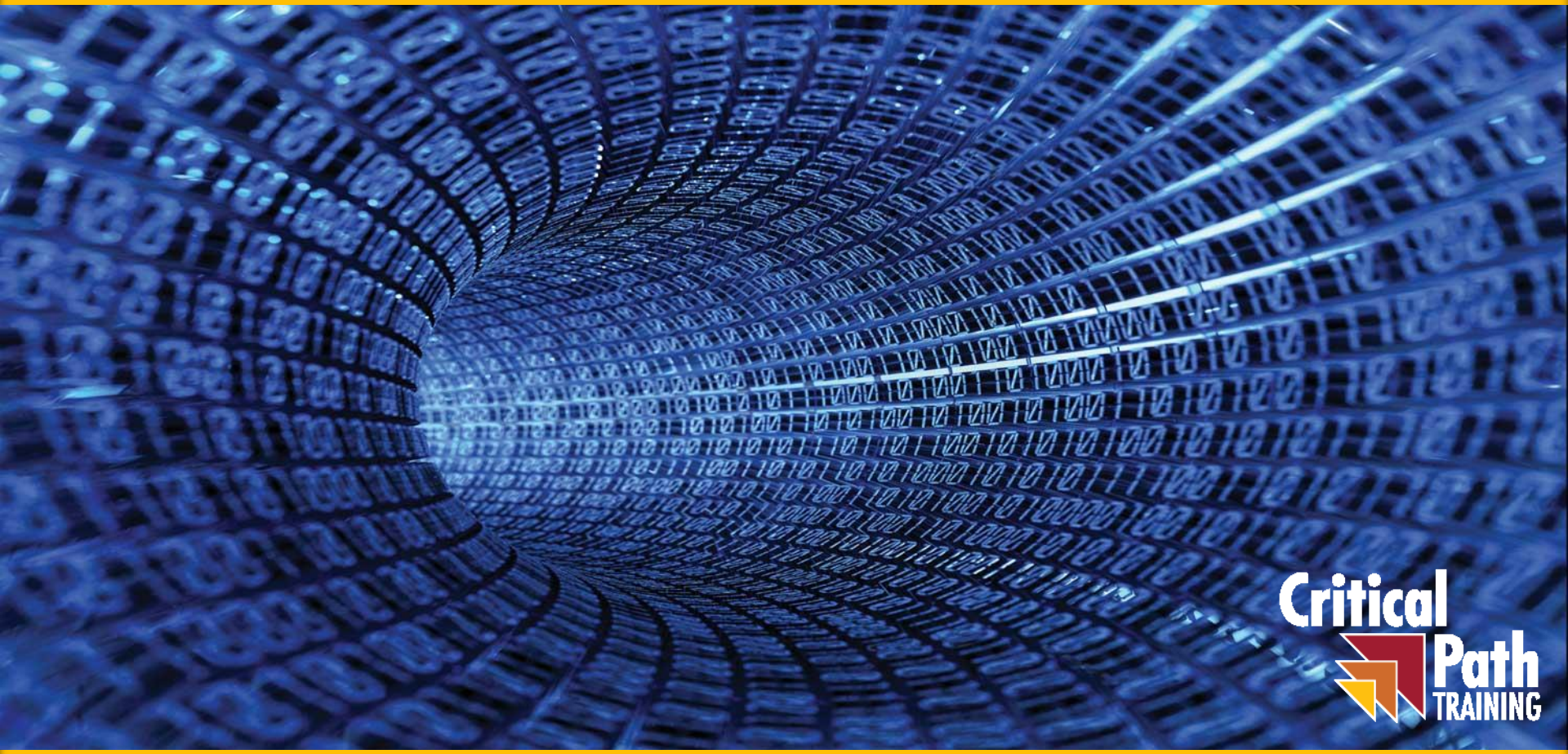
Business Connectivity Services



Agenda

- BCS Overview
- Creating Secure Store Service Applications
- Creating External Content Types
- Consuming External Content Types
- External Content Types with SharePoint Add-ins

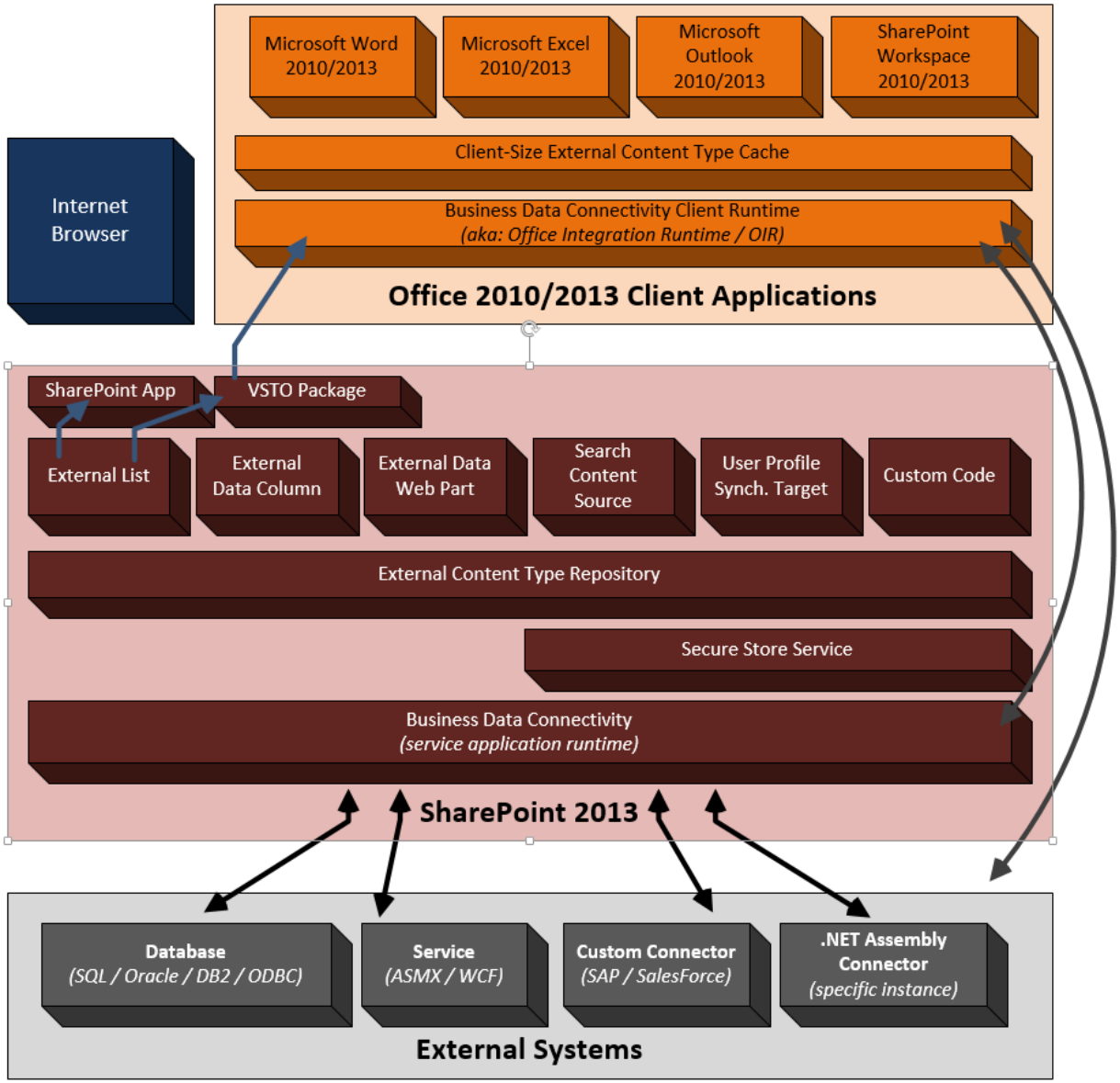
Business Data Connectivity Services (BCS)

- Integrates SharePoint with external data sources
  - External data can be surfaced through SharePoint sites
  - Supports write back to external data source
  - External data can also be surfaced in Office clients

Essential BCS Terms and Concepts

- External Data Source
  - Data source accessible to BCS through SQL, web services, etc.
- External Content Type (ECT)
  - Metadata for accessing data in external data source
- External List
  - Used to surface the data for an ECT in a specific SharePoint site
- External Data Column
  - Used to surface ECT data in a specific SharePoint list column
- Business Data Web Parts
  - Used to surface ECT data on web part pages and wiki pages
- Profile Page
  - Automatically-generated page which displays single ECT instance

BCS Architecture



External Content Types

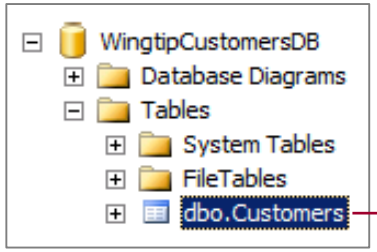
- Describe the schema of external data source
- Describes operators / operations on external data
- Creating External Content Types:
  - SharePoint Designer 2013
  - Visual Studio
- Can export/import external content types via the Business Data Connectivity service application

Surfacing External Data

- External Data Columns
  - Add data from external content types to standard SharePoint lists
  - Can be made available as Content Controls in Word
- Provided Web Parts
  - External Data Item
  - External Data List & External Data Related List
  - External Data Item Builder
  - Chart Web Part
- Profile Page
- External Data Search
  - Integrate External Data into search results
- Inclusion in SharePoint Apps

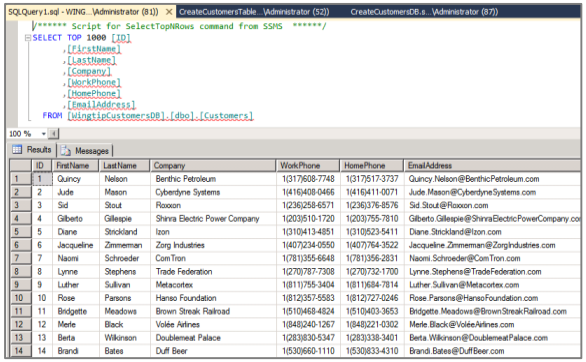
Connecting to Database Tables and Views

- Easy to create ECT to database table
  1. Model database tables as external content type (ECT)
  2. Surface ECT in specific site as an external list



External Content Type

External List



SQLQuery1.sql - WING...\Administrator (81)) | CreateCustomersTable...\Administrator (52)) | CreateCustomersDB.s...\Administrator (87))

```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP 1000 [ID]
      ,[FirstName]
      ,[LastName]
      ,[Company]
      ,[WorkPhone]
      ,[HomePhone]
      ,[EmailAddress]
  FROM [WingtipCustomersDB].[dbo].[Customers]
```

100 %

Results | Messages

	ID	FirstName	LastName	Company	WorkPhone	HomePhone	EmailAddress
1	1	Quincy	Nelson	Benthic Petroleum	1(317)608-7748	1(317)517-3737	Quincy.Nelson@BenthicPetroleum.com
2	2	Jude	Mason	Cyberdyne Systems	1(416)408-0466	1(416)411-0071	Jude.Mason@CyberdyneSystems.com
3	3	Sid	Stout	Roxxon	1(236)258-6571	1(236)376-8576	Sid.Stout@Roxxon.com
4	4	Gilberto	Gillespie	Shinra Electric Power Company	1(203)510-1720	1(203)755-7810	Gilberto.Gillespie@ShinraElectricPowerCompany.co
5	5	Diane	Strickland	Izon	1(310)413-4851	1(310)523-5411	Diane.Strickland@Izon.com
6	6	Jacqueline	Zimmerman	Zorg Industries	1(407)234-0550	1(407)764-3522	Jacqueline.Zimmerman@ZorgIndustries.com
7	7	Naomi	Schroeder	ComTron	1(781)355-6648	1(781)356-2831	Naomi.Schroeder@ComTron.com
8	8	Lynne	Stephens	Trade Federation	1(270)787-7308	1(270)732-1700	Lynne.Stephens@TradeFederation.com
9	9	Luther	Sullivan	Metacortex	1(811)755-3404	1(811)684-7814	Luther.Sullivan@Metacortex.com
10	10	Rose	Parsons	Hanso Foundation	1(812)357-5583	1(812)727-0246	Rose.Parsons@HansoFoundation.com
11	11	Bridgette	Meadows	Brown Streak Railroad	1(510)468-4824	1(510)403-3653	Bridgette.Meadows@BrownStreakRailroad.com
12	12	Merle	Black	Volée Airlines	1(848)240-1267	1(848)221-0302	Merle.Black@VoléeAirlines.com
13	13	Berta	Wilkinson	Doublemeat Palace	1(283)830-5347	1(283)338-3401	Berta.Wilkinson@DoublemeatPalace.com
14	14	Brandi	Bates	Duff Beer	1(530)660-1110	1(530)833-4310	Brandi.Bates@DuffBeer.com

ID	First Name	Last Name	Company	WorkPhone	HomePhone	EmailAddress
1	Quincy	Nelson	Benthic Petroleum	1(317)608-7748	1(317)517-3737	Quincy.Nelson@BenthicPetroleum.com
2	Jude	Mason	Cyberdyne Systems	1(416)408-0466	1(416)411-0071	Jude.Mason@CyberdyneSystems.com
3	Sid	Stout	Roxxon	1(236)258-6571	1(236)376-8576	Sid.Stout@Roxxon.com
4	Gilberto	Gillespie	Shinra Electric Power Company	1(203)510-1720	1(203)755-7810	Gilberto.Gillespie@ShinraElectricPowerCompany.com
5	Diane	Strickland	Izon	1(310)413-4851	1(310)523-5411	Diane.Strickland@Izon.com
6	Jacqueline	Zimmerman	Zorg Industries	1(407)234-0550	1(407)764-3522	Jacqueline.Zimmerman@ZorgIndustries.com
7	Naomi	Schroeder	ComTron	1(781)355-6648	1(781)356-2831	Naomi.Schroeder@ComTron.com
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12	Merle	Black	Volée Airlines	1(848)240-1267	1(848)221-0302	Merle.Black@VoléeAirlines.com
13	Berta	Wilkinson	Doublemeat Palace	1(283)830-5347	1(283)338-3401	Berta.Wilkinson@DoublemeatPalace.com

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- ➢ Creating Secure Store Service Applications
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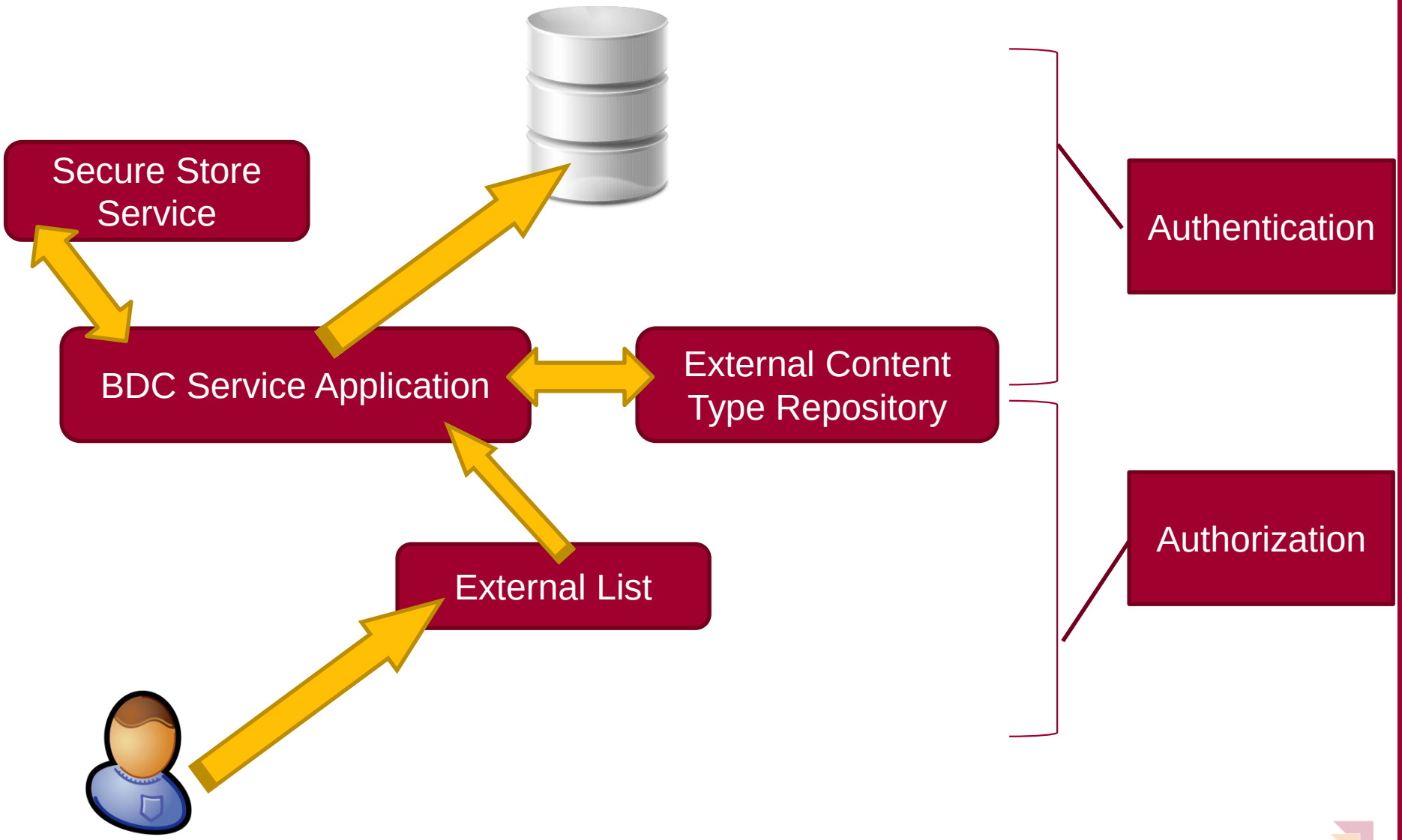
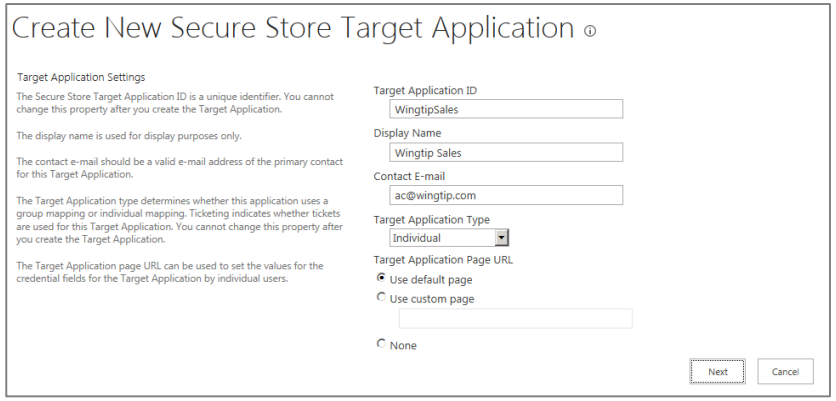
BCS Authentication & Authorization



Secure Store Service (SSS) Applications

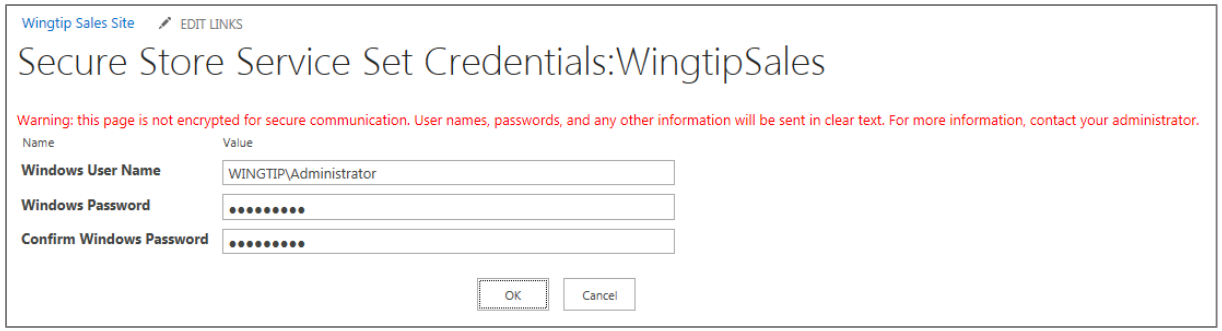
- Provide infrastructure for credential caching

- Two primary types of SSS applications
  - Individual: credentials cached separately for each user
  - Group: One set of credentials used across many users



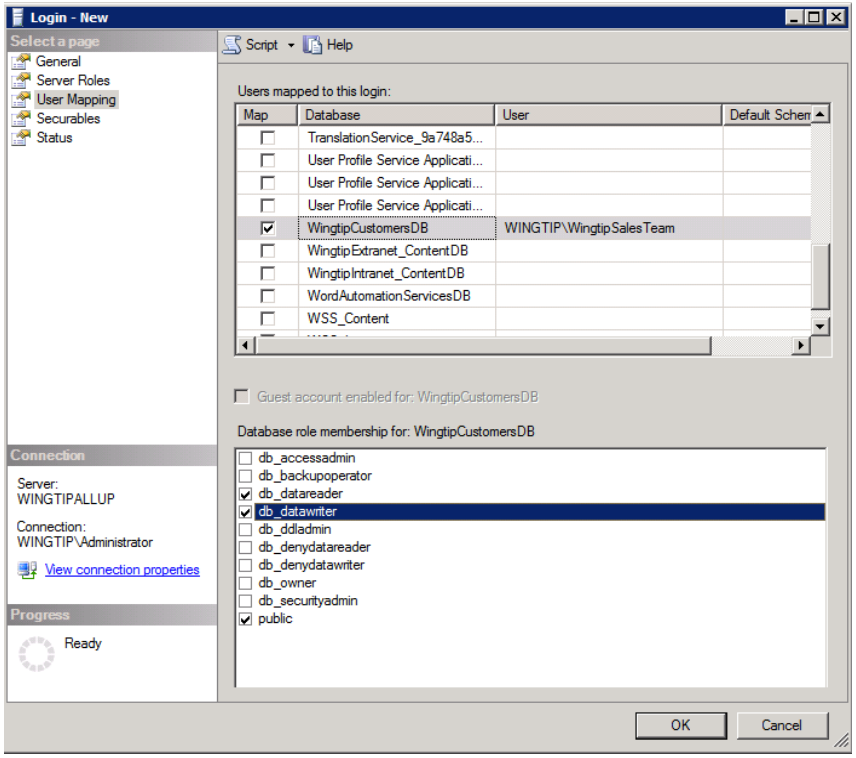
The Default Target Application Page

- What happens if user has no valid credentials?
  - User redirected to Target Application page
  - Allows users to enter credentials in just-in-time fashion
  - Credentials cached in SSS DB in encrypted format



Assigning Data Source Permissions

- External data source must be configured
  - Permissions required for accounts accessing data
  - Could be user accounts, daemon accounts, AD groups




DEMO
Creating a Secure Store Service Application

Agenda

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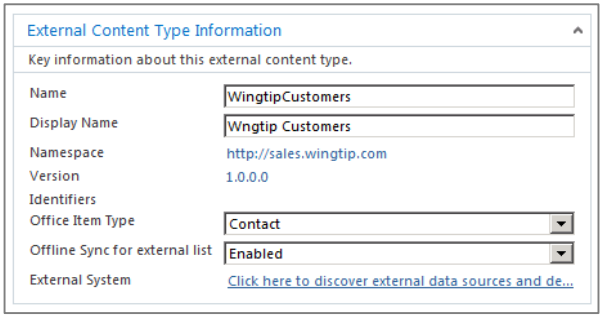
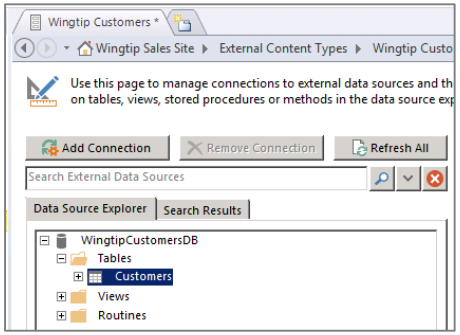
Create an External Content Type in SPD

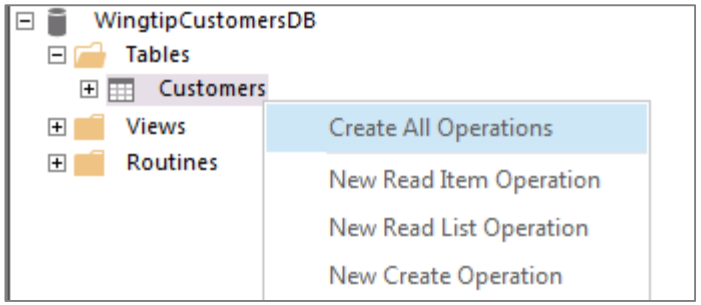
1. Give ECT a name



2. Connect to data source

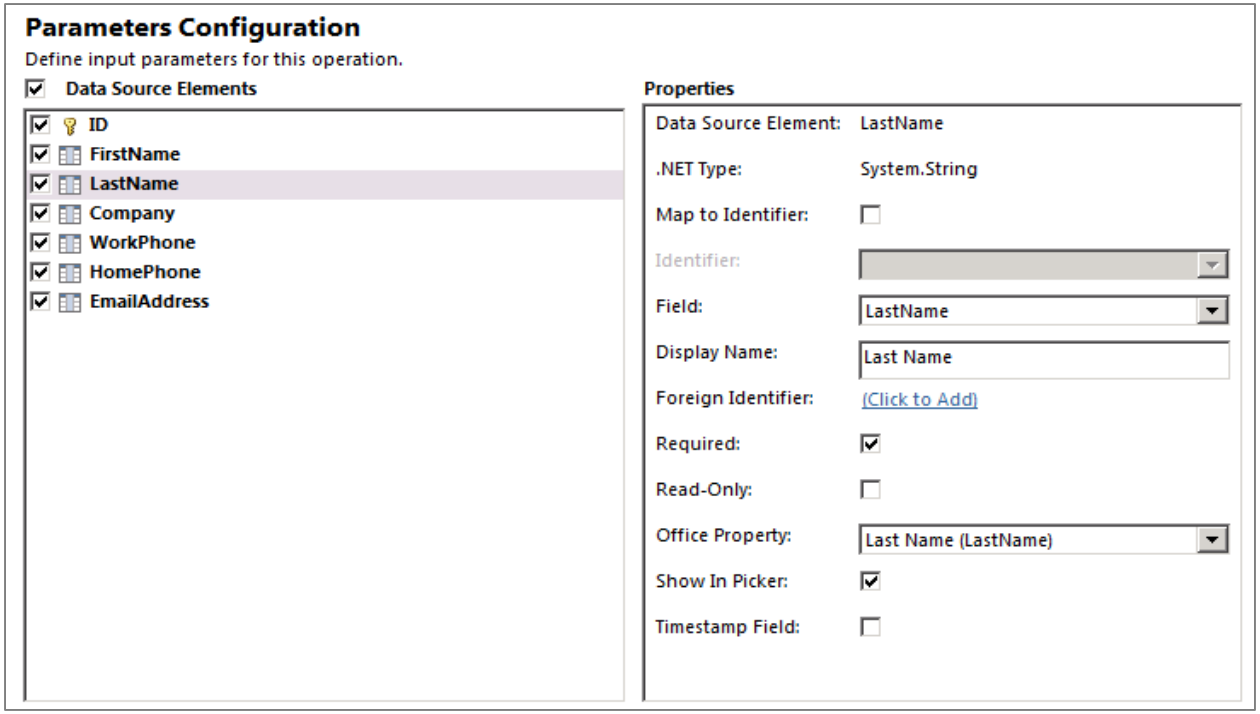


3. Create ECT operations



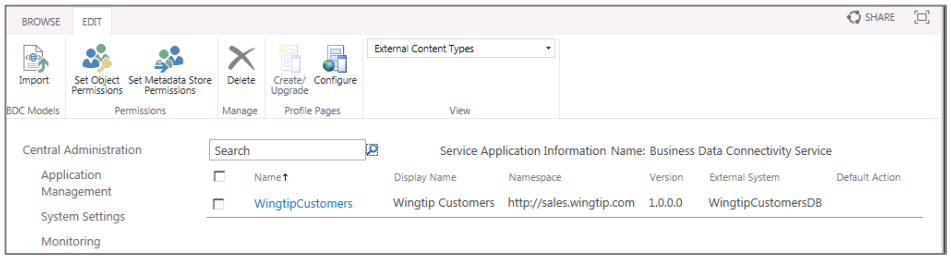
Creating Parameters for an ECT

- Essential to define parameters when creating ECT
  - They define WHERE clause parameters and row limits
  - They provide users with search capabilities

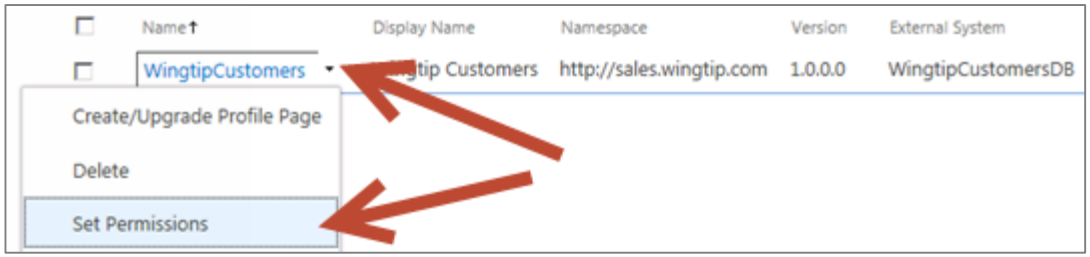


Assigning ECT permissions

- New ECT is not accessible to anyone
  - ECT provides no default permissions - even to the creator

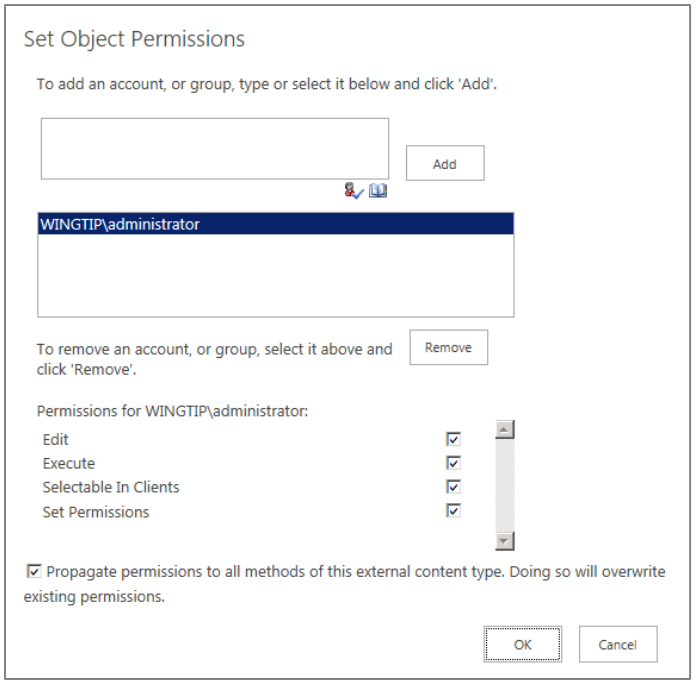


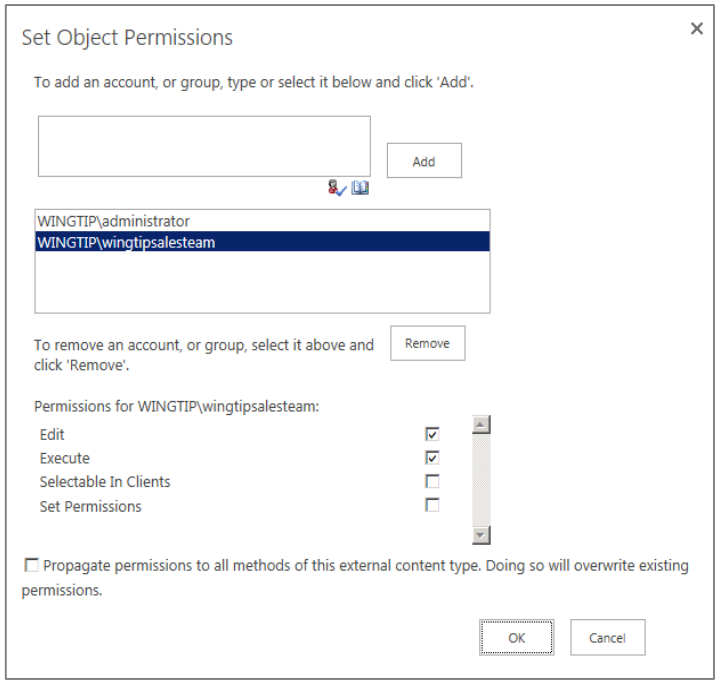
  - Once ECT has been created, you must assign permissions

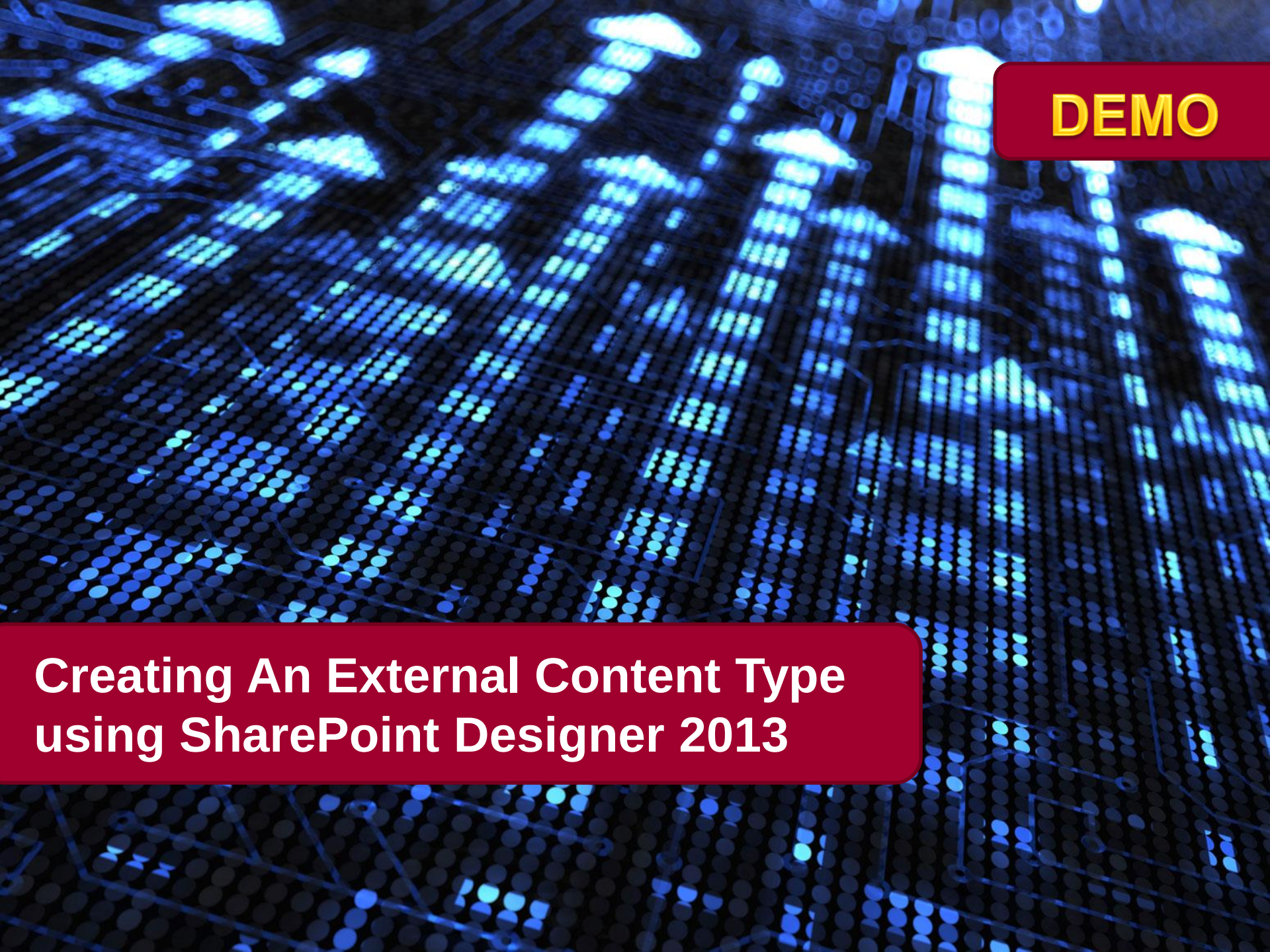


Granting BCS Permissions

- Configurable BCS Permissions:
  - **Edit**: create, delete, update metadata objects
  - **Execute**: call external system (read)
  - **Set Permissions**: give permissions to other users
  - **Selectable In Clients**: accessible to clients applications like entity picker






DEMO
Creating An External Content Type using SharePoint Designer 2013

Creating ECTs with OData Data Sources

- OData is very popular protocol for services
  - OData not supported by BCS in SharePoint 2010
  - OData now supported by BCS in SharePoint 2010
  - OData also supported with ECTs in SharePoint Online
- Creating ECTs based on OData data sources
  - Visual Studio provides support for automatically generating ECT and external list from an OData source
  - No support in SharePoint Designer 2013 for OData

OData Sources

- Creating External Content Types

```
<?xml version="1.0" encoding="utf-8"?>
<LobSystem Name="ODataWebNorthwindModel" Type="OData">
  <Properties>
    <Property Name="ODataServiceMetadataUrl" Type="System.String">
      http://services.odata.org/Northwind/Northwind.svc/$metadata
    </Property>
    <Property Name="ODataMetadataAuthenticationMode" Type="System.String">PassThrough</Property>
    <Property Name="ODataServicesVersion" Type="System.String">2.0</Property>
  </Properties>
  <LobSystemInstances>
    <LobSystemInstance Name="http://services.odata.org/Northwind/Northwind.svc">
      <Properties>
        <Property Name="ODataServiceUrl" Type="System.String">
          http://services.odata.org/Northwind/Northwind.svc
        </Property>
        <Property Name="ODataServiceAuthenticationMode"
                  Type="System.String">PassThrough</Property>
        <Property Name="ODataFormat" Type="System.String">application/atom+xml</Property>
      </Properties>
    </LobSystemInstance>
  </LobSystemInstances>
</LobSystem>
```

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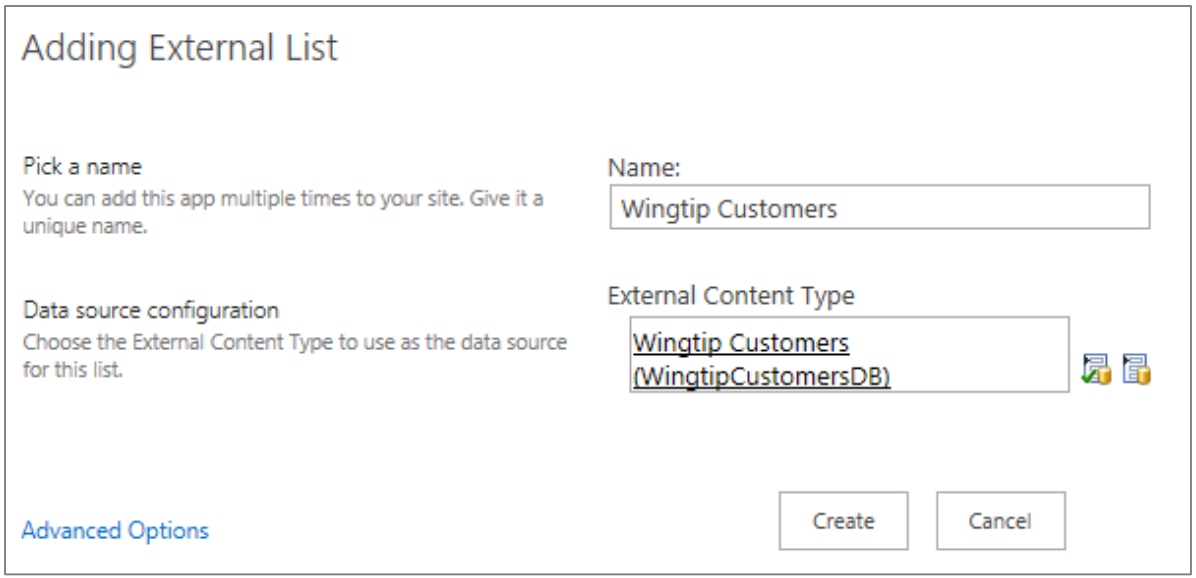
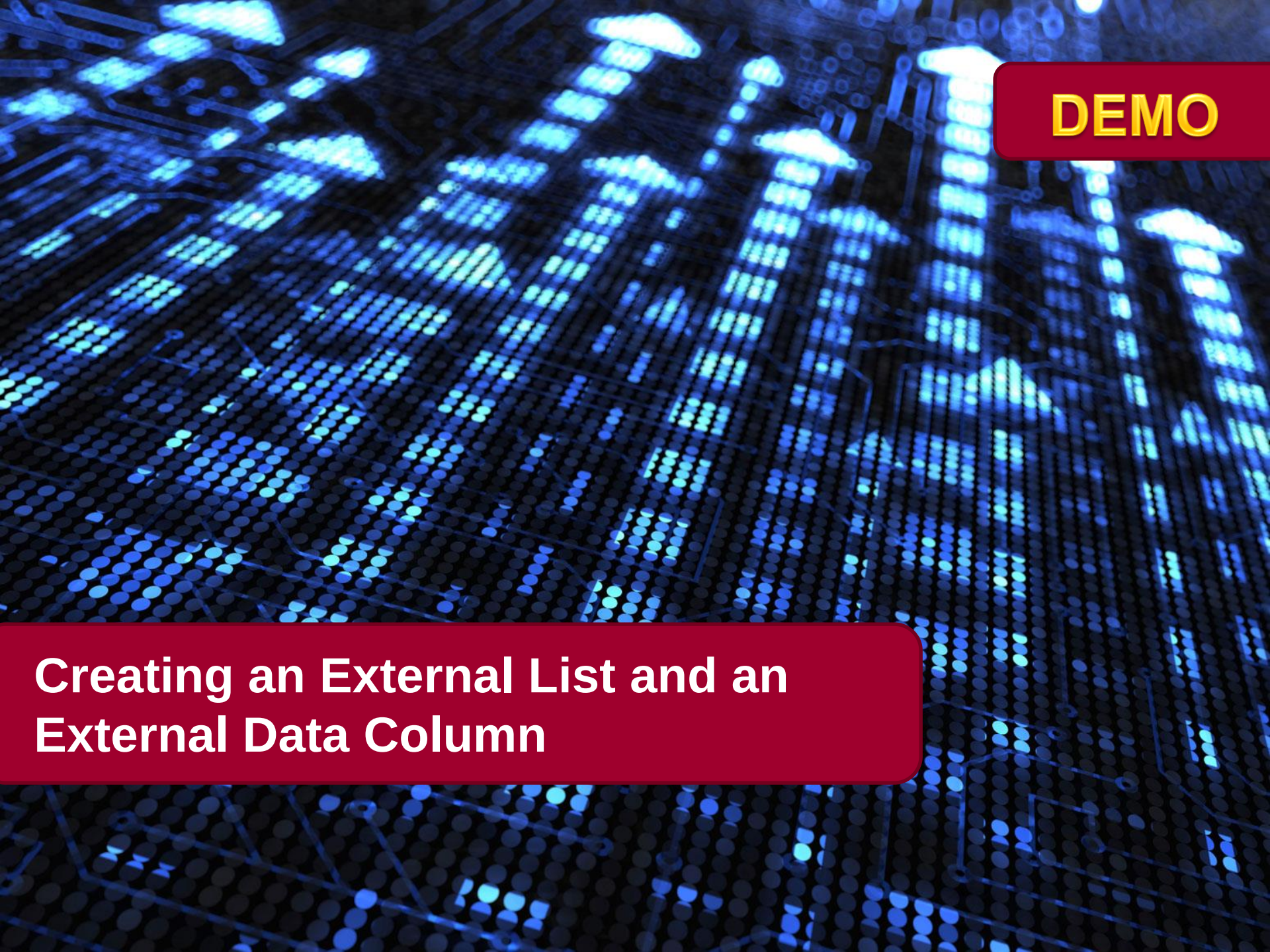
External Lists

- Expose external data as a native SharePoint list
  - Full CRUD-Q capability w/ familiar UI & navigation
  - Forms can be converted to InfoPath forms
  - Profile page available for each item in the list
  - Access via SharePoint object model (`SPList`)
- New support for alerts (notifications)
  - Requires implementation of new operators
- Some differences from traditional SP lists
  - Because SharePoint doesn't "own" the data, some standard list functionality is not available with external lists

Creating an External List

- External list used as simplest way to surface ECT
  - External list created using pre-existing ECT
  - External list can be created through SPD or browser




DEMO
Creating an External List and an External Data Column


DEMO
Using the Business Data Web Parts

Agenda

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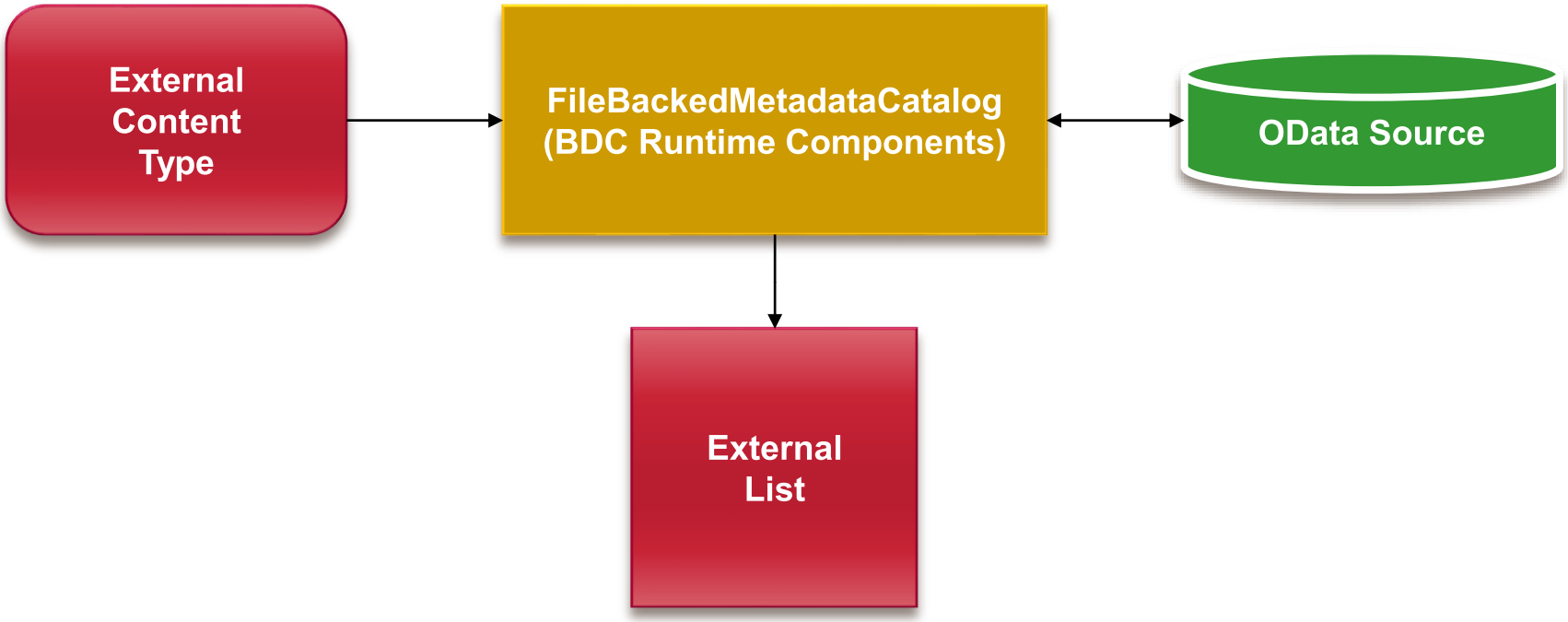
App-Level ECTs

- Ability to define ECT within an app
  - ECT is isolated to the app only
  - Can be used to create External List
  - Can be access using API
- Allows for accessing variety of External Systems
  - CRUD operations performed using standard list APIs

Architecture



External List Definitions

```
<?xml version="1.0" encoding="utf-8"?>
 <Elements xmlns="http://schemas.microsoft.com/sharepoint/">
   <ListInstance Url="Lists/Employees" Description="Employees"
                 OnQuickLaunch="TRUE" Title="Employees">
     <DataSource>
       <Property Name="LobSystemInstance" Value="Northwind" />
       <Property Name="EntityNamespace" Value="NorthwindModel" />
       <Property Name="Entity" Value="Employees" />
       <Property Name="SpecificFinder" Value="ReadSpecificEmployee" />
       <Property Name="MetadataCatalogFileName" Value="BDCMetadata.bdcm" />
     </DataSource>
   </ListInstance>
 </Elements>
```

SharePoint REST API Against External List

```
AppLevelECT.Grid.prototype = {
  init: function () {
    var query = siteUrl + "_api/lists/getbytitle('Person')/items?$select=FirstName,LastName"
    $.ajax({
      url: query,
      headers: { "ACCEPT": "application/json",
                 "X-RequestDigest": $("#__REQUESTDIGEST").val()
      },
      success: this.showItems
    });
  },

  showItems: function (data) {
    var resultString = "";
    $.each(data.d.results, function (key, val) {
      resultString += val.FirstName + " " + val.LastName + "\n";
    });
    alert(resultString);
  }
}
```

CSOM Against External List

```
using (var clientContext = spContext.CreateUserClientContextForSPAppWeb()) {
     List list = clientContext.Web.Lists.GetByTitle("Employees");
     CamlQuery camlQuery = new CamlQuery();
     camlQuery.ViewXml = @"<View>...";
     ListItemCollection listItems = list.GetItems(camlQuery);
     clientContext.Load(
          listItems,
          items => items
              .Include(
                  item => item["EmployeeID"],
                  item => item["LastName"],
                  item => item["FirstName"],
                  item => item["HireDate"],
                  item => item["HomePhone"]));
     clientContext.ExecuteQuery();
     foreach (ListItem listItem in listItems)     {
         …
     }
```

Summary

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- ✓ Creating Secure Store Service Applications
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- ✓ External Content Types with SharePoint Add-ins