new field. The 'Display Name *' is 'Event Type' and the 'Name *' is 'awcevent_EventType'. The 'Type' dropdown is set to 'Option Set'. The 'Use Existing Option Set' checkbox is checked, and the 'Event Types' option set is selected. The 'Default Value' is set to 'Trade Show'.

Figure 37 - USING A GLOBAL OPTION SET

Edit Option Sets

You can modify local and global option sets after they have been created.

You can add new options to an existing option set and also modify the labels of the existing options and change their display order. These changes will not have any impact on existing records.

Deleting an Option from an Option Set

Deleting an option from a local or global option set could lead to data integrity issues. The records that use the deleted option will no longer seem to have data in that field—in a view column, for example. However, the underlying stored integer value will still be in the database, and queries that use conditions for that field such as “Contains Data” will still return these records.

If the option set field has a default value other than Unassigned Value, these records will use that default value when the record form is next opened. If you delete an option set option and then add another option that uses the same value that was used previously, existing records will show the new label in the field.

Instead, we recommend one or a combination of the following approaches:

- Perform an Advanced Find search for any records that use the option to be deleted. Then, modify the option set field value to a value that is not being deleted, or clear the value (set to null).
- Modify the label instead of deleting the option, for example, adding the words “Do Not Use” to the label. In this case, you would also move the option down the order the options are shown in the list.
- Use a Business Rule (described in the “Configuring Business Rules” module) to test for unwanted values when a form is opened or updated and set the fields to the correct value, or clear the field values. This rule could also add a message to the field to guide the user to the correct selections.
- Use a real-time workflow to prevent the record from being saved, and present an error message dialog box to the user providing guidance about how to make the best choices.

Using a Lookup to a Custom Entity Instead of an Option Set

An alternative to having to use an Option Set field to avoid issues of managing the list of choices is to use a Lookup field for a custom entity created for the purpose of lookups. In practice, users will select an existing record from the records that are available. This function is similar to an option set because it limits the users’ selections.

For example, you might create a custom entity that is named “Service package” and create records with names of Gold, Silver and Bronze. This custom entity might not require any additional fields, and is likely to have “Organization” ownership (not “User or Team”).

This approach makes it easier to manage lists of options that are likely to change significantly over time, such as the types of products or services that are being offered.

This means that you can also delegate the management of the available options to the user who is responsible for the area by assigning the user a security role. By doing this, the user can create and modify records for the custom entity. If the user changes the status of a custom record to Inactive this custom record will no longer be available to other users to select in future. However, this custom record will remain as a valid value on existing records. In the earlier example, the user could make the Bronze service package Inactive, and create a new record that is named Basic.

This approach keeps the historical data intact and limits the user's current selections for the correct values.

Lesson 4-7 Status and Status Reason Fields

Every record in Microsoft Dynamics CRM has an associated status. A record can be active or inactive. However, sometimes there is more than one reason for the status - an inactive Lead for example can be Qualified, Disqualified or Cancelled, or a Phone Call can be inactive because it is cancelled, never made or received.

Each entity has two status fields:

- Status - The main state of the record. Most records have two states, active or inactive. However, some entities have more than two states, for example a Case can have a status of active, resolved or cancelled. Custom entities can only have a status of active or inactive. The schema name of this field (which would be used in a JavaScript, or code, or FetchXML query for a report) is statecode.
- Status Reason - A reason for the status, to provide additional detail. For example, a Case that has a status of resolved can have a status reason of Problem Solved or Information Provided. Custom entities have default status reasons of active and inactive that are associated with the status of the same name. The schema name of this field is statuscode.

The Status field cannot be modified.

The Status Reason field can be modified similarly to an Option Set field, except on certain system entities where this is restricted by the platform. For each status, you can add new status reasons or edit the labels of existing status reasons. You cannot select the integer values. Therefore, you should plan your status reason changes carefully to make sure that these values are suitable for sorting, especially in custom charts.

Modify the Status Reason Option Set

Custom entities have the following two statuses:

- Active
- Inactive

If you have to clarify why a record is inactive, you must modify the Option Set within Status Reason by selecting the Inactive status and adding additional Option Set values underneath the Inactive status.

Status Reason Transitions

There's new capability to specify status reason transitions for Case and custom entities.

If you're in charge of incident management for an organization, it's important to provide a simple model for customer service representatives responsible for entering and updating case status.

Status reason transitions are an optional additional level of filtering to define what the status reason value can be changed to for each status reason. Defining a limited list of valid options can make it easier for people to choose the correct next status reason for a record when you have a large number of combinations for valid status reason values.



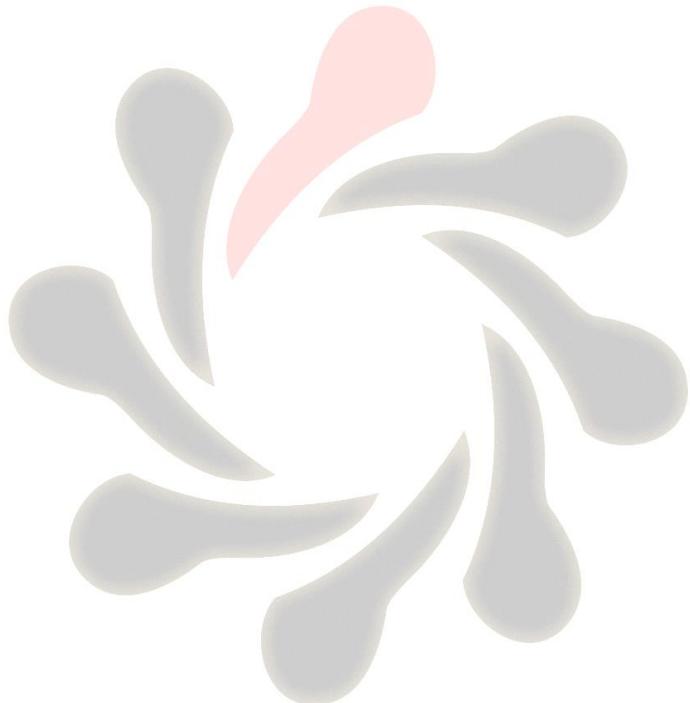
Figure 38 - Case Status Reason Transition Example

Enabling status reason transitions for Case

1. Make sure that you have the System Administrator or System Customizer security role or equivalent permissions.
2. Go to Settings > Customizations.
3. Choose Customize the System.
4. In the solution explorer, in the left navigation pane, expand Entities, expand the Case entity, and then double-click or tap Fields.
5. Go to the second page of fields, and then open the statuscode (Status Reason of Case) field.
6. In the Field: Status Reason dialog box, click or tap Edit Status Reason Transitions at the top of the dialog box.
7. In the Status Reason Transitions dialog box, under New Status Reasons, click or tap one of the Enter Value buttons corresponding with one of the existing status reasons.
8. In the Select Status Reason dialog box, in the Available Values list, select the values you want to add, and then click or tap the chevron button to add to the Selected Values list. Click or tap OK when you're done with that status reason.
9. Click or tap another Enter Value button to modify other status reasons. When you're done, click or tap OK.

Each status reason option for an active status must allow at least one path to an inactive status. Otherwise, you could create a condition where it would not be possible to resolve or cancel a case.

In the Status Reason Transitions dialog box, select the Enable Status Reason Transitions check box to apply the defined status reason transitions to case records. The list of available status reasons will be filtered for each case record based on the defined transitions.



Module 5 - Managing Relationships

As part of the business analysis process, it is important to understand how a custom entity is associated with other entities. You can then determine if you must configure *relationships* to define these associations, and what types of relationships to use. The customization tools in Microsoft Dynamics CRM let users who have almost no programming experience create custom entities. However, it is important for these users to understand the features and behaviours of the relationships that link entities to one another in the system.

This module defines the different types of supported relationships in Microsoft Dynamics CRM. The module also describes the options for *cascading rules* that control how certain actions that occur on a record affect related records in a one-to-many relationship.

Another feature of one-to-many relationships is *field mapping*. This can be used to make data entry easier when a new record is created and related to a parent record.

Objectives

The objectives are:

- Identify the types of relationships that can be configured between custom and system entities.
- Explain how 1:N relationship cascading rules control how certain actions that occur on a record affect related records.
- Explain how to create entity relationships and configure relationship behaviour.
- Discuss how field mapping eases data entry when new records are added to a parent record.

Lesson 5-1 Types of Entity Relationships

When a custom entity is created, it is important to configure the custom entity's relationship with other entities. The system entities in Microsoft Dynamics CRM have many relationships. Relationship examples include the following:

- An Activity record can be related to an Opportunity (or many other entities).
- An Opportunity must be related to either an Account or Contact.
- Every Account or Contact is associated with the User that the record is Created By (and by other relationships to other Users or Teams).
- Every User is associated with a Business Unit and an Organization.

Custom entities can linked to other entities by using relationships in a similar way to system entities. Relationships describe the interactions between records, such as when one record "belongs to" another record. You can also create additional relationships between system entities.

Microsoft Dynamics CRM differentiates between the types of relationships based on how many records might connect to or from a specific record.

1:N and N:1 Relationships

One-to-many relationships (known as 1:N in Microsoft Dynamics CRM) are relationships that occur between one *primary entity* record and many *related entity* records. This means that a primary entity record (frequently known as the *parent* record) can be linked to multiple records (*child* records) of the related entity.

The relationship is maintained by a lookup field that is automatically created by the platform on the related entity. This lookup field on the child record stores a reference to the parent record's globally unique ID (known as a GUID). Because many related records can have the same primary record GUID in their lookup field, a one-to-many (1:N) relationship is maintained.

When you create a 1:N relationship, you must enter a **Display Name** and a schema **Name** for the lookup field, the same as for any custom field.

For example, a ticket agency wants to track the bookings it creates for their customers. The agency creates a 1:N relationship from a Contact as the primary entity to a custom entity that is named Booking as the related entity to record ticket sales for each customer. A Contact can have many Bookings (a customer buys many tickets) however, each Booking can only be linked to one Contact. This is shown in a lookup field on the Booking record.

After you create the 1:N relationship between Contacts and Bookings, when the agency opens a Contact record, a link to **Bookings** is available in the navigation bar at the top of the screen, together with the other entities that are associated with Contacts. By clicking **Bookings** in the navigation bar, all bookings that are related to the contact are displayed. However, when the agency opens a specific Booking record, "Contacts" does not appear in the navigation bar. Instead, the lookup field that displays the related Contact record for that booking appears on the Booking form.

Note: The lookup field is not automatically added to the related entity's form. The lookup field is present in the list of available fields for the related entity. Therefore, you must manually add the lookup field to the form.

There is no difference between a one-to-many (1:N) and a many-to-one (N:1) relationship. The two terms are used depending on which "end" of the relationship is being considered. In both cases, only a 1:N relationship exists in the metadata that is stored in the database, where the primary entity is the "one" and the related entity is the "many."

Whichever way the relationship is created, Microsoft Dynamics CRM displays the inverse entry on the associated entity in the solution explorer for convenience when customizing the system. A one-to-many (1:N) relationship for a primary entity also appears in the solution explorer below the related entity as a many-to-one (N:1) relationship, and you can modify the relationship from either side.

You can create a one-to-many (1:N) relationship from either the primary entity or the related entity. You select the way the relationship is described, depending on whether you create the relationship from the related entity or the primary entity.

From the primary entity, you would select to create a 1:N relationship. For the new relationship, you must specify the related entity (the “many” side) that completes the one-to-many relationship.

From the related entity, you would select to create a N:1 relationship, although this really creates a 1:N relationship the other way round, in terms of the metadata that is created and stored. For the new relationship, you must specify the primary entity (the “one” side) that completes the many-to-one relationship.

For example, in the ticket agency scenario that is discussed earlier, the Booking entity stores the details of a booking that is made by a Contact. This is a typical one-to-many (1:N) relationship where each Contact has zero, one or many Bookings, although a Booking only has one Contact. Consider the following:

- If you access this relationship from the Contact entity, it is a one-to-many (1:N) relationship.
- If you access this relationship from the Booking entity, a link to the relationship would be found in the many-to-one (N:1) relationships node of the solution explorer under the Booking entity.

N:N Relationships

In a one-to-many (1:N) relationship, each related record can only be linked to one primary record. Sometimes, you need must have a relationship where a related record can be linked to many primary records and a primary record can be linked to many related records. For example, consider a business that offers training courses. Each training course can have multiple students and each student can attend multiple training courses over time. In this scenario, a 1:N relationship cannot be used, instead a many-to-many (N:N) relationship is required.

Many-to-many relationships can be created in Microsoft Dynamics CRM by using a combination of system entities and custom entities. Not every system entity can be included in a many-to-many (N:N) relationship.

Many-to-many relationships are implemented in the database by using an intermediate table that links the two entities that are involved. The intermediate table is also known as the *intersect entity*, *link entity* or the *linking table*. Each entity in the many-to-many relationship has a one-to-many (1:N) relationship with the intersect entity.

In Microsoft Dynamics CRM, there are two ways in which you can create a many-to-many (N:N) relationship:

- *Native* many-to-many (N:N) relationships are a feature of the application and created and managed in a standard way.

- *Manual* many-to-many (N:N) relationships are a term that is used to describe a relationship that is formed by using a third entity to provide a “bridge” between two other entities. This is not an application feature. It is a way to describe a specific model that you might select for part of your system design.

The two approaches differ in how the intersect entity is created and managed, and have different advantages and disadvantages.

Native N:N Relationships

For a native N:N relationship between two entities, Microsoft Dynamics CRM creates a hidden intersect entity to use as the intermediate table. The intersect entity contains the following information for each pair of records that are connected through the N:N relationship:

- Primary Key GUID of the intersect record
- Entity 1 record GUID (a lookup field)
- Entity 2 record GUID (a lookup field)

You specify the two related entities for the relationship and the platform creates the intersect entity. Because the platform creates and manages the intersect entity, restrictions apply to the intersect entity, including the following:

- The intersect entity cannot be customized.
- Columns cannot be added to the intersect entity.
- The intersect entity cannot be queried directly (for example to view when a connection is made between two records).
- The intersect entity is not available for inclusion in Workflow rules as a trigger or to be created or updated.

The associated view of one entity from the other entity is displayed from the second entity in the relationship and not from the intersect entity. Because a many-to-many (N:N) relationship is symmetrical, the associated view is used from either entity to add associated records, there is no lookup field.

The intersect entity is always enabled for auditing. Therefore, if auditing is turned on at the Organization level, you can view the audit history for the intersect entity from either related entity to view the details of who made or removed the association between the two records and when this occurred.

Create, update, and delete permissions for the intersect entity are controlled by the related entities’ Append and Append To privileges. No privileges are associated directly with the intersect entity.

Note: To create a many-to-many (N:N) association between two records, a User must have Append and Append To privileges on both entities. The same privileges are required to disassociate records.

For example, an organization hosts corporate hospitality events and creates an Event entity in Microsoft Dynamics CRM, and must record the Contacts that attend each Event. The organization creates a native many-to-many relationship between the entities. In this scenario, a Contact can attend many Events, and an Event can be attended by many Contacts, and these attendances can be recorded through the N:N relationship. This cannot be achieved by using a single 1:N relationship between the Event entity and the Contact entity.

Manual N:N Relationships

A manual many-to-many (N:N) relationship is not a true type of relationship, and will not appear in the N:N relationships node for an entity. It is a convenient way to describe how you can use a custom entity that has two lookup fields for the N:1 relationships to the two entities that you want to connect. This is known as a *manual* many-to-many (N:N) relationship because you create a custom entity instead of having the system create and maintain a hidden intersect entity.

The main benefit of creating a many-to-many (N:N) relationship in this way is that you can add custom fields to the intersect entity. In a native many-to-many (N:N) relationship, the intersect entity is hidden and custom fields cannot be added.

When you decide on the type of many-to-many (N:N) relationship to create, you have to know whether the organization must record additional information about the intersect entity.

In the earlier corporate hospitality example, the native many-to-many relationship provided the required functionality that let multiple Contacts attend an Event, and a Contact attend multiple Events. However, because the intersect entity cannot be customized, additional details of a Contact's attendance cannot be recorded, such as the following:

- Contact's registration status
- User who recorded the registration information
- When the contact registered to attend the event
- If the contact has any specific requirements, such as accessibility or dietary requirements

If you have to store this additional information, you must create a manual many-to-many relationship. For example, in this scenario, create a custom entity that is named "Booking," and then add fields to the Booking entity to record the additional data that is required. Then, from the Booking entity, create the following two N:1 relationships:

- From Booking to Contact
- From Booking to Event

By using the Booking entity as an intersect entity, the organization can track registration information that is related to both Events and Contacts, and still let multiple Contacts

attend an Event, and a Contact attend multiple Events. When you create two 1:N relationships from the same entity in this manner, this can be described as a manual N:N relationship.

A disadvantage of this approach is that the two related entities are not directly linked using a true relationship. Therefore, you cannot display a view of Events from a Contact, or the other way round. You can only display a view for the Booking entity. Therefore, additional work must be performed to create views that can be used on each primary entity form in a grid, or to configure a single associated view that is suitable to use from either entity.

There are several built-in features in Microsoft Dynamics CRM that use N:N relationships where the intersect entity is not hidden and can be queried or used in automated processes. These features could be described as manual N:N relationships. However, in some cases, because these relationships involve system entities, there are some restrictions on the properties that you can customize. Examples of built-in system entities that are used to link records together include the following:

- Queue Items store details of records that are linked to Queues, who is working on the Queue Items and when the Queue Items are created and modified. A record can only have one active Queue Item at a time.
- Follows are created by users to indicate records they are interested in. These filter posts in social panes and provide a tool for queries such as Accounts I Follow. Only one Follow between a specific record and a specific user can be created. When you create Follows in a Workflow, for example, the create step might fail if the record is already being followed by that user.

Connections provide a flexible model to associate almost any two records as described in the “*Connections and Connection Roles*” topic.

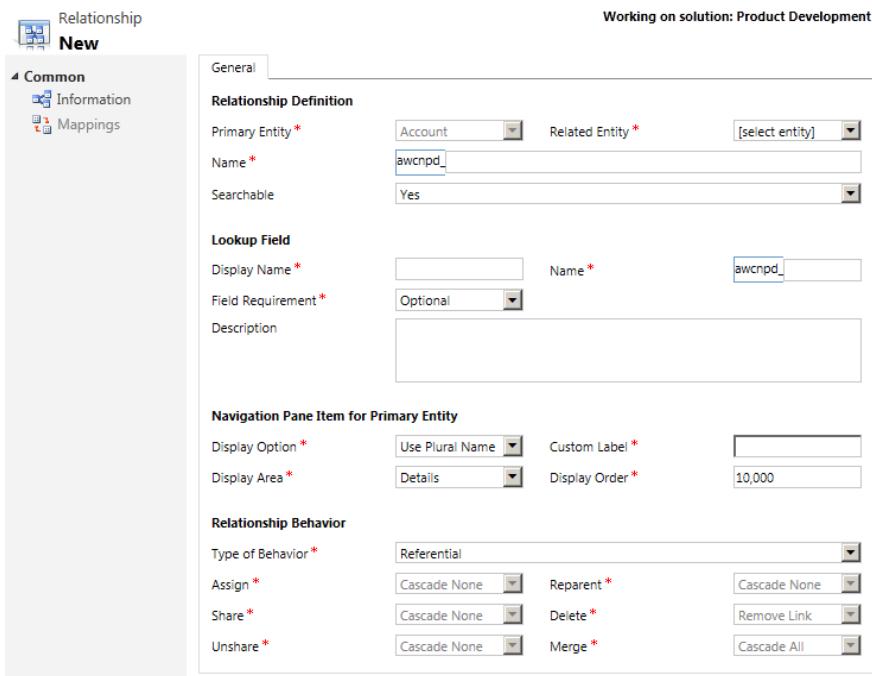
Lesson 5-2 Create Entity Relationships

To create a relationship between two entities, follow these steps.

1. On the navigation bar, click **Microsoft Dynamics CRM > Settings > Solutions**.
2. Double-click the solution where the relationship is to be created.
3. Expand the **Entities** node in the solution explorer.
4. Expand the entity from which the relationship is to be created.
5. Select the required type of relationship (1:N, N:1, N:N).
6. Click the **New** button on the menu bar above the list of relationships.
7. Configure the relationship as described in the topics of this lesson.

Configure a 1:N or N:1 Relationship

You can create or modify a 1:N or N:1 relationship by using the relationship configuration form. The example shown in the “Create a One-to-many (1:N) Relationship” figure is for a 1:N relationship. The N:1 form is identical (because this is just another way of looking at the same relationship), except that the **Related Entity** property is already completed instead of the **Primary Entity**.



The screenshot shows the 'Relationship' configuration form in 'New' mode. The title bar says 'Working on solution: Product Development'. The left sidebar has 'Common' selected, with 'Information' and 'Mappings' also visible. The main area is divided into several sections:

- General** section: Contains fields for 'Primary Entity' (set to 'Account'), 'Related Entity' (set to '[select entity]'), 'Name' (set to 'awcnpd_'), and 'Searchable' (set to 'Yes').
- Lookup Field** section: Contains 'Display Name' (empty), 'Name' (set to 'awcnpd_'), 'Field Requirement' (set to 'Optional'), and a 'Description' field (empty).
- Navigation Pane Item for Primary Entity** section: Contains 'Display Option' (set to 'Use Plural Name'), 'Custom Label' (empty), 'Display Area' (set to 'Details'), and 'Display Order' (set to '10,000').
- Relationship Behavior** section: Contains four groups of dropdowns for 'Assign', 'Share', 'Unshare', 'Reparent', 'Delete', and 'Merge' operations.

Figure 39 - Create a One-to-many (1:N) Relationship

The form is divided into clear sections, with properties in each section to define the relationship, the lookup field for the related (many) entity, how the related entity will appear in the primary entity navigation, and the relationship behaviour. These properties are described in the following tables.

Relationship Definition

You must complete all four fields in this section to fully define the relationship.

Property	Description
Primary Entity	The entity for which there is one record in each relationship. For example, if you must create a relationship between the Idea and Prototype entities, where one idea could lead to many prototypes, the Primary Entity will be Idea. When you create the 1:N relationship, this is already completed and has the entity that you started from, and cannot be changed.
Related Entity	The entity for which there are many records in each relationship. In the earlier example, the Prototype entity must be selected here. When you create the N:1 relationship, this is already completed and has the entity that you started from, and cannot be changed.

Property	Description
Name	A name for the relationship. After the entities are selected in the first two fields the Name is generated from their schema names. However, you can change the name before you save the relationship, if this is necessary. By convention, relationships describe the primary entity first, and the related entity second. You might also have to describe the nature of the relationship if it is not obvious from only the entity names, or if more than one relationship exists between the same pair of entities. When one or both entities in the relationship is a custom entity, this Name will have the solution prefix repeated several times. You might find the name easier to deal with later if you delete these repetitions, to avoid relationship names such as awcnpd_awcnpd_idea_awcnpd_prototype.
Searchable	When users search for data with the Advanced Find tool, the users can drill down into related records. For example, searching for Accounts that have Orders that were created in the last month. By default, relationships are configured to allow this behaviour. However, you can change the value in this field to No, if the users do not have to query based on the related entity.

Lookup Field

This section describes the properties of the lookup field that will be created because of the relationship. After these properties are created, the properties can be modified in the **Relationship** form, or in the lookup field.

Property	Description
Display Name	The Display Name property specifies the label that is used for the lookup field on the related entity.
Name	This is the schema name of the lookup field. This is automatically completed by the system, by using the Display Name and adding the suffix “Id” to the end. You can enter a different name if you prefer. We recommend that you include the name of the primary entity this lookup relates to, and the suffix “Id” is a useful reminder that this is a lookup field (especially when developers use the field - refer to the note below). You might also specify the nature of the relationship with the primary entity. For example, OriginatingIdeald as a name for the lookup on a Prototype to an Idea from which the Prototype originated.
Field Requirement	The requirement levels are the same as for any other field. If the related records can only exist in the context of the primary entity, you should select Business Required to prevent orphan records from being created. For example, Bookings are not useful records without being related to an Event. Therefore, the lookup to the Event entity would be made Business Required on the Booking entity.
Description	A description for the lookup field. This is displayed as an infotip when a user points to the name of the field on a form.

Note: For a system customizer, it is convenient to think of a lookup field as storing the GUID of the parent record. While this is true, developers must deal with lookup fields as an EntityReference which require a different approach from other field types such as a text field. An EntityReference has three properties, all of which must be set to update a lookup field programmatically, and they must be read individually. The properties are **Id**: the GUID value of the target record, **LogicalName**: the logical name of the primary entity (“systemuser” for example), **Name**: the text value of the primary attribute of the entity.

Because lookup fields require different handling in .Net and JavaScript code, we recommend you use the suffix “Id” or another naming convention on the field name to remind developers that a field is a lookup.

Navigation Pane for Primary Entity

When you open a record for the primary entity, you can use the navigation bar to select a link to one of the related entities, to view a list of the related entity records. For example, in an Account record, you could use this navigation to view all the Contacts who work for that company. The properties in this section control how the related entity is referred to in this navigation bar.

Property	Description
Display Option	Select Use Plural Name to display the related entity by using the value that is already defined as the plural name property of the related entity. If you select Use Custom Label , you must specify the Custom Label property. Select Do not display if you do not want to show the related records in the navigation bar. This might be because the related records are already displayed in a grid on the form.
Custom Label	Instead of using the usual plural name, you can enter a custom label to describe the relationship on the navigation bar for the primary entity. This property is not required and has no effect unless you select Use Custom Label as the Display Option . A Custom Label can be useful to give the navigation link a name that is more specific to the context. For example, Contacts related to an Event might be better described as Attendees. This is especially important if you have more than one relationship between the same pair of entities. For example, an Account might have to display <i>Employees</i> and <i>Investors</i> for two relationships with related Contacts to clarify the difference.
Display Area	As described in the “Customizing Forms” module, a form has four areas in the navigation bar for related entities. Here, you can select the area that should display a link to the related entity. If you change this by customizing the form navigation directly, the form definition will remember the new location, and any changes to the relationship will be ignored.
Display Order	Enter an integer value that determines the default order in which the related custom entity appears in the navigation bar in the Display Area that is selected. Numbers less than 10,000 are reserved, for backward compatibility. You do not have to configure this value if you prefer to change the order in which the items are displayed by modifying the form directly.

Relationship Behaviour

The properties of the Relationship Behaviour section of the form are discussed in detail in the “*Relationship Behaviour*” lesson in this module.

Note: You can also create a 1:N relationship by creating a field that has the **Lookup** type, from the Fields node under an entity in the solution explorer, or directly from the form designer. When you create a lookup field, you can enter a name for the relationship. However, the other properties such as the Navigation Pane and Relationship Behaviours are not available to modify in the new field form. Therefore, default settings are used. We recommend that you revisit the relationship afterward to make sure that the appropriate settings and properties are selected.

Configure a N:N Relationship

The new relationship configuration form for a N:N relationship is shown in the “Create a Many-to-many (N:N) Relationship” figure.

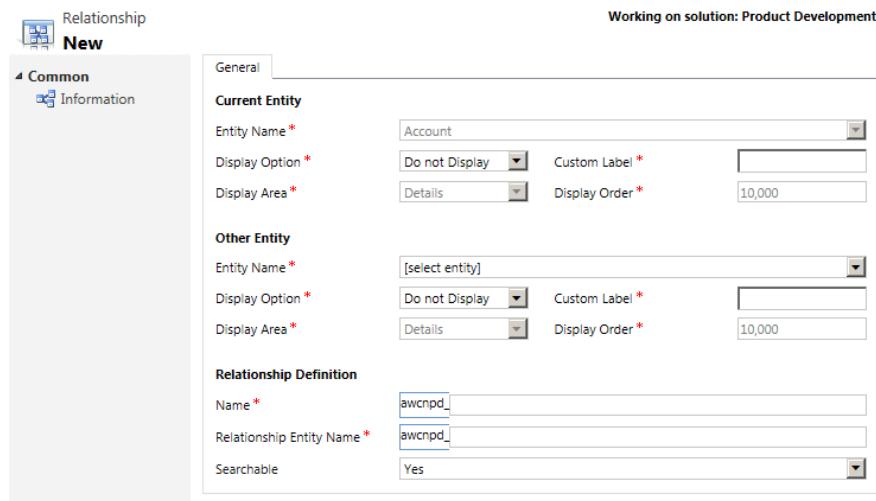


Figure 40 - Create a Many-to-many (N:N) Relationship

The form is divided into three sections. The first two sections have the same properties for the two entities that are involved in the relationship, because a many-to-many (N:N) relationship is symmetrical.

Current Entity and Other Entity

In the **Entity Name** list, select the entity that you want to use for each side of the relationship. The **Current Entity** side will be already completed with the entity that you started from and cannot be changed.

The other four properties in each section are identical to the same properties in the **Navigation Pane for Primary Entity** section of the **1:N configuration** form, because both these entities are the primary entity in a 1:N relationship with the intersect entity.

Relationship Definition

The properties in this section are described in the following table.

Property	Description
Name	A name for the relationship. After the entities are selected in the first two fields the Name will be generated from their schema names. However, you can change the name before saving, if this is necessary. When one or both of the entities in the relationship is a custom entity, this name will have the solution prefix repeated several times. You might find the name easier to deal with later if you delete these repetitions, to avoid relationship names such as awcnpd_awcnpd_venue_awcnpd_production.
Relationship Entity Name	A name for the intersect entity. This has the same value as the Name property by default. However, you can change the name before saving.
Searchable	Select No if the users do not have to create Advanced Find queries that rely on the relationship between the two entities. Note: You cannot query the intersect entity. This property controls whether you can search for the existence of records on the other side of the N:N relationship, or the records that meet certain criteria. For example, to find Contacts who are linked to a particular Event (although not when that link is formed).

Lesson 5-3 1:N Relationship Behaviour

In one-to-many (1:N) relationships in Microsoft Dynamics CRM, you can control how certain actions that are taken by a user on a primary record affect any related records. You can also take advantage of the hierarchy of records to make it easier to manage the related records.

Relationship behaviour refers to whether certain actions that are performed on the primary entity cause the same actions to occur on related entities. In every 1:N relationship you can configure the actions that are *cascaded* to the related entity, and on which records of the related entity they apply.

All 1:N relationships have the same set of actions that are defined in the relationship behaviour section of the relationship record.

For example, when an Account is assigned to a new sales representative, you must decide which of the following actions should occur on related Opportunities:

- All Opportunities that are related to the Account are assigned to the new sales representative (this is the default behaviour for this relationship).
- Only open Opportunities are assigned.
- Only the Opportunities that are owned by the original Account owner are assigned.
- No Opportunities are assigned.

For many of the existing relationships between system entities, you can modify the behaviours. However, in some cases the behaviours are fixed and they cannot be configured.

Supported and Unsupported Behaviour Types

How records of the related entity are treated when certain actions are performed on the primary entity determines whether a relationship is described as parental or referential.

- **Parental Relationship:** One or more actions that are performed on the primary record are also performed on the related records. For example, if a primary record is assigned, the related records are also assigned.
- **Referential Relationship:** Actions that are performed on the primary record are not performed on the related records.

An entity can only have one N:1 parental relationship with another entity. Any other N:1 relationships must be referential. A parental relationship establishes a sense of *belonging* or *exclusivity*—the related record belongs to the primary record much more than to any other record.

This limit of one parental relationship prevents a situation where the same action can occur on two primary entity records, and both records update the related record. This could lead to unpredictable outcomes.

For example, in a real estate office you might create a custom N:1 relationship from the Opportunity entity to the Account entity, to record the finance company (Account) that is lending the money for the sale on behalf of your customer (Contact). Microsoft Dynamics CRM does not allow this relationship to be parental, because there is already a parental relationship between Opportunity and Customer (Contact). If a second parental relationship is configured, when the finance company Account is assigned to a new user this would also cause the Opportunity to be assigned. Then, when the Contact is assigned, the Opportunity is assigned again, and so on. You must decide on the relationship that describes most accurately where the record belongs, and configure that relationship to be the parental relationship.

One-to-many (1:N) relationships in Microsoft Dynamics CRM can be divided into different types according to the types of entities involved in the relationship. Relationship types include the following:

- **One-to-Many, System-to-Custom:** This is where a system entity is a primary entity to a related custom entity. The relationship can be a referential or parental relationship. For example, a car leasing firm might create a custom entity named Vehicle to associate with an Account, and then track details of the Vehicles that are currently leased by each Account.
- **One-to-Many, System-to-System:** Many relationships already exist between system entities. However, you can create more relationships to describe other ways in which your records are associated to one another. Only one relationship can be a parental type, and most system entities already have a parental relationship (frequently with Account or Contact) so a new system-to-system relationship is usually referential. For example, you can create a referential system-to-system relationship between Opportunity and User to record the responsible Technical

Sales Representative, but this could not be parental because Opportunity already has a parental relationship with Customer.

- **One-to-Many, Custom-to-System:** This represents a custom entity that is the primary entity to a related system entity. *This cannot be configured as a parental relationship type*; it can only be a referential relationship type. For example, you can create a custom entity named Professional Association to register the Contacts that are members. Actions that are performed on a Professional Association record will not be performed on the Contacts that are members. For example, the Contacts will not be assigned, shared or (importantly) deleted. A Contact's membership is only one piece of information about the Contact—it does not define the Contact in an exclusive way.
- **One-to-Many, Custom-to-Custom:** You can create relationships between custom entities. However, only one relationship can be a parental relationship.
- **One-to-Many, Custom-to-Activity/Note:** When you select the option to have Notes or Activities associated with a custom entity this type of relationship is automatically created. If you create a custom Activity entity this creates many-to-one (N:1) relationships between the new entity and all entities that already have the Activity option selected. Many other properties that you can set when you configure a custom entity will create relationships to other entities, such as Connections or Queues.

Cascading Behaviours

Relationship behaviour refers to the configuration of which related entity records are affected when an action is performed on a primary entity record. You must configure the cascading behaviours for every 1:N relationship separately. However, you cannot configure in one place what happens to *all* related entities when a primary entity is assigned, for example.

The following table describes the actions that trigger 1:N relationship behaviour.

Action	Description
Assign	A primary entity record is assigned.
Share	A primary entity record is shared.
Unshare	A primary entity record's sharing is removed.
Reparent	A related entity record is associated to a primary entity record (its “parent”) for the first time, or this is changed.
Merge	A primary entity record is merged with another record.
Delete	A primary entity record is deleted.

Note: You cannot configure the “merge” action. Although the merge action is shown in the Relationship form, this action is always unavailable. Therefore, the merge action is not discussed in this module.

For each action that is described in the earlier table, you can configure rules to define the related entity records that will be affected when the action is performed on the primary

entity record. These actions are said to *cascade* down the relationship. The rules affect the primary entity and each of the primary entity's related entities. These related entities could have cascading rules that affect their related entities, and so on through the whole hierarchy of records.

For assign, share, unshare and reparent actions, the following rules are available:

Rule	Result for related entities in this relationship
Cascade All	Perform the action on all related entity records.
Cascade Active	Perform the action on all related entity records that have a status of active (or the equivalent label for different entities).
Cascade User-Owned	Perform the action on all related entity records that are owned by the same user as the owner of the primary entity record. You cannot use this option if one of the entities in the relationship has ownership at the organization level. (Note: for the assign action, this means the owner before the reassignment, not the new owner).
Cascade None	Related entity records are not affected.

For the delete action, the following rules are available:

Rule	Result for related entities in this relationship
Cascade All	Delete all related entity records.
Remove Link	Clear the lookup field for this relationship, so that the related record remains in the system and is no longer associated with a parent record through this relationship.
Restrict	This rule prevents the primary entity record from being deleted if any related entity records exist. Related records are not affected.

Cascading rules override restrictions in Security Roles. So, you have to make sure that you are not introducing unwanted behaviour into the system, such as letting users delete or assign records unexpectedly that they should be unable to. When a cascading rule is triggered in a 1:N relationship, the user does *not* require the privileges to perform the resulting action on affected records.

For example, a user might have privileges to delete Accounts and not have privileges to delete Contacts. If the cascading rule is set to delete related Contacts when an Account is deleted, then the related Contacts will be deleted when the user deletes an Account, even though the user cannot directly delete Contact records. A cascade rule will even delete records that are not visible to the user because the user does not have read privileges. Therefore, asking the user to check for any child records before deleting the Account is insufficient to prevent unwanted and unexpected deletions.

Types of Behaviour

You do not have to configure the cascading rules individually for each action that is defined in a 1:N relationship. Microsoft Dynamics CRM provides predefined types of

behaviour that act as templates to let you quickly apply typical combinations of rules. When you select a behaviour type, the appropriate cascading rules are set for you. The following table describes the behaviour types.

Type of Behaviour	Cascade rules applied
Parental	All rules: Cascade All
Referential	Main rules: Cascade None, Delete: Remove Link
Referential, Restrict Delete	Main rules: Cascade None, Delete: Restrict Delete
Configurable Cascading	All rules: Cascade All by default, although you can configure the rules however you want to.

You can use the Configurable Cascading type to set the rules individually for each action. The relationship is considered a *parental relationship* if you configure any action to Cascade All, Cascade Active or Cascade User-Owned. You can only have one parental relationship for each related entity. Therefore, if you configure any of these options for a related entity that already has a parental relationship (where such a cascade rule already exists) and try to save your changes, a message “The related entity has already been configured with a parental relationship or where some relationship behaviours cascade.” is displayed.

Even if you intend to create a parental relationship, you might prefer the control of Configurable Cascading to let you configure the rules individually instead of the **Parental** behaviour type “template,” even though both will result in a parental type relationship.

Assign

When a record is assigned, the owner changes. This not only makes a difference for reporting and responsibilities, this might also affect who can read or act on the record. When the assign action cascades to many related records, the related records are also assigned, and this might not be the correct behaviour to suit your business processes. You must carefully consider how you want an action such as assign to apply to the records in the system.

For example, when an Account is assigned from one salesperson to another salesperson because of a change of personnel or territory boundaries, it might be appropriate to assign all the open Opportunities to the new sales account manager. However, what must you do about the closed Opportunities that represent the deals that are already completed? Must you keep accurate information about who owned the Opportunity when it is closed, perhaps for bonus calculations?

Should the Account assignment affect Cases that are usually managed by customer services, not by sales at all? Some Cases might be handled by sales where the issue is a problem with an incorrect delivery, for example. In these scenarios, it might be useful to assign all Cases that are owned by the old account manager to the new account manager.

For the relationships between one entity and the different related entities, you might have to different combinations of the four options to assign cascade rules:

- Cascade All
- Cascade Active
- Cascade User-Owned
- Cascade None

Notice that the default behaviour for many relationships between important system entities, such as Account, Contact, Case, Opportunity and all Activities uses the Parental template. Therefore, all actions are set to Cascade All.

Share and Unshare

Sometimes sharing records is a convenient way for a user to grant a colleague access to a record he or she might not have, especially for temporary reasons. When sharing a record, it might help to give a more complete picture if the related records of the shared record are also available to the colleague. Using cascading rules, this means that the user does not have to remember to share all the related records individually.

However, when you use cascading rules in this way, this could lead to hundreds or even thousands of shares being created for every related record that is connected to the original record, and all the related records below those records.

For example, sharing an Account would share all the Contacts, Cases and Opportunities that belong to the Account, and all the activities and other related records below those records. For a long-standing customer who has many interactions, this might be a very large number of records, and therefore a very large number of shares would be created.

When you create many shares this can adversely affect performance in some circumstances. Other factors also contribute to whether this would create a noticeable change in performance for users. These factors include how the Security Roles are configured, and the overall performance of the database server. You can reduce the effect by configuring Security Roles and cascading rules to prevent unnecessary sharing.

If your organization has an open and “transparent” security model, where all users have a Security Role that grants the users global privileges to an entity already, then the users have no reason to share the records for that entity. For example, if all users can read, write and assign Contacts, then the users do not have to share Contacts with each other. By removing the share permission from the Security Roles you can prevent the users from unnecessarily sharing the Contacts and all related records.

At the same time, if you have identified an entity that all users can already access, such as Contacts, you should view the parental N:1 relationship from that entity and remove the share cascade rule. Then, if a primary entity record such as an Account is shared, the rule will not share the related records unnecessarily. To change this rule, you might have to select the “configurable cascading” template instead of the “parental” template. However, remember that the relationship will still be considered a parental relationship if any rules are configured to cascade.

As with other cascading rules, you might choose to only let some sharing cascade by using the user-owned or active rules.

When you change the cascade behaviour for the share action, there is no effect on the records that are already shared and only future actions are affected.

Reparent

The reparent cascade rule is unlike the other rules, because it is triggered by an update to the related entity, instead of an action on the parent. When you complete the lookup field on a record of the related entity to join it to a primary record, this is known as “parenting” the entity (giving it a “parent”). If you change the lookup to a different record, you are “reparenting” the related record.

The first parenting or the later reparenting actions both trigger a reparent cascade rule to take effect. When the rule is triggered, it will add a special kind of share to the related record. This gives the owner of the primary record access to the related record to act on as if he or she owned the record.

Because this share is added as a result of another event, not a deliberate share action, it is known as an *implicit* share (compared to *explicit shares* that are created by users). Both types of shares can exist at the same time, even for the same User in relation to the same record. The platform maintains both types of shares separately, although the shares are stored in the same table of the database.

The related record is not changed or assigned. However, the implicit share grants the owner of the primary record the same rights to the related record as the owner has on his or her own records of the same entity as the related record.

For example, Megan Sherman is a senior salesperson at the Lucerne Publishing advertising agency. She is the owner of the Account for Blue Yonder Airlines, a large global customer. There are several other salespeople who work with the customer in different regions, and internal sales who work with small repeat orders for printed materials. All the salespeople have the same Security Role that allows them to read all Opportunities, but only to write or assign their own Opportunities.

As the senior account manager, Megan may have to override what the other members of her sales team are doing. The reparent cascade rule between Account and Opportunity lets her act on any Opportunity that has Blue Yonder Airlines as the customer Account, as if she owned the Opportunity. She can write or assign any of these Opportunities, without first having to assign the Opportunities to her. This action will pass to the related records, and then on to their related records and so on.

If an Opportunity is created for an incorrect customer, and then reparented to the Blue Yonder Airlines Account, this triggers the cascade rule to give Megan the access she must have. This same rule, triggered by the reparent action, would cascade down to the related records of the Opportunity, such as activities. This rule helps make sure that Megan also has complete visibility and access to those records. In every case, she will have the same rights to the related records as she has to her own records of the same type.

This behaviour is useful for these scenarios to grant additional access that makes it easier for users to act on a whole hierarchy of records. However, this might be unexpected for users (and administrators). If the related entity is much more sensitive than a sales Opportunity, you might configure Security Roles so that users could only read their own records and not the records that are owned by someone else. It might be a significant problem, if it is discovered later that, although the users do not own the records, they can read the records because these users are owners of a parent record.

The cascade reparent rule cannot give the user more access to a record than the access that the user already has on his or her records. The Security Role will always limit the access that is granted by an explicit or implicit share.

If Megan's Security Roles give her no rights to the delete privilege for the Opportunity entity, she cannot delete any Opportunities, regardless of any explicit or implicit shares because she is not able to delete her own Opportunity records.

Note: The cascade reparent rule is not triggered by a change of ownership. If Megan assigns the Blue Yonder Airlines Account to her colleague Stefan Delmarco, no related entities are changed. Therefore, the reparent rule is not triggered. Stefan will not have any additional access to the Opportunities that are owned by other colleagues, and Megan will still have the additional access she had before.

Although you can use different levels for this cascade rule, it is usually most useful when the rule is configured to cascade all, and it is most secure when the rule is defined as cascade none. Sharing records the user already owns does not achieve anything unless the ownership changes later (the user keeps the implicit shared access). If you are trying to give better visibility of the related records, the closed related records can be just as useful as the active records. "User-Owned" and "Active" settings are rarely used for this rule.

Setting this rule to cascade all makes this a parental relationship, and this is only possible if no other parental relationship already exists.

Best Practice: If the business requirements show that you must make a specific entity secure, or configure any privilege to user level only, you should also check the parental N:1 relationship for the entity. Make sure that cascade reparent will not grant access to these records because of the ownership of the primary entity in the relationship.

Remember that this is a cascading rule. Therefore, this rule grants access to the owner of the parent record and the owner of the parent of that record (if the owner is different). We recommend that you also examine the built-in behaviour of the existing relationships between entities to check that the behaviours meet your overall requirements.

Delete

The rules for the delete action are used to help you prevent the occurrence of "orphan" records. These are records that are no longer associated with a primary (or "parent") record. In many cases this would result in records which are worthless on their own. For example, a Phone Call that does not describe who should be called or why you should call

them is not helpful, so you would not want such a record to exist. You can prevent orphan records in your system using the cascade delete rule in two ways:

- Use the Cascade All setting so that when the primary entity record is deleted, all the related entity records are also deleted.
- Use the Restrict rule so that the primary entity cannot be deleted if there are one or more related entity records already in the system.

Restrict delete means that you can let users have delete privileges to a primary entity and not the related entity. Then, the users can delete records for the primary entity, although only if the users have not added related records to the primary entity.

For example, a team of project managers create custom Project records, and associate Timesheets with Projects to record the time that will be charged to the customer. After a Project is started, the Project should not be deleted, and Timesheets must not be deleted or the business would lose possible revenue. However, sometimes a user might create a Project record before he or she realizes it is a duplicate, or some other issue. You can let project managers delete Project records that they own, and configure the restrict delete rule on the 1:N relationship between Project and Timesheet. Then, the project managers cannot delete a Project after a single Timesheet is allocated to the Project. (You might let the project managers modify Timesheets to re-parent the Timesheets if the Timesheets are associated to the incorrect Project).

You should not use the remove link rule in this scenario. If you use the remove link rule, this keeps the orphaned Timesheets, but the Timesheets will lose their context, because they *belong* to a Project, to identify who pays for the work. You also should not use Cascade All in this scenario because that would delete the Timesheets that contain important information and represent potential revenue.

Restrict delete prevents a user from deleting a record that has one or more related records through the relationship that the rule is applied to. This includes preventing the users who have the System Administrator Security Role from deleting the primary record.

Lesson 5-4 Field Mapping in 1:N Relationships

Field mapping makes data entry faster and more accurate when a user creates new records that are related to a primary record in a N:1 relationship. When a user opens a record and creates a related record from the primary record form, the mapping process copies values from the specified *source fields* in the primary record into defined *target fields* in a new related record. The user can overwrite any of the mapped values before the user saves the record.

For example, when a user opens an Account record and creates a new Contact from here, the Company Name field will be completed with a lookup to the Account, and the main address and telephone number fields will also be copied from the Account. If the Contact works at the main office of the company this saves time. Otherwise, the user can enter the correct address details instead.

Field Mapping Limitations

Although field mapping is useful, it is limited in scope. Consider the following limitations:

- If a new record is created outside the context of a primary record, all the fields in the form will be blank. The user must enter all the information that is required. This requires more time, and increases the risk of incorrect information and spelling errors being introduced
- If a saved record is linked to a primary record by completing a lookup later, no field mapping occurs. For example, if a Contact is created and saved, then linked to an Account by using the Company Name lookup, the Contact address will remain unchanged. We recommend that you use a workflow or plugin to help complete important fields in these scenarios, in addition to using field mappings.
- Field mapping only occurs one time, pre-filling the values of fields on the form for a new record. This occurs before the record is created, and lets the user change the values before the user first saves the record (some system entities such as Quote and Order are auto-saved when they are created so these entities will be saved with the mapped values, although they can still be changed). Later changes to the primary record are not copied to the related records.
- Mapping only copies data from a primary record to a new related record, not the other way round. For example, if you start to complete the Primary Contact lookup on an Account record, and select to create a new Contact instead of selecting an existing Contact, this new Contact is *not* a related record of the Account. The relationship from Account to Primary Contact is N:1 instead of 1:N. Therefore, the Primary Contact record is the primary record, and the Account is the related record.

These limitations are not always clear to users. Therefore, we recommend that you provide clear guidance to the users about the best way to create new records to take advantage of field mapping, where they can.

Configure Field Mapping

For each 1:N relationship in the system, you can configure the source fields from the primary record that are mapped to corresponding target fields of the related entity.

To create a mapping, follow these steps.

1. Navigate to the primary entity or the related entity in a Solution.
2. Open the 1:N or N:1 relationship.
3. Click **Mappings** in the navigation pane on the left side of the **Relationship** form.
4. On the toolbar, click **New**.
5. In the **Create Field Mapping** dialog box, select the source field on the left side from which the data is taken, and the target field on the right side where the data is mapped (copied) to.

6. Click OK.

Repeat steps 4 through 6 for other fields.

Click **Save and Close** to close the **Relationship** form.

One source field can be mapped to more than one target field. For example, a telephone number on the Account entity might be copied to more than one telephone number field on the Contact entity.

Each field of the target entity can only be used in one mapping to receive a value from a single source field. Because of this, the fields that are already configured in a mapping do not appear in the list of possible target fields.

Generate Mappings

If you have to map many fields between two entities, in the **Relationship** form, you can click **More Actions > Generate Mappings**. All fields that have matching field data types and schema names in both entities will be mapped, regardless of display names. Any mappings that are not required can be selected and deleted (you can hold down **Ctrl** while clicking to select multiple mappings at the same time). Fields that originated in solutions with different publishers will not be automatically mapped by this process because the prefixes are part of the schema name of the fields.

Field Mapping Restrictions

When you map fields, the following restrictions apply to the source and target fields:

- Both fields must be of the same data type.
- For text fields, the source field cannot be shorter than the target field. The length of each text field is shown in parentheses after the field type in the Create Field Mapping dialog box.
- For numeric fields, the range of possible values must be the same on both fields.
- A target field can only be involved in one field mapping.

If you try to add a mapping that does not meet these requirements, an error message is displayed, as shown in the “Invalid Field Map” figure.

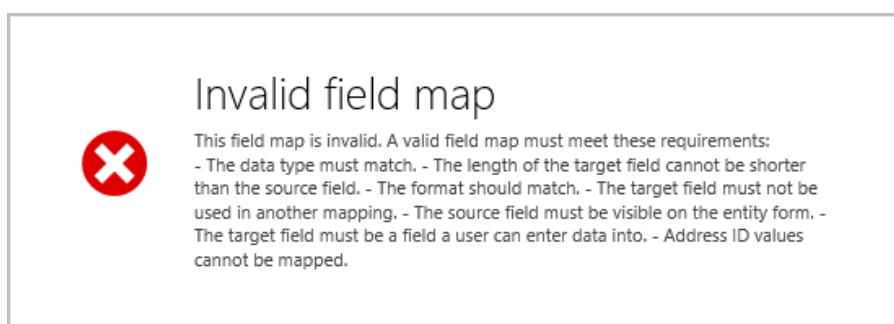


Figure 41 - Invalid Field Map

Mapping Option Set Fields

When you map option sets, you must especially consider the corresponding values of the options, as described in the “*Customizing Fields*” module.

Every option set option has an integer value and a corresponding text display value. Fields that use option sets only store the integer value in the database. Therefore, when these fields are mapped, the integer value is copied directly.

If the source field integer value is not an option in the target field’s option set, the value is discarded. If the source field integer value is in the target field’s option set, the value is copied, even if the text label for that integer value is completely different.

When you create a mapping between option set fields the system does not check the validity of your choices.

Best Practice: Before you map between option set fields, you must check that the same integer values are available in both option sets, and that the text labels have matching labels or equivalent meanings.

We recommend that you always use global option sets for all new option set fields where you have to map the fields in a 1:N relationship. This can help reduce administrative effort and the risk of error.

Lesson 5-5 Entity Hierarchies

You can gain valuable insights by visualizing your data as a hierarchy. For example, the following screenshot shows accounts displayed in Microsoft Dynamics CRM as a hierarchical visualisation.

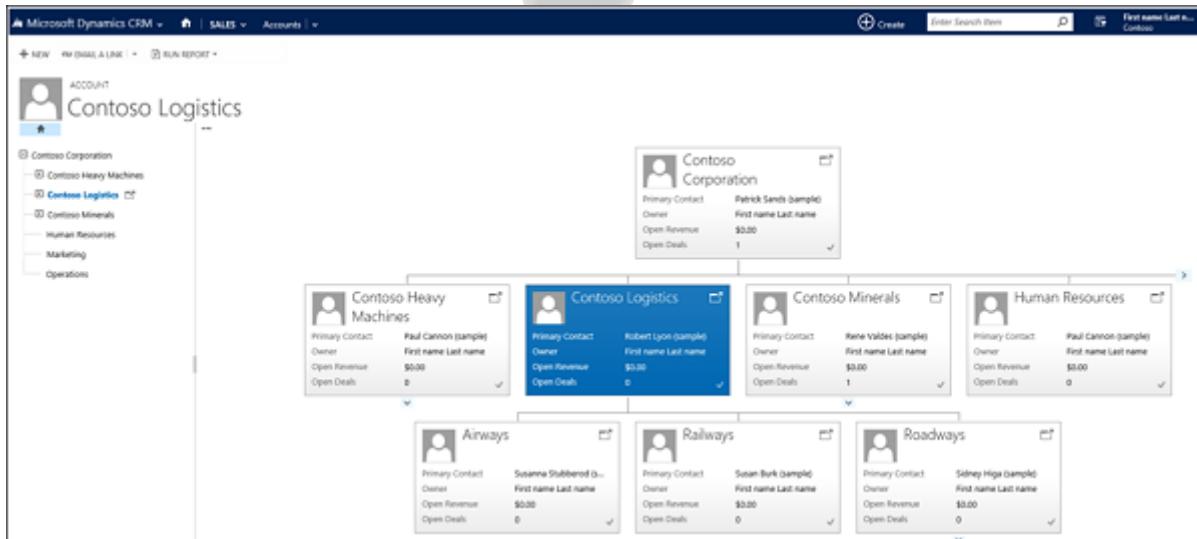
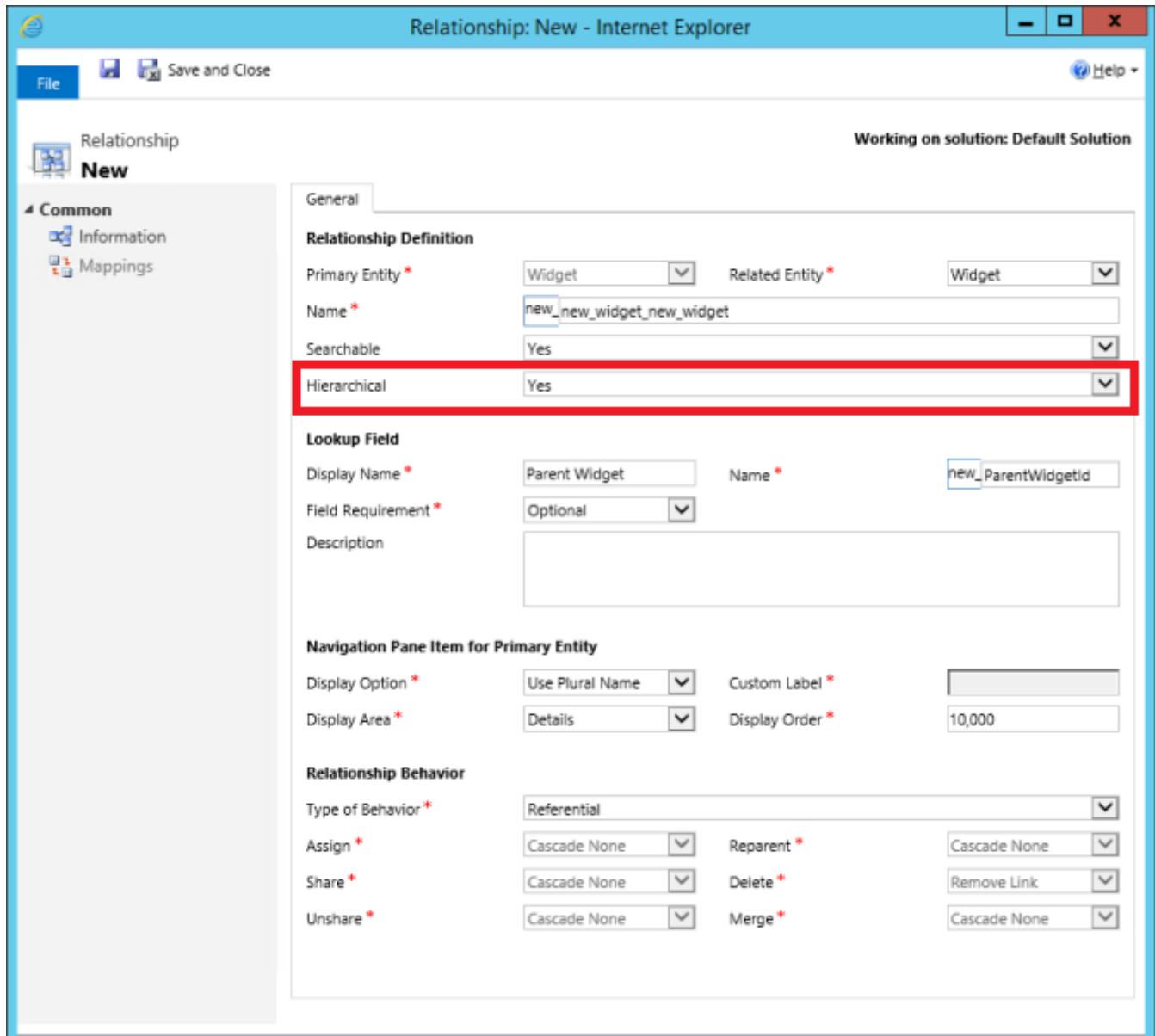


Figure 42 - Entity Hierarchy

Enabling Entity Hierarchy

For some entities, such as account and user, hierarchies are enabled by default. Other entities, including Case, Contact, Opportunity, Order, Quote, Campaign, and Team can be enabled for a hierarchy, and all custom entities can be enabled for a hierarchy.

To query the data as a hierarchy, you must set one of the entity's one-to-many (1:N) self-referential relationships as hierarchical, or if there is no such relationship, create a new self-referential 1:N relationship.



The screenshot shows the 'Relationship: New - Internet Explorer' window. The title bar says 'Relationship: New - Internet Explorer'. The top menu has 'File' and 'Save and Close'. On the right, it says 'Working on solution: Default Solution'. The left sidebar has 'Relationship' and 'New' selected, with 'Common' expanded, showing 'Information' and 'Mappings'. The main area has a tab 'General' selected. Under 'Relationship Definition', 'Primary Entity' is 'Widget' and 'Related Entity' is 'Widget'. 'Name' is 'new_new_widget_new_widget'. 'Searchable' is 'Yes'. 'Hierarchical' is 'Yes' (highlighted with a red border). Under 'Lookup Field', 'Display Name' is 'Parent Widget', 'Name' is 'new_ParentWidgetId', 'Field Requirement' is 'Optional', and 'Description' is empty. Under 'Navigation Pane Item for Primary Entity', 'Display Option' is 'Use Plural Name', 'Custom Label' is empty, 'Display Area' is 'Details', and 'Display Order' is '10,000'. Under 'Relationship Behavior', 'Type of Behavior' is 'Referential', 'Assign' is 'Cascade None', 'Reparent' is 'Cascade None', 'Share' is 'Cascade None', 'Delete' is 'Remove Link', 'Unshare' is 'Cascade None', and 'Merge' is 'Cascade None'.

Figure 43 - Setting Relationship to Hierarchical

To turn the hierarchy on for an entity:

1. Open a solution and add the entity
2. Create a self-referential 1:N relationship, if one does not exist
3. Create a Quick View form, if one does not exist
4. In the relationship definition, set Hierarchical to Yes. Save & Close.
5. Click on the Hierarchy Settings node of the entity

6. Click on New
7. In the Hierarchical Setting form enter the following:
 - (Schema) Name
 - Select the Quick View Form
 - Self-Referential 1:N Relationship to use
8. Save and Close
9. Publish

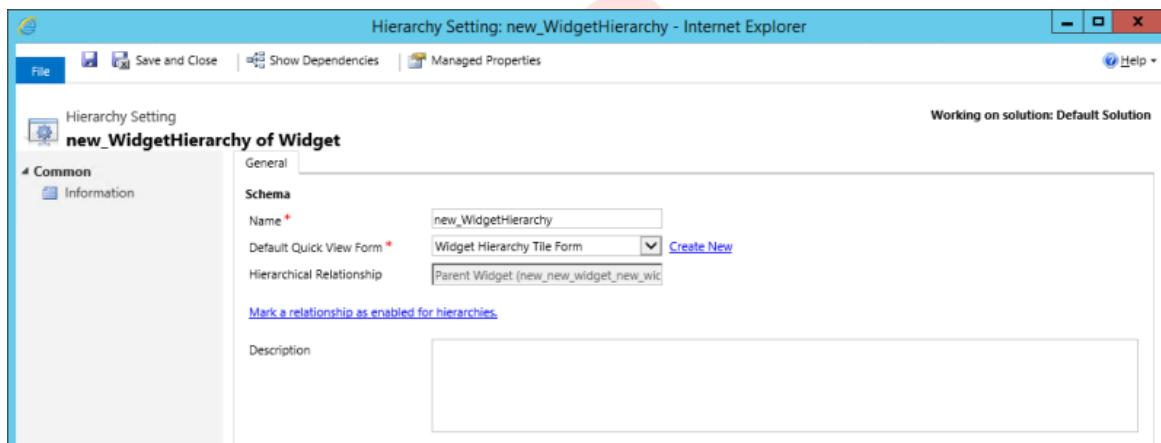


Figure 44 - Hierarchical Setting

Note: Only one (1: N) self-referential relationship per entity can be set as hierarchical.

Lesson 5-6 Connections and Connection Roles

In Microsoft Dynamics CRM, you can create a relationship between two entities. However, doing this requires planning and administrative effort. Users might have to create many associations between records to show the links between records without the cost or time that is required to customize the system for every possibility.

Connections are a way for users to record associations between almost any two records and provide additional information to describe how the records are linked to one another.

Connections

A user can add a Connection from one record to another record in the system of the same or a different entity. An entity must be configured to participate in Connections to be available for a user to add records of that entity on either side of the Connection record.

A single Contact might be connected to several other records. Some examples might include the following scenarios:

- Another Contact, connected as a family member or friend.
- An Account that the Contact used to work for.
- An Opportunity that the Contact referred to you.

- A Case that the Contact is resolving on your behalf as a contractor.
- A User in your organization who provides a particular service to the Contact, such as a healthcare professional.

For each Connection between two connected records, the user can select a Connection Role for each *party* (record at each side of the connection) to describe how the records are linked. When you install Microsoft Dynamics CRM, the system creates several general-purpose Connection Roles (these are records, not an Option Set). Examples include the following:

- Colleague
- Decision Maker
- Influencer
- Partner
- Stakeholder

Creating a Connection

From within one record, from the Command bar click **Connect**.

In the **New Connection** form, in the **Connect To** tab, select the *other* record by using the **Name** lookup field. Notice that you can select any supported entity in the lookup dialog box.

In the **As this role** lookup field lookup, select the appropriate Connection Role. Notice that the options will be filtered for the Connection Roles that are appropriate to the entity selected.

Expand the **Details** tab on the form. The original record is shown in the **Connected From** field. In the **As this role** lookup field lookup, you can select the appropriate Connection Role. Notice that the options will be filtered for Connection Roles that are appropriate to the entity selected *and* based on the Connection Role already selected. There might be only one option. If this is the case, the option is already completed.

If the Connection is or was only true for a fixed period, enter the start date and/or the end date. For example, if a Contact is connected as an employee to an Account as the employer, you can record the time period that the person worked for the company.

You can connect a record to yourself or another User to record several relationships beyond being the owner of a record. For entities that are configured to support Connections, you will find a view that is named **My Connections**. This view shows all records for the entity that is connected to your User account. This can be a convenient way to keep track of records that you are interested in without having to use a custom relationship.

The **My Connections** view shows how related Connections can be used to filter records. This method can be applied several ways such as to query information for a dashboard, or

to configure Microsoft Dynamics CRM for Microsoft Office Outlook filters to synchronize all connected Contacts (instead of, or as well as, synchronizing the Contacts that the user owns—this is the default filter).

Use of Connections in Dynamics CRM

Connections are also used for some built-in features of Microsoft Dynamics CRM 2015, such as the Stakeholders grid on an Opportunity, and Related Cases for a Service Case. Although these features provide a different way for a user to interact and add associated records here, these are stored as Connection records and can be viewed and queried the same way.

Connection Roles

You can create Connection Roles to describe the possible links between records in the Microsoft Dynamics CRM system, and deploy the Connection Roles to another Organization by using a Solution.

When you create Connection Roles, you can make the Connection Roles easier for people to use by restricting the Connection Roles to be used only with the entities that are appropriate. This means that for a specific Connection, there will be fewer options for the user to select.

You can also link Connection Roles to matching roles, to indicate that the roles belong together. When a user has selected a role for one of the records in a Connection, this reduces the options that are available for the other record.

In some cases, one Connection Role might have more than one matching role, such as mother and son *or* daughter.

Frequently, the Connection Role for one record will have only one matching role for the other record, such as former employee and former employer, doctor and patient. When this is the case, if you select one record this automatically uses the corresponding record if the other record has the correct entity type.

Some Connection Roles have no obvious matching role, and the user would rely on the context or record types to explain the relationship. A Contact could be a “supporter” of a product, an event, a competitor, and other types of record. You do not have to define the matching roles—the intention should be clear.

A Connection Role has a Connection Role Category property. This is an option set that you can modify, and is intended to simplify reporting and queries. For example, you could find all Connections a Contact has with any Connection Role in the Business category, or Family, without having to specify the roles individually.

Module 6 - Customising Forms

In Microsoft Dynamics CRM, forms are used to capture and display data. You can customize forms to modify their layout and behaviour. You can have multiple forms for each entity that support access from clients including browsers, Microsoft Outlook, Microsoft Dynamics CRM for Tablets and Microsoft Dynamics CRM for Phones. If you create multiple forms for an entity, you can assign Security Roles to each form to define the users that can access that form.

Objectives

The objectives are:

- Explore the structure of forms.
- Describe the different components that can be added to a form.
- Discover how forms can be copied and created.
- Investigate the benefits of *quick create* and *quick view* forms.
- Discover how forms can be made available to specific Security Roles.

Lesson 6-1 Form Customization Overview

Microsoft Dynamics CRM users create, read and update records by using forms. A form contains the components that a user can read or interact with, and controls how these components are arranged and displayed. The final layout of a form that is displayed to a user depends on how the form is structured. Microsoft Dynamics CRM 2015 uses a *responsive design* to change the presentation of a form according to the screen size of the device on which the form is displayed.

All system and custom entities have at least one main form and one mobile form. You can create more than one *main form* and more than one *mobile form*. The main form is used by the browser, the Outlook client, and the Microsoft Dynamics CRM for Tablets client. The mobile form is used by the Microsoft Dynamics CRM for Phones client. The tablet and phone clients are discussed in the “*Mobile Clients*” lesson later in this module.

Forms can be assigned to Security Roles to control the groups of Users or Teams that have access to use a specific form. The form that is displayed to a user is determined based on a combination of Security Roles that are assigned to the User and form order settings. Controlling access to forms is discussed in more detail in the “*Manage Multiple Forms*” lesson later in this module.

Note: If multiple forms are available to a user who accesses Microsoft Dynamics CRM from the web application or the Outlook client, then the user can choose a specific form by selecting from the forms list that is displayed on the upper-left corner of a record above the record name. Then, this same form will be used every time that the user opens a record for this entity, until the user signs out of the application or selects a different form.

Updated Entity Forms

Microsoft Dynamics CRM 2013 introduced several new features that are displayed through forms or that interact with the fields on forms. These features include Business Process Flows and Business Rules. The Microsoft Dynamics CRM for Tablets client also uses forms, and users can access Microsoft Dynamics CRM from several client devices. Microsoft Dynamics CRM 2015 forms includes support for the new features, enables the Microsoft Dynamics CRM for Tablets application, and provides a responsive design that delivers the best experience to users who have many devices and screen sizes.

Microsoft Dynamics CRM 2015 includes an update to the most frequently customized system entities. These *updated entities* and all custom entities display forms by using a new presentation that displays a command bar (instead of a ribbon or toolbar), and provides a responsive design. Updated entities that are enabled for the Microsoft Dynamics CRM for Tablets client, share the same main forms as the browser client. You can design a form one time and use the form on different client platforms.

Other system entities keep the form presentation that is used in earlier versions of Microsoft Dynamics CRM. These forms are sometimes known as *classic forms*. Classic forms display a toolbar or ribbon instead of the new command bar, and do not provide support for new features, such as Business Process Flows and Business Rules. Entities that still use the classic forms include Article, Connection, Price List and Quote Product.

Typically, most customization work involves the updated entities and custom entities. The same form editor tool is used for to configure the main forms for the updated system entities, custom entities and entities that use the classic forms. The form editor disables features that are not available for the form or the entity that you are modifying.

Forms Upgraded from earlier versions of Dynamics CRM

If an organization upgrades from an earlier version of Microsoft Dynamics CRM, some forms that were already in the system will be upgraded. Depending on the platform that is being used (Microsoft Dynamics CRM 2015 on-premises or Microsoft Dynamics CRM Online), forms might be upgraded, or new forms might be added alongside your existing forms in an active or inactive state.

Merge Forms

If new forms are added for the updated entities, you can click **Merge Forms** on the form editor ribbon for a new form to bring in all the components from a previous form. You can then drag the copied components to where you want them on the new form or remove any components that are not required. This lets you use the new forms and features and easily bring the old customizations into the new forms.

Structure of a Form

A form is made up of three main areas - the form header, footer and body.

Header and Footer

The header and footer sections display fields at the top and bottom of the form. The header and footer are displayed in a fixed position in the window, even when a user scrolls

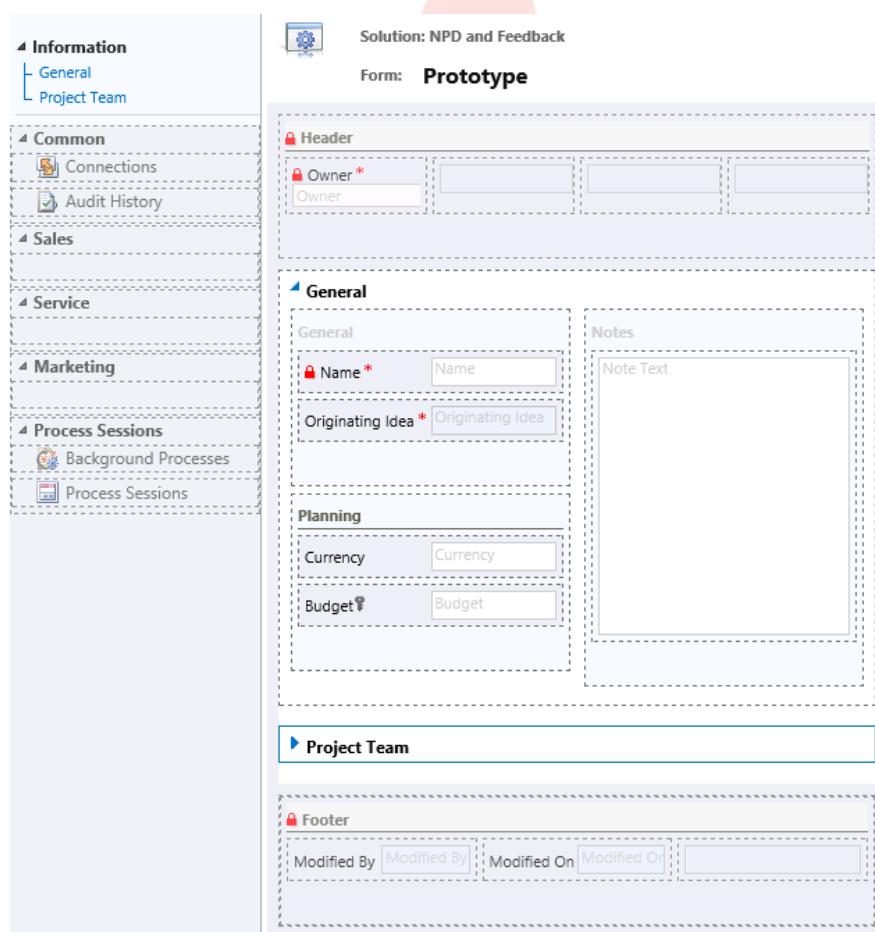
through the form. The header and footer cannot be removed, although you do not have to add any components to them.

Fields in the header are displayed as *tiles*, and users can update the values in these fields. Fields in the footer are always read-only.

You can also display Web Resources, such as graphics in the header or footer.

Structure of the Form Body

The body of a form contains one or more tabs. Each tab is divided into columns. Each column contains one or more sections.



The screenshot shows the Microsoft Dynamics CRM Form Structure Editor. The left pane displays a navigation tree with categories like Information, General, Project Team, Common, Sales, Service, Marketing, and Process Sessions. The right pane shows the form structure. At the top, it says "Solution: NPD and Feedback" and "Form: Prototype". The form is divided into sections: Header, Body, and Footer. The Body section contains a General tab with two columns: General (containing Name and Originating Idea) and Notes (containing Note Text). The Notes section includes a Social Pane. The Footer section contains Modified By, Modified On, and Modified On fields.

Figure 45 - Form Structure

The **Information** form for the **Prototype** entity is shown in the “Form Structure” figure. The **Header** and **Footer** areas are shown, and between these areas is the form body (not labeled). In the form body is the **General** tab that contains two columns. The left column contains two sections that are labeled **General** and **Notes**. The **General** section contains the **Name** and **Originating Idea** fields. The right column contains the **Notes** section, and this section contains the Notes control (also known as the *Social Pane*).

Except for fields, all elements are added to a form by using buttons on the **Insert** tab of the ribbon, shown in the “Form Editor Ribbon - Insert Tab” figure.

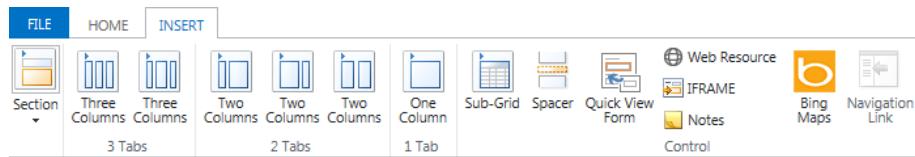


Figure 46 - Form Editor Ribbon - Insert Tab

Tabs

A form can contain one or more tabs. Each tab can have a label that is shown on the form and has other properties that control its appearance and the layout of its contents.

In the web browser client, tabs are arranged vertically down the form, and each tab fills the width of the screen. Therefore, users have to scroll up and down the screen to be able to view the tabs that are off-screen.

Each tab contains columns. On the **Insert** tab of the ribbon, you can select from tab layouts of one, two or three columns in several relative widths.

You can modify an existing tab by double-clicking the tab in the form editor, or clicking the **Home** tab on the ribbon and then clicking the **Change Properties** button. The **Tab Properties** dialog box is displayed as shown in the “**Tab Properties - Display Tab**” figure.

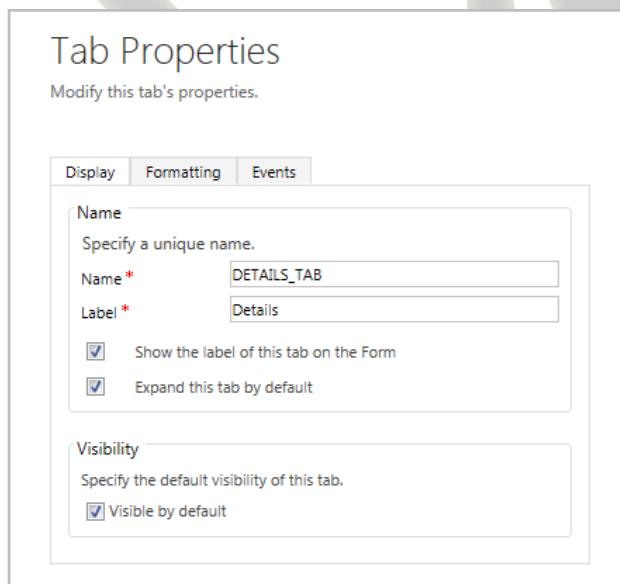


Figure 47 - Tab Properties - Display Tab

On the **Display** tab of the **Tab Properties** dialog box, you can configure the properties that are described in the following table.

Property	Description
Name	The name of the tab. Developers can add JavaScript code to Microsoft Dynamics CRM to customize the user experience in various ways, such as dynamically changing the layout of a form by expanding, collapsing or hiding tabs. In such scripts, the tab is referred to by the Name property here.

Property	Description
Label	This appears on the form as a label at the top of the tab.
Show the label of this tab on the Form	Select this check box if the label that is defined in the Label field will appear on the form. If this box is cleared no label will appear.
Expand this tab by default	Clear this box if the tab must appear collapsed (fields and sections hidden) on the form. The user must expand the tab by clicking a button. This is useful if the data that is contained in the tab is only important to a small group of users, especially if the tab contains Web Resources or IFrames that might take a long time to retrieve data,
Visible by default	Select this check box to display the tab on the form. If this box is cleared the tab will not be displayed. However, a JavaScript function could be used to make it visible.

The **Formatting** tab of the **Tab Properties** dialog box controls the formatting and layout of the tab on the form, as shown in the “Tab Properties - Formatting Tab” figure. Although the ribbon provides buttons that are used to insert Tabs that have a different number of columns in the predefined layouts, you can modify the layout later. You can configure the width of each column as a percentage of the width of the tab.



Figure 48 - Tab Properties - Formatting Tab

When you use forms for updated entities and custom entities in the browser or Outlook client, each tab is displayed depending on the width of the browser window. This is known as *responsive design* of a web application.

For example, the first tab on the default **Account** form is the **Summary** tab and this tab has three columns. When the **Account** form is displayed by a user who has a high resolution screen, the three columns in the **Summary** tab are shown side by side. Another user might have a slightly narrower screen, or prefer not to maximize the browser window. Although the user can still view the three columns, each column will be narrower so that the columns can fit in the available space and the user can avoid having to scroll horizontally. The columns respond to the size of the display, and keep the same proportions they had previously.

If the form is displayed on an even narrower screen, such as on a small laptop, or in a browser on a tablet device that is held in portrait mode, the third column is displayed below the other two columns. These two columns expand to share the full width of the screen. This continues as the screen width becomes smaller, until all columns are in a single vertical display.

Note: In the Microsoft Dynamics CRM for Tablets client, tabs are arranged horizontally. Users swipe the viewport left and right to view different parts of the form instead of scrolling vertically as they do in the browser and Outlook clients. This is discussed in more detail in the “Mobile Clients” lesson.

On the **Events** tab of the **Tab Properties** dialog box, you can add a JavaScript function to the **TabStateChange** event that is triggered when a user expands or collapses a tab.

Sections

Each section in a tab column can have a label that is shown on the form. Additionally, each section in a tab column also has other properties that control the layout of the components in the section.

The sections contain the interactive components of a form that can include a combination of the following:

- Fields
- Sub-grids
- Charts
- Notes control (also known as the *Social Pane*)
- IFrames
- Web Resources
- Bing maps
- Spacers

Some components, such as fields, are used for data entry and display. Other components are used only to display information. Sections can include one through four columns. The columns always evenly divide the width of the tab column in which the section is located.

For example, a tab might have two columns, configured so that the left side column uses 60 percent of the screen width, and the right side column uses 40 percent. A three-column section in the left tab column would be divided evenly into thirds, equal to 20 percent of the overall screen width for each section column. The right side tab column might have a single-column section, or it might have a four-column section. The columns of a section are independent of other sections in the tab, or the number of columns in the tab.

Components in a section can span one or more columns, up to the number of columns that the section has.

Best Practice: Because of the responsive design of Microsoft Dynamics CRM 2015, we recommend that you use tabs that have multiple columns that each contain one-column sections, instead of tabs that have one column that contain multiple-column sections. Tab columns will be moved down as necessary in a smaller window, whereas section columns become narrower.

For a specific combination of components, you might have to have some components span more than one section column, whereas other components use only one column. In this scenario, you can use a section with more than one column. However, you should consider how this affects the layout at different sizes.

To access the properties of a section, double-click the section, or select the section, click the **Home** tab on the ribbon, and then click **Change Properties**. Many of the properties on this page are the same as the properties for tabs and fields. The only unique property is the width that lets you configure the width of the label for all fields in this section to a specific number of pixels.

Section Properties

Modify this section's properties.

Display Formatting

Name
Specify a unique name.

Name *

Label *

Show the label of this section on the Form

Show a line at top of the section

Field Label Width
Specify the width of the field label area in pixels.

Width *

Visibility
Specify the default visibility of this section.

Visible by default

Lock the section on the Form

Figure 49 - Section Properties - Display tab

You can configure the format of the section in the **Formatting** tab of the **Section Properties** dialog box.

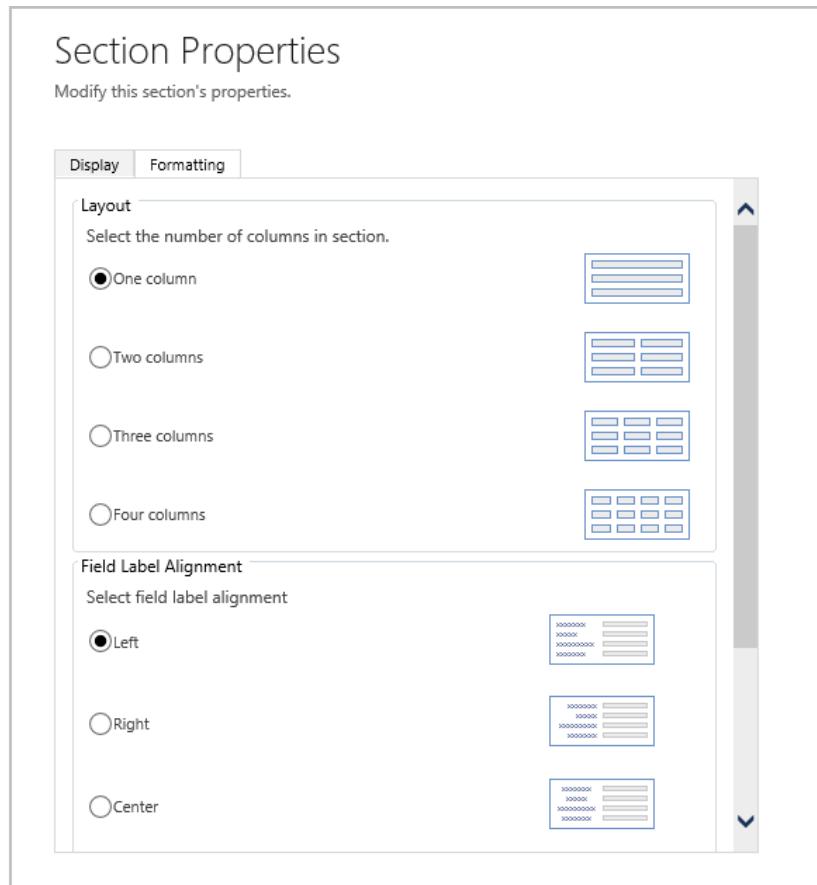


Figure 50 - Section Properties - Formatting Tab

You can configure the following three properties on the **Formatting** tab:

Property	Description
Layout	The number of columns that the section has. Regardless of how many columns there are in the tab, each section in that tab can be divided into one, two, three or four equally-sized columns.
Field Layout Alignment	The alignment of text in field labels - left, right, or center.
Field Label Position	The position of field labels in the section - to the left side of or above the corresponding field control.

To remove a tab or section, select the item to remove, press **Delete** on the keyboard, or click the **Home** tab on the ribbon, and then click **Remove**. When you remove a tab, this removes all the sections in the tab. When you remove a section, this removes all the components in the section. An **Undo** button is provided on the ribbon.

Note: You cannot remove a field that is Business Required or System Required, or that is locked on the form, or has script or non-script dependencies associated with the field. All

these cases are indicated by a red padlock icon displayed next to the field name in the form editor.

If you try to remove a section that contains a field that matches one of these criteria, the action will fail. You must move the locked fields elsewhere on the form first. Or, consider configuring the section not to be **Visible by default**.

Form Properties

When you click the **Form Properties** button on the ribbon the **Form Properties** dialog box is displayed. This dialog box lets you configure options that are related to the form and its behaviour.

On the **Events** tab of the **Form Properties** dialog box, you can link script libraries (saved as Web Resources) to the form. This lets developers add custom logic to the form by configuring functions from the attached libraries to be run based on events such as **OnLoad** (when a record is opened or created by using this form) or **OnSave** (when a record is saved by using this form). Writing JavaScript functions is not part of the scope for this course.

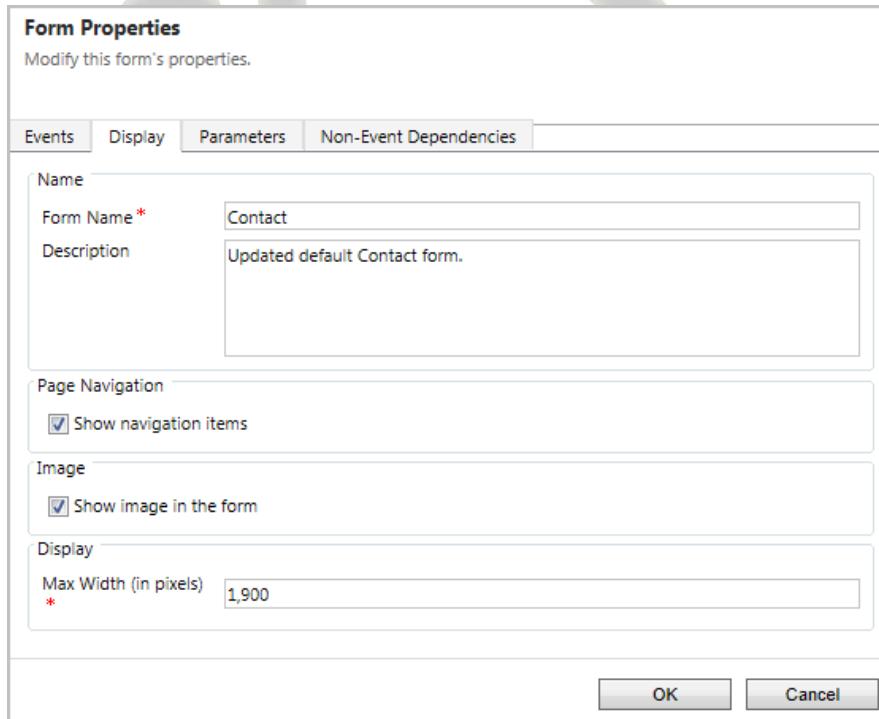


Figure 51 - Form Properties - Display Tab

The properties on the **Display** tab, shown in the “Form Properties - Display Tab” figure, are described in the following table:

Option	Description
Form name	You must provide a Name for each form. If you create multiple forms for an entity, we recommend that you give each form a unique and descriptive name, for example Managers Form. The name of the form that is being used appears at the upper-left side of the form above the record name.
Description	A description for how the form is used.

Option	Description
Show navigation items	When a record is opened by using this form and this option is checked, the navigation bar will display a list of related entities.
Show image in form	If the entity has an image field, and the entity property Primary Image is configured to use that field, an image placeholder will be displayed at the upper-left side of the form if this box is checked. A user can click this image placeholder, to begin the process of uploading an image file to be displayed for that record.
Max Width (in pixels)	The maximum width of the form on the screen. Forms are rendered by using a responsive design to suit the screen the form is displayed on. On screens that are wider than the Max Width property, the form will remain at the maximum width and not expand. The default value for new forms is 1900 pixels.

On the **Parameters** tab, you can add string parameters so that data can be passed to the form. This can be used when a form is opened programmatically instead of through the usual user interface (UI) methods, for example from a custom button on the command bar. The parameters that are passed to the form in this manner can be used to set default values for fields, or the parameters can be read by and used in scripts that are running on the form that is opened.

The **Non-Event Dependencies** tab lets you specify if any fields are required by non-event scripts. This includes the fields that are used in scripts that are started from a custom button on the command bar, or scripts that run inside an IFrame or HTML Web Resource on the form. Any fields that are marked as dependent cannot be removed from the form until the fields are removed from the **Dependent fields** section of this tab.

Lesson 6-2 Create and Modify Forms

You can add several components to sections of a form. This includes fields and sub-grids and special controls, such as the Notes control, Web Resources and Iframes.

Create or Modify a Form

To create a new form for an entity, follow these steps.

1. Navigate to Settings > Solutions.
2. Expand Entities, expand the entity that you want to customize, and then click Forms.
3. Click the New button in the toolbar.
4. From the drop-down menu that appears, select the type of form that you want to create.
5. When you are finished editing the form, click Save and Close.

If you click **Save** or **Save and Close**, the form will be saved with the name “New Form.” To rename a form, click **Form Properties** on the ribbon, change the name in the **Form Properties** dialog box, and then save the changes.

When you create a new form, instead of having to create a completely blank template, the system will create a copy of the form that is the highest in the form order. Or, you can create a new form of your choice by opening an existing form and then clicking **Save As**. By doing this, you create a copy of the form with a new name.

The new form appears in the list of forms and can be customized in the same manner as all other forms.

If you have a record open, you can modify the current form directly. On the command bar, click **More Commands**, and then click **Form** or **Form Editor** (the option might be labeled differently, depending on context). This opens the form editor for the current form in the context of the Default Solution. Therefore, when you edit the form, you should consider this carefully if you want to add a new field, because the field prefix might differ from the prefix used by the Publisher of any custom Solution.

Fields

All fields for an entity appear in the Field Explorer at the right side of the form editor. You can select to filter for **All Fields** (the default) or **Custom Fields**, and in either case to **Only show unused fields**. To position a field on a form, drag the field from the Field Explorer to the required location. A red line will appear on the form that shows where the field will be positioned.

You can create a new field directly from the form editor by clicking the **New Field** button at the bottom of the Field Explorer.

Note: When you customize system entity forms, there might be many system fields that are listed in the Field Explorer that are not used in the organization. When you change the filters to **Custom Fields** and **Only show unused fields**, this helps identify the fields that you are likely to need on at least one form.

You can change the properties of an existing field on a form by double-clicking the field. Or, you can select the field, and then click the **Home** tab on the ribbon, and then click **Change Properties**. The **Field Properties** dialog box is displayed as shown in the “Field Properties - Display Tab” figure.

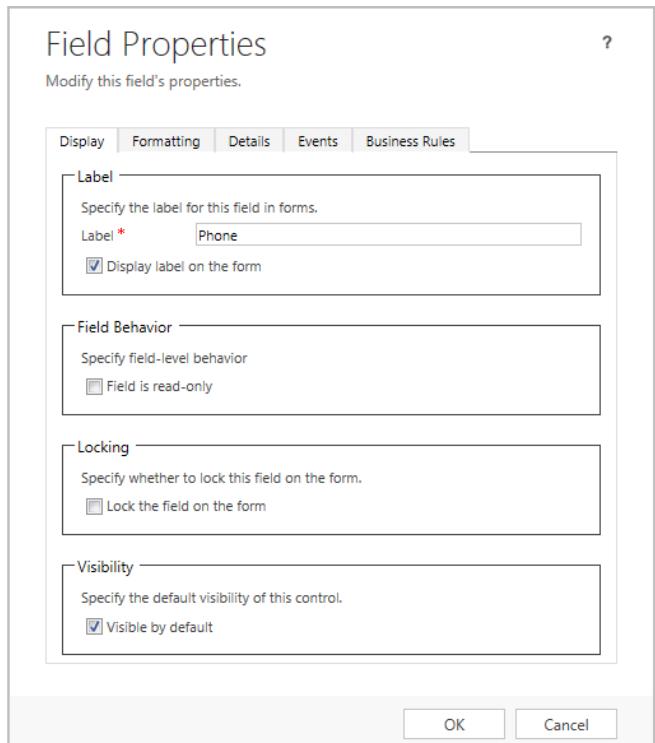


Figure 52 - Field Properties - Display Tab

On the **Display** tab, the following options can be configured:

Option	Description
Label	The label that appears next to the control on the form. By default, the Display Name of the field is used. Note: If you change the field label on the form, and then later change the display name of the field, the label on the form remains unchanged. If the labels on fields are long, the end of the label will be displayed as “fading out” at the right side.
Display label on the form	Clear this box if the label must not be displayed.
Field is read-only	Check this box if the field must be read-only. A read-only field appears dimmed (unavailable) on the form when you view a record. Be aware that Business Rules and JavaScript functions can modify the read-only property of a field. Business Rules are discussed in more detail in the “Business Rules” module.
Lock the field on the form	Check this box if the field must not be removed from the form. A locked field can be removed by accessing the field properties and unchecking this box before removing the field.
Visible by default	Clear this box if the field must not appear on the form when it is first opened. Frequently, this is applied to the fields that users do not have to view but that are used by JavaScript functions on the form, to store a calculated value for example, or to update a date field to record when a specific status is reached. A JavaScript function or Business Rule can be used to programmatically show or hide a field.

On the **Formatting** tab of the **Field Properties** dialog box, you can select how many section columns a field should span, from one through four.

You can view the properties of the underlying field definition on the **Details** tab of the **Field Properties** dialog box. The properties displayed here are read-only. To modify the field, you can click the **Edit** button to open the field definition form.

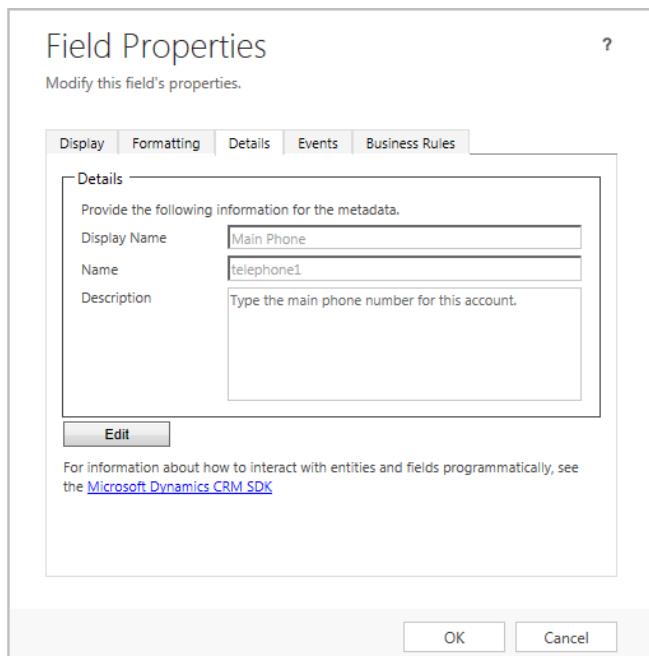


Figure 53 - Field Properties - Details Tab

You can add JavaScript functions to the **OnChange** event for a field on the **Events** tab of the **Field Properties** dialog box. On the **Business Rules** tab, you can view, add or modify Business Rules that involve this field.

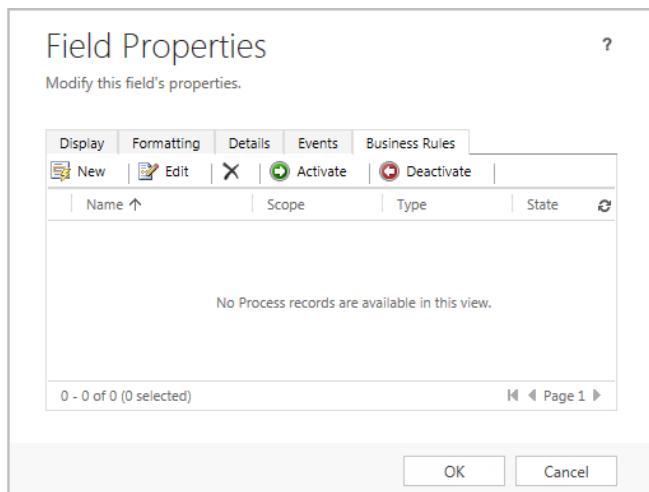


Figure 54 -Field Properties - Business Rules Tab

Business Rules are discussed in the “*Business Rules*” module.

To remove a field from a form, select the field and press **Delete**, or select the field, click the **Home** tab on the ribbon, and then click **Remove**.

Composite Fields

Microsoft Dynamics CRM 2013 introduced a new predefined field type for some system entities that is known as a *composite field*. You cannot modify the behaviour of a composite field or add a new composite field. However, you can select whether to use a composite field in your forms or views.

A composite field concatenates the values of multiple text fields together as one text field in the database. You can add a composite field to a form as you would add any other field. The composite field is displayed on the form as a single control that shows the primary fields in a *flyout* when it is clicked. Many composite fields are already included on the forms for their entities.

For example, the **Contact Full Name** field appears on a form as a single field. However, when the user clicks the field, a flyout appears next to the field that asks the user for the **First Name**, **Middle Name** and **Last Name** fields separately. When these fields are completed, the user clicks **Done** and the completed field is displayed as a single control again. In another example, the **Account Address 1** field can be displayed as a single field that will ask the user for seven separate fields from **Street 1** through **Country/Region** when the user clicks the **Address 1** field.

This approach uses much less space on a form than separate fields and can be easier to read as one item. You can add composite fields to views and forms.

If one or more of the fields that are used in a composite field is set to a field requirement level of **Business Required**, the composite field will be displayed as required on a record form (using a red asterisk to remind the user). This forces the user to provide a value for the composite field, and when the user clicks the composite field, the flyout will indicate the individual fields that are required.

Composite *address* fields always have a name with the suffix “_composite”, for example **address1_composite** or **shipto_composite**. The **fullname** composite field on Contact, Lead and User has no suffix in the field name.

Note: Not all system entities that have addresses use composite fields. For example, Account, Contact, Lead, Quote, Order, Invoice and User all have two composite address fields. The Business Unit entity has no composite address field, and the address fields on Business Units can only be used as individual fields on a form or view.

Filtered Lookups

On Lookup fields there additional section for Related Record Filtering

The section titled **Related Records Filtering** on the Field Properties dialog allows you to determine which of the related records will be presented in the lookup dialog. You can define the filter to compare fields from the two entities concerned in the lookup that contain references the same type of entity. In the Price List lookup on the account form, the filter is set to show only those price lists that are defined in the same currency as the

currency that is set for the account. You could change that to show only those price lists that were created by the account owner. The options that are presented depend on the defined relationships in the two entities.

Because there is a relationship between Account and Contact and a relationship between Price List and Contact, you can choose to filter the lookup based on the Contact field in the Account, matching with any Contact that is related to the price list.

The form also includes check boxes for turning on filtering and for allowing the form user to turn off the filter when he or she is in the lookup dialog.

Sub-grids

A sub-grid displays data from other records on a form. The records are usually from another entity, and typically the records are related to the record in the main form. The sub-grid displays data that is based on the records that are returned by a view. The records are displayed as a list or a chart, but not both together. Users can open records that are shown in a list and add new records of the same type.

To add a new sub-grid, select the section in which you want the subgrid to appear, and then on the **Insert** tab of the ribbon, click the **Sub-Grid** button. The sub-grid can be configured through the list or chart **Set Properties** dialog box.

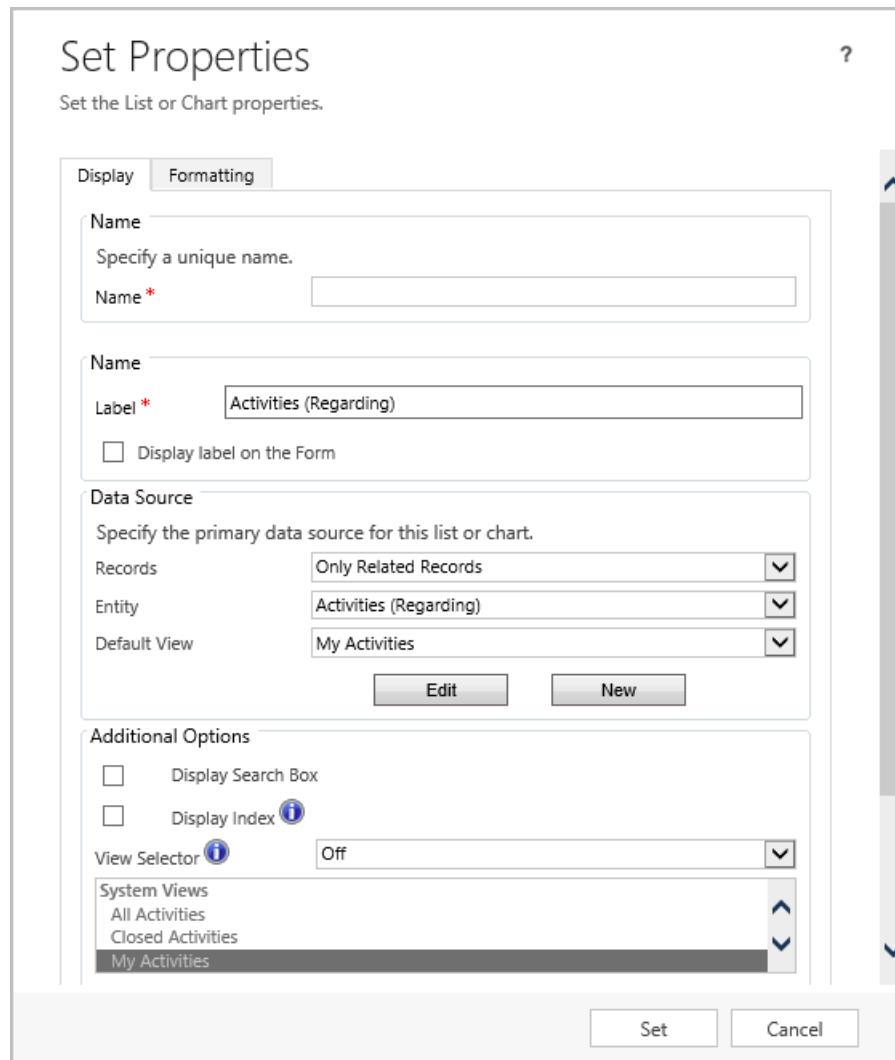


Figure 55 - Sub-grid Properties - Display Tab

On the Display page of the sub-grid properties the following options are set:

Option	Description
Name	You must specify a name for the sub-grid that is unique on the form. The name must be alphanumeric and it cannot contain spaces. However, the name can contain underscores.
Label	A label that describes what is shown in the sub-grid.
Display label on the Form	This determines whether the label appears on the form. We recommend that you always select this option to display the label. If the view selector and the search box are both disabled, the label is displayed on the form at the top of the list. If either the view selector or the search box is enabled, this option will automatically be selected and unavailable to be changed. Then, instead of the label being visible on the form, the label is displayed as an infotip when the user points to the top of the list next to the view selector or search box.
Records	Select All Record Types or Only Related Records.
Entity	Depending on the setting of the Records option, the entity list displays all

Option	Description
	entities in the system or all related entities. For 1:N relationships the list shows the related entity and the name of the lookup field that connects the related entity to the form entity. N:N relationships show only the entity name. An entity can appear more than once if more than one relationship exists with the form entity.
Default View	Select from the list of public views for the selected entity. The view that you select here will be used when the list is first displayed.
Edit and New buttons	These refer to the views and will let you create a new public view for the entity in the entity list, or edit the selected view.
Display Search Box	When this option is selected, the sub-grid displays a search box. This is useful if you are displaying a sub-grid that can have many records. Note: The search returns records from the Quick Find view regardless of the view that is used for the list.
Display Index	This option enables the display of a list of letters at the bottom of the list area. Clicking a letter filters the list for records that begin with this letter in the column that is first in the sort order. If the sub-grid is too narrow to display the index correctly, it will not be displayed. (This is not supported in updated entity forms - refer to the note at the bottom of the table.)
View Selector	This option has three settings: Off, Show All Views, and Show Selected Views. <ul style="list-style-type: none"> • Off - Always uses the Default View. • Show All Views - Displays all System views for the user to select from. • Show Selected Views - Displays only those views that you select in the list. Note: The Default View is always included in the selection.
Default Chart	This lets you select from the lists of charts that are defined for the entity. The chart will show data for all the records that are returned by the selected view. This option has no effect unless Show Chart Only is selected. More detailed information about charts is provided in the “Customizing Charts and Dashboards” module.
Show Chart Only	This removes the list from the grid and displays only the selected chart. Note: Users cannot perform “drill-down” functions for the charts that are on forms as they can on Dashboards.
Display Chart Selection	If Show Chart Only is selected, the Display Chart Selection option causes the chart selection list to appear at the top of the chart.

Note: Lists are an easy way to view records within a form. To reduce visual distractions, some features that are found in earlier versions of Microsoft Dynamics CRM are no longer available to use directly in a list that is added to an updated entity form. Instead, you can click the icon at the top of the list to display the records in a full view in a separate window. Then, in this view, you can use the index, chart pane and other features as usual.

Notes Control

The Notes control can be added to a form to display Notes, Posts (sometimes known as *activity feed posts*), and Activities in a single component, by using tabs to display one area at a time. These three tabs can be seen in the Notes control shown on the right side of the “Account Form with Notes Control” figure.

Figure 56 - Account Form with Notes Control

Users can view Posts in the Notes control and select a filter to view only automatic system-generated Posts, or only Posts that are added by other users, or both. Posts are always displayed in date and time order with the latest Post at the top of the pane.

Automatic system posts are generated when records are created and for some status changes, for example when an Opportunity is won or a Case is resolved. You can configure rules to create Posts in this manner, or you can use Workflows to perform this function. A detailed discussion about how to configure automatic Posts is not part of the scope for this course. Users can also add to the “conversation” by typing in the **Enter Post here** box at the top of the Notes control.

You can create “inline” Notes and Activities in simplified versions of their forms. You can also read in a continuous scrolling pane what is occurring to a record much faster and more easily than having to open multiple related records.

Activities can be marked as complete or cancelled from the Notes control. If an activity is too long to be displayed in the short version of the form the activity can be expanded to show more information. If an activity entity has custom fields, these fields are not displayed in the inline form in the Notes control. Instead, you must click to open the activity in a new window.

Note: In the form editor ribbon, the button to add this component is labeled **Notes** and in the XML for the form, the component is named **notescontrol**. When you open the properties of the component, the **Activities Tab Properties** dialog box is displayed. These

different terms refer to the same component. Therefore, it is useful for system customizers to be aware of the terms to avoid confusion. We recommend that you use the term **Social Pane** in end-user documentation and training, unless you use the Notes control only for Notes.

If you enable an entity for Notes before you save the entity, the Notes control is added to the default forms that are created for you by the system. If you enable an entity for Notes later, or you have removed the Notes control from the form earlier, then to add the Notes control to a form, follow these steps.

1. Select the section in which to show the control.
2. Click the **Insert** tab on the ribbon.
3. Click **Notes**.
4. Double-click the Notes control on the form (labeled **Note Text** on screen).
5. In the **Activities Tab Properties** dialog box, on the **Display** tab, in the **Tab** list, select **Activities, Posts or Notes** to be the tab of the control that is displayed by default when a record is opened.
6. On the **Formatting** tab, select the columns the control should span, and enter the number of rows that the control should occupy.
7. Click **Save and Close**.
8. **Publish** the form.

Note: You can only add the Notes control to a form once. The button on the Insert ribbon will be unavailable if you already have the control on the form, or if the entity property for Notes is not enabled.

Other Components

Other components that can be added to sections on a form include spacers, quick view forms, Web Resources, IFrames, and Bing Maps.

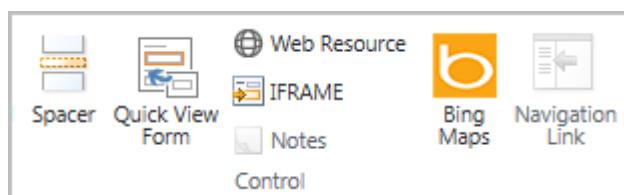


Figure 57 - Additional Form Components

Spacer

A **Spacer** is a blank area that uses the space that a field would occupy in a section. You can use a spacer to modify the layout of the fields in a section to alter the way the fields are arranged to be more intuitive or logical. For example, in the “Form Section with Spacer” figure, the spacer is forcing the fields in the column on the right side to move down to align with those in the left column. The field at the top of the left side column

has a different purpose than the other fields and is being made to stand out here. (This field is an option set and the other fields are all bit fields.) Without the spacer, the fields on the right side column would be displayed at the top of the section.

A spacer appears in the form editor as a gray block with the word "Spacer" displayed. You can modify the position of a spacer the same as a field by dragging with the mouse or by pressing the arrow keys. You cannot change the size of a spacer to span multiple columns, instead you must add a spacer to each column in which you want the spacer to appear.

When the form is used, the spacer is displayed as a blank area in the form section and is not visible to users.

You can remove a spacer by selecting it in the form editor and then clicking the **Remove** button on the ribbon or pressing the **Delete** key.

Quick View Forms

A quick view form displays the details of a parent record in the form of a child record in a read-only format for convenient reference. For example, on a Contact form, you could add a quick view form from the Account entity to show some details of the company where the Contact works, such as the **Account Number**, **Address**, and **Website** fields.

Quick view forms are discussed in more detail in the “*Quick View Forms*” topic later in this module.

Web Resources

Web Resources are Solution components that store different types of data to be reused from different parts of the system. Some types of Web Resource can be included on a form. Form-enabled Web Resources include graphics, HTML, and Silverlight resources.

When you add a Web Resource to a form, you can configure the behavior of the control through the properties dialog box. Many of the properties are the same as for other components to define the name, label and formatting of the Web Resource. You can also specify any custom parameter data that should be passed to the Web Resource (for scripts or HTML pages), in addition to Alternative Text that is displayed as an infotip when the user points to the component on the form.

If the Web Resource is a graphic, additional formatting options are available to configure the Vertical and Horizontal Alignment, in addition to configuring the size of the graphic in the control.

Inline Frames (IFrames)

An IFrame is a control that displays a webpage that is defined as the target URL for the IFrame. By putting an IFrame on a form, you can display data in Microsoft Dynamics CRM from any website that users have access to.

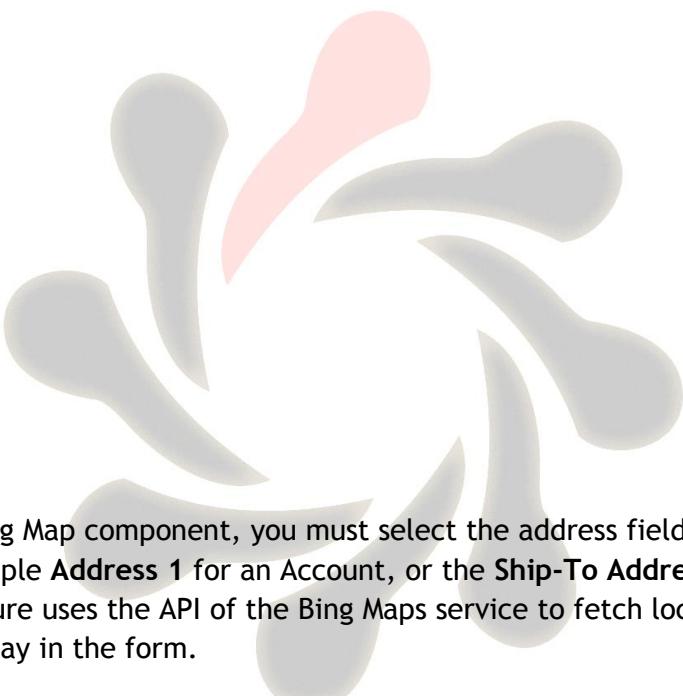
The URL that is used by an IFrame can be set programmatically by using JavaScript. For example, an IFrame on an Account form could be used to display the website for the account, by using the value in the **Website** field as the URL for the IFrame. You can also

display reports from SQL Server Reporting Services (SSRS) in an IFrame. However, how to configure the system to display reports from SSRS in an IFrame is not part of the scope for this course.

Bing Maps

A Bing Map can be added to a form to display the location of the address of the record. Bing Maps can only be added to the forms of system entities that have a composite address field. The system entities that can display Bing Maps on forms, include the following:

- Account
- Contact
- Lead
- User
- Quote
- Order
- Invoice
- Competitor



When you add a Bing Map component, you must select the address field that will be displayed, for example **Address 1** for an Account, or the **Ship-To Address** for an Order. The Bing Maps feature uses the API of the Bing Maps service to fetch location and mapping information to display in the form.

For customers who use Microsoft Dynamics CRM Online, a connection to this service is included in the User Subscription License (USL) and no configuration is required to use the feature.

For on-premises deployments, you must sign in to the Bing Maps Portal and create an API key. Depending on the size of the deployment, the type of organization that you work for (private sector, education, or government, for example), and whether you have other license agreements with Microsoft that include your use of the service, there might be an additional cost for this service.

To enable this feature in an on-premises deployment, you must follow these steps.

1. Obtain a Bing Maps API key from the [Bing Maps Portal](#).
2. Open Microsoft Dynamics CRM.
3. In the navigation bar, click Microsoft Dynamics CRM > Settings > Administration.
4. Click System Settings.
5. On the **General** tab, scroll to the **Enable Bing Maps** section.

6. In the Show Bing Maps on forms section, click Yes.
7. In the Please enter Bing Maps key field, enter your Bing Maps API key.
8. Click OK. Bing Maps can now be added to forms for the enabled system entities.

Modify Related Entity Navigation

When an entity has relationships to other entities, users can click the drop-down arrow to the right side of the record name in the navigation bar to view links to these related entities. The “Related Entity Navigation from an Account Record” figure shows the navigation bar above an Account record form. Notice that the custom Venue and Event entities have been moved to appear near to the left side of this navigation bar.

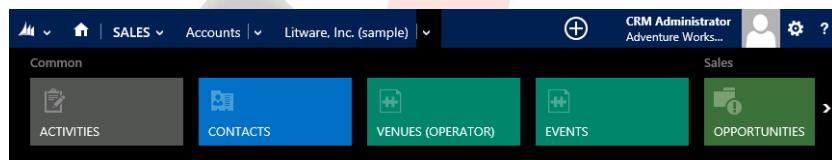


Figure 58 -Related Entity Navigation from an Account Record

In the form editor, you can modify the order in which the related entities are displayed and how the related entities are grouped. The “Modifying Related Entity Navigation” figure shows the navigation area that is displayed on the left side of the form editor. Related entities are displayed here in a vertical column. You can drag entity links to a new position or to a different group.

The five groups in the navigation area can be renamed. However, the five groups cannot be deleted, and new groups cannot be added. If a group contains no entities, or if a user has no read access to any entity that is in a group, the group is not displayed.

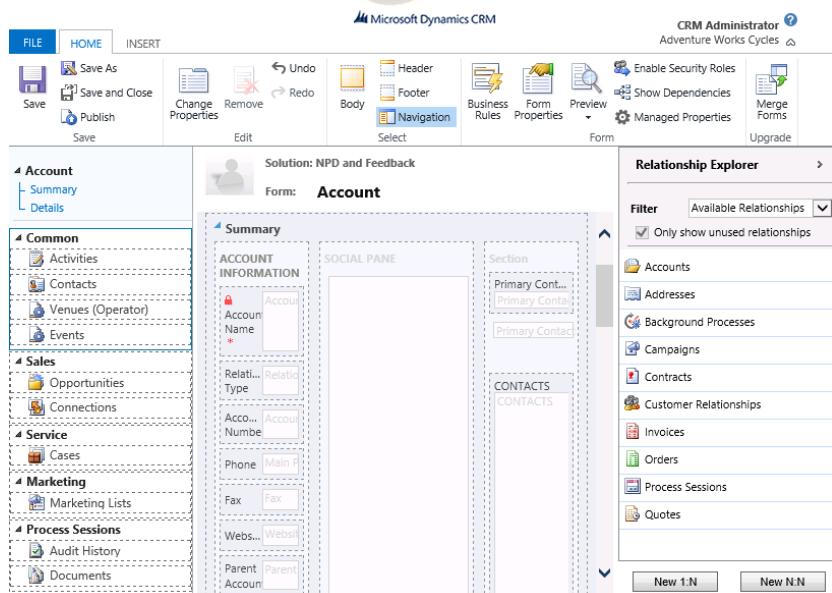


Figure 59 - Editing Related Entity Navigation

The navigation bar for related entities is not displayed at the top of the screen when you use the Microsoft Dynamics CRM for Tablets application. Instead the links that are to

related entities are shown to the left side of the form. The Microsoft Dynamics CRM for Tablets client is described in more detail in the “*Mobile Clients*” lesson.

Preview Form Customization

Sometimes when you add components to forms, it is difficult to visualize how the form will be displayed to the user. You can click the **Preview** button on the ribbon and view how the form will be displayed without having to save and publish your work. You can select from three form states. The end result of these states might differ from one another if you have JavaScript or Business Rules in effect on the form. The form states include the following:

- **Create Form** - How the form is displayed to a user who is creating a new record with the form.
- **Update Form** - How the form is displayed to a user, if the user is reading or updating an existing record with the form.
- **Read-Only Form** - How the form is displayed to a user, if the user is viewing an inactive record, or if the user can only read the record and not modify the record because of his or her Security Roles.

Lesson 6-3 Quick Create and Quick View Forms

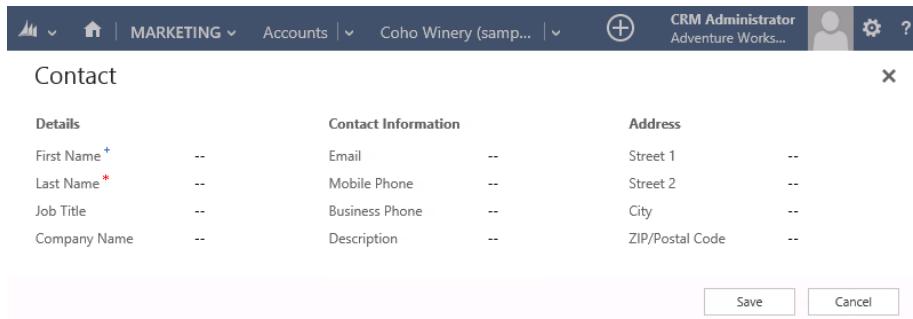
Quick Create Forms

You can configure a *quick create* form so that users are presented with fewer fields to complete when they first create a record. Doing this helps users to create records more quickly, by leaving some information to be completed later.

When a user creates a new record in Microsoft Dynamics CRM, the user might only have limited information to enter on the record. Therefore, the user might not require the full form that includes all the fields for an entity. Additionally, the user will not require sub-grids and other components that have no information to display, because the record cannot be linked to anything when it has not yet been created.

A quick create form is a shortened version of the form that includes the important fields that the user must complete. The user can save the record, and then return to the record to complete the rest of the fields later.

A quick create form can only contain a single tab that contains three columns with one single-column section in each column. The three sections can only contain fields and spacers (or be left empty).



Details		Contact Information		Address	
First Name *	--	Email	--	Street 1	--
Last Name *	--	Mobile Phone	--	Street 2	--
Job Title	--	Business Phone	--	City	--
Company Name	--	Description	--	ZIP/Postal Code	--

Save Cancel

Figure 60 - Contact Quick Create Form

You can design more than one quick create form for an entity and use the form order to define the form that is first. Only the first quick create form in the form order is displayed to users. You cannot assign Security Roles to quick create forms.

Allowing more than one quick create form helps prevent issues if you import a Solution that includes an entity that already has a quick create form. By allowing more than one quick create form to exist in the system, you can import such a Solution without any conflict. You can also take advantage of this if you need to make changes to a quick create form. Instead of modifying the current form, you can create a copy to modify and test, by using **Save As**. Then, you can quickly revert to the earlier quick create form by changing the form order, if you have to.

A user can access a quick create form to create a new record in four ways:

- Click the **Create (+)** button on the navigation bar, then click the entity that you want to create a record for, as shown in the “Create Records From the Navigation Bar” figure. This “global create” feature is always available so that a user can create a record quickly and then return to his or her work. For example, a user can create a Case to deal with an incoming support issue, and then return to an Opportunity record that he or she is working with.
- At the bottom of a lookup field drop-down list, click the **New** button to create a new record instead of selecting an existing record. When the record is saved, the new record link will already be completed in the lookup field.
- In a sub-grid, click **New (+)**, click the lookup icon, and then click **New** instead of selecting an existing record.
- In an Associated View, click **Add New <Entity>**.

If you create a new record from a sub-grid or an Associated View, this is a “child” record. Because you create this record from the context of the “parent” record, field mappings are used to automatically complete some fields. If any mapped fields are on the quick create form, the user can change the values before the record is saved.

Note: Although activities are shown in the navigation bar when you click the global Create button, when you click an activity button this does not use a quick create form for the entity, instead the usual form is used.

Custom activity entities can use quick create forms from lookups, sub-grids and an Associated View of that specific entity (not a general Activity Associated view). This will only apply to some specific business scenarios but might be useful in some high-volume environments.

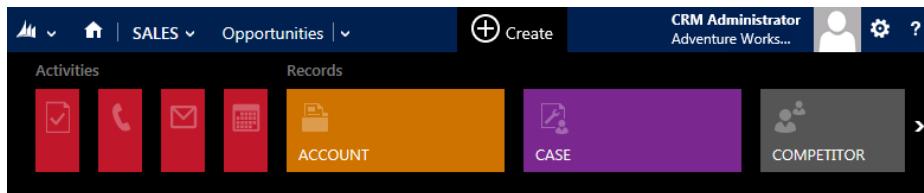


Figure 61 - Create Records from the Navigation Bar

To create a quick create form, follow these steps.

1. Navigate to **Settings > Solutions**, and then double-click to open the Solution that you want to customize.
2. Expand the entity for which a quick create form is required.
3. Click **Forms**.
4. Click **New**.
5. Select **Quick Create Form**.
6. Modify the quick create form by using the form editor in the way you would configure any other form. Make sure that you remain within the limitations of a quick create form.
7. On the ribbon, click **Save and Close**.
8. In the solution, click the entity.
9. In the **Data Services** section, check the box next to **Allow quick create**.
10. On the ribbon, click **Save**.
11. On the ribbon, click **Publish**.

Note: An entity will not use quick create forms unless you also enable the entity property **Allow quick create**. You can enable the property first, or create the form first. However, you must perform both tasks and the entity must be published before the users can create records using the quick create form. You might have to refresh the Microsoft Dynamics CRM page in the browser for the entity to be displayed in the global create area.

Quick View Forms

A *quick view* form is a simple form that can be embedded in a main form of a child entity to show some details of the parent record. For example, when you view an Account record, it might be helpful to view the details of the Primary Contact without moving away from the Account record. This can also apply to a Contact form, where it might be useful to view information from the Account that they work for.

A quick view form includes one tab that has one column that can contain one or more single-column sections. Each section can only include fields, sub-grids or spacers. You cannot add other form components to a quick view form. When the quick view form is displayed in the child record form, information that is shown in the quick view form will be read-only. You can create more than one quick view form to use in different child entity forms. However, you cannot assign Security Roles to control access to these quick view forms.

To create a quick view form from the entity node in a Solution, follow these steps.

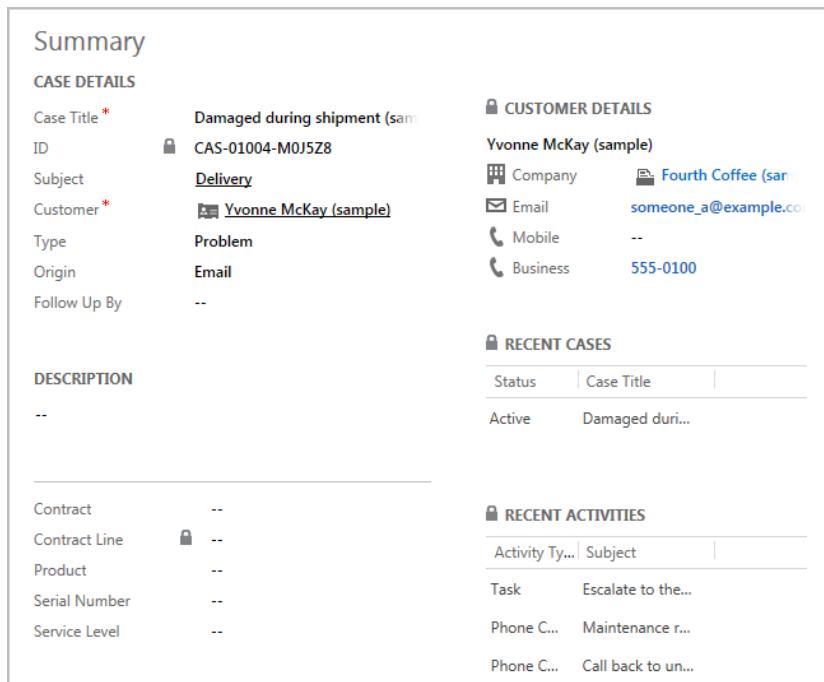
1. In a Solution (or the Default Solution), expand the entity, and then click **Forms**.
2. Click **New**.
3. Click **Quick View Form**.
4. Modify the form in the usual manner within the limitations of a quick view form.
5. To change the name of the form, on the ribbon, click **Form Properties**, and then enter a new **Name**.
6. Click **Save**, then click **Publish**, and then click **Save and Close**.

Or, to create a quick view form directly from the form in which the quick view form is to be embedded, follow these steps.

1. Open the form in which you want to add a quick view control.
2. Click the field that the quick view form should be inserted underneath.
3. On the ribbon, click the **Insert** tab.
4. Click **Quick View Form**.
5. Specify a **Name** and a **Label** for the quick view form control on the child entity form.
6. If the quick view form is immediately underneath the lookup that controls the form, you might clear the check box for **Display the label on the Form**.
7. In the **Lookup Field** list, select the field that will be used to populate the quick view form. For example, if you add a quick view form to the Account form to display fields that relate to the Primary Contact, select **Primary Contact**.
8. In the **Related Entity** field, select the entity that is used by the lookup field. In most cases, this is selected for you, based on the lookup field. However, if the lookup is a multi-entity lookup, such as **Customer** or **Regarding** that can link to different entities, you can select each entity that can be used in the lookup and select an appropriate quick view form for each entity.
9. In the **Quick View Form** field, select an existing quick view form for the selected entity. Or, click **New** to create a new quick view form, and configure the quick view form the same as a standard form.

10. Click OK. The quick view form is embedded on the form.

For example, the “Case Customer Quick View Form” figure shows a quick view form for the Account entity that is displayed on the right side of a modified form for a Case. Notice that the quick view form includes three sections. The lower sections contain sub-grids for other recent Cases and Activities for this customer. The quick view form control displays the details of an Account or a Contact, depending on the record that is selected in the Customer lookup in the **Customer Details** section on the left side.



CASE DETAILS	
Case Title *	Damaged during shipment (sam)
ID	CAS-01004-M0J5Z8
Subject	<u>Delivery</u>
Customer *	<u>Yvonne McKay (sample)</u>
Type	Problem
Origin	Email
Follow Up By	--

DESCRIPTION	
--	

CUSTOMER DETAILS	
<u>Yvonne McKay (sample)</u>	
Company	Fourth Coffee (sam)
Email	someone_a@example.co...
Mobile	--
Business	555-0100

RECENT CASES	
Status	Case Title
Active	Damaged duri...

RECENT ACTIVITIES	
Activity Ty...	Subject
Task	Escalate to the...
Phone C...	Maintenance r...
Phone C...	Call back to un...

Figure 62 - Case Customer Quick View Form

When you add a quick view form to the form for a child entity, you cannot modify the formatting of the control, for example to span multiple columns of a section. Make sure that you select an appropriate section in which to add the quick view form, or add a new section to contain the quick view form, if this is necessary.

Lesson 6-4 Manage Multiple Forms

When an entity has multiple forms, you can control access to each form by assigning Security Roles. A form will only be available to those users who have the appropriate Security Roles assigned.

When a user creates or edits a record, the form that is presented is the highest in the form order that the user's Security Roles give him or her access to. Advantages of using different forms for different users include the following:

- Fields can be included in some forms and not in other forms. This lets the user focus on the fields that he or she has to edit.
- Data that is important to a specific user group can be shown. For example, a sub-grid can contain records from different entities, or from different records for the same entity.

- The same information can be included on two forms. This information can be shown in different layouts and can be prioritized for different groups of users.
- Two forms might include some of the same fields, but some of the fields on one form might be configured to be read-only.

If a browser or the Microsoft Office Outlook client is being used, and multiple forms are available, the user can select a specific form to use. The user can select from the list of forms that is displayed on the upper-left corner of a record above the record name. Then, this same form will be used every time that the user opens a record for this entity, until the user signs out of the application or the user selects a different form. If Microsoft Dynamics CRM for Tablets or Microsoft Dynamics CRM for Phones is being used, the user cannot switch between forms. The user can only view the first form in the form order that is available for his or her Security Roles.

Assign Roles to Forms

Each form can be restricted to only those users who have specific Security Roles. Security Roles are assigned to forms through the **Enable Security Roles** button that is located on the menu bar of the forms list, or on the **Home** ribbon tab of the form editor. When you use either button, you will receive a dialog box that resembles the dialog box that is shown in the “Enable Form Roles Dialog Box” figure.

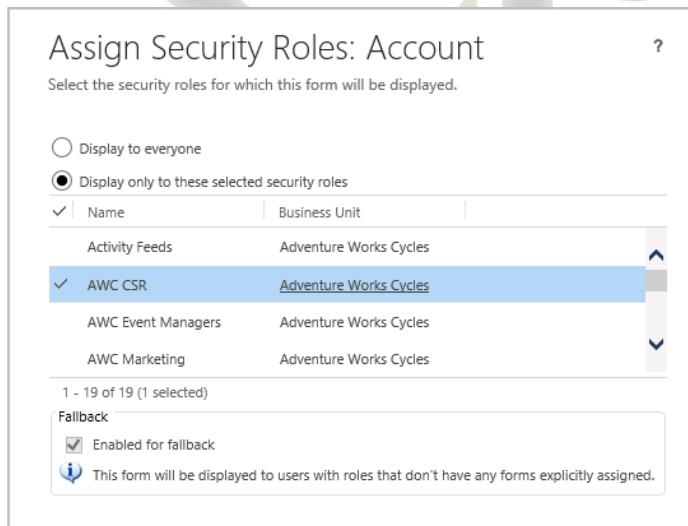


Figure 63 - Enable Form Roles Dialog Box

The list shows all the Security Roles in the root Business Unit in the Microsoft Dynamics CRM Organization. If you select to display the form to everyone, every Security Role will be selected and the list will be disabled. If you select the **Display only to these selected security roles** option, then you can enable or disable each role one at a time by clicking the check box next to the role.

If you assign Security Roles to every form for an entity, you might unintentionally create a situation where a user has no access to any form because the user has none of these Security Roles. However, a fallback form is available to prevent a user from being denied access to the form. A user who does not have explicit access to a form through his or her

Security Roles will be shown the fallback form. You can define a form as a fallback form by selecting the **Enable for fallback** check box.

By default, the main form that is supplied by the system is always enabled for fallback. If you create and make a new form available for fallback, then the form that is used is the form that is highest on the Form Order list. If you enable another form for fallback, you can disable this property on the default form. If only one form in a form set is enabled for fallback, you cannot disable the property on that form to make sure that there will always be one form available for any user who has Read access to the entity.

In Microsoft Dynamics CRM 2015, you can also remove access to a form for all users by making the form inactive if it is no longer required. This form status transfers from one Organization to another when you deploy a Solution. However, if you delete a form, then the form is no longer referenced in a Solution, and the form must be deleted individually in each system.

Form Order

The order that forms will be considered for a user is determined by the form order. To set the form order, follow these steps.

1. In a Solution, expand the entity that has multiple forms you need to configure.
2. Below the entity node in the solution explorer, click **Forms**.
3. Above the list of forms, in the menu bar, click **Form Order**, and then select **Main Form Set**, **Quick Create Form Set** or **Mobile Form Set** as required. The **Form Order** dialog box is displayed.
4. Select a form, and then click the green arrows to move the form up or down in the form order.
5. Click **OK** when you have the forms in the required order.

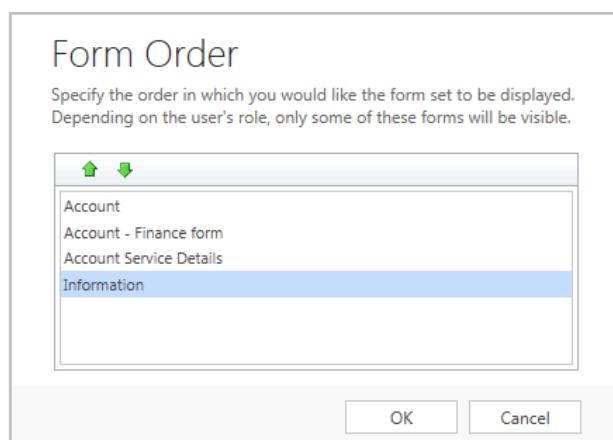


Figure 64 - Form Order Dialog Box

Lesson 6-5 Mobile Clients

Microsoft Dynamics CRM 2015 supports several client devices in addition to the supported browsers and the Microsoft Office Outlook client. A Professional license is required to use the mobile clients. This feature is included in the client access license for on-premise customers and the user subscription license for Microsoft Dynamics CRM Online.

There is a native client application (known as an “app”) for Windows 8 and iPad devices named Microsoft Dynamics CRM for Tablets. This application lets users connect to Microsoft Dynamics CRM and have access to read and write records of entities that support the sales process and custom entities that are enabled for mobile client access. Some other system entities are also enabled to read records, although not to update records.

Other devices that have smaller screens and that have a supported operating system can use the Microsoft Dynamics CRM for Phones app.

Access to Microsoft Dynamics CRM 2015 from tablet and phone devices can be controlled through Security Roles. On the **Business Management** tab, in **Miscellaneous Privileges**, you can select or clear **Microsoft Dynamics CRM for Phones** and **Use Microsoft Dynamics CRM for Tablets**.

Not all entities can be used with the Microsoft Dynamics CRM for Tablets app. The system entities that are available and enabled for read and write access are the following:

- Account
- Appointment
- Competitor
- Connection
- Contact
- Lead
- Opportunity
- Opportunity Product
- Phone Call
- Task
- Activity
- Note

Any of these system entities, except for Activity and Note, can be modified to be available on a read-only basis, or disabled so that they are not visible in the Microsoft Dynamics CRM for Tablets client. These settings are described in the “*Customizing Entities*” module.

Six additional system entities are available on a read-only basis in the Microsoft Dynamics CRM for Tablets app. These system entities are the following:

- Case
- Email (including Email attachments)
- Product
- User
- Team
- Currency

The Case, Email and Product entities can be disabled so that they are unavailable in the tablet application. None of these entities can be made available for write access in the current version.

All custom entities can be enabled for either or both the mobile clients. You can also select whether to make the custom entities available for read-only access in Microsoft Dynamics CRM for Tablets. All entities are also controlled by Security Roles. Therefore, you can configure the system to give full access to an entity in the apps, but some users will still only have read access because they do not have the privileges that are required to edit some records.

Forms for Microsoft Dynamics CRM for Tablets

The Microsoft Dynamics for Tablets client uses the same main forms as the browser and the Outlook client. However, the forms are displayed in a different layout. In the browser, forms scroll vertically and have tabs arranged on top of one another. Forms in the Microsoft Dynamics for Tablets client scroll horizontally and have tabs arranged side by side.

Note: Users cannot switch between different forms in the Microsoft Dynamics CRM for Tablets client. The form order and the user's Security Roles determine the form that will be displayed.

Some limitations to consider when you design forms that will be shared by the Microsoft Dynamics for Tablets client users, include the following:

- Only the first five tabs or the first 75 fields from the form will be displayed (hidden components count toward these limits, because, as an example, the components might be displayed later by using Business Rules).
- No more than 10 lists (sub-grids) can be displayed.
- The tablet client does not display Web Resources, IFRAMEs, Bing maps, Yammer, activity feeds, or SharePoint document libraries.
- Entity images are visible in list views and contact cards. However, entity images are not visible in the form.

The same form definition is used to display the form components in the browser and Outlook clients, and in the Microsoft Dynamics CRM for Tablets application. The “Browser Client Updated Form Layout” figure and the “Microsoft Dynamics CRM for Tablets Form Layout” figure show a comparison of where the different elements are positioned on a form for an updated entity or custom entity.

Some form elements that display in the Microsoft Dynamics CRM for Tablets client move with the *view port* so that the elements are always available on the screen in the same position. These elements include the **Navigation** and the **Home** button, the process control and search, and the command bar.

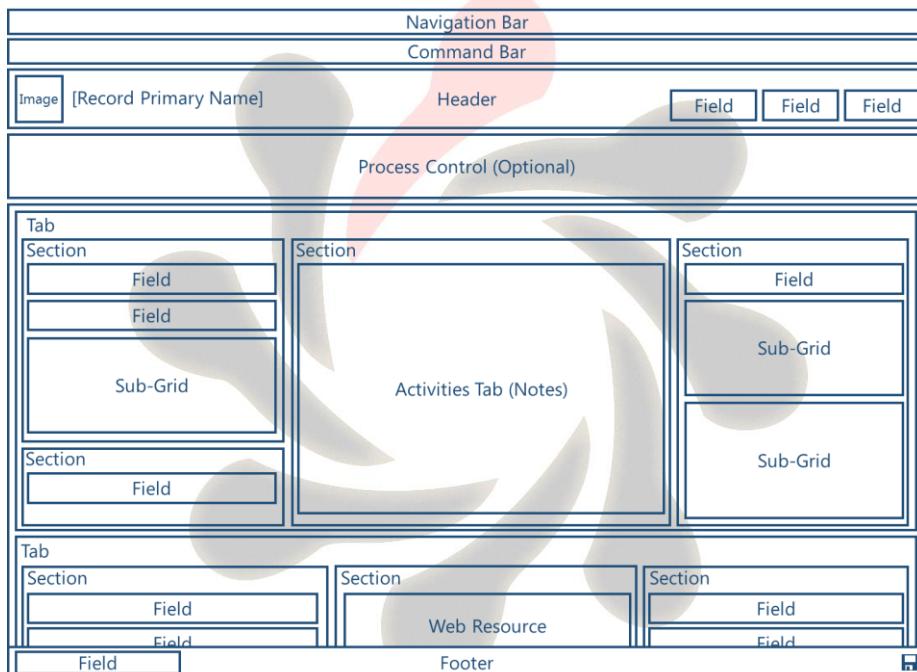


Figure 65 - Browser Client Updated Form Layout

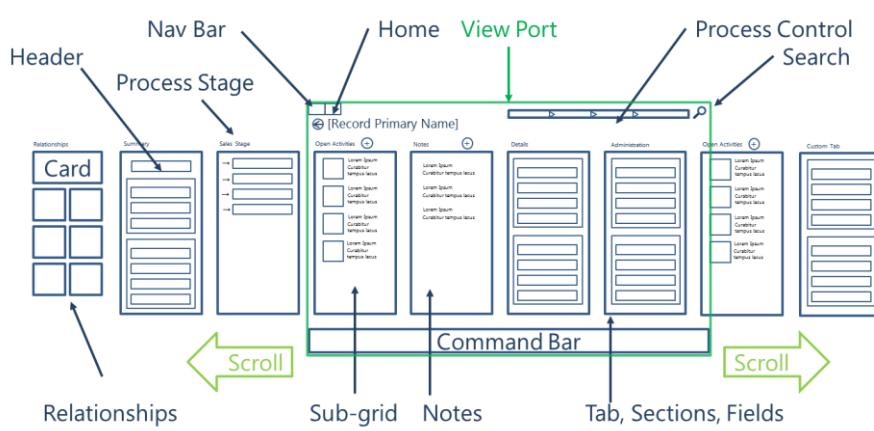


Figure 66 - Microsoft Dynamics CRM for Tablets Form Layout

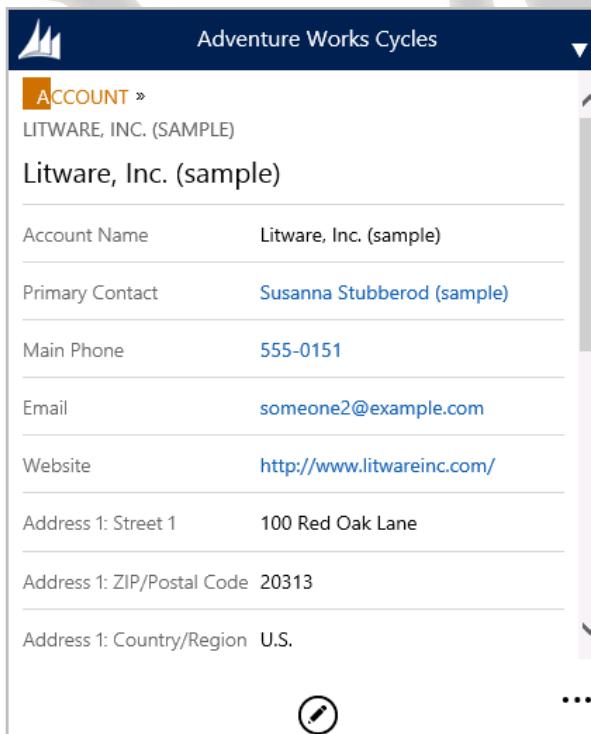
Mobile Forms for Microsoft Dynamics CRM for Phones

The Microsoft Dynamics CRM for Phones app uses simple forms that have a form type of **Mobile**. This app can be downloaded from the online application store for your device.

Devices that have an operating system or browser (or combination) that is not on the list of fully supported clients for the browser-based web application, can access a different version of the Microsoft Dynamics CRM website. If an unsupported browser is used to connect to the Microsoft Dynamics CRM website, the browser is redirected to the usual URL with /m appended to the end. This “mobile” version of the website uses the same Mobile forms as the Microsoft Dynamics CRM for Phones app. However, the user does not have the advantages of an installed application, such as saved user credentials.

You can configure entities that are available for use in the Microsoft Dynamics CRM for Phones app by selecting or clearing the **CRM for phones** property of an entity. You can also create and modify mobile forms that will be used by these client devices, and you can assign Security Roles and define the form order to determine the mobile form that is displayed to a specific group of users. Only the first form in the form order that is available to a user will be displayed, and the user cannot switch forms.

Mobile forms have an easy, single-column presentation as shown in the “Account Mobile Form” figure. When you view an existing record, only the fields that contain data are shown. By default, all the fields are read-only to reduce the screen space that is used by the field controls that are required for editing. You can click the **Edit** button at the bottom of the form to make all fields available to be completed or modified.

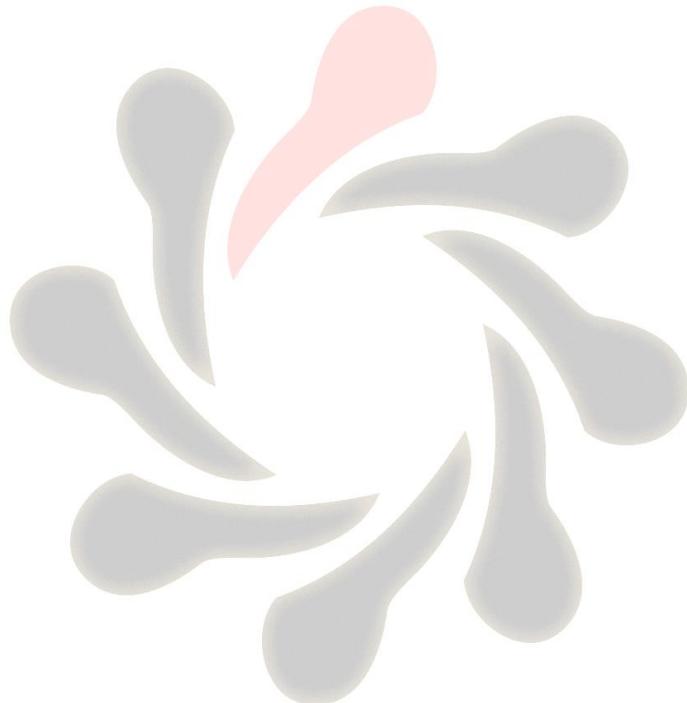


Account Name	Litware, Inc. (sample)
Primary Contact	Susanna Stubberod (sample)
Main Phone	555-0151
Email	someone2@example.com
Website	http://www.litwareinc.com/
Address 1: Street 1	100 Red Oak Lane
Address 1: ZIP/Postal Code	20313
Address 1: Country/Region	U.S.

Figure 67 - Account Mobile Form

By default, all fields that are business required or system required are included in the form and cannot be removed. If you configure a required field as read-only on the mobile form, the users who view a record cannot edit that field. If the user creates a new record, read-only fields will not be displayed and the user can save the record without this data. However, the next time someone edits the record by using another client, he or she must provide this value before the changes can be saved.

 Note: To view and test customizations for the mobile environment including mobile forms and the form order, you can add /m after the usual URL in a supported browser.



Module 7 - Configuring Business Rules

Business Rules were a new feature in Microsoft Dynamics CRM 2013 and have been enhanced in Microsoft Dynamics CRM 2015. Business Rules let a system customizer who has no programming skills apply conditional logic to a form. For example, based on the value in a specific field, another field might become required, or read-only, or be automatically completed with a calculated value.

Business Rules can also be used to display error messages to the user that remind the user of the rules defined by the business process. An error message also prevents the user from saving a record until the issue is resolved.

When you configure a Business Rule you can select the form that the rule is used for, known as the *scope* of the Business Rule. The scope can be set to apply the rule to all forms, or just one form.

Business Rules will be enforced when the forms that are in scope are used in the browser or the CRM for Tablets or CRM for Phones mobile applications. Because Business Rules apply to these different platforms without having to be rewritten in different ways, the feature is sometimes known as *portable business logic*.

Objectives

The objectives are:

- Describe how to create and use Business Rules.
- Detail how to configure conditions and actions.
- Show how to create and apply rules

Lesson 7-1 Configure Business Rules

Business Rules are configured to apply *client-side logic* to data in the Microsoft Dynamics CRM 2015 system. Instead of using processes or custom code that runs on the server, such as Workflows or plugins, Business Rules apply to data that a user enters or modifies in a form.

You can configure Business Rules to be used on all forms for an entity, or only on one form. If you want to apply a Business Rule to several forms, and not all forms, you must create a copy of the rule for each form. You can do this by opening the rule and clicking Save As and entering a new name for the copy of the rule. You must activate a Business Rule before the logic in the rule takes effect.

Each form can have zero, one or several Business Rules associated with it specifically or because the rule applies to all forms for that entity.

Each active Business Rule that is associated with a specific form is evaluated when that form is loaded, or when the value changes in a field that is included in a *condition* that is defined in the rule. Business Rules are not run again when a record is saved.

If the value of the field matches a condition when the form is opened, or the value is changes, then the *actions* that are defined in the rule will be applied.

Conditions and actions are discussed in more detail later in this module.

If a Business Rule includes a condition or an action that has a reference to a field that is not displayed on the form, the rule will not run, although an error is not created. Therefore, the business logic of the rule might not be applied in the way that you intended, but the user does not experience a problem, so you might not easily become aware that the rule is not being applied. You can set non-event dependencies on a form to help prevent other system customizers from removing a field without first removing the dependency. This should remind customizers to check the system documentation to understand the reason for the dependency.

Create Business Rules

To view, create or edit Business Rules, follow one of the following four procedures.

- In a Solution, in the solution explorer, click the **Business Rules** node below an entity node to display a list of all Business Rules for the entity.
- From the list of fields for an entity, double-click to open a field. In the navigation pane on the left side, click **Business Rules** to display all rules that use this field in a condition or in an action.
- With a form open for editing, double click a field on the form to open the **Field Properties** dialog box, and then click the **Business Rules** tab to display a list of all Business Rules that use this field *and* that have this form in scope.
- Open a form for editing, and then on the ribbon, click **Business Rules** to display the **Business Rules Explorer** pane to the right side of the form designer. This displays all the rules that have this form in scope. The **Business Rules Explorer** does not display the Business Rules menu bar. However, the **Business Rules Explorer** does include a button to create a **New Business Rule**.

In all four areas where you can access Business Rules, the list of rules that is displayed includes Business Rules that are not activated. The menu bar for Business Rules is displayed for the first three areas only. This menu bar includes a button to create **New** rules, **Edit** or **Delete** rules, and **Activate** or **Deactivate** Business Rules.

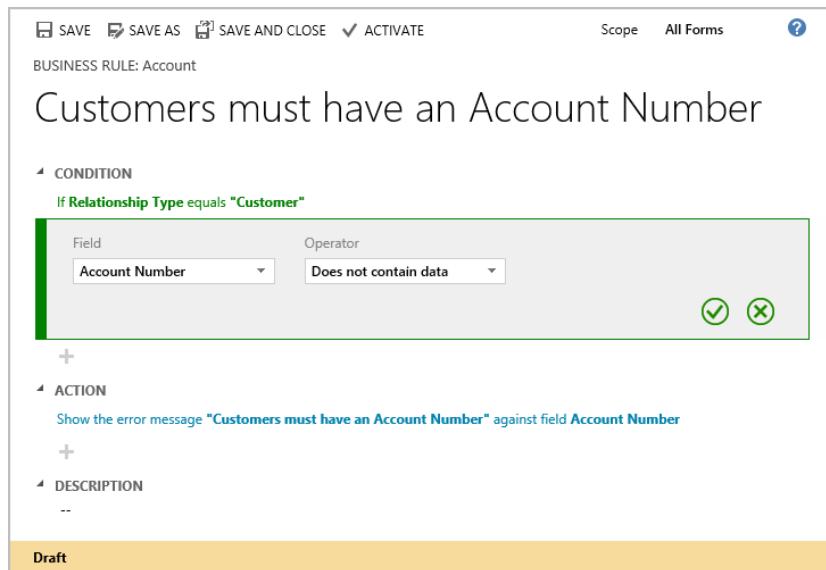


Figure 68 - Business Rule Editor

When you create a Business Rule it has a **Status** of Draft and does not affect any users who are working on the system.

You can test a Business Rule by opening the form designer for a form that is in scope for the rule and clicking the **Preview** button on the ribbon to preview a version of the form. Activated rules *and* draft Business Rules are applied to the preview of the form.

To apply the logic that is defined in the Business Rule to the system, you must make sure that you save any changes to conditions and actions, and then click **Activate** on the command bar. In the Process Activate Confirmation dialog box, click **Activate** to confirm. The Business Rule now has a **Status** of Activated.

You cannot modify or delete a Business Rule while it is Activated. You must click the **Deactivate** button on the command bar to return the Business Rule to a draft status first.

You must **Save** the Business Rule at least one time before you can activate it. However, when you edit a rule that is already saved, you only have to click **Save** on the command bar if you change the **Name** of the rule, changes to the conditions and actions are saved individually.

If you want to create a new rule that is similar to an existing rule, you can open the existing Business Rule and then click **Save As** on the command bar to create a new copy of the rule. The new copy will have “Copy of” added in front of the name of the Business Rule that you copied. You can use this method to create a copy of an existing Business Rule that is Activated or in Draft status.

In some scenarios you might want a rule that is the reverse of an existing rule, to apply to the same form. For example, you could create a Business Rule that makes the **Estimated Cost** field on the **Event** entity Business Required if the **Status Reason** is changed to Launched. If a user changes the **Status Reason** on a specific record to Launched, and then the user changes the **Status Reason** back to back to Planned without saving the record, the **Estimated Cost** field would become Business Required. However, there is no rule to

reset **Estimated Cost** back to the original field requirement level. You could copy the rule and quickly edit the condition and action to reverse the logic, and activate the new copy. The two rules work together to make sure that the requirement level of the **Estimated Cost** field is correct for the **Status Reason** that the Event record has.

Adding a **Description** to a Business Rule is optional. It is not displayed anywhere in the user interface (UI) except in the Business Rule editor. However, we recommend that you include a description of what requirement the rule is designed to meet, and how the rule works or interacts with other rules. This information will help other customizers who are working on the system.

Set the Scope of a Business Rule

In Business Rule editor, in the upper-right corner the Scope control displays a list of all main and mobile forms that are available for the entity that the rule applies to. An additional option of **All Forms** is displayed.

You can set the scope for the rule to **All Forms** or select any one of the main or mobile forms. If you set the scope of a Business Rule to one form, you must create copies of the rule if you want to apply the rule to other forms, or you can change the scope to **All Forms** if that is appropriate for your requirements.

If you select All Forms as the scope of a Business Rule, the rule will be applied to all forms with a form type of Main or Quick Create. You cannot select the scope for a rule to apply only to the Quick Create form.

You can only change the scope of a Business Rule while it is in a Draft status. If the Business Rule is activated, you must deactivate the Business Rule (back to draft) before you change the scope.

Conditions

Conditions in a Business Rule define the fields that will cause the rule to be triggered, and the conditions to evaluate to determine whether the actions that are configured in the rule should be performed.

You can add multiple conditions that are based on the same fields or different fields. All conditions must evaluate to “true” for the actions to be applied—this is a logical AND.

You cannot configure a rule to use conditions in a logical OR. However, you can apply several rules that have different conditions to achieve the same result. When you use **Save As** to create copies, this reduces the time taken to create these alternative rules because you do not need to recreate the set of actions for each new Business Rule.

To add a condition to a Business Rule, follow these steps.

1. Create a Business Rule or open an existing Business Rule.
2. If the Business Rule Status is Activated, on the command bar, click **Deactivate** and then in the **Process Deactivate Confirmation** dialog box, click **Deactivate**.

3. In the Business Rule editor, in the Condition section, click the + icon to **Add a condition**. A new condition row will appear with default values set.
4. In the left **Field** list, select the field that will trigger the rule to be evaluated when that field value changes. You can only select fields from the entity to which the rule applies, you cannot select a field from a related entity.
5. In the **Operator** list, select the logical operator to use, for example **Equals**, **Is greater than**, or **Contains data**. Operator options depend on the data type of the selected field.
6. In the **Type** list, select one of the following three options:
 - a. **Field** - Use this type to compare the value of the selected form field to another field. You can only compare fields that are both on the form, and that both have the same data type.
 - b. **Value** - Use this type to compare the value of a form field to a value that you enter. The values to compare to and the way you enter the values depend on the field data type. For example a text, numeric, date or option set field will present different options for you to select from.
 - c. **Formula** - This option only appears for fields that have numerical or date data types. It does not appear for fields that contain text. Use this type to compare the result of a simple calculation that can use either a value in another form field or a value that you enter. For example you could use a formula to test if an Account has a **Credit Limit** that is greater than the **Annual Revenue** multiplied by 0.01. This example is shown in the “Business Rule Condition With Formula” figure. You can only use fields that are in the form.
7. Depending on the **Type** that you select, you must enter a **Field or Value** to compare to, or for a **Formula**, you must enter a **Field**, **Operator**, **Type** (**Field or Value**) and a second **Field or Value**.
8. When you complete the configuration of the condition, click the green check mark button to save the changes.
9. You can add more conditions by starting again at step 3.

Field	Operator	Type
Credit Limit	Is greater than	Formula
Field	Operator	Type
Annual Revenue	*	Value
		0.01
<input checked="" type="button"/> <input type="button"/>		

Figure 69 -Business Rule Condition With Formula

To modify a condition, click on it in the list of conditions to expand the condition for editing. You can only expand one condition or action at the same time. You can click the

green cross (x) to **Discard your changes**. For an unsaved condition, this removes the condition.

To remove a saved action, with all conditions and actions collapsed, point to the action, and then click the **Delete** button at the right side of the row.

Actions

To add an action to a Business Rule, follow these steps.

1. Create a Business Rule or open an existing Business Rule.
2. If the Business Rule **Status** is Activated, on the command bar, click **Deactivate**, and then in the **Process Deactivate Confirmation** dialog box, click **Deactivate**.
3. In the Business Rule editor, in the Action section, click the + icon to **Add an action**, and then select one of the following options:
 - Show error message
 - Set field value
 - Set business required
 - Set visibility
 - Lock or unlock field

A new action row will appear with default values set, depending on the action selected.

- In every case, the first option that you must select is the field to which the action will be applied. Other options depend on the type of action that is selected. You can only apply an action to a field from the entity that the rule is for, not a related entity.
- When you have completed the configuration of your action, click the blue check mark button to save the changes.
- You can add more than one action by starting again at step 3.

Show error message

Use this action to set an error message on a field if the data in the field is not valid. The text that you specify for the message will be displayed with an error icon near the field (a red circle with a white diagonal cross).

The error message text disappears after a short delay; you can view the error message again by pointing at the error icon.

The record cannot be saved while this message is displayed. The text of the error message is shown on the lower right side of the form next to the **Save** icon. If a user clicks the **Save** icon, the focus will move to the first field that is on the form that has an error.

If you change a field so that the rule is triggered and reevaluated, and the condition is no longer true, the error will be dismissed. Other actions are not “reversed out” in this manner.

Set field value

You must select the Field and Type. The three Types are the following:

- **Field** - Sets the value of the selected field to the same value as another field that you select, which must be of the same data type. Both fields must be on the form.
- **Value** - Sets the value of the selected field to a fixed value that you define. The type of value depends on the data type of the selected field, for example a date, text, currency or option set value.
- **Formula** - Applies to numeric and date fields only, and is configured in the same manner as a condition. You can use mathematical operators, for example to set the **Follow Up By** field on a Case to 1 day after the **Case Created On** field.

Note: If you use an action in a Business Rule to set the value of a field, the **OnChange** event handlers for that field will **not** run. Therefore, JavaScripts that are configured to run when a field is changed will not be triggered. You might have to reconsider how some functions are triggered, for example to run for the **OnSave** event instead of **OnChange**.

Set business required

Use this type to change the requirement level for the field. The options are **Not Business Required** and **Business Required**. There is no option to set this to **Business Recommended**.

Set visibility

Use this type to change whether the field is displayed in the form. The options are **Show Field** and **Hide Field**. You cannot use Business Rules to show or hide sections or tabs. You can use JavaScript functions to change the visibility of a whole tab or section.

Lock or unlock field

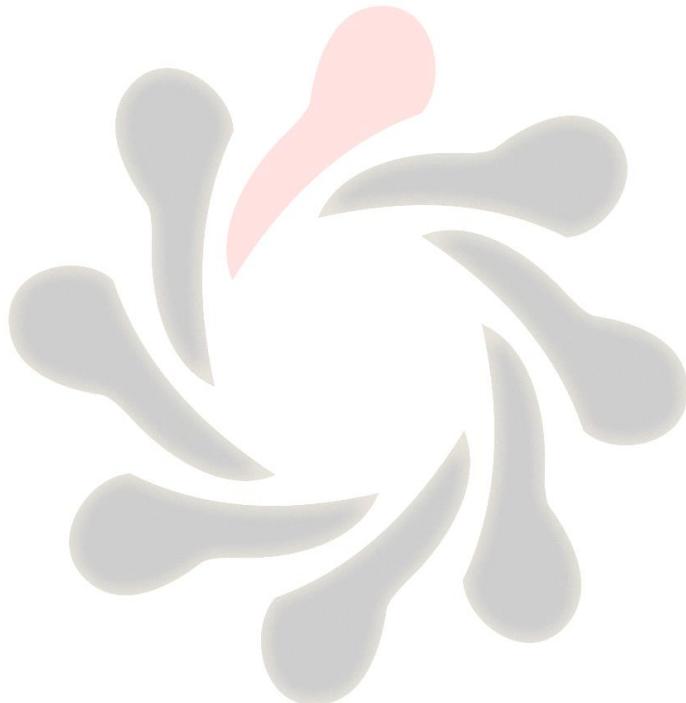
Use this type to change whether the field is enabled in the form. The options are **Lock** (read-only) and **Unlock**. When the field is locked users cannot edit the value in the field.

Note: If you use the actions Set business required, Set visibility or Lock or unlock field, you might have to create the “reverse” rule to set the property back if the opposite condition is true. For example, you might have a Business Rule that applies to an option set field named Job Title that has Other as an option. When a user selects Other, the Business Rule sets Other Job Title to Business Required. If a user selects Other, and then the user selects another option in the Job Title Option Set, the Business Rule will not set the requirement

level back its earlier, because several rules could be controlling this property at the same time. You must create another Business Rule to explicitly set the requirement level to the value that achieves your business requirements.

To modify an action, click on it in the list of actions to expand the action for editing. You can only expand one action or condition at the same time. You can click the blue cross (x) to **Discard your changes**. For an unsaved action, this removes the action.

To remove a saved action, with all conditions and actions collapsed, point to the action and then click the **Delete** button at the right side of the row.



Module 8 - Customising Views

Microsoft Dynamics CRM shows lists of records in views. Each view has a query that determines the records that are shown in the view. Users can select from several views for an entity to change the data that is presented. The definition of a view includes the columns that are shown, the query that is used to select records, and the fields that are used to sort the records.

When you add a new entity, the system creates several default views for the entity. You can customize these views, and create custom views.

Objectives

The objectives are:

- Define the types of views.
- Describe the special system views.
- Discover how to create new views.
- Explain how views can be filtered and sorted.
- Explain how to configure the columns displayed in a view.
- Describe how to remove unwanted views.

Lesson 8-1 View Customization Concepts

Before you create new or modify existing views, you must understand key concepts that are described in this lesson. There are important differences between system, public and personal views. However, they share many characteristics such as filtering, sorting and columns that you can configure to meet your requirements.

System, Public and Personal Views

Microsoft Dynamics CRM includes three types of views—*system*, *public* and *personal*. Although all three types share the same structure, differences exist that are related to how the views are accessed and used in the application.

System Views

System views are special views that are created by Microsoft Dynamics CRM and used in specific parts of the applications. System view types include the following:

- Advanced Find View
- Associated View
- Quick Find View
- Lookup View

A description of each view is located in the “System Views” topic later in this module. Each entity has one of each type of system view. However, some system entities have more than one of Associated View and other entities have more than one Lookup View.

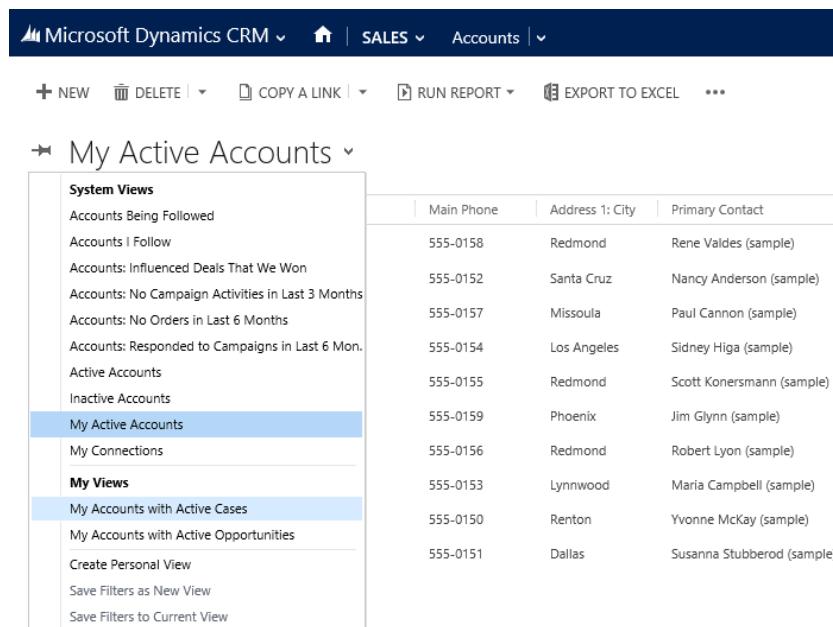
Although system views can be customized they cannot be deleted, and additional system views cannot be created. The system views are not displayed in the view selector, so the system views are not available to select when using the application. System views also cannot be used in sub-grids on a form or as a list on a dashboard.

Public Views

When a user navigates to an entity the user is shown the default view for that entity, and the name of the view is displayed at the top of the list of records. When the user clicks the drop-down arrow to the right side of the view name a list of the views for the entity is displayed, and the user can select a different view. The view that the user last selected for an entity is remembered when between entities until the user selects a different view or signs out. However, the user can select a view as a personal default by clicking the pushpin icon to the left side of the view name. The selected view is used instead of the system default.

Note: In the list of views that is displayed to the user, public views appear in the System Views section. The views in this section differ from the views that are described in the “System Views” topic. The phrase System Views in the list of views indicates that the views are available system-wide to all users. This section separates the System Views from the views that are displayed in the My Views section that are available only to the user who created the view and to the users to whom the views are shared.

An example of a list of public and personal views that a user might see in the view selector for the Account entity is shown in the “List of Public and Personal Views for the Account Entity” figure.



The screenshot shows the Microsoft Dynamics CRM interface for the Account entity. At the top, there's a navigation bar with the Microsoft Dynamics CRM logo, a home icon, and the text 'SALES | Accounts |'. Below the navigation bar are standard CRM actions: NEW, DELETE, COPY A LINK, RUN REPORT, EXPORT TO EXCEL, and three vertical dots for more options.

The main area is titled 'My Active Accounts' with a dropdown arrow. To the left of this title is a sidebar containing a list of views under 'System Views' and 'My Views' sections. The 'My Active Accounts' view is highlighted with a blue selection bar.

The main content area displays a table of account records. The columns are 'Main Phone', 'Address 1: City', and 'Primary Contact'. The data is as follows:

Main Phone	Address 1: City	Primary Contact
555-0158	Redmond	Rene Valdes (sample)
555-0152	Santa Cruz	Nancy Anderson (sample)
555-0157	Missoula	Paul Cannon (sample)
555-0154	Los Angeles	Sidney Higa (sample)
555-0155	Redmond	Scott Konersmann (sample)
555-0159	Phoenix	Jim Glynn (sample)
555-0156	Redmond	Robert Lyon (sample)
555-0153	Lynnwood	Maria Campbell (sample)
555-0150	Renton	Yvonne McKay (sample)
555-0151	Dallas	Susanna Stubberod (sample)

Figure 70 - List of Public and Personal Views for the Account Entity

When you add a custom entity, Microsoft Dynamics CRM creates a set of public views and you can create additional public views later. The list of default public views varies, depending on whether the entity is an activity, whether it is owned by users or teams (in which case there will be views that begin with “My”), whether it participates in Connections and whether it is configured for activity feed Follows.

Although public views that are created automatically by Microsoft Dynamics CRM can be modified or deactivated, they cannot be deleted. Public views can be created by a system administrator, system customizer, or a user who has the appropriate privileges, or by importing a Solution. Public views created in any of these ways can be modified, deactivated, and deleted.

A view in a Managed Solution might have managed properties configured that do not allow the view to be modified. (However, if the Solution is deleted, then the view is deleted.)

If a user has rights to read records of a particular type (to at least User level) then the user can access all the public views for that entity. However, the access levels that are assigned in the user’s Security Roles control the records that are shown to the user. For example, two users who have different Security Roles select the Active Accounts view. The list of records that are shown to each user will not necessarily be the same, even though the views are the same, because Microsoft Dynamics CRM will not show records in the list that the user cannot read.

Personal Views

A user can create a personal view by clicking the **Create Personal View** link near the bottom of the list of views, or by performing an Advanced Find search and then clicking the **Save** button. A personal view can be created from a blank view or based on an existing public or personal view as a starting point.

Personal views cannot be viewed by other users, including administrators, until the personal views are shared with other Users or Teams. When a view is shared with other Users or Teams, it will be displayed to those Users or the members of the Teams in the **My Views** section in the list of views. The view selector list does not differentiate between the views that the user has created and the views that are shared to the users.

You cannot convert a personal view to a public view or a public view to a personal view.

View Filtering

A view returns a subset of records that are based on a query or *view filter* for a single entity. A view cannot display records from more than one entity. The query is built by using an interface that resembles Advanced Find, and is stored as FetchXML.

Views can use parameters in the query that return records that depend on the context when the view is displayed, such as the current user, or the value of a date field compared to the current time.

For example, the Account entity has a public view named My Active Accounts. This view only displays accounts that have a status of Active and that are owned by the current user.

Therefore, this view returns a different set of records that depend on the user who is displaying the view and the status of each Account record.

View filters can include tests that are on the fields in the entity, and on the fields that are on parent or child records and records that are associated through a N:N relationship. All views have a filter defined, although the filter can be empty. A view with no clauses in the filter will return all records.

When a user selects a view, the only records displayed are those which are included and to which the user has a minimum of read access according to the user's Security Roles or through record sharing.

View Columns

In a view, you can display a column for any field in the entity that the view is configured to display. You can also include fields from a primary (parent) entity in a 1:N relationship. You cannot include columns from any related (child) entities because there is no way to select which one of the possible child records to display the data from. You can only include columns from the directly related parent entity, not a parent entity of a parent entity.

For example, in the **My Active Accounts** view, the **Primary Contact** field is displayed. This is the lookup field to a Contact record, containing the GUID for the record. The primary field of the Contact (**Full Name**) is actually displayed instead of the GUID. Also shown in the My Active Accounts view is the **Email** of the Primary Contact. This **Email** field can be displayed in a view of Accounts because it is stored on the parent record (the Primary Contact).

You can add and remove columns in a view. The order in which the columns are displayed can be changed by moving the columns to the left or the right, and the width of each column can be adjusted by using predefined standard widths.

There is no limit to the number of columns that can be displayed in a view. If a view contains more columns than can be displayed on the screen a horizontal scrollbar is shown. Every column you include in a view will result in data being returned from the Microsoft Dynamics CRM server when the view is used. You should try to limit how many columns are included in views that are used very frequently.

When you design views to be used as sub-grids in a form or as a dashboard list component, try to limit how many columns are included. Views used in list components might have to be displayed in a limited space, especially for users who have smaller screens.

In particular, remove any columns that are redundant. For example, for a view of Contacts that is intended to be used in a sub-grid on an Account form you do not have to show the **Company Name** field. Similarly, consider if columns are unnecessary because of the filtering that is applied. A view that filters for active records that are owned by the current user does not have to display the **Owner** or **Status** fields (although the **Status Reason** might be useful, depending on the requirements).

You can configure a view to sort the results by a first column and optionally by a second column. Although the results are sorted by default, users can click the column headers to sort in a different order to suit their needs. However, fields from a parent record cannot be used to sort the view.

Lesson 8-2 System Views

System views are created automatically for each entity by Microsoft Dynamics CRM and are used in specific circumstances. Unlike public views, a user cannot select when to display data with a system view—instead a system view is used to provide built-in functionality in the application.

The four types of system view are:

- Advanced Find view
- Associated view
- Quick Find view
- Lookup view

Advanced Find View

Every entity has a single Advanced Find View that is used as follows:

- When a user clicks **Create Personal View** in the list of views.
- When a user starts an Advanced Find and in the **Use Saved View** list, selects **[new]** instead of selecting an existing view. By default, Advanced Find always starts with the view that is currently displayed.

The query and the set of columns that are used for the results are those that are defined for the Advanced Find View. The Advanced Find view is used to save time by making sure that a basic set of columns is included in the view definition. A user can override the default columns and change the columns that are shown in the view.

You can also configure the default filter for the Advanced Find View. However, we recommend that you usually leave this blank so that users create their own query.

Users do not have to use the Advanced Find View. Instead, the users can start a query from any public or personal view. For example, to create a query for “My Won Opportunities” you can start from **My Open Opportunities** and then change the **Status** clause of the query, or start from **Won Opportunities** and add a clause to filter for records where the **Owner** “Equals current user”. The choice of starting point might depend on the view that has the set of columns and the filter that is closest to the columns and the filter that is required in the view that is being created.

Associated View

The Associated View for an entity is displayed when the user navigates to a list of related records that is displayed in a primary record form.

For example, when you view an Account form, you can use the navigation bar to view related records such as Activities or Contacts, and then these records are displayed by using the Associated View.

The sub-grid on a form must be configured to use a *public* view for the entity that is displayed in the grid. A sub-grid cannot display the Associated View.

Most system entities, and all custom entities, have only one Associated View, and this view can be modified.

Some entities have more than one Associated View. For example, Activities that are linked to a primary record through the **Regarding** lookup field are displayed in a list of mixed activities by using one of the Associated Views for the Activity entity (ActivityPointer), in which the user can select to show only Open or Closed activities. If an activity entity has a custom N:1 relationship directly to a primary entity then the Associated View for the specific activity entity will be displayed when the activity is accessed through the related entities navigation.

The Account, Contact and Lead entities have an additional Associated View that is only used to view the records that are in a Marketing List. For example, the view that is used to display Contacts who are members of a Marketing List is named Contact List Members View and has the Associated View type. This resembles the Contact Associated View. However, the view does not filter based on record status (inactive records are included). Although you can modify the columns and sorting of this List Members view, you cannot change the filter that is used by the view.

Quick Find View

In a view, at the right side above the list, a “Search for records” box is shown. If a user enters text in the box and then presses **Enter**, or clicks the magnifying glass icon a list of records that match the text is shown. The results can be filtered, for example, to display only the records that match the text and that have a **Status** of Active.

The Quick Find view defines the columns that are displayed for the records that match, and the fields in the entity that are searched for the text that is entered by the user.

Quick Find Views have two sets of columns—*view* columns and *find* columns.

When a search is performed, the columns that are displayed in the current view are not used to display the results. Instead, the fields that are configured as *find columns* in the Quick Find view are used. Each find column is searched for records where the field value *begins with* the text that is entered by the user. You can only select find columns from the fields on the entity. You cannot select find columns from other associated entities.

If the user prefixes the search text with an asterisk (*), this searches for any find column of the entity that *contains* the text string, instead of *begins with*. A search query that uses “begins with” takes advantage of the indexes on the SQL server to perform the query by using the least processing effort, and to give the user the fastest results. If a user performs a “contains” search by using a wildcard at the beginning this reduces this performance because indexes cannot be used. However, whether this causes any

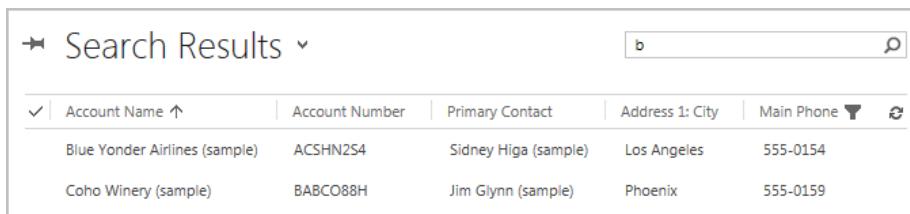
noticeable effect depends on the server configuration, the number of people who use the Quick Find feature, the number of records for the entity that is being searched and the number of find columns. From a practical point of view, a wildcard search that is performed for several fields at the same time is more likely to return more records together with the records that the user is searching for.

We recommend that you explain to users that they should carefully consider whether to use a wildcard, the effect of using the wildcard, and when it is more helpful to use Advanced Find for more complex queries to receive the results that they are searching for. In an Advanced Find query, you can use a “contains” clause for the specific field that you need to use a wildcard, instead of having to search all the Quick Find columns together.

To modify the Find columns, follow these steps.

1. On the navigation bar, click **Microsoft Dynamics CRM**, click **Settings**, click **Solutions**, and then open the solution to modify.
2. Expand the relevant entity.
3. Click **Views**.
4. Double-click the **Quick Find** view.
5. In the **Common Tasks** area, click **Add Find Columns**.
6. Select the check boxes next to any fields that will be searched - clear the check boxes for fields that should not be searched.
7. Click **OK**.
8. Click **Save and Close**.
9. Publish the customizations.

The “Quick Find Search Results for the Account Entity” figure shows Accounts that are the results of a search for “b”. Notice that one result shows an Account Name that begins with “b” and another result shows that the Account Number matches. Neither of the results is case-sensitive.



Search Results				
<input type="text" value="b"/> <input type="button" value=""/>				
✓	Account Name ↑	Account Number	Primary Contact	Address 1: City
	Blue Yonder Airlines (sample)	ACSHN2S4	Sidney Higa (sample)	Los Angeles
	Coho Winery (sample)	BABC088H	Jim Glynn (sample)	Phoenix

Figure 71 - Quick Find Search Results for the Account Entity

A user cannot control the fields that are searched when he or she uses Quick Find. All the find columns that are defined in the Quick Find View for that entity will always be searched. For a more specific search, Advanced Find must be used. As you define more columns, the search performance might become slower, although this may not cause noticeable problems unless you have a very large number of users and records. More

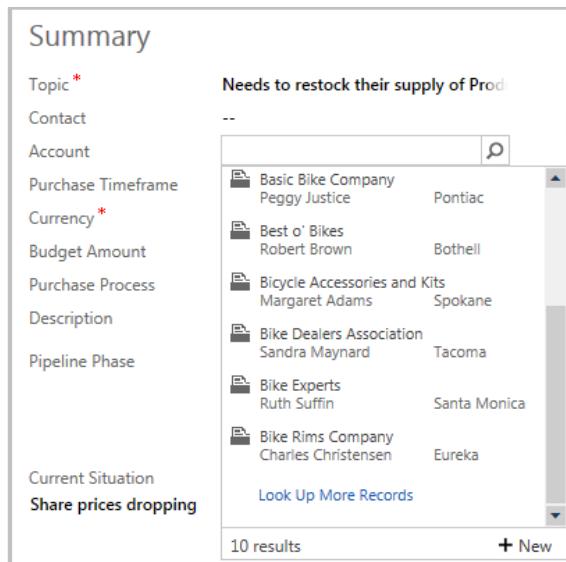
columns to match against a search string is likely to produce a larger number of results, might not be helpful to the users.

In Microsoft Dynamics CRM 2015, when you add a find column in a Quick Find view, a non-clustered index on the corresponding column in the SQL database is created by an index maintenance job on the server when it runs the next time. Indexes are no longer automatically created for an entity if you add a text field that is longer than 900 characters or if you add more than 20 find columns. If you remove find columns the corresponding indexes will be removed at the next index maintenance interval. Database indexes improve the search performance of “begins with” queries in particular. Therefore, if you work within these limitations, you will provide a better user experience for the Quick Find feature without having to perform any additional steps. If you have to include more than 20 fields or a field that is longer than 900 characters, you should consider adding nonclustered indexes to the columns in the database tables directly. To maintain indexes requires processing by the computer that is running SQL Server. Therefore, you must decide whether the advantage gained by users is outweighed by the extra processing when you add many find columns and indexes. Details of how to add indexes in SQL Server, and the performance considerations of this are not part of the scope of this course.

Lookup View

The Lookup View is used when a user clicks the lookup icon that is displayed to the right side of a lookup field in a form. A list of possible parent records is displayed that shows the primary field of the parent and the first two columns from the Lookup View below the primary field.

The “Opportunity Form Showing Account Lookup Field List” figure shows the Account lookup field on an Opportunity. In this example, the Account Lookup View is configured to show the Primary Contact and Address 1: City fields as the first two columns. Therefore, these fields are displayed below each Account Name.



The screenshot shows the 'Summary' section of an Opportunity form. On the left, there are several input fields: Topic (Topic *), Contact, Account, Purchase Timeframe, Currency * (Currency), Budget Amount, Purchase Process, Description, Pipeline Phase, Current Situation (Current Situation), and Share prices dropping. To the right of these fields is a summary text: 'Needs to restock their supply of Prod'. Below this is a 'Look Up' button. A dropdown menu is open, displaying a list of accounts with their primary contact and address 1: city. The list includes:

Account	Primary Contact	Address 1: City
Basic Bike Company	Peggy Justice	Pontiac
Best o' Bikes	Robert Brown	Bothell
Bicycle Accessories and Kits	Margaret Adams	Spokane
Bike Dealers Association	Sandra Maynard	Tacoma
Bike Experts	Ruth Suffin	Santa Monica
Bike Rims Company	Charles Christensen	Eureka

At the bottom of the dropdown, there is a 'Look Up More Records' link and a note indicating '10 results'.

Figure 72 -Opportunity Form Showing Account Lookup Field List

If the required record is not available in the list that is displayed, or you cannot determine the correct record from the information that is shown, click **Look Up More Records** to display a dialog box that shows all the results. You can also click the **New** button at the bottom of the displayed list to create a new record. This will use Quick Create if it is enabled for that entity, otherwise it will open a full new form for that entity.

The Lookup View filter determines the records that are shown and the view columns define the fields that are displayed. The default Lookup View for most system entities and all custom entities includes a filter to only show records that have a status of Active. You can modify the filter and the view columns. However, the primary field must always be the first column in the Lookup View. If you try to remove the primary field the message “This column is required and cannot be removed” is displayed.

Note: By default, when lookup fields are added to forms, the Lookup View will be used to enable a user select a record. However, in the form editor you can configure a specific lookup field to use a different view instead of the lookup view.

If a user types in a lookup field and presses the **Tab** key, or uses the search control in the **Look Up Record** dialog box, the search uses the find columns that are defined for the Quick Find view. The definition of the find columns is used for both the Quick Find and the Lookup Views. The results are not filtered by the Quick Find View filters. Instead, the results are filtered by the Lookup View (or the view that is configured for the lookup field). The results might also be filtered by a configuration on the form. For example, the Contact lookup on an Opportunity can be configured to only show Contacts who are linked to the selected Account for the Opportunity.

Although most entities have only one Lookup View some system entities, such as Case, have more than one Lookup View. You can modify the filter and view columns for Lookup Views. However, you cannot delete or create your own Lookup Views.

Multi-Entity Search

Microsoft Dynamics CRM extends Quick Find to search up to ten entities at the same time in the Browser Client as well as the Tablets client. Users can select to filter the search to only a single entity if they want to for a particular search.

The results of the search are shown in lists, one for each searched entity that returns results. Searching uses the same concept as Quick Find, for each searched entity the find columns of the Quick Find View are used. Typically, the find columns are different between entities.

Searching for “Redmond,” for example, might return Accounts, Contacts and Leads in that location (if the City field is added to the Quick Find View find columns), and Contacts and Leads with the Last Name of Redmond, and an Account called Redmond Inc.

To configure the entities that are searched by a multi-entity search, follow these steps.

1. Navigate to **Settings > Administration > System Settings**.
2. On the **General** tab in the **Set up Quick Find** section, next to the label **Select entities for search on CRM for tablets**, click **Select**.
3. In the **Select Entities** dialog box, move entities from the list of available entities on the left side to the list of searched entities on the right side by using the **Add** button, or remove with the **Remove** button.
4. Change the order that the entity results lists appear by using the **Move Up** and **Move Down** buttons.
5. Click **Save and Close**.

A maximum of ten entities can be included in the multi-entity search.

Lesson 8-3 Custom Views

Typically, to help users find and use records in Microsoft Dynamics CRM, you must create custom views. Although each entity already has several views that are created by Microsoft Dynamics CRM, you might have to modify the views or add more views to meet users' requirements. For example, based on your requirements, you might create a view of all Accounts in a specific industry sector, or a view of all Cases that were created more than three months ago and are still unresolved. If the default view are similar to your requirements, you might only have to add some columns to the existing views for an entity.

Custom views appear with other public views in the view selector in alphabetical order, and are shown to the users who have permissions to read records of that type.

We recommend that you keep view names short. Because the list is always shown alphabetically, choose names carefully so that the most frequently used views are near the top of the list, and the views that are similar in definition and usage are near one another.

In addition to displaying the list of records of an entity, views can also be embedded in forms (as a sub-grid) and can be displayed as a list component on a Dashboard. For example, a sub-grid that is embedded in an Account form can be used to display Orders that have been made by the Account.

You can create new custom views or copy an existing view by using **Save As** and then modifying the copy. A view is automatically published when it is created and saved by using either method. Later changes must be saved and the entity published before the changes to the view will be visible in the application.

You modify the properties of a view by using the view editor, as shown in the "View Editor" figure.

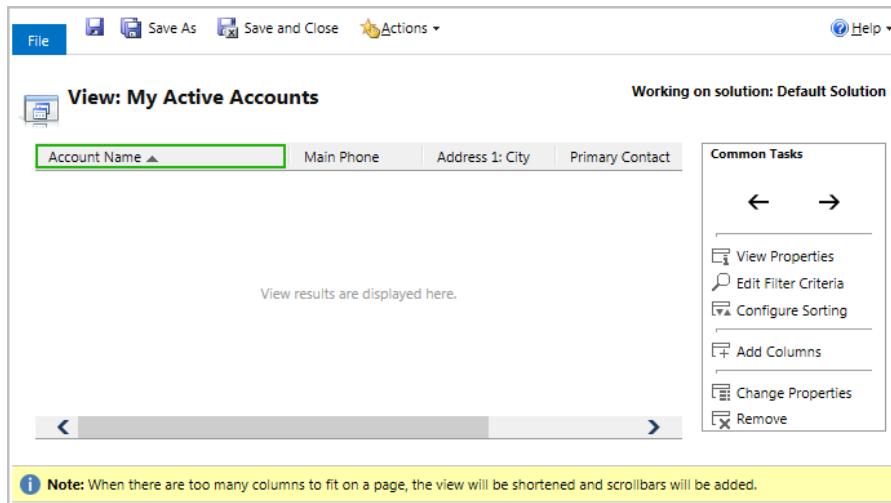


Figure 73 - VIEW EDITOR

Copy an Existing View

If you must have a new view that is similar to an existing view, you can copy the existing view and modify it to meet your requirements.

To copy and modify an existing view, follow these steps.

1. Navigate to Microsoft Dynamics CRM > **Settings** > **Solutions**.
2. Open a Solution that contains the entity for which you have to modify a view or a Solution to which you will add the entity.
3. Expand the list of Entities in the solution explorer.
4. Expand the entity that you want to customize.
5. Click **Views**.
6. Double-click the view that you want to copy.
7. After you open the view, click **Save As** and specify a new name and (if this is required) a description for the view.
8. Click **OK**.
9. Modify the view as required.
10. Click **Save and Close**.
11. On the toolbar, click **Publish**.

After you publish the view, the new view is available for use.

Note: a view is automatically published when it is created.

Create a New View

When you collect business requirements for a new view, consider asking the following questions:

- Which entity such as Account, Quote or Case must the view display?
- Which records must appear in the view? By default, all records appear in the view according to the permissions of the user who is accessing the view. Are any filters required to show only the records that meet specific requirements?
- Which fields must be displayed?
- How should the data be sorted by default?

After these questions are answered, to create the view, follow these steps.

1. Navigate to Microsoft Dynamics CRM > Settings > Solutions.
2. Open a Solution that contains the entity for which you have to modify a view, or a Solution to which you will add the entity.
3. Expand the list of Entities in the solution explorer.
4. Expand the entity for which the view should be created.
5. Click **Views**.
6. Click **New**.
7. Provide a name and (if this is required) a description for the view.
8. Define filters to specify the records that should be displayed.
9. Add, remove and configure the columns.
10. Configure the default sort behavior.
11. Click **Save and Close**.
12. **Publish** the changes. After you publish the changes, the view is available to all users whose Security Roles include the privileges to read records of the associated type.

Edit Filter Criteria

After a new view is created, the next task is to specify the filter criteria. By default, a view displays all the records that a user is permitted to read based on the user's security roles. For example, if a user views Active Accounts and the Security Roles for the user grant access at the User level, the view only displays Accounts that he or she owns and any Accounts that are shared to the user.

Filters specify a query that is made up of one or more criteria that describe the records that you want the view to return, and are similar to WHERE conditions in SQL queries. By

default, if you add more than one criteria, these are additive—all the conditions must equate to “True” (a logical AND behavior). However, criteria can be grouped and changed from using an AND behavior to an OR behavior.

In addition to querying fields in the current entity, filters can query fields in related records.

To add a field to the selection criteria, click the **Select** control. A list of fields for the view entity is shown. After the list of fields, a list of entities that are related to the view entity is shown in a section of the list that is labeled **Related**. To include a field from a related entity, first select the related entity, and then click the **Select** link underneath the related entity clause. Then, a list of fields is displayed for the related entity. This can be repeated to include fields from entities that are associated to a related entity that has already been added. This might be a child entity of a child entity, or a parent entity of a parent entity, or other combinations of relationships.

Adding multiple relationships to a query and including many fields from those related entities will result in a query that requires more processing on the computer that is running SQL Server. How this affects performance and whether it is noticeable to users will depend on how many relationships and fields are included, how many records are involved for each entity and the specification and configuration of the server.

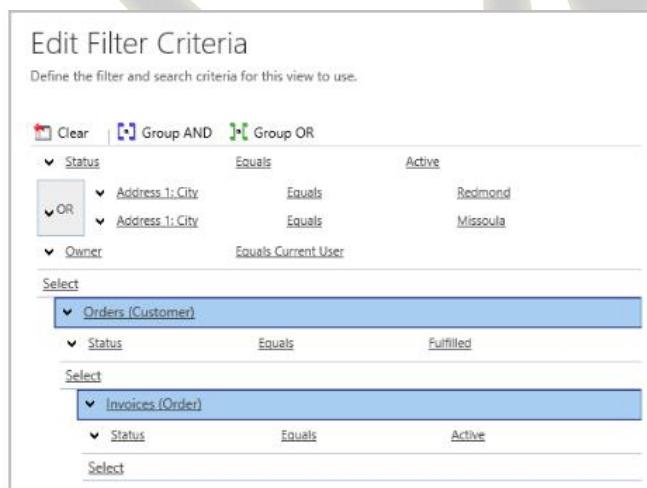


Figure 74 - Filter Query Including Related Entities

Add Columns to a View

By default, new views contain a single column—the primary field from the relevant entity. For example, only the Account Name is selected for new views for the Account. You must add the required columns.

There is no limit to how many columns can be displayed in a view. However, if more columns are added than can be displayed on the width of the screen a horizontal scroll bar is shown. We recommend that to improve performance that you do not include more columns than is necessary.

Columns always use the display name of the field as the name that is shown in the view header, and you cannot modify this in a view. You can modify the display name in the

field properties to change how the field is described throughout the system. You can override the display name of a field on a form by using the form editor. Therefore you should consider views first instead of forms when you configure field display names.

To add columns to a view, follow these steps.

1. Navigate to Microsoft Dynamics CRM > **Settings** > **Solutions**.
2. Open a Solution that contains the entity, or add the entity to a Solution before you continue.
3. Expand **Entities** in the solution explorer.
4. Expand the relevant entity node.
5. Click **Views**.
6. Double-click the view that you want to modify.
7. In the **Common Tasks** area, click **Add Columns**.
8. Select the columns that you want to add to the view.
9. Click **OK**. The columns are added to the view.

To modify the position or size of a column in a view, follow these steps.

1. In the view designer, select the column to move. A green border appears around the column header.
2. In the **Common Tasks** area of the View Designer, click the left or right arrows to move the column in the view. Each click moves the column one position to the left or right.
3. To resize the column, in the **Common Tasks** area, click **Change Properties**.
4. In the **Change Column Properties** window, select a width for the column. Widths are shown in pixels.
5. Click **OK**.

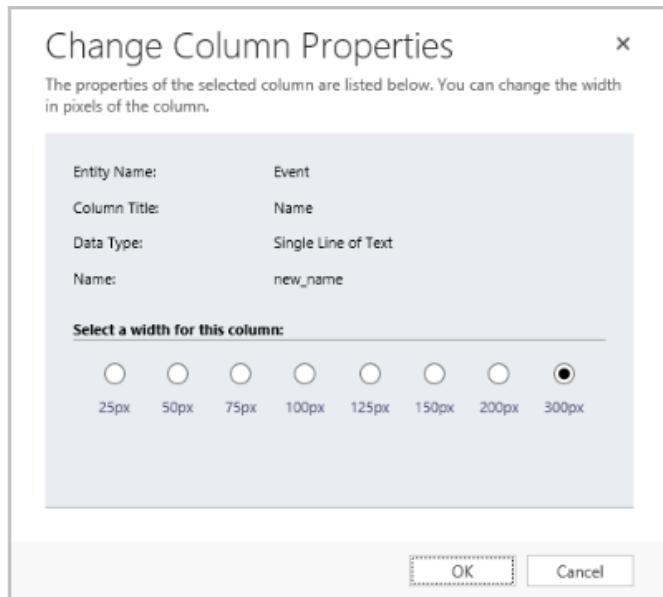


Figure 75 - Column Properties

In the **Change Column Properties** dialog box, you can set the width of the column by selecting a predefined number pixels from the list of options, and then click **OK** to resize the column.

Configure Sorting

By default, a view is sorted by the primary field for the relevant record type (for example, for Accounts the view is sorted by Account Name).

In the View designer, a triangle after the column header indicates the sort columns. In the application, an arrow indicates the sort columns, and the direction of the sort (ascending or descending). The user can click a column header in a view to sort by that column.

To change the default sort behavior, one or two sort columns can be specified. If you add two sort columns, the data is sorted first by one field, and then the records that have the same value, in that field are sorted by the second field. For example, a list of Contacts can be sorted by Last Name and then First Name. Columns can be sorted in ascending order (A-Z) or descending order (Z-A).

Although a view can display fields from parent records, you cannot sort on these fields. For example, if a view of Contact records includes the **Website** column from the parent Account, you cannot sort records by using the **Website** column, you can only sort the columns that represent the fields from the Contact entity.

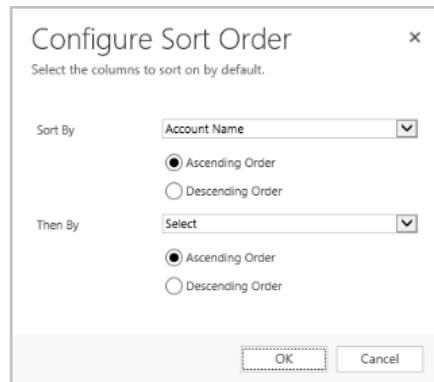


Figure 76 - Configure the Sort Order for a View

Set the Default Public View

By default, most entities have a “My Active (name)” view, for example, “My Active Accounts,” which is the default view for each entity. The default view is the view that will be displayed for users when they first navigate to a specific entity.

Each entity has one default view.

Lesson 8-4 Remove Unwanted Views

If views are no longer required, they can be deactivated or deleted.

Deactivate a Public View

If a public view is not required it can be deactivated. Deactivated views are not visible to users. However, if a deactivated view is required at a later date it can be enabled.

Delete a Public View

If a Public View is no longer required, it can be permanently deleted. This operation cannot be reversed. Therefore, always consider deactivating a view instead of deleting a view.

If you delete a public view, any references to the view are removed from all Solutions. If you import a Solution to a Microsoft Dynamics CRM Organization where the public view already exists, the view is not deleted. You must manually delete the view from every target system where the view already exists, before or after you import the updated Solution.

Module 9 - Customising Charts and Dashboard

One way to make the Microsoft Dynamics CRM system more usable and valuable is to make it easier for people to understand the data that is available.

You can use Microsoft Dynamics CRM 2015 to build charts that people can use to quickly interpret the information that they must have to do their work. Charts provide a visual display of data that helps people view patterns, trends and exceptional data more easily than lists of records and their values.

Dashboards give users key information that relates to their jobs, displayed on a single screen. This means that you must create different dashboards for people who have different roles and responsibilities.

You can include several different components on a dashboard, although the most common items are charts and lists of records. Both of these component types are based on views that already exist to determine the data to display. Users can create personal dashboards by using views or charts they already have access to, and share these with their colleagues.

Objectives

The objectives are:

- Create and modify system and personal charts.
- Select a chart type and related options.
- Add series and categories to a chart.
- Export and import charts.
- Create and modify system and personal dashboards.
- Control access to system dashboards by using Security Roles.
- Add components to a dashboard and modify the layout.

Lesson 9-1 Create and Modify Charts

Charts can be created to help users understand the data so that they can make decisions or review the progress of their business processes. Many system entities have several charts that you can use. When you create a custom entity you must create any charts that you need.

Charts can be displayed in the chart pane alongside a view, or embedded in a single record form, or as a component on a dashboard.

You can design *system charts* that are available to all users. Users can create *personal charts* if they must have something more specific for their role, and personal charts can be shared with other users. In both cases, a chart can only include data from records of a single entity.

When you design a chart, consider the following:

- The entity that contains the data that you want to display.
- The fields that you want to summarize as a *series*.
- How you want to summarize the data in those series, for example to count how many records there are, or to sum a set of values.
- The fields that will be used to group the data into *categories*.
- The type of chart that will provide the best display of the data that you selected to show in the chart.

You can display up to five series, grouped by one category, or one series that is grouped by one or two categories. You cannot display multiple series that are grouped by more than one category.

When you create a chart by using the chart designer tools in the user interface (UI), you cannot configure the following:

- The view the chart will represent visually.
- The records the chart will include.
- The colors to use when the chart is displayed.

System and Personal Charts

Before you create a chart, you must decide whether it will be useful to all users, or only to a small group such, as one department or team. System charts are maintained by a system customizer or administrator and are available to all users of the system. Personal charts are created by users and can be shared with colleagues who might benefit from them.

System Charts

System charts are Solution components and can only be created by users with permissions to customize the system. You can modify or delete the default charts that are created when you install the application, and create additional charts to meet the requirements of the users. System charts are included with the entity they belong to when you export a solution package.

Personal Charts

A user who has the appropriate permissions can create a personal chart and share it with other users or teams. **Note:** All default Security Roles let users create, modify, delete, assign and share personal charts.

The same features are available to use in personal charts as with system charts. Personal charts cannot be included in a solution package for deployment to another Microsoft

Dynamics CRM system. However, the definition of a personal chart can be exported as an XML file and then imported into a target system without using a Solution.

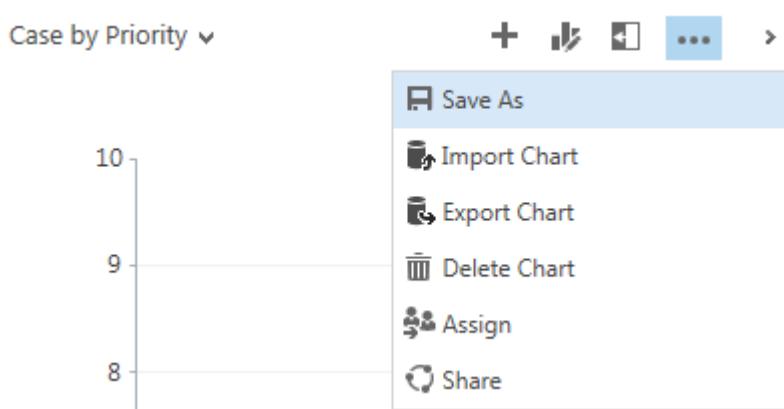


Figure 77 - Part Of The Chart Pane Showing New Chart, Edit Chart, Expand, More Commands, Save As, And Other Buttons

Select the Type of Chart to Create

If a user has a specific requirement for a chart that not everyone must have, then the chart should be created as a personal chart and shared with the appropriate users, instead of creating a system chart that all users can view in the list of available charts.

Charts differ from the other components of Microsoft Dynamics CRM 2015 because you can export the definition of a chart and import the chart back into the same or a different Organization without using a Solution. This can also be used to convert a system chart to a personal chart or the other way around. These methods are described in the “*Converting between Personal and System Charts*” topic.

Chart Types and Options

When you create or modify a system chart, you configure the options as shown in the “New Chart Form” figure.

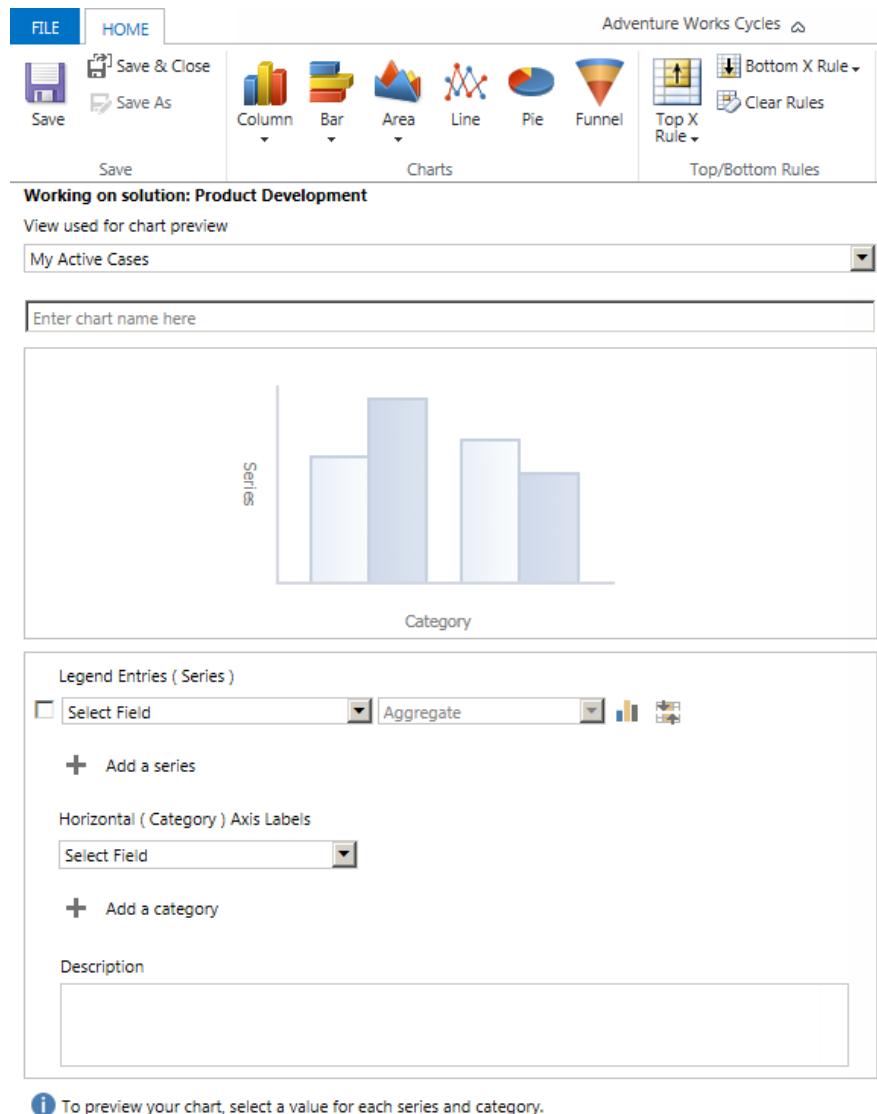


Figure 78 - New Chart Form

A chart displays a *series* of aggregate (summarized) values, broken down by *category*, such as a series of the count of Case records that are categorized by priority. You must choose between two approaches—one series of values divided into one or two categories—or more than one series with a single category.

Microsoft Dynamics CRM 2015 can display many types of charts. However, only some types of charts can be configured by using the User Interface (UI) tools. You can select the required chart type from the chart form ribbon, or from the chart type button that is next to each series. The chart types include the following:

- Column
- Bar
- Area
- Line

- Pie
- Funnel

If you select to display more than one series by using a column chart, the series is displayed as columns next to one another (sometimes this is known as a *clustered column* chart type). If you have only one series with two categories, you can select one of the following subtypes of column chart instead:

- **Stacked Column** - Series values are stacked over one another in a single column and they use the second category. Typically, this type is used when you must compare the total values between categories, and you must have a visual breakdown in each category.

For example, you might show a count of support Cases that are arranged by owner to determine whether the workload is evenly distributed in the team. The first category is the most important breakdown. Therefore, this category is frequently known as the *primary* category. You might also want to know whether one service representative has an unusual amount of high priority Cases. For the divide to be visible, a *secondary* category is used to divide each column.

- **100% Stacked Column** - Series values are stacked over one another. However, each category column is extended to the top of the chart. Large and small categories appear as the same size and their total values cannot be compared visually. Select this type when you must highlight how the “mix” of the subcategories changes between the records of each category.

For example, if you must know the communication channel (origin) for cases that are received that have each level of priority, the differences in proportions of origins for each priority are important. This information might not be clear if there are significantly more cases of one priority than the other priorities and a usual stacked column is used. Use a 100% stacked column to show a count of Cases, arranged by priority and summarized by origin. This might highlight that most high priority Cases are raised by telephone, whereas for low priority calls an email message might be the preferred channel.

Bar and Area charts also have subtypes for stacked and 100% stacked displays of two categories that work exactly like columns. Bar charts resemble column charts. However, their horizontal layout provides more space for categories that have long names so that they can produce a visualization that is easier to read and interpret.

Combining Chart Types

When you display multiple series, you can use a different chart type for each. However, some types cannot be combined. These limitations are described in the following table.

Chart type	Available Combinations
Column (all types)	All column, area and line charts
Area (all types)	All column, area and line charts
Line	All column, area and line charts

Chart type	Available Combinations
Bar (all types)	Only other bar charts (of any type)
Pie	None - pie charts only support a single series
Funnel	None - funnel charts only support a single series

Select a View Used for Chart Preview

The first option on the new chart form is **View used for chart preview**. You must select a public view from the list (you cannot use a personal view or any of the special system views). The records in the view that you select are used to show a preview of the chart as you configure the chart. This helps you to visualize the effect of the selections that you make.

The view that you select here is *not* saved as part of the chart definition, it is only used to preview the chart as you build it.

If you create a chart to specifically include on a dashboard, we recommend that you use the view that you intend to associate with the chart on the dashboard. As a system customizer, you might not own many records. Therefore, avoid views that filter for “my” records to avoid not receiving any results or to receive a preview that does not represent what is visible to other users.

The sort order of a view does not affect the preview or the layout of a chart. A chart can show data from fields even if the fields are not displayed as columns in the view that the chart is associated with.

Using Fields from the Preview View

When you configure a chart, you select fields to use as series or categories from a drop-down list of the fields that are defined for the entity. For convenience, the columns in the view that you use for preview are shown at the top of this list (in alphabetical order, not the order in which they appear in the view). Other fields are listed alphabetically by display name below a separation line.

This is important when you create charts that use a property of a primary (parent) record, as is described in the following scenario.

Using a Value from a Parent Entity as a Chart Category (Example)

The head of the Services division at Adventure Works Cycles wants a chart of the number of new Cases that are created each month, categorized by the service level agreement of each customer’s contract.

The service level is stored on the customer’s Account record in a custom option set field that is named Service Level with the options Warranty Only, Silver, or Gold.

Instead of creating a matching field on the Case entity and using relationship mappings or a workflow to copy the value from an Account to every new Case that is created, you want to use the field directly by creating a view containing the field your wish to use in the Chart.

Configure Series and Categories

A chart must have at least one series and one category. You configure series to control what data is displayed in a chart, and use categories to split the series into different *data points* to compare to one another. The term data point describes a single value that is displayed on a chart, whether it is displayed as a dot, a column, or a segment of a pie chart.

Chart Series

To configure the first series for your chart, in the **Legend Entries (Series)** section of the chart configuration form, click **Select Field**, and then select the field to use. Then, click **Aggregate** to select how you want to summarize the data in that field.

Regardless of the method that you select, only the records that are included in the current view are used in a chart that the records are associated with. The collection of records that are returned by the filter query that is defined for the view is known as the *record set*. If the view contains more records than are shown on a single page, the chart displays all the data that is included in the record set. Any filters that are applied to the view by the user are also considered.

Fields that have a numeric data type (whole number, decimal, float or currency) can be summarized by using simple mathematical functions. All other fields can only be summarized by counting the records. The aggregation methods that are available for different field types are described in the following table.

Method	Description	Supported field types
Avg	Calculates the average of the data values.	Numeric only.
Count:All	The number of records in the record set.	All field types (refer to the Best Practice at the bottom of this table).
Count:Non-empty	The number of records in the record set which have a value in the selected field.	All field types. If this is used for a two option field, it will be the same as Count:All. Therefore, we recommend that you don't use Count:Non-Empty for two-option fields.
Max	The highest value of the field in the record set.	Numeric only.
Min	The lowest value of the field in the record set.	Numeric only.
Sum	The sum of all the values of the field in the record set.	Numeric only.

Best Practice: To count all the records in the record set, the best field to select for the series is the primary key field. This field contains the GUID for the record, and always contains a value. By default, this field has the same display name as the entity (the

schema name of the field might vary, and includes the suffix “Id”). You can reliably use this field for counting, and it should be obvious to other users what your intentions are.

Do not select other fields that always contain a value such as “Created By” or “Modified On”. Although this works, your intention might not be clear to other system customizers.

To add more series, click **Add a series**, then repeat the steps that are used to configure the first series to select a field and aggregation method. The **Add a series** button will be unavailable if you have two categories, or if you have already added the maximum of five series, or if you select a Pie chart or a Funnel chart (which support only one series).

To delete a series, click × (Delete the series) to the right side of the series entry that you want to remove. You cannot delete the series when there is only one series, you must select a different field and aggregate method.

Chart Categories

To configure the first category for your chart, in the **Horizontal (Category) Axis Labels** section of the chart configuration form, click **Select Field**, and then from the list of available fields, select the field that you want to use.

To add a second category, click **Add a category**, then repeat the steps that are used to configure the first category to select another field and grouping (for a date field). The **Add a category** button will be unavailable if you have more than one series, or if you have already added the maximum of two categories or if you select a Pie chart or a Funnel chart (which support only one category).

To delete a category, click × (Delete the category) to the right side of the category entry that you want to remove. You cannot delete the category when there is only one category, you must select a different field.

Date Fields as Categories

Because date fields store the date and time, regardless of the display format, a date field category that is not grouped shows a data point for each unique date and time value in your record set. This could lead to many data points, and does not provide a useful visualization or summary, and you might be unable to display the chart.

If a category field has a data type of date and time, the **Date Time Grouping** option set appears, set to the default of **Month**. To group date values, you must select an option from the following list:

- Day
- Week
- Month
- Quarter
- Year

- Fiscal Period
- Fiscal Year

Weeks are displayed as *week numbers* and years, for example “Week 4 of 2014.” Microsoft Dynamics CRM 2015 follows the convention that is used in the United States, as follows:

- Sunday is the first day of each week.
- January 1 is always the first day in Week 1.
- Week 1 has from one through seven days.
- The last week of the year is always Week 53, even if it only contains December 31.

This differs from the convention that is used in Europe and many other countries that follow the ISO 8601 system in which the following is used:

- Monday is the first day of each week.
- Week 1 is the first whole week that contains at least four days of the new year.
- January 4 is always in Week 1.
- Week 1 always contains seven days. This can include up to three days from December.
- The last week of the year can be Week 52 or 53, and can contain from one through seven days.
- The first three days of January can be in week 52 or 53 of the previous year.

Make sure that the users understand the system that is being used by Microsoft Dynamics CRM. Do not use week as a date grouping level if it could cause confusion when other conventions are well established or used by other systems the users work with, such as finance or ERP software.

If the primary category is a date and time field, you can select the same field as the secondary category. However, you must select a date grouping that is smaller than the one that is used for the primary. For example, you might configure a stacked column chart to show the value of opportunities groups by quarters, then additionally categorize by month, by using the **Estimated Close Date** field for both categories. This displays a column for each quarter, stacked by month.

If you use the same field for both categories and the secondary is grouped by a longer period of time than the primary, the chart layout does not change and the secondary category is not shown.

Designing Categories for Effective Drill-Down

When a user views a chart next to a view, the user can click a data point in the chart to filter the records in the view. This filters the records in the view to show only those that

match the categories for the data point. The user can also drill down to view a new chart that shows more detail for those records.

For example, if you create a column chart that shows Cases by one category of owner, then each data point shows the Cases for a specific owner. When someone clicks the chart column for a user, the view is filtered to show only the Cases that are owned by that user in the selected view. The user can use use drill-down to show how the filtered Cases are distributed by any other field in the Case entity, such as priority, or product (the selected field does not have to be in the view or the original chart).

If on the other hand, you add a secondary category of priority to show the breakdown for each owner, then each data point now represents the Cases for a single owner and a single priority. The user cannot click a whole column to show all Cases for one owner at the same time. He or she must click each priority section of the owner column to view these in succession. In the same manner, the user can only drill down in this smaller subset of records for each priority one at a time. Sometimes a more detailed chart is less useful for these explorations of data than a simple chart.

Filter and Sort Charts

To make your information easy to visualize and understand, you might choose to show only the most important data on a chart. In some scenarios the information that requires the most attention might be the smallest values, for example to highlight products that are selling in the lowest volume.

On a chart with a single category, you can configure one of the series of your chart to filter the record set by using a top or bottom rule to include only the data points with the greatest or smallest values. You must specify how many data points to include. Therefore, these rules are known as *top X* and *bottom X* rules, and indicate that the unknown number “X” can be set to whatever value that you must have (up to a maximum of 100).

These rules also sort the data so that the pattern of variation between categories is easier to interpret.

Filtering Charts by Using Top and Bottom Rules

By default, if you use the buttons on the ribbon to apply a **Top X Rule** or a **Bottom X Rule**, this is applied to the first series. You can select the check box to the left of the series field name and then use the ribbon buttons to apply a rule to that series, or use the **Top/Bottom Rules** button next to the series in the main body of the chart editor form. The buttons for both rules include options for **Top** (or bottom) **3** or **5** records and a **Custom** option so that you can select any number.

For example, you might want to create a chart to show your organization’s risk exposure by displaying credit limit for Accounts. However, you only want to show the ten Accounts that have the highest credit limits. To do this, add a series for **Credit Limit** and a category for **Account** and then apply a top X rule, by using the custom option and type **10** in the **View top items** field. The rule filters the data so that only the top 10 Accounts (category) are displayed, sorted in descending order by credit limit.

If you use a bottom X rule, the categories are filtered for the lowest values, and sorted in ascending order.

A chart will displays data from the record set in the associated view. The credit limit chart in the previous example will not show the top ten Accounts by credit limit in the whole organization unless a view of all Accounts is used. If a user displays the chart next to the “My Accounts” view, the top rule is applied to only the record set that is returned by that view.

If you have two categories, all rules are cleared and the buttons for applying the rules are unavailable.

Sorting Charts

By default, charts are sorted according to the categories that are used, and ignore the sort order of the associated view.

The sort order of a field depends on its data type, as follows:

- Text fields are sorted alphabetically.
- Numeric fields are sorted in ascending order by value.
- Date fields are sorted by date (and always grouped).
- Option Set fields are sorted by the underlying values of the options, *not* the labels.
- Lookup fields are sorted by the GUID of the primary record, although the primary field such as **Name** or **Subject** is used for labels.
- If you select the *primary key* (GUID) field of the chart entity as a category, this uses the *primary field* instead. This is a text field therefore it is sorted alphabetically. For example, on a chart for the Contact entity, when you use the **Contact** field (that contains the GUID) or the **Full Name** field, this gives the same result, and the contacts’ full names are shown. Use whichever makes your intent clearer.

Lookup Fields

Because GUIDs are not usually shown to users, sorting lookup fields as chart categories can appear random. Also, lookup fields such as **Customer** or **Regarding** that are lookups to more than one type of entity, are sorted by entity, then by GUID. A **Customer** lookup that is used as a category will always show Accounts, sorted by GUID, then by Contacts.

Frequently, business processes will dictate that only one type is used for **Customer** on a specific entity. **Regarding** is usually used for many purposes, and **Owner** might vary between User and Team in business areas and entities.

Best Practice: To use a more natural sort order for a lookup, add a suitable field from the primary (“parent”) entity to the view that you are using for the chart preview, and use that field as a category. For example, you might add Account Name (**Customer**) or Full Name (**Owning User**). These are text fields and they would be sorted alphabetically.

Ranking Data by Using Top or Bottom Rules

There are no buttons or controls to apply a different sort order. However, you can rank your data according to the values in a series. Apply a top or bottom rule to a series, by using a custom number that is greater than the number of categories you expect in the record set , and then this sorts your data by the series values without the filtering taking effect.

For example, you could create a chart to show the count of Cases that are categorized by owner, and use a top rule with a custom value of 50, if this is more than the number of staff in the Service department. The chart would display a category for every owner, sorted by the number of Cases each owns. The chart also shows the person who has the most Cases first, and then descending in ranked order. The highest custom number that you can use for a top or bottom rule is 100. However, this would be many data points to try to display on a single chart in any scenario.

Sorting by using a top or bottom rule overrides the default sort order of your category, and this includes dates. Because people will usually expect dates to go from left to right on a chart (in most cultures), use top or bottom rules with caution when you have date categories, and make sure that the chart name and the labeling describes very clearly how this is arranged.

Lesson 9-2 Export and Import Charts

You cannot use the chart design tools to configure charts that use all the features that can be displayed in Microsoft Dynamics CRM 2015.

If your business requirements are more complex, or you must have more control over the format and layout of a finished chart, you can modify the XML definition of the chart by exporting the chart definition as a file, editing the XML in the file and importing the file back into your system.

You can also use export and import to copy charts from one Organization to another without having to use a Solution, and to convert a personal chart to a system chart, or the other way round.

Export Charts

You might want to export system or personal charts from Microsoft Dynamics CRM for the following reasons:

- To make a backup of the chart definition before you make changes so that you can revert to the previous configuration.
- To export a personal chart and import it as a system chart to make it available to all users.
- To export a system chart and import it as a personal chart to share with only one team of users who must have a different version of the chart.
- To import to another Microsoft Dynamics CRM organization, without using a Solution.

The XML file that you export includes the complete definition of the chart, and includes the following:

- The GUID that uniquely identifies the chart in the Microsoft Dynamics CRM organization.
- The name and description of the chart.
- The entity that the chart shows.
- The fields that are used for data series and categories.
- Sorting and filtering of the data.
- The chart type and the related properties for each series. This includes colors.
- Chart layout. This includes the properties for each axis and the chart legend.

Export a System Chart

Import Charts

You can import a chart to the same Microsoft Dynamics CRM 2015 Organization that the chart is exported from or to a different Organization. No application version information is stored in the chart definition. Therefore, you can import charts from Microsoft Dynamics CRM 2011, 2013 or Microsoft Dynamics CRM 2015.

When you import a chart the XML file is checked to make sure that it uses the correct syntax. You will receive an error message if it does not conform.

Update a Chart or Create a Copy

During the import process, if an existing system chart is found to have the same GUID as a chart that you are importing, a dialog box appears, as shown in the “Import Chart Wizard - Duplicate Found” figure. If you export a personal chart and import it as a system chart, you will not receive a message, and the chart is given a new GUID after it is imported.

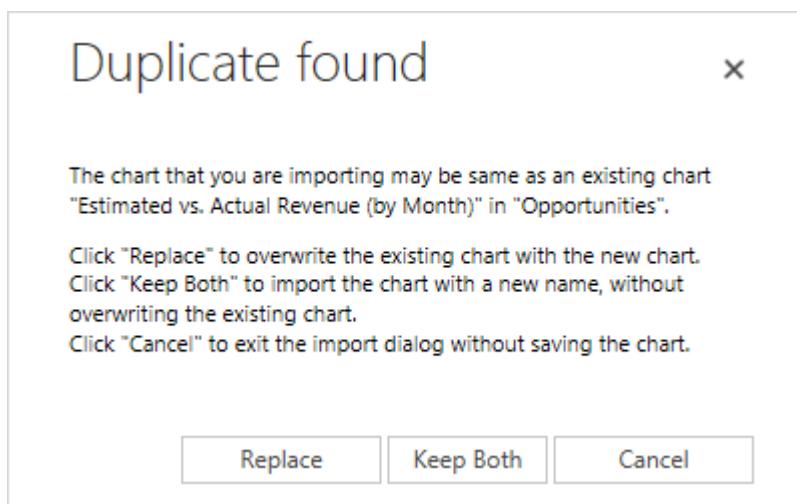


Figure 79 - Import Chart Wizard - Duplicate Found

You must select one of the following three actions:

- Click **Replace** to overwrite the existing chart with your new definition.

If you import a personal chart, the **Replace** button is unavailable, because you cannot overwrite a system chart from the chart pane, even if you have the System Administrator Security Role.

When you click **Replace**, the existing chart definition is updated. You must publish the entity to be able to view the changes.

- Click **Keep Both** to create a separate new chart.

Enter a **Name** and **Description** for your imported chart. The properties that are stored in the XML are displayed as defaults. You cannot use the same name as an existing chart for this entity of the same type (system or personal).

Your chart will be imported and assigned a new GUID.

- Click **Cancel** if you do not want to import this chart.

Modify the Chart XML

In Microsoft Dynamics CRM 2015, you can use the chart configuration tools to create several types of charts. However, these tools do not let you control all the capabilities of the chart rendering engine. To more accurately control the appearance of your charts, or to take advantage of more advanced techniques, you must export your chart, edit the chart XML and then import the XML file back into the system.

Some chart properties usually modified in this manner include the following:

- Changing the colors that are used for data points.
- Preventing the values from being displayed against data points.
- Improving axis labels for clarity, or to specify a scale such as “Sales (millions).”
- Changing the number format of values on axes or data point labels for ease of reading, for example by using “8.3” instead of “8,300,000.00” (if the scale is explained in the chart name or axis label).
- Removing the legend to create more space for the chart, especially if the colors or markers that are used have a well-understood meaning among the users.
- Removing the category axis label if it is obvious from the names of the categories or implied from the chart name, for example dates that are grouped by months on a sales forecast chart.

When you remove unnecessary components and simplify the appearance of a chart, there is more space for the data points, and the overall clarity is improved, especially when you use charts in a limited space, such as on a dashboard.

Modify, Import, Test and Repeat

When you update a chart by making changes to the XML, you must import the chart and select to replace the existing duplicate that is found. Then, you must publish your changes before you test the changes to view the results. Depending on the outcome, you might have to make additional modifications and repeat this process several times.

You can perform all the initial development by using a personal chart to avoid having to publish the changes every time. Then, you can import the personal chart as a system chart when you are ready to deploy or have users test the design.

Lesson 9-3 Create and Modify Dashboards

A dashboard is used to show several areas of Microsoft Dynamics CRM in a single display. This is useful to show an overview of the status of a process, amount of activity, and items that require attention. Frequently, dashboards are designed for a specific job role or department, and show information that requires the user to browse through several screens to receive the details that they must have.

Users can interact with the information in dashboards to explore and analyze the information to gain new insights, and take actions on records to deal with any issues. For example, a Customer Service manager might notice an unusually large volume of new Cases on a chart on his or her dashboard and want to discover why. Drilling down into the chart shows that many of the Cases are related to a new product that is recently introduced. By opening a new window that shows the view of the records for the chart, the manager can use the chart pane to filter only these Cases, and then assign these Cases to a single service representative to search for common issues and to find a cause of the issues.

Microsoft Dynamics CRM 2015 includes several dashboards that you can customize or use as a starting point to create your own. You can change the layout to suit users' requirements and add and remove components as described later in this module. The four types of component that can be added include the following:

- Charts
- Lists (based on views)
- IFRAMES
- Web Resources

System and Personal Dashboards

Dashboards in Microsoft Dynamics CRM are either *system dashboards* or *personal dashboards*, and although the main features are the same, there are some differences.

System Dashboards

A system dashboard can be made available to any user. However, a system dashboard can only contain components that are also available system-wide. You cannot include personal views or personal charts on a system dashboard. You can include a system dashboard in a

Solution to export and deploy it to another organization. You must make sure that any components the system dashboard uses are included in the Solution or already exist in the target organization.

From Microsoft Dynamics CRM 2013 onwards, you can assign security roles to system dashboards to control who has access to each dashboard. Typically, you do this so that the users are presented only with the dashboards that they find useful, and not to help secure the information that is shown. You can use Security Roles to prevent users from reading data that they are not authorized to view, whether this is through a dashboard or any other method.

Personal Dashboards

All default Security Roles let users create, modify, delete, assign and share personal dashboards.

System or personal views and charts can be included in a personal dashboard. Users can share personal dashboards with other users or teams. If the dashboard includes personal components these must also be shared.

A personal dashboard cannot be included in a Solution, and you cannot directly export or import a dashboard or convert between the two types of dashboards.

Dashboard Name and Description

When you create a system or personal dashboard, you must enter a name, and should also provide a helpful description that is displayed as an infotip to users when they point at the name of the dashboard in a list.

In Microsoft Dynamics CRM 2015, if you create a dashboard from a blank template, you cannot enter a description. You also cannot access the description of a dashboard through the UI after you have saved it for the first time.

We recommend that you select an existing dashboard and use **Save As** to add a description when you first save your dashboard, instead creating a new dashboard. Make sure that you provide the correct description because it will not be easy to update later.

Control Access to Dashboards

To make Microsoft Dynamics CRM easier to use, you can limit who can access each system dashboard. By doing this, each user has a shorter list of dashboards from which to select. The default for all existing and new dashboards is **Display to Everyone**. You can use existing Security Roles. However, we recommend that you create new Security Roles that have no permissions. (You might already have Security Roles to control access to forms that can also be used for dashboards).

To reduce efforts to maintain who has access to each dashboard, you can assign these Security Roles to one or more Default Teams. Then, any user who is added to a business unit can automatically access the dashboards for that department or area of business.

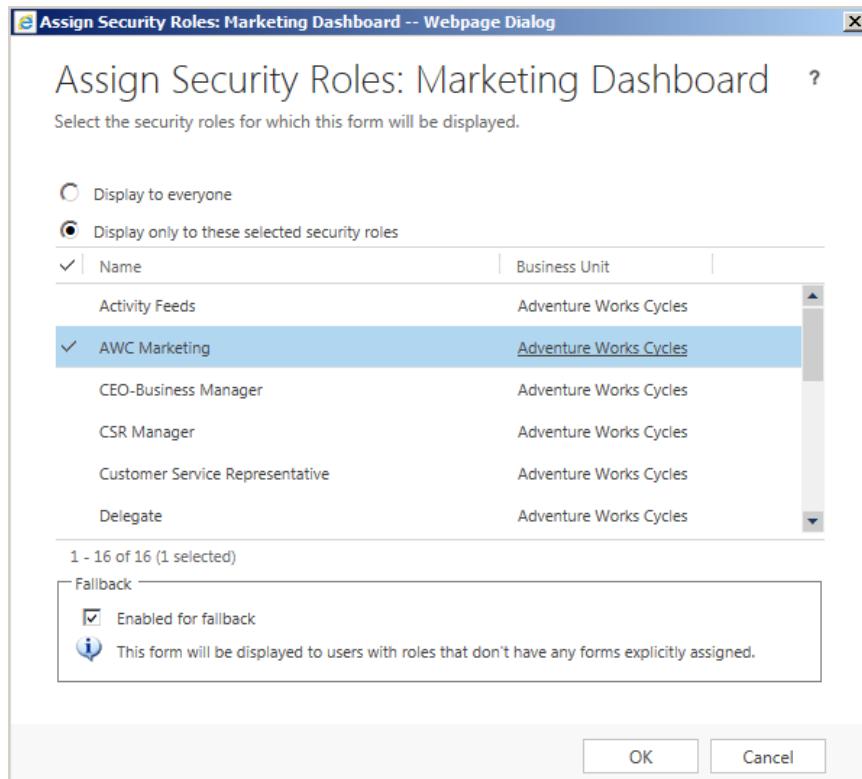


Figure 80 - Dashboards - Assign Security Roles Dialog Box

To control access to a dashboard, follow these steps.

1. Open a Solution that contains the dashboard (this can be the Default Solution).
2. Select the dashboard that you want to update, and then click **Enable Security Roles** on the menu bar.
3. In the **Assign Security Roles** dialog box, select **Display only to these selected security roles**.
4. Click the check mark to the left side of the column heading **Name**, to set or clear all check marks.
5. Click to select a check mark next to each Security Role that should have access to the dashboard (or use CTRL + click to select multiple items).
6. Click **OK**.
7. With the dashboard still selected, in the menu bar, click **Publish**.

You cannot control a preferred “order” for the display of the dashboards, as you can for forms. All available dashboards are listed in alphabetical order.

Default Dashboards

In Microsoft Dynamics CRM 2015, the structure of the navigation bar showing areas such as Sales, Service, Marketing, Settings, and the entities and other components in these areas

are stored in the *sitemap*. You can add this component to a Solution, although it only appears in the **Components** list, and not as a node in the Solution Explorer hierarchy.

In the XML for the sitemap, each area specifies a default dashboard to use that is identified by its GUID. You cannot modify the sitemap by using tools in the UI to change this default. If you want to change the dashboard that can be viewed by a user when the area is first accessed, you can edit the current default dashboard to include the layout and the components that you want, and change its name. You can make a copy first if you want to keep the original definition of dashboard so that it can still be used.

If the specified default dashboard for an area is not available to a user because it is restricted to Security Roles that are not assigned to that user, the system-wide default dashboard is displayed instead. We recommend that you set the system-wide default to a dashboard that applies to many users. To do this, select a dashboard in any Solution, and on the menu bar, click **Set Default**. This has no effect unless a user cannot access the default dashboard for a specific area.

Dashboard Layout

Dashboards are laid out on a grid system of columns and rows that are contained in tabs.

Tabs are displayed across the whole width of the dashboard, one underneath another, and can be expanded and collapsed as required. There are no tools in the UI to add, move or delete a tab. However, you can rename a tab and select whether to show the tab expanded or collapsed when the dashboard is first viewed. A simple dashboard might use only one tab that is always expanded, and hides the tab label to show a clearer display.

Each row is a fixed unit of height (the same as a field on a form). Columns are equal-sized divisions of the width of the dashboard, and adapt to the size of the user's display to avoid horizontal scrolling. Every component on a dashboard is put in this grid system.

Components can span multiple rows and columns, and this could lead to a flexible system for laying out components of different sizes.

When you create a new dashboard (instead of making a copy of an existing dashboard), you must select a layout from the six options in the **Choose Layout** dialog box, as shown in the “Creating a Dashboard - Select Layout Dialog Box” figure.

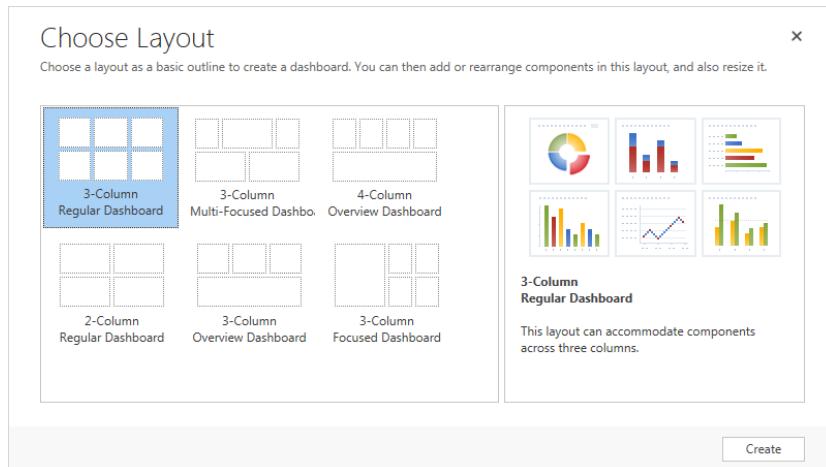


Figure 81 -Creating a Dashboard - Select Layout Dialog Box

The six layouts have placeholders for components that span multiple columns, and are constructed as described in the following table.

Layout name	Construction
3-Column Regular Dashboard	One tab of three columns
3-Column Multi-Focused Dashboard	One tab of four columns
4-Column Overview Dashboard	Two tabs of four columns each
2-Column Regular Dashboard	One tab of four columns
3 Column Overview Dashboard	Two tabs of three columns each
3-Column Focused Dashboard	One tab of four columns

Avoiding the Limitations of the UI Tools

You cannot use the UI tools to create or modify a dashboard with more than four columns in a tab, add or remove tabs, or change the number of columns in a tab. More complex layouts such as the five columns of the built-in Sales Performance dashboard can only be created by editing the XML in an exported solution package.

Instead of creating a new dashboard from the layout templates, you can create a copy of the built-in Marketing Dashboard, and then remove all the components in this dashboard before you add your own components. This dashboard has three tabs. The first tab has four columns, the second tab has three columns, and the third tab has four columns. By setting the visibility of these tabs on and off, and configuring components to span multiple columns, you can use this to produce many combinations. This includes all the built-in layouts other than the 3-Column Overview. You can also change the layout easily, by moving components from a three column tab to a four column tab, or the other way round.

Modifying the Properties of a Tab

To modify the appearance of a tab, select the tab (this shows a blue line around the tab), and then click **Edit Component**. The **Tab Properties** dialog box will appear as shown in the “Dashboard Tab Properties Dialog Box” figure.

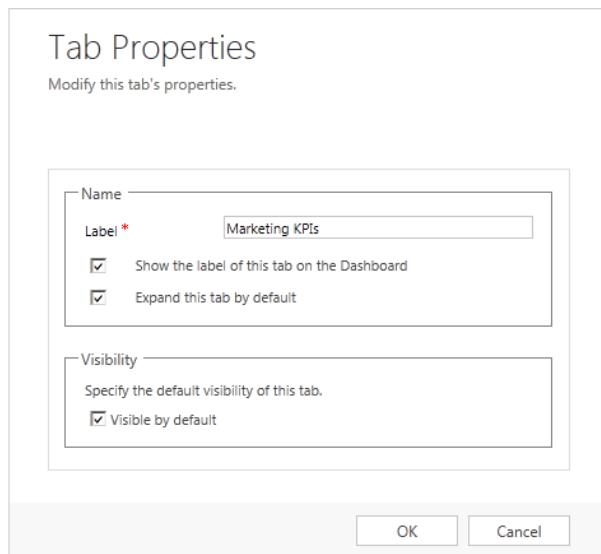


Figure 82 - Dashboard Tab Properties Dialog Box

Responsive Design

Forms change the layout that is displayed to respond to the width of the screen. Dashboards also respond to screen width, by moving components from the right side column of a tab underneath components on the left side if the device display is too narrow to show the columns side by side without shrinking the components' width too far. On the narrowest devices such as a smartphone the components will appear in a single vertical arrangement one under another.

Dashboard for the CRM for Tablets Application

Microsoft Dynamics CRM 2015 includes a system dashboard that is named **Sales Dashboard**. This is the only dashboard that is displayed when the CRM for Tablets application is used. Users cannot switch to a different system or personal dashboard.

You cannot specify a different dashboard for users of the tablet client. However, you can rename and modify the Sales Dashboard to suit the users' requirements. You can do this for users who are not in sales and might use custom entities to manage their processes.

This same dashboard can also be viewed by other users. This includes the web browser and Outlook client, and supported browsers on tablet devices. So, users of the CRM for Tablets application might still have access to their other data, but only from outside the application.

The CRM for Tablets application only displays charts and lists. Web Resources and IFrames cannot be displayed. As with other clients, the dashboard will respond to the size and orientation of the user's device to display the dashboard in a layout that gives the user the best result.

Add and Remove Dashboard Components

A dashboard contains the components needed by the users who will access the dashboard. Sometimes variations of a dashboard might have to be created. For example, the Head of Sales wants an overview of sales performance for the whole business, a Regional Sales

Manager might only want the results for his or her own team, and sales team members are most interested in their own results, although they might also be permitted to view other dashboards for comparison.

Frequently, dashboards are used to display data from Microsoft Dynamics CRM records by using lists and charts. A list is a grid arrangement of data from a view that shows rows of records that have fields as columns. A dashboard chart uses an existing chart that is associated to a specific view. After the components are added to the dashboard you can move and resize the components, and configure the components' properties, or change a chart to a list or the other way around.

Add a List to a Dashboard

A list is a version of a view that helps keep the dashboard easy to view, and uses the same filter query, columns, and sort order as the view that it represents. However, you cannot select more than one record at a time, apply filters, or display a chart next to the list.

A list provides the features that are not found in a view. These features include the following:

- You can click the plus sign at the top of the list to add a new record of the same type (this is only shown if the user has a minimum of “User” level for the create privilege for the entity).
- If you point to a record in the list, a delete button is displayed to the right side of the row (this is only shown if the user has a minimum of “User” level for the delete permission for the entity).

Add a Chart to a Dashboard

When adding a chart to a dashboard you need to select the Record Type, Chart and the view to use with the Chart. This is the only time in CRM where a view is associated with a chart.

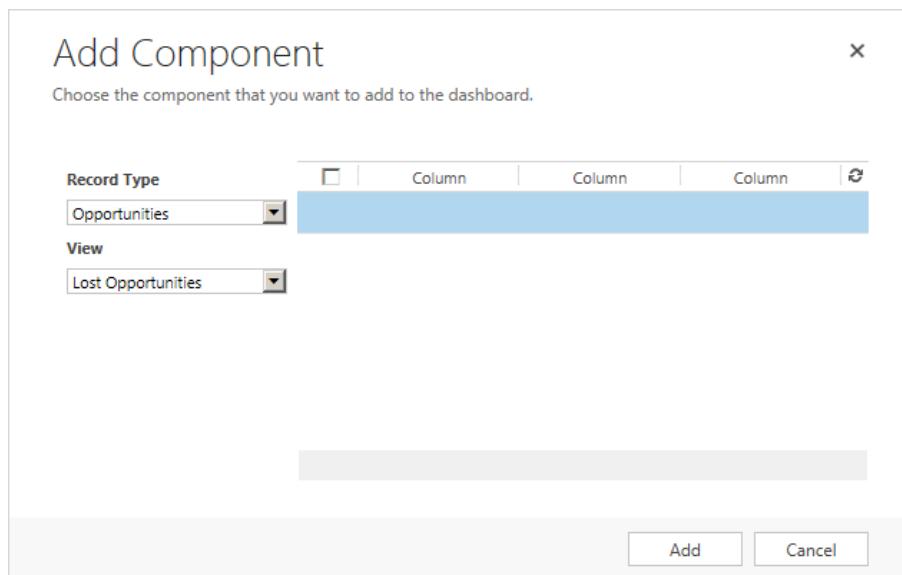


Figure 83 - Add Component Dialog Box - Chart

Date Filters for Chart Views

Frequently, charts are based on a view that is filtered on a date field. For example, when you show the sales forecast for the next three years, or service cases that are closed in the previous six months.

This field is used to exclude data that you do not have to consider. For example, customer satisfaction from last year might not be important any longer. A sales forecast further than three years into the future is probably not helpful to include on a dashboard intended to display information that changes frequently or that requires immediate action, although a chart for that forecast might still be very useful.

When you filter, based on dates, especially when the same field is also used as a category, you must carefully consider carefully the criteria used to filter the dates. Typically, you will use a *relative* filter that compares data to the current day and time, instead of on, before or after a fixed calendar date. Microsoft Dynamics CRM includes several options for relative date filters in views that work in different ways. These differences are important for how they are used on charts, as described in the following table.

Pattern	Examples	How filtering is applied
Last, This, Next	Yesterday Last Week This Month Next Fiscal Year	Uses the usual calendar units, Fiscal Periods or Years. For example, Next Month includes all dates that occur in the calendar month after the current calendar month.
Last X, Next X (date or time intervals)	Last X Hours Last X Weeks Next X Years Earlier Than X Months	Uses an exact mathematical comparison. At 14:30 on October 16, the “Last 3 Months” includes dates back to exactly 14:30 on July 16. This means that a data point for July would only use approximately half the records for that month. If the chart is viewed on successive days, the value for July seems to be decreasing, even though the data has not changed. Note: If “X” is set to 1, this pattern behaves differently from the previous pattern, they are not equivalent. For example, “Next 1 Month” and “Next Month” are <i>not</i> the same. Avoid this pattern for views of past data that is used with charts, unless no suitable alternative exists. Use with months and years in relation to future data only, with caution. Make sure that users understand the chart and view definition. For example, users might expect “Next 3 Months” to include the whole of the third month.
Last X Fiscal Periods or Years, Next X Fiscal Periods or Years	Last X Fiscal Periods Next X Fiscal Years	Unlike the second pattern described in this table, this pattern uses any date that occurs in any of the intervals that are described. For example, Last X Fiscal Periods, that has X set to 3, and has fiscal settings configured to use calendar months, includes the same records on the first day of a month through the last day of a month. Note: If X is set to 1, this pattern behaves the same as the first pattern that is described here, they are equivalent.

Pattern	Examples	How filtering is applied
		<p>Next X Fiscal Periods does not include the current period. Therefore, you have to combine this in an OR clause with “This Fiscal Period” (and the same for Last X, and for Fiscal Years).</p> <p>We recommend that you use this pattern to filter past data. This helps make sure that your chart includes whole intervals of time and unaltered data does not seem to change, depending on when the chart is viewed.</p> <p>You should use this for future data if this improves the clarity and understanding of your dashboard.</p>

Other Dashboard Components

Dashboards can also include two other types of component—*Web Resources* and *Iframes*.

Web Resources

These are Solution components that store many types of data to be used elsewhere in the application. The most useful Web Resource types to include on a dashboard are *Silverlight* controls (.xap files) and *HTML* (complete static webpages that can also contain JavaScript to fetch data from external sources and render it for display, for example).

Iframes

These are containers that display the target of a URL. You can configure this to show an external or internal webpage, or anything that can be accessed by using a URL, such as a SQL Server Reporting Services report.

By adding these other components, you can display material from outside Microsoft Dynamics CRM to users without bringing the data into the system. This makes the dashboards a richer source of information that someone must have to do his or her job.

Examples of external information that you might display on a dashboard include the following:

- Social media feeds about your company and products
- Currency exchange rate information
- News feeds about the industry your organization operates in
- Stock prices of clients or competitors
- The home page of the company intranet

Maximum Number of Components

The maximum number of components that you can add to a dashboard is six. You can change this limit by using a PowerShell command if you are running Microsoft Dynamics CRM 2015 On-premise. However, you cannot modify this limit if you use Microsoft Dynamics CRM Online. Consider the performance effect before you increase this limit,

because all components in visible tabs of the dashboard will be rendered every time that the dashboard is selected or updated.

As you use the dashboard editor, you can temporarily add more components than the maximum number. However, you cannot save your changes until you remove components to comply with the limit. When you save the dashboard the **Maximum Controls Limit Exceeded** message is displayed if you exceed the maximum number that is allowed.

If you receive this error message when you try to save your dashboard, you must remove components until you have less than the limit. To remove a dashboard component, select the component and press the **Delete** key or click **Remove**.

Because the limit is only enforced when you save, this lets you add a new variant of an existing component, for example, and compare the properties of the new component with the existing component before removing the original component.

Lesson 9-4 Modifying Dashboard Components

You can modify the position and size of a component on a dashboard in the grid structure of the layout. For lists and charts, you can also change other properties that control what exactly is displayed, and whether the user will be able to select alternatives.

Move or Resize a Component

To move a component, click to select it, and then press the arrow keys on the keyboard to move the component up, down, to the left side or to the right side. Press **Shift+Arrow** to increase or decrease the height and width as appropriate.

Or, you can use the mouse to drag a component to a new location - look for the red insertion line that indicates where the component will be inserted. You can use the **Increase Height**, **Increase Width**, **Decrease Height**, and the **Decrease Width** buttons under More Commands. The height of a component changes in increments of three rows regardless of the method that is used.

Other components will move as required when you move or resize a component.

If you modify the XML of a dashboard in a solution package, you can use any number of rows instead of in three rows at a time, for more precise control.

You cannot move a component to a tab that has fewer columns than the component currently spans. You must first reduce the width, and then move the component to the location that you want.

Modify a List or Chart Component

To modify a list or a chart component, double-click the list or the chart component or select, and then click **Edit Component**. The Set Properties dialog box is the same for both types as shown in the “Dashboard List or Chart Component - Set Properties Dialog Box” figure.

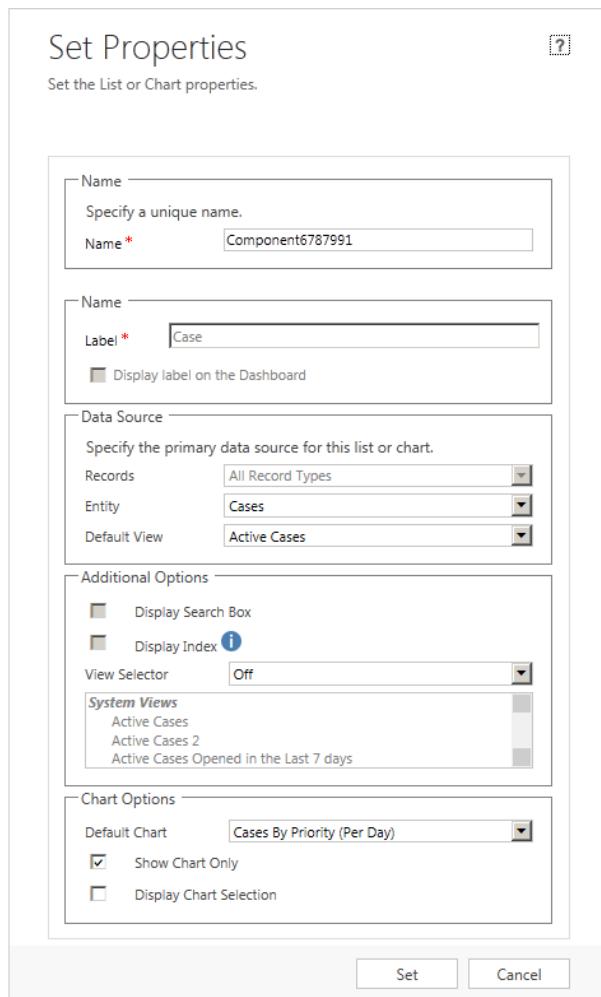


Figure 84 - Dashboard List or Chart Component - Set Properties Dialog Box

The properties for a list or chart component control the display on the dashboard as follows:

Name

Although the name must be unique within the dashboard it is not displayed anywhere. You can accept the default that is suggested or enter a name of your choice. The name must contain only alphanumeric characters, without any spaces.

Label

A description for a list component that is displayed as an infotip when a user points to the header area of the list (next to the view selector). This is only displayed if you select the **Display label on the Dashboard** option, *and* turn on the View Selector. A chart component always displays the chart name as its main heading, and the underlying view as a subheading. Therefore, these options are not available for charts.

Data Source

This defines the record set that is displayed by the list or the chart. Select an Entity and Default View that will be used when the dashboard is first opened. If the View Selector is turned off, this is the only view that is available for this component.

Additional Options

For a list control, you can select **Display Search Box**, if the users have to perform a Quick Find search in the dashboard (this returns all results from the Quick Find view, not the displayed view). The **Display Index** property is deprecated in Microsoft Dynamics CRM 2015 and an index will not be displayed regardless of what you select (refer to the note that appears later in this topic).

The View Selector has three possible settings that function as follows:

- **Show All Views** gives the user the choice to show any view.
- **Show Selected Views** will only let the user select between the views that you select in the list (hold down **Ctrl** while clicking to select more than one item). For example, you might let the user select between Active Cases and My Active Cases, and not let the user view any of the resolved or canceled cases that you might display in another component. In the view selector list, you cannot clear the view that you have used as the default.

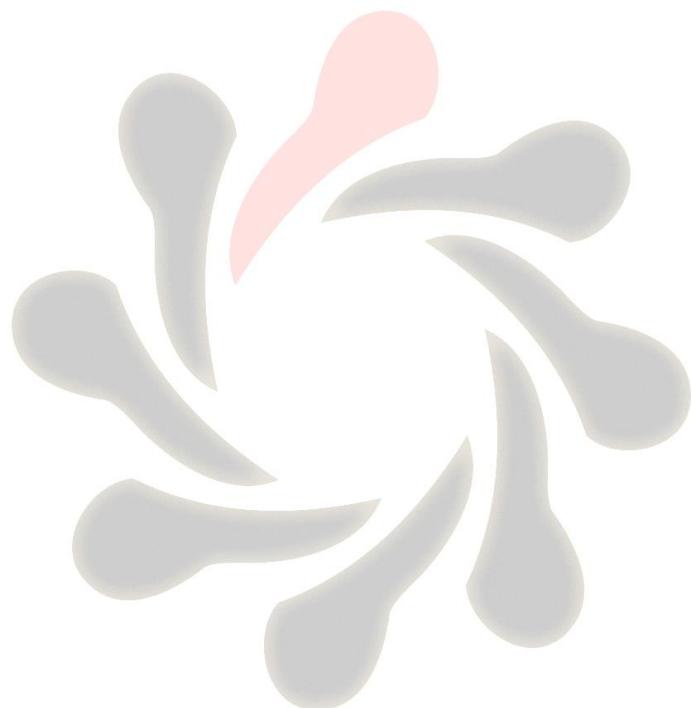
If you display the view selector for a chart, this appears at the top of the component and requires additional space. Therefore, you might have to resize the chart component to compensate for its size.

- You can turn **Off** the view selector if you do not want users to use a view other than the default that you have selected. This can be important for charts so that a user does not display a chart with a view that is unsuitable, and receive misleading results. For example, viewing the sales forecast chart for closed opportunities.

If you turn off the view selector for a list, this means that the list has no visible description, and it will turn off and make the **Display label on the Dashboard** option unavailable. We recommend that you do not turn off the view selector for lists unless the content of the view is completely self-explanatory for users. Instead use **Show Selected Views** and select only the default view so that the selector shows the view name as a visible description on the dashboard of what the list shows.

Chart Options

In a chart component, the Default Chart determines the chart that is displayed when the dashboard is first opened. If you select the **Display Chart Selection** option, the user can view any chart that he or she selects for this entity, and you cannot limit the user's choices. Select **Show Chart Only** to configure this component as a chart component, clear this for a list component. In Microsoft Dynamics CRM 2015, a list component cannot display a chart next to it. So, the Default Chart and Display Chart Selection make no difference to a list.



Module 10 - Additional Security Options

The primary security model of Microsoft Dynamics CRM uses Security Roles to define privileges that are assigned to a User or Team. The defined privileges and access levels grant permissions to perform actions on different records, depending on where the User or Team is in the Business Unit hierarchy in relation to the owner of the record (if the record has an owner).

Two additional security features are available that complement central model—Field Security and Access Team Templates.

Field Security lets you restrict who can read or edit the contents of a custom field, even if the user has the permissions to view or edit a record. This works in addition to the core security model to give you more precise control of user permissions at the level of individual fields.

Access Team Templates and the Access Teams that are created from them provide a way for users to easily link colleagues to a record to give them permissions they would not usually have. Although this works in a similar way to sharing a record, using Access Teams make it easier for users to apply permissions that have been centrally defined.

Auditing is a feature that does not control security or prevent actions that can occur. However, auditing keeps a record of the changes that are made to data and to the system configuration. Therefore, auditing can help identify changes that are made that reduce the security that was previously configured.

Objectives

The objectives are:

- Describe how to enable Field Security to restrict access to a field, and create Field Security Profiles to grant permissions to secured fields.
- Detail the interaction between Field Security and Security Roles.
- Explain how Access Team Templates let users grant colleagues permissions to a record.
- Describe how Auditing can be used to verify the integrity of the data and the security model.

Lesson 10-1 Field Security

Field Security Profiles control access to system and custom fields in system entities and custom entities. This differs from the Security Roles that control access at the record level.

For example, the Human Resources (HR) Manager wants to record salaries on the User entity. However, although all users can view User records, the **Salary** field must only be visible to members of the HR department and can only be edited by the HR Manager. To meet this requirement, add a **Salary** field to the User entity, enable the field for field

security, and then configure a Field Security Profile that grants read permissions for a Team in which HR staff are Team members. Then, configure a separate Field Security Profile for the HR Manager that grants read and update permissions.

Field Security Scope

Field security is implemented in the platform and applies to all client applications. This includes Microsoft Dynamics CRM for Outlook, the web client, Microsoft Dynamics CRM for Phones and Microsoft Dynamics CRM for Tablets.

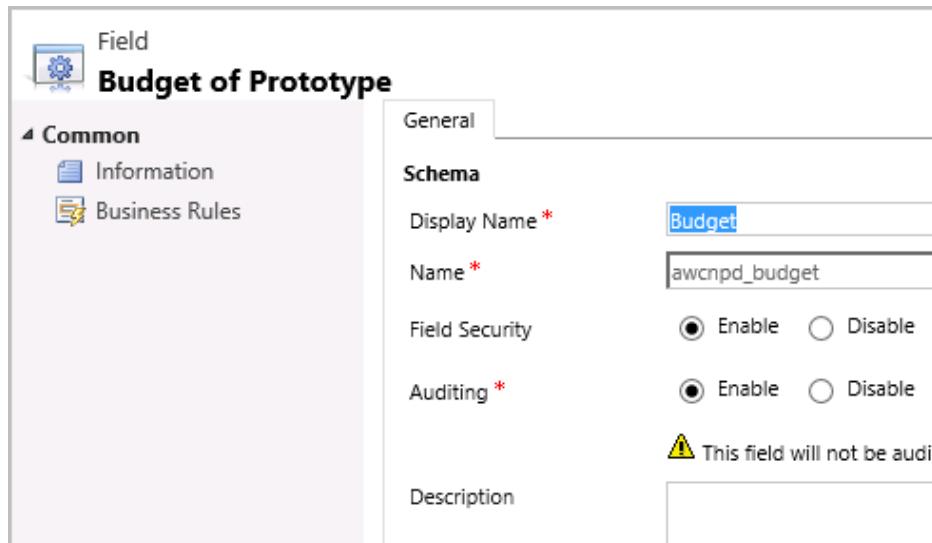
Field security applies to all the methods that are used to view and update data. These methods include the following:

- Reports
- Quick Find
- Charts
- Offline access in Microsoft Dynamics CRM for Outlook
- Filtered views in the SQL database
- Auditing logs
- Duplicate detection
- Data Import Wizard
- Access by using the Microsoft Dynamics CRM Software Development Kit (SDK)

You can control access to fields in forms by using Business Rules or client-side programming to make fields read-only or hidden as required. However, this approach only applies when users work with data in the form.

Implement Field Security

A system or custom field can be enabled for **Field Security** in the field customization form as shown in the “Field Security for a Field” figure.



Budget of Prototype

General

Schema

Display Name * **Budget**

Name * **awcnpd_budget**

Field Security Enable Disable

Auditing * Enable Disable

Description

⚠ This field will not be audit

Figure 85 - Field Security for a Field

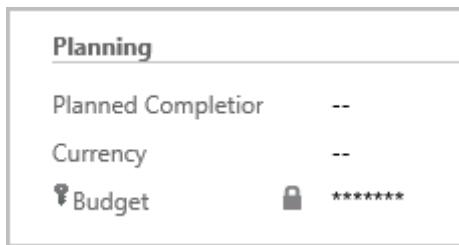
After a field is enabled for field security and the entity is published, the field is secure and no user has access to the field except the users who have the System Administrator Security Role.

A field that is enabled for field security displays a key symbol next to the field label in the form editor, and when the form is displayed to a user (including users who have full access to the field). The key symbol is the reminder to all users that this field is secured and that some users might not have access to the field.

If a user cannot edit a field because of field security or because the field is configured on the form to be read-only, or a Business Rule or JavaScript has set the field to read-only, a padlock symbol is displayed next to the field control.

If a user does not have access to read the value in a field, the field control displays a row of asterisks, even if the field has no value.

These three indicators are shown in the “Budget Field that has Field Security Enabled” figure.



Planning

Planned Completion --

Currency --

Budget  *****

Figure 86 - Budget Field that has Field Security Enabled

Field Security Profiles

Field Security Profiles specify the permissions that users and teams have on fields that are enabled for field security. To provide access to a secured field, a user (or a team that includes the user) must be added a Field Security profile. If a field is enabled for field

security and a user does not belong to any Field Security Profiles, then the user has no permissions to the secured field. The permissions that can be granted to a secured field are described in the following table.

Permission	Description
Read	A User can view data in the field.
Update	A User can change data in the field.
Create	A User can enter data in the field when he or she creates a record.

The field permissions for each field in a Field Security Profile apply to every User and Team that is linked to the Field Security Profile.

The permissions operate independently. A user could have update permissions and not have read permissions. For example, although a user could update the credit card number for a Contact, the user might be unable to view the credit card number that is saved.

Every Field Security Profile lists every field that is enabled for field security. You do not have to grant permissions to every field in every Field Security Profile. Typically, each Field Security Profile will only define permissions for some fields that are on the list.

Users and Teams can be added to more than one Field Security Profile. In this case, the least restrictive combination applies. For example, a User belongs to a Field Security Profile that only grants read permission to a secured field. The user also belongs to another Field Security Profile that grants create permission to the secured field. The effective permissions are Read and Create.

If a user views a form with secured fields to which the user does not have read access, asterisks are shown instead of the data. In views, columns for secured fields to which a user does not have access are empty.

System Administrator Field Security Profile

The System Administrator Field Security Profile is present in every Microsoft Dynamics CRM organization. This profile has the following properties:

- For every secured field, every field permission is set to Yes.
- The profile cannot be deleted.
- The profile is automatically populated with any user or team that has the System Administrator Security Role.
- Any User or Team that is automatically added to the profile cannot be removed from the profile.
- Other Users or Teams can be added to the profile.
- The profile does not appear on the list of Field Security Profiles in a Solution.

Users who do not have the System Administrator Security Role do not have permissions to secured fields unless the users are made a member of a Field Security Profile (either directly or through the membership of a team).

Create a Field Security Profile

You create a Field Security Profile from the Field Security Profiles node in a solution,

To add Teams or Users as members of a Field Security Profile, follow these steps.

1. Click **Teams or Users** in the navigation pane.
2. In the menu bar, click **Add**.
3. Select the Teams or Users who you want to add to the profile.
4. Click **Select** to add the Teams or Users to the **Selected Records** box.
5. Click **Add**.
6. Repeat steps 1 through 5 for additional Teams or Users.

To configure permissions for the fields that have field security enabled, follow these steps.

1. Click **Field Permissions** in the navigation pane.
2. Select one or more fields for which you want to change the permissions.
3. On the menu bar, click **Edit**.
4. Select **Yes** or **No** for the three available permissions—**Allow Read**, **Allow Update**, and **Allow Create**. These permissions are shown in the “Edit Field Security Permissions” figure.
5. Click **OK**.
6. Repeat steps 2 through 5 for any other fields on which you want to set permissions. You can set different permissions for different fields in the same Field Security Profile.
7. On the Field Security Profile toolbar, click **Save and Close**.

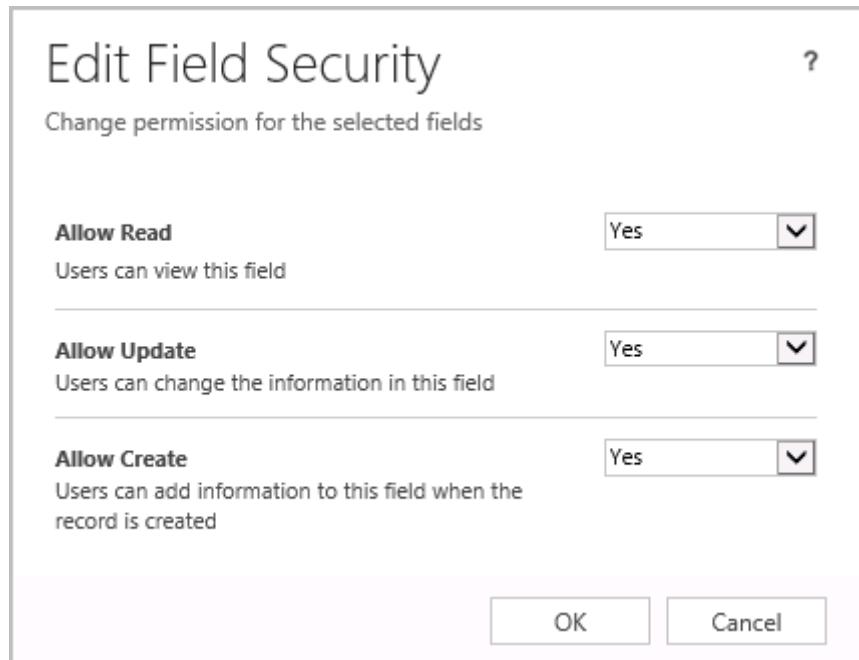


Figure 87 - Edit Field Security Permissions

If you add Users or Teams to a Field Security Profile in which all the field permissions are set to No, this is the same as if you had not added the Users or Teams. You do not have to create a profile to “lock down” the field. If a field is enabled for field security, the field is secure by default. You must use Field Security Profiles to grant permissions to the field for only those Users or Teams that must have these permissions.

Effect of Security Roles and Field Security

In Microsoft Dynamics CRM, security applies at the following levels:

- **Entity:** Security is managed through Security Roles.
- **Record:** Security is enabled by sharing specific records and allocating share permissions.
- **Field:** Security is controlled by using Field Security Profiles.

The access that a user has to a field on a specific record is the result of the interaction of all three security types.

Privileges that are granted through Security Roles or Sharing cannot increase the access a user has to a field that is enabled for field security. For example, if a user has all privileges at the Organization level for the Contact entity, and the user has no permissions from a Field Security Profile for the **Credit Card Number** field, the user cannot read the contents of the field.

Sharing extends the scope of a user’s access, not the type of access the user has. Sharing a record can extend privileges that the user has to their own records, to apply to records that the user does not own.

However, sharing cannot grant privileges that a user does not have in a Security Role at the User level or above.

Privileges that are granted through a Field Security Profile cannot increase the access the user has to a field, on a record to which the user does not have access. For example, all the permissions are set to Yes in a Field Security Profile that a user is a member of. If the Security Roles that are assigned to the user have read and write permissions to the entity only at the User level, then the user can only update the field on records that he or she owns.

Lesson 10-2 Access Team Templates

The sharing feature of Microsoft Dynamics CRM lets users grant permissions to a record to other Users or Teams. However, the user who is sharing the record must decide the permissions to give, and configure the permissions every time he or she shares a record.

If a record is shared, you cannot determine who has access to the record without opening the **Sharing** dialog box for each record that you want to check. You cannot create queries with Advanced Find to report on shared access.

Access Team Templates are used to resolve these issues by providing a much faster way for users to add their colleagues to a record so that they receive a set of permissions that the system customizer has configured in advance.

The list of who has access to the record is easily visible, and can be changed with immediate effect by users who have the necessary privileges to perform this action.

Because the Access Teams feature is based on the usual Team entity, and Access Teams have Users as members, you can query records based on relationships to Teams and Users to identify the records that can be accessed by a User (or any group of Users). For example, this type of query could be used as the basis for a view of all **Project** records for which the current user is a member of the **Stakeholders** Team.

Configure Access Team Templates

To configure and use Access Team Templates, follow these steps.

1. Enable the entity for Access Teams and publish the change.
2. Create an Access Team Template that defines the *access rights* to be granted to members of an Access Team that uses this template.
3. On a form for the entity, add a sub-grid that will be used to add and display Users who are members of the Access Team for a record. The sub-grid is associated with a specific Access Team Template.

You can create more than one Access Team Template for the same entity. For example, to grant read access rights to one Access Team, and write access to another Access Team.

The maximum number of team templates that you can create for an entity is specified in the `MaxAutoCreatedAccessTeamsPerEntity` deployment setting. The default value is two. The maximum number of entities that you can enable for auto-created access teams is

specified in the MaxEntitiesEnabledForAutoCreatedAccessTeams deployment setting. The default value is five. If you use Microsoft Dynamics CRM 2015 on-premises, you can modify these settings by using PowerShell commands. If you use Microsoft Dynamics CRM Online, you cannot change these settings from the default values. You can disable Access Teams for an entity if you no longer want to use the feature for the entity. This lets you enable the feature for a different entity instead.

You do not have to create Teams to use with Access Team Templates. When the first user is added to a record through the sub-grid that you have configured on the form, a Team is created by the system.

This Team has some specific properties that include the following.

- The **Team Name** is a concatenation of the GUID of the record, a plus sign (+) and the GUID of the Access Team Template that is associated with the sub-grid where the User is added
- The **Team Type** is **Access** (instead of Owner)
- The Team has the property **Is System Managed** set to **Yes**

The Teams that are created by the system are not displayed in the default views for Teams, because the views use the **Team Type** or **Is System Managed** properties to exclude the Teams from the view filters. You can use Advanced Find to create a view to display the Teams if you want to, or as part of a query to identify the users who have access to a record through the Access Teams feature.

The access rights that are defined for the Access Team Template are shown in the “Access Team Template” figure. These access rights are granted to the new Team and stored in the database in the same manner as a standard share. However, the Access Team is not visible in the sharing dialog box, to prevent users from changing the permissions that are granted. Members of the Access Team have the same access rights as the Team indirectly through their membership. However, the record is not shared with each User individually.

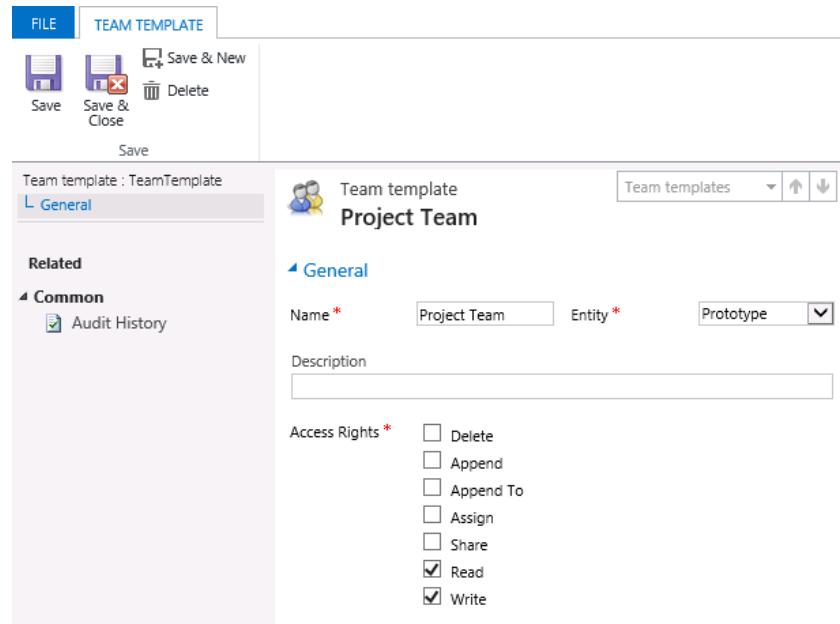


Figure 88 - Access Team Template

When you try to add a User to an Access Team for a record, the following three rules are enforced by the system:

- The user who adds a new Access Team member to a record must have share privileges to the record.
- The user who adds a new Access Team member must have for this record all the access rights that are defined in the Access Team Template. For example, if the Access Team Template grants the delete access right, the user who adds the Team member must already have delete privileges for the record. Generally, in Microsoft Dynamics CRM, a user cannot grant privileges they do not have. When a standard share is used, any of the privileges that the user does not have are unavailable and cannot be selected to grant these permissions in the sharing dialog box.
- The user who is added to the Access Team must have at least User level access to all the privileges that the Access Team Template has. For example, you cannot add a user to an Access Team that would grant delete access rights to a record, if the user does not have delete privileges on the entity to at least the User level. When you use a standard share, you *can* grant permissions that the user does not have for his or her own (user owned) records. However, because the Security Role has precedence, one or more of the shared permissions might be ignored.

These rules prevent a user from adding himself or herself to an Access Team on a record to gain permissions to the record that the user does not already have. The user is also prevented from adding an Access Team member to give another user permissions that this user does not already have for his or her records.

If you include the **Share** in the access rights defined for an Access Team Template, then any member of the associated Access Team can add more team members, because by definition they meet the criteria of having all the rights and share permissions already.

Note: Because Access Teams use sharing to grant permissions to records, users must have share privileges to the records that have Access Teams that the user wants to modify. Therefore, you cannot use Access Team Templates to provide a “managed” approach to share records and at the same time remove share privileges to prevent users granting permissions through shares in an “unmanaged” manner.

However, you can customize the command bar for an entity to remove or hide any buttons for sharing. You can do this by modifying the Ribbon XML that defines the command bar, or use third-party software tools that have a GUI environment to help you do this. Details of how to modify the command bar are not part of the scope for this course.

Lesson 10-3 Audit

Auditing can show who made changes to data, settings, security configuration and some customizations.

This helps you to understand how users work in Microsoft Dynamics CRM and verify whether they are working to their defined business processes. For changed data, the record of the earlier values that are stored before the change can help if you must revert to an earlier value to correct something that changed in error.

Auditing creates additional work for the Microsoft Dynamics CRM platform and for the server that runs Microsoft SQL Server. Auditing also stores additional data that you will have to back up. Use auditing to identify and track specific issues or areas where you need to ensure compliance. Be aware that if you audit the whole system, this can cause a significant operating cost, and produce so much data that it might be difficult to gain useful insight from so much data.

How Auditing Works in Microsoft Dynamics CRM 2015

You can enable auditing at the following three levels:

- Organization level, in **Settings > Administration > System Settings > Auditing**.
- Entity level, by selecting the **Auditing** property. This is described in the *Customising Entities* module.
- Field level, by selecting the **Auditing** property of a field. This is described in the *“Customising Fields* module

When you enable Organization level auditing, this audits system level changes, such as when a Security Role is assigned to a User, or when auditing is disabled. This helps strengthen your overall security because you can determine whether unauthorized or incorrect changes are made and then you can quickly correct these changes.

When you enable entity level auditing, this audits changes to the entity, such as deleting an attribute (field) or disabling auditing for the entity. Although Entity level auditing can be configured, auditing will not occur unless Organization level auditing is also enabled. This means that you can configure the entity settings in the development system without incurring the performance cost of auditing if you keep auditing disabled at the Organization level.

When you enable field level auditing, this records changes to data values in those fields. Field level auditing only occurs when entity and Organization level auditing are also enabled. Therefore, this lets you configure the settings that you must have in the development environment and you only have to start using the settings in the production environment.

A one-to-many (1:N) relationship between two entities is represented by the value of the lookup field on the related (“child”) record. If you enable auditing for this field and the related entity, you can audit changes to record relationships. The primary (“parent”) record does not show any changes when related records are associated with the parent record, because there is no change to the data on the primary record.

After auditing is enabled, the system tracks changes as they are made and stores them in an audit table in the Microsoft Dynamics CRM database. All audit entries record the type of event that occurred, the User who triggered the event and the date and time that the event occurred.

Audited events can be reviewed from the following two areas:

- **Audit History** for a single record that is accessed through the navigation bar from the record form. Be aware that if the record is deleted this option is not available.
- **Audit Summary View** shows Organization and entity level events, and a summary of the data changes that are made to records. The Audit Summary View shows only the records that are created, deleted or changed, and not the detailed information about the field values.

When a field is updated, the old value is saved in the audit table before the new value is written to the SQL database. When you view the audit history, the information that is shown joins the individual audit entries together, and shows the old value and the new value for a field. The new value is obtained from later rows in the audit table or from the current value of the field if there is no later row.

For example, if you change the credit limit for an Account from \$1000 to \$2000 and then to \$3000, the entries in the audit history would show the change from \$1000 to \$2000 and from \$2000 to \$3000. The last “new” value is not part of the audit log, it is the current value on the record. If you disabled auditing after you changed the value to \$3000, and then enabled auditing again before you changed the value to \$6000, the system will have recorded the fact that auditing was disabled in between these two field value updates. In this case, the audit history would show the old value of \$3000 and for that row the audit history will not show the new value to which the row changed. The audit log does not have the new value that is stored for the change, and the audit history will not show the value from the later audit entry that occurred after auditing is disabled and then re-enabled. Any value shown might be misrepresentative because the audit log does not know what occurred during the gap in the audit log. The entry after the change shows the value of \$6000 being changed to \$7000. However, the user will have to determine what occurred during the period when auditing is disabled.

Because of how the audit history shows these gaps, when you disable auditing at the Organization or entity level, you receive the message “If you disable auditing, some change history may be lost.” This does *not* mean that any audit entries will be deleted. This message advises that the audit history that is shown later will not show the new values for the last entries that are made before the audit is disabled. Therefore, a complete, uninterrupted history will not be shown. An example of how the interruption in the audit history is displayed is shown in the “Audit History with Interruption” figure.

Audit History					
Filter on: All Fields ▼					
Changed Date	Changed By	Event	Changed Field	Old Value	New Value
11/5/2013 8:49 AM	Alan Jackson	Update	Credit Limit	\$6,000.00	\$7,000.00
			Credit Limit (Base)	\$6,000.00	\$7,000.00
			Currency	 US Dollar	 US Dollar
11/5/2013 8:48 AM	CRM Administrator	Entity Audit Started			
11/5/2013 8:48 AM	CRM Administrator	Entity Audit Stopped			
11/5/2013 8:47 AM	Alan Jackson	Update	Credit Limit	\$3,000.00	
			Credit Limit (Base)	\$3,000.00	
			Currency	 US Dollar	
11/5/2013 8:46 AM	Alan Jackson	Update	Credit Limit	\$2,000.00	\$3,000.00
			Credit Limit (Base)	\$2,000.00	\$3,000.00
			Currency	 US Dollar	
11/5/2013 8:46 AM	Alan Jackson	Update	Credit Limit	\$1,000.00	\$2,000.00
			Credit Limit (Base)	\$1,000.00	\$2,000.00
			Currency	 US Dollar	
11/5/2013 8:45 AM	Alan Jackson	Update	Credit Limit	\$1,000.00	\$1,000.00
			Credit Limit (Base)	\$1,000.00	\$1,000.00
			Currency	 US Dollar	
11/5/2013 8:45 AM	CRM Administrator	Audit Enabled			

Figure 89 - Audit History with Interruption

Control Access to Audit Data

Audit data can only be viewed by users who have miscellaneous privileges for **View Audit History** (for individual record changes) or **View Audit Summary** (for all audited data). These privileges are granted on the **Core Records** tab of a Security Role. You cannot grant a user permission to audit data for only selected entities. However, the audit history is only visible from a record form, therefore a user who has no read permission to an entity cannot access and read the audit history for those records. Additionally, the audit summary will not show data for entities for which a user has no read privileges.

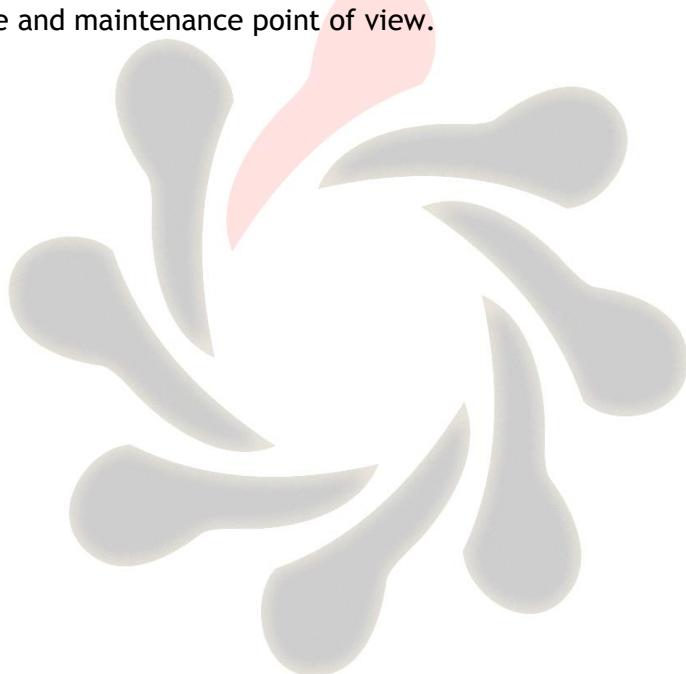
If a user views the audit history for a record that has a field that has field security enabled, the data for the field will only be visible to the user if he or she has a field security profile that grants the user read access to the field.

The default Security Roles at “manager” level and above have **View Audit History** enabled. The System Administrator role is the only default role that has **View Audit Summary** enabled.

Audit data is divided into audit logs for each quarter of the calendar year. These audit logs can be viewed in **Settings > Auditing > Audit Log Management**. Audit logs can be deleted one at a time by users who have the **Delete Audit Partitions** privilege enabled in their roles. You can only delete the earliest log at any time, to keep a continuous history. You cannot delete the most recent audit log. Disabling auditing and deleting audit logs are both audited events. Therefore, if auditing is disabled or audit logs are deleted, records of

these actions are included in the latest audit log. Because the latest audit log cannot be deleted, this evidence is secured.

If you use SQL Server Enterprise Edition, the audit table will be divided into partitions for each quarter. Partitions can be used to improve performance for large tables by allocating the data to different logical storage devices. Whether the logs are stored in a single partition or in multiple partitions, the logs are presented in the user interface (UI) divided into separate quarters, although the method that is used to generate the separation is different. Sometimes, the divisions are known as logs or partitions in documentation, from the point of view of a system administrator using the application these terms are interchangeable. The difference is only important to the management of the SQL database from a performance and maintenance point of view.



Module 11 - Business Process Flows

Business Process Flows guide people to keep to the standard operating procedures of the organization, following a process through the stages you define. Business Process Flows also help staff become familiar with processes quickly and direct users to adopt methodologies that achieve better results.

An update to Microsoft Dynamics CRM 2011 introduced Business Process Flows for specific sales and services. Now, Microsoft Dynamics CRM 2013 and Microsoft Dynamics CRM 2015 have extended this feature to enable more process customization and for the feature to be used with more entities.

A *process bar* is located at the top of a form for a record that is involved in a Business Process Flow. The process bar is used to move the users through the organization's processes and is an alternative method to capturing data entry in stages, instead from many fields on a form at the same time. The same process bar can be used to move users through processes that involve several entities. A sales process might start from a Lead, continue through an Opportunity, Quote, and Order and end with a Case to manage the fulfilment of the customer's order. Users can focus on the requirement for each process stage to move forward, without having to consider the different entities or relationships required to complete the necessary tasks.

Objectives

The objectives are:

- Define Business Process Flows.
- Detail the features of Business Process Flows, and the entities that can participate in Business Process Flows.
- Create and modify a Business Process Flow.
- Describe how to use required steps and field security to control how a user continues through a process.
- Describe how to use process stages for queries, reporting or dashboards.

Lesson 11-1 Business Process Flows

Not all users in an organization have to follow the same process, and different conditions might require that a different process be applied. For example, users might have to follow a different sales process for repeat orders from existing customers compared to new business from prospects. A service process for dealing with a faulty product is likely to be very different from a process for a new installation.

When you configure Business Process Flow processes to meet the requirements of the organization, you must decide the entities that will be involved in each process, the stages that are required, and the steps that must be in each stage.

Compare Process Types in Microsoft Dynamics CRM 2015

Business Process Flows are one of several types of process you can configure in Microsoft Dynamics CRM 2015. To help you decide the type of process that is most suitable to meet your business requirements, consider the following features of the different types of processes available in Microsoft Dynamics CRM.

- **Workflows** can be configured to start based on an event, such as a field value that is being changed, or can be manually started *on-demand* by a user. Workflows can include conditional logic, for example to perform or ignore actions, depending on data values. Workflows can also use branching logic to perform alternative actions. These actions can include starting other Workflows. Workflows can update or create several records during a process. After a Workflow is started, the user does not have to interact with the Workflow. A Workflow might be configured to wait during the process for some time, or for a further event such as the record status changing to a particular value. Several Workflows can run and be associated with the same record at the same time.
- **Dialogs** are started by a user who then interacts with a series of steps, provides information, and selects options and so on. The Dialog can include branching logic to present different questions to the user, depending on earlier selections. The user must complete the Dialog until its end (or abandon the Dialog). The user cannot save the Dialog part-way and then return to the Dialog later. The user can only run a single Dialog. However, different users can run multiple Dialogs with the same record at the same time (although this might rarely occur in real-world scenarios, this is possible in the platform).
- **Business Process Flows** are started automatically when a record is created for an entity that has a Business Process Flow configured. Although the user can switch to a different process, the process cannot do this automatically. Business Process Flows are linear, and do not have branching or conditional logic. Lookup fields in the record store the current process and stage that is reached. This means that the user can exit the process and then return to the process later and continue from the same stage, or another user can follow up on the process. Only one Business Process Flow can be associated with a record at the same time.
- **Actions** are used to create a new operation that is not available in a stock Microsoft Dynamics CRM installation or to combine multiple disparate operations into a single operation. For example, in the case of a support call centre, you could combine create, assign, and setstate operations into a single new “escalate” operation.

Business Process Flows do not include any conditional business logic beyond enforcing *required* steps to prevent a user from progressing without completing the necessary information. However, you can combine Business Process Flows with other components, such as Field Security, Business Rules and Workflows. This provides powerful managed processes that can save users time, reduce training costs, and increase user adoption.

Create a Business Process Flow

Before you can include an entity in a Business Process Flow, you must configure the entity to enable the Business process flows property, and then save and publish the entity. When you do this, the system will add two lookup fields to the entity that are named **Process Id** and **Stage Id**. These fields store the current process and the stage for a record, and this lets the user continue a process from where the process stopped. You cannot modify these fields, add these fields to a form or use these fields in Workflow or Dialog processes. You can include these system fields in queries for a view or Advanced Find. If you add the **Process Id** or **Stage Id** as columns in a view, the process and stage GUIDs are displayed, not the names. Therefore, adding these fields as columns is less useful than including the fields in the query definition.

In a Business Process Flow, you can include any custom entity that is enabled for Business process flows, and the key system entities that are enabled for Business Process Flows. You cannot enable other system entities to be used in a Business Process Flow.

To create a Business Process Flow, follow these steps.

1. Navigate to **Microsoft Dynamics CRM > Settings > Processes**, or, in a Solution, in the solution explorer, click **Processes**.
2. On the menu bar, click **New**.
3. In the **Create Process** dialog box, enter a **Name** for the process. The name of the process does not have to be unique. However, the name should be meaningful for users who have to select a process to switch to. You can change this name later.
4. In **Category**, select **Business Process Flow**. You cannot change the process **Category** after you click **OK** to save the process.
5. In **Entity**, select the entity that will be used for the first stage of the process. You cannot select a different **Entity** after you click **OK** to save the process. If the entity that you must have is not in the list, make sure that the **Business process flows** property is enabled for the entity and that the entity is saved and published.
6. Click **OK**. The process is saved and the **Business Process Flow** editor form is displayed.

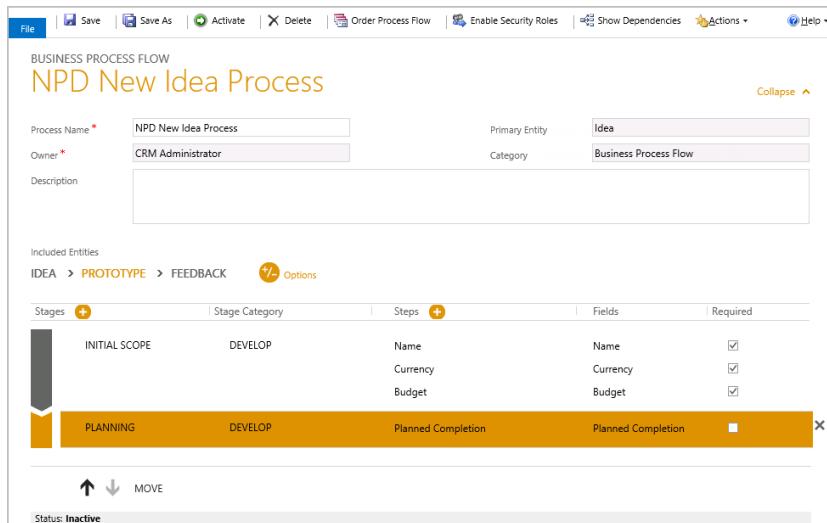


Figure 90 - Business Process Flow Editor

A process that is already created and has several stages and steps is shown in the “Business Process Flow Editor” figure. Some key features to note in the editor include the following:

- This process starts with the **Idea** entity. This is the **Primary Entity** for this process and cannot be changed.
- The **Included Entities** section shows that after the **Idea** entity, this process moves to the **Prototype** entity for two stages. Then, the process moves to the **Feedback** entity. Only the stages for the selected entity (Prototype) are displayed.
- A new entity can be added from the **Options** button to the right side of the entity names.
- The stage that is named **Planning** is selected in the figure. The arrow buttons at the bottom of the editor can be used to move a stage to earlier in the process or later in the process.
- Because the **Planning** stage is selected, an X is displayed at the right side that you can use to delete the stage.
- For each stage, you can select a **Stage Category**. The **Stage Category** is not displayed to users, and is used for reports. For example, you could query for all Opportunities that are in a stage that has a **Stage Category** of **Develop**, even though the Opportunities might follow different processes.
- Each **Step** is associated with a **Field**. You can add a step by clicking the plus sign (+) at the top of the Steps column. Instead of typing a step name, you can select a **Field** first, and then the step will use the display name of the field unless you change the step name.
- If a step must be completed before the user can move to the next stage, select the check box in the **Required** column next to the field name.

When you create or modify a process, the process will be in an **Inactive** status and will not be displayed to the user or be available for a user to switch to. To activate a process, on the toolbar click **Activate**. You cannot modify a Business Process Flow when it is **Active**. However, you can make a copy of the Business Process Flow regardless of the status. To make a copy of a Business Process Flow, on the toolbar, click **Save As**. A new copy of the process is created and saved, with **(Copy)** added to the end of the process name.

To modify a Business Process Flow, or if you have to stop the Business Process Flow from being accessed by users, you must **Deactivate** the process.

You can have up to 10 *active* Business Process Flows that have the same primary entity to provide appropriate processes for different situations.

If you import a Solution that contains processes, in the **Import Solution** wizard, the final step asks you to select if the import should also Activate any processes that are included in the Solution. If the Solution includes Business Process Flow processes, this page of the wizard (shown in the “Solution Import Options” figure) also includes the message “NOTE: new business process flows will be imported in a draft state. The activation state of any business process flows already in the target system won’t change.”

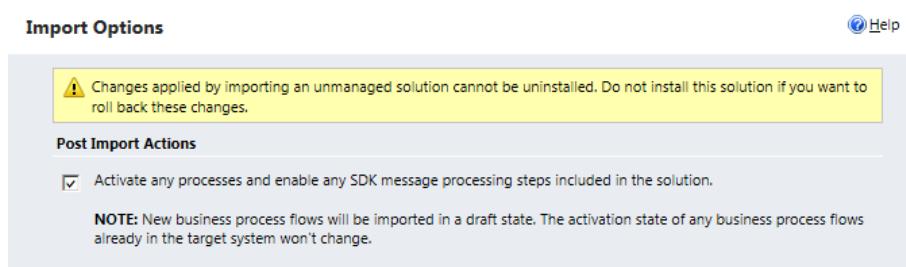


Figure 91 - Solution Import Options

Configure Stages and Steps

Business Process Flows contain *stages*, each of which contains one or more *steps*. A record that has a Business Process Flow in progress displays a process bar (more formally known as, a *business process flow control*) that displays steps that are grouped into stages, with one stage in view at a time, and other stages shown as headings only.

Stages

Each stage is associated with an entity, and you can configure multiple stages for the same entity in a process.

When you add an entity to a process, you must select an entity that is in a N:1 relationship with the previous entity in the process. Each record in a process is a “child” of the previous record. When a user progresses a process to a stage that uses a different entity, the user must select an existing record, or create a new record to continue to that stage. If the user creates a new record, field mapping is used to copy data from the primary entity to the related entity, the same as if the record is created from a sub-grid or associated view.

When you add an entity in the process editor there is an additional option to **Close Process Cycle** by selecting an entity that is used earlier in the process. When a user continues to this stage, the same record is used that was used earlier in the process, and the user is not asked to create a new record.

Each process can contain up to 30 stages in total, and no more than five entities.

Steps

In each stage, you must add steps that are fields of the entity that the stage is associated with.

You can configure a step to use the field label or provide a different label that might be more useful in the context of the process. Fields can be included as steps regardless of whether they are on the entity form. If a field is located on the form and in a process, the user can enter a value in either location and the value will be applied in both locations as soon as the focus is moved off the control (without having to save the record). When a field or corresponding step is changed, any Business Rules or form scripts that are configured to be triggered by that change will be applied.

Although the Business Process Flow control in the form does not provide any direct client-side programmability, any changes that are applied by Business Rules or form scripts are automatically applied to Business Process Flow controls. For example, if you hide a field in a form, that field will also be hidden in the process bar. Fields that are locked (read-only) on the form remain available in the process bar.

If a step uses a field that has field security enabled, this is also enforced in the process. Several considerations are involved that are discussed in the “*Field Security and Business Process Flows*” topic.

The field requirement level of the field that is associated with a step is respected by the process, and the step in the process bar will change if a Business Rule or client-side JavaScript changes the field requirement.

A step can be required in a process stage without having the related field always being required. A required step displays a red asterisk the same as a business required field. However, the record can be saved without providing a value for a required process step. The user cannot continue to the next stage of the process without completing the step.

For example, the **Estimated Cost** field on a custom **Event** entity might be required before the user can continue to the stage to request approval and create a Campaign to invite people to the **Event**. However, if you make the **Estimated Cost** field business required, this means that this value must be entered when the record is first created, when it is unlikely an accurate figure can be provided.

A user can click the heading of an earlier stage or a later stage of a process to view the steps in any stage without having to move the process forward to the next stage. In this manner, a user can review the stages that already occurred, and preview and prepare for the next steps before the user reaches the next stage

A user can begin to add information to steps in later stages for the same entity without continuing the process to the next stage. Stages for a different entity will be shown in the process bar with a padlock symbol and cannot be accessed or updated until that stage is reached because the record for that stage has not been selected or created. This padlock symbol has nothing to do with required steps.

Lesson 11-2 Control Access to Processes

To give users an experience that best suits their job role, access to Business Process Flows is controlled through Security Roles in the same manner as forms and dashboards. Unlike forms and dashboards, by default, a new Business Process Flow is only assigned to the System Administrator and System Customizer roles. This lets you test a process before you assign additional roles. To manage access to Business Process Flows, you might choose to create custom Security Roles that have no privileges to keep the Security Roles separate from the roles that are used to grant access to data.

For example, you might have two processes for managing services, one to manage the fulfilment of customer orders, and another to deal with faults. When a member of the Sales department creates a Case, he or she wants to use the fulfilment process. However, a Customer Service Representative (CSR) answering an incoming call wants to start the fault management process. You can create two processes, and then you can assign each process to a Security Role that is assigned to an appropriate Team.

However, the CSRs will also manage the fulfilment process for Cases that are passed on to the Service department by the sales team. Therefore, you must also grant the CSRs access to the fulfilment process by assigning this process to an appropriate Security Role that the CSR users have. You can use the **Process Flow Order** dialog box to present the processes in a preferred order. The fault management process is available first to the CSRs and therefore is used by default for new Cases a CSR creates. However, the CSRs can also continue the fulfilment process that is started by the sales team.

When a user creates a new record, the list of activated Business Process Flows that have the entity as the **Primary Entity** is compared to the Business Processes Flows that the user's Security Roles will show for the user.

By default, the first activated Business Process Flow in the process flow order is applied.

If more than one activated business process flow is available for an entity, a user can select **Switch Process** from the command bar to apply a different process. When a user switches processes, the current process stage will be set to the first stage of the newly applied business process flow.

Note: When a user switches processes, the current process stage will be set to the first stage of the newly applied business process flow. Therefore, the user can only select processes that have the current entity as the Primary Entity of the process (this entity is also used in the first stage). For example, a user might follow a process from a Lead through to an Opportunity. Depending on whether the user is viewing a stage for the Lead or the Opportunity when he or she selects Switch Process, the user will be able to select from a list of processes that start from a Lead entity or start from an Opportunity.

Each record can have only one business process flow at a time. When any user applies a different process, that is the process that is visible to the next user who views the record.

If the user's Security Roles do not allow the user to use the current Business Process Flow for a record, although the process will be visible in the process bar, the process will be disabled.

Lesson 11-3 Field Security and Business Process Flows

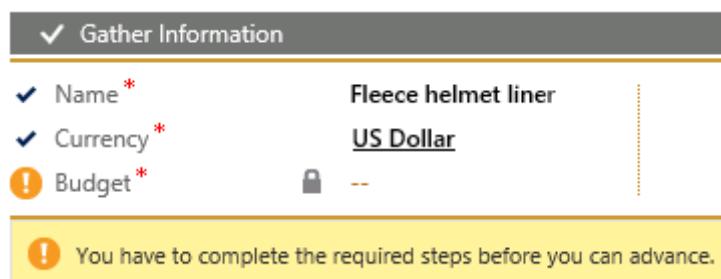
You can use a combination of field security and a required step to create an approval step in a process.

If a step is required for a user to continue to the next stage, and the field that is used by the step has field security enabled, then users who do not have a Field Security Profile that grants write permissions to the field cannot complete the field and they cannot continue.

For example, you might have a field that is named **Budget** with field security enabled so that only one group of managers can enter a value for the **Budget**. This field security will also be used by the step in the process. Therefore, a manager must enter a **Budget** value before any user can continue to the next stage of the process.

The “Required Step With Field Security Enabled” figure shows a process step that is required, this is indicated by a red asterisk. The field has field security enabled. This makes the field read-only for this user, this is indicated by a padlock icon.

If the user clicks the **Next Stage** button in the process bar when there is a required step that has not been met, an error message is displayed below the process bar. This error message is also shown in the “Required Step With Field Security Enabled” figure.



✓ Gather Information	
✓ Name *	Fleece helmet liner
✓ Currency *	<u>US Dollar</u>
! Budget *	— 

! You have to complete the required steps before you can advance.

Figure 92 - Required Step with Field Security Enabled

If a required step uses a field that has field security enabled, and the user does not have at least read permission to the field, then the field value cannot be viewed by the user. In this case the process that is running on the form, in the context of the user's credentials, also cannot view the value. Because the process cannot check whether there is a value in the field, *the process will treat the field as if it had a value and the step requirement will be met*. Therefore, the user can continue to the next stage of the process.

Best Practice: If you have a field that has field security enabled that you intend to use for an approval step, we recommend that you create a Field Security Profile includes all users (you might use the default teams of every Business Unit to achieve this). Configure the

Field Security Profile to grant read permissions for “approval” field. Then create another Field Security Profile for users who will have write permissions to the field. Notice that Field Security Profile “create” permissions are not relevant to process steps, because a user cannot access the steps of a process until the record is already saved in any case.

