

Course Guide

API Lifecycle Governance with IBM API Connect v2018

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Course description

API Lifecycle Governance with IBM API Connect v2018

Duration: 2 days

Purpose

This course teaches you how to configure the gateway, portal, and analytics services in Cloud Manager that are used by the API Connect infrastructure through all phases of the API lifecycle. You manage all aspects of the provider organization in the API Manager user interface to create, publish, version, and retire API artifacts such as Products, plans and APIs themselves. You also learn how to manage consumer organizations who use the APIs that are made available on the Developer Portal. You learn how to add members to the consumer organization that provides access to the APIs on the Developer Portal. You learn how the layout of the Developer Portal can be customized. Finally, you call the APIs on the secure gateway and you view the graphs and metrics of API usage.

Audience

This course is designed for API Connect cloud administrators, lifecycle administrators, and application developers.

Prerequisites

Conceptual knowledge of APIs; for more information, see the resources at
<https://developer.ibm.com/apiconnect/>

Objectives

- Configure services in Cloud Manager for an on-premises installation of API Connect V2018
- Identify the container runtime infrastructure that supports the API Connect services
- Create a catalog and Developer Portal
- Create a consumer organization
- Manage member roles and permissions in the Developer Portal
- Define APIs, Products, and plans in API Manager
- Identify the API lifecycle stages
- Stage, publish, version, migrate, deprecate, and retire Products and APIs
- Review and approve API lifecycle requests
- Customize the Developer Portal
- Create an application and subscribe to a plan

- Review API analytics in the Developer Portal
- Review analytics dashboards and visualizations in API Manager

Contents

- Configuring the API Connect cloud topology
- Managing catalogs and consumer organizations
- Defining an API and Product
- Managing and approving API Products
- Customizing the Developer Portal
- Creating an application and subscribing to a plan
- Calling APIs on the gateway and analyzing usage

Agenda

**Note**

The following unit and exercise durations are estimates, and might not reflect every class experience.

Day 1

- (00:15) Course introduction
- (01:00) Unit 1. Managing the API Connect cloud topology
- (00:45) Exercise 1. Configuring the cloud topology
- (00:45) Unit 2. Managing catalogs and consumer organizations
- (01:00) Exercise 2. Managing catalogs and consumer organizations
- (00:30) Unit 3. Defining APIs in API Manager
- (00:45) Exercise 3. Defining an API and Product in API Manager
- (01:15) Unit 4. The Product lifecycle

Day 2

- (01:00) Exercise 4. Managing and approving API Products
- (00:45) Unit 5. Customizing the Developer Portal
- (00:45) Exercise 5. Customizing the Developer Portal
- (00:30) Unit 6. Creating an application and subscribing to a plan
- (00:45) Exercise 6. Creating an application and subscribing to a plan
- (00:45) Unit 7. API analytics
- (01:00) Exercise 7. Calling an API on the gateway and monitoring API usage
- (00:05) Unit 8. Course summary

Unit 1. Managing the API Connect cloud topology

Estimated time

01:00

Overview

When you install IBM API Connect, you must define an on-premises cloud. You define the topology of your on-premises cloud with the Cloud Manager web user interface. As the Cloud administrator, you configure the services that run in your cloud: the Analytics service, the Gateway service, and the Developer Portal service. In addition, you manage the membership of provider organizations by creating the owner for the organization that creates APIs.

How you will check your progress

- Review questions
- Lab exercise

How to check online for course material updates



Instructions

1. Enter this URL in your browser:
ibm.biz/CloudEduCourses
2. Find the product category for your course, and click the link to view all products and courses.
3. Find your course in the course list and then click the link.
4. The wiki page displays information for the course. If a course corrections document is available, this page is where it is found.
5. If you want to download an attachment, such as a course corrections document, click the **Attachments** tab at the bottom of the page.

Comments (0) Versions (1) **Attachments (1)** About
6. To save the file to your computer, click the document link and follow the prompts.

Managing the API Connect cloud topology

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Figure 1-1. How to check online for course material updates

Unit objectives

- Explain the concept of the API Connect cloud
- Describe the purpose of the Cloud Manager user interface
- Explain the role of the Cloud administrator
- Review the topology of an API Connect cloud
- Identify the gateway service types
- Examine the configuration of gateway service
- Define an email server
- Describe the purpose of user registries
- Identify the types of supported user registries in Cloud Manager
- Describe the role of Transport Layer Security profiles
- Explain the concept of a provider organization
- Describe the API Connect user interfaces by function
- Identify deployment options for API Connect at installation
- Describe the function of the installation assist utility
- Identify the components of the runtime environment

Figure 1-2. Unit objectives

IBM API Connect solution

- A comprehensive solution to create, secure, control, publish, manage, and monitor application programming interfaces (APIs)
- The IBM API Connect solution has four installation offerings:
 - Install and managed on your own network with the on-premises edition
 - IBM Cloud Private (ICP)
 - Dedicated IBM Cloud
 - As a service on the IBM Cloud
- **IBM API Connect on-premises** edition is a single, or multi-organization cloud solution
- The "API Connect cloud" is the combination of virtual appliances or Docker containers that are needed to host your APIs
 - A set of servers and services that are provided by an API Connect installation, whether it is installed on-premises or hosted as a cloud-based service

Managing the API Connect cloud topology

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Figure 1-3. IBM API Connect solution

IBM API Connect is a comprehensive solution to create, secure, control, publish, manage, and monitor APIs.

IBM API Connect has a range of installation and management options ranging from on-premises through hosted services that run on the public IBM Cloud architecture.

IBM API Connect is an on-premises, single, or multi-organization, cloud-based solution.

The on-premises solution runs in-house on the customer's network, hardware, and software infrastructure.

The on-premises cloud can be a combination of new and existing physical appliances and virtual appliances or can be entirely composed of virtual appliances.



Information

For more information, see the topic “Available deployment options of API Connect” in the IBM Knowledge Center for IBM API Connect at

https://www.ibm.com/support/knowledgecenter/SSMNED_2018/com.ibm.apic.overview.doc/rapid_overview_apic_formats.html.

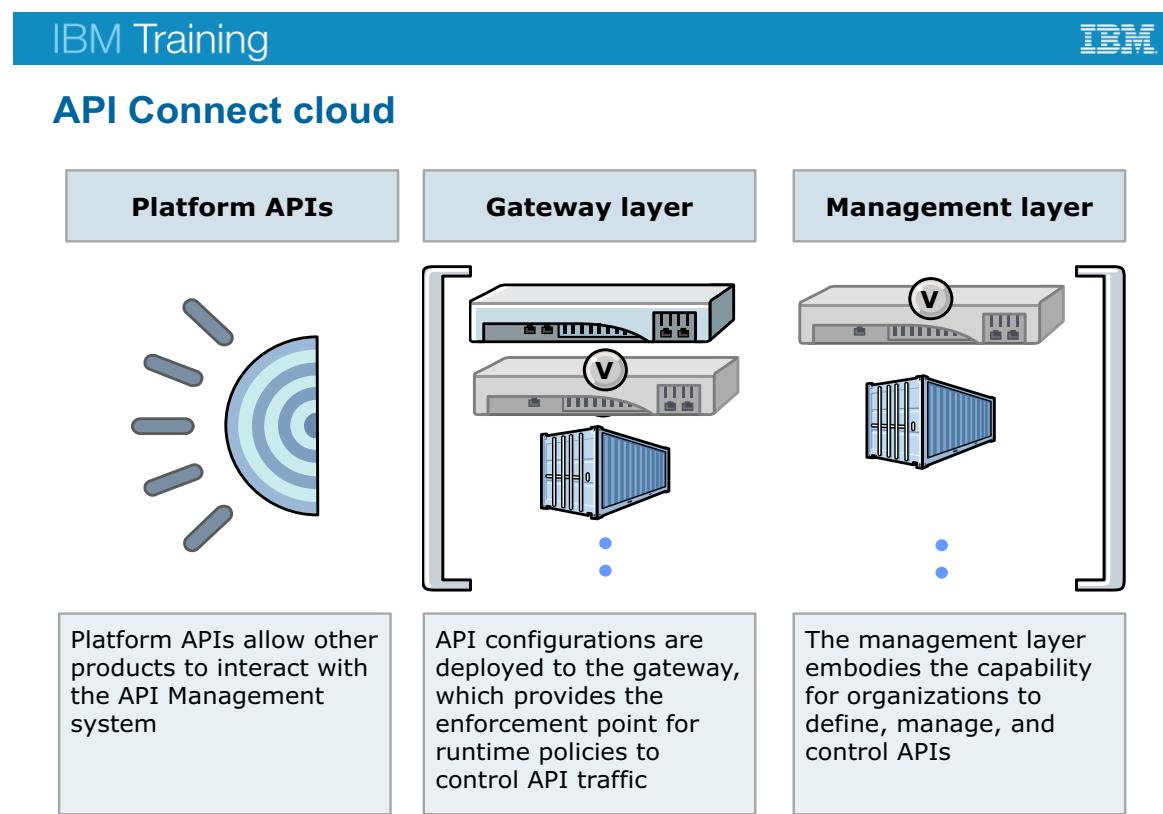


Figure 1-4. API Connect cloud

When you install IBM API Connect, you define an on-premises cloud. To determine the topology of appliances for this cloud, consider the number of Management and Gateway services that are required to address your API needs.

The Gateway provides the enforcement point for runtime policies to control API traffic.

The Management layer embodies the capability for organizations to define, manage, expose, and control APIs.

At least one Management service and one Gateway service are required to create a cloud capable of running the API Connect solution.

Not shown in the figure is the consumer organization components that includes the Developer Portal.

There are two types of deployment scenarios for API Connect v2018:

- Appliance-based deployment using .ova files on virtual machines
- Container-based deployment using Docker and Kubernetes clusters.

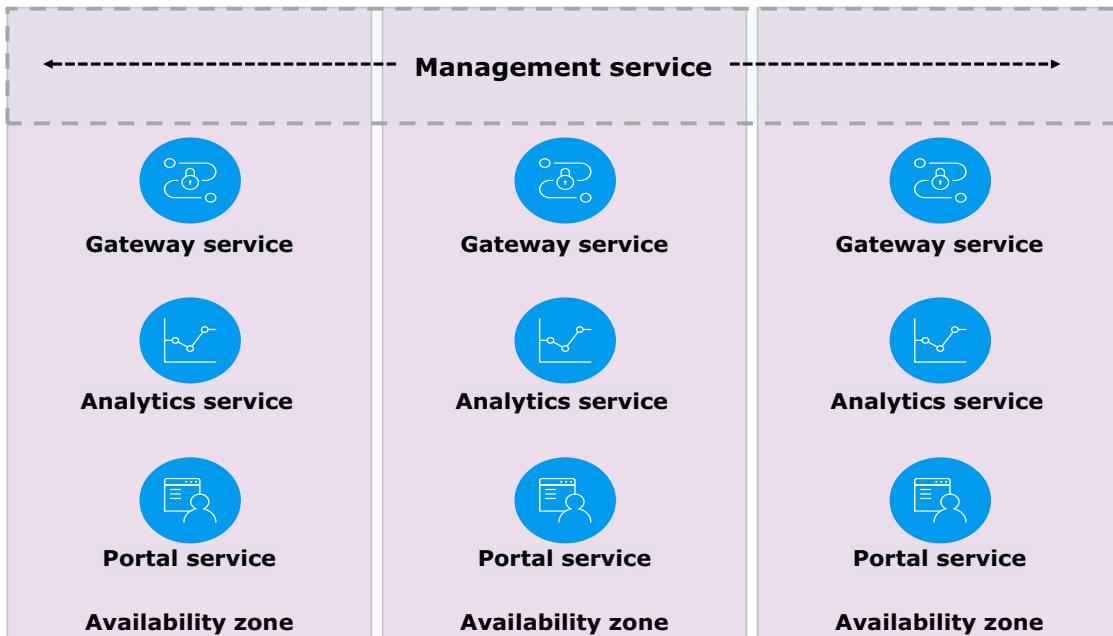


Information

The images that are used for the exercises in this course are built with a container-based deployment using Docker and Kubernetes clusters.

IBM API Connect and API Connect are used interchangeably in the remaining presentations in this course.

Cloud topology



Managing the API Connect cloud topology

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Figure 1-5. Cloud topology

The Cloud Manager topology consists of availability zones that contain the API Connect services - management, gateway, analytics and portal services. Availability zones can contain one or more gateway services, analytics service, and portal service, but there is one management service that spans all availability zones.

A default availability zone is created during installation that includes a Management service.

An availability zone is a logical or physical set of data centers containing one or more API Connect services. Availability zones provide redundancy and failover in the event of network issues.

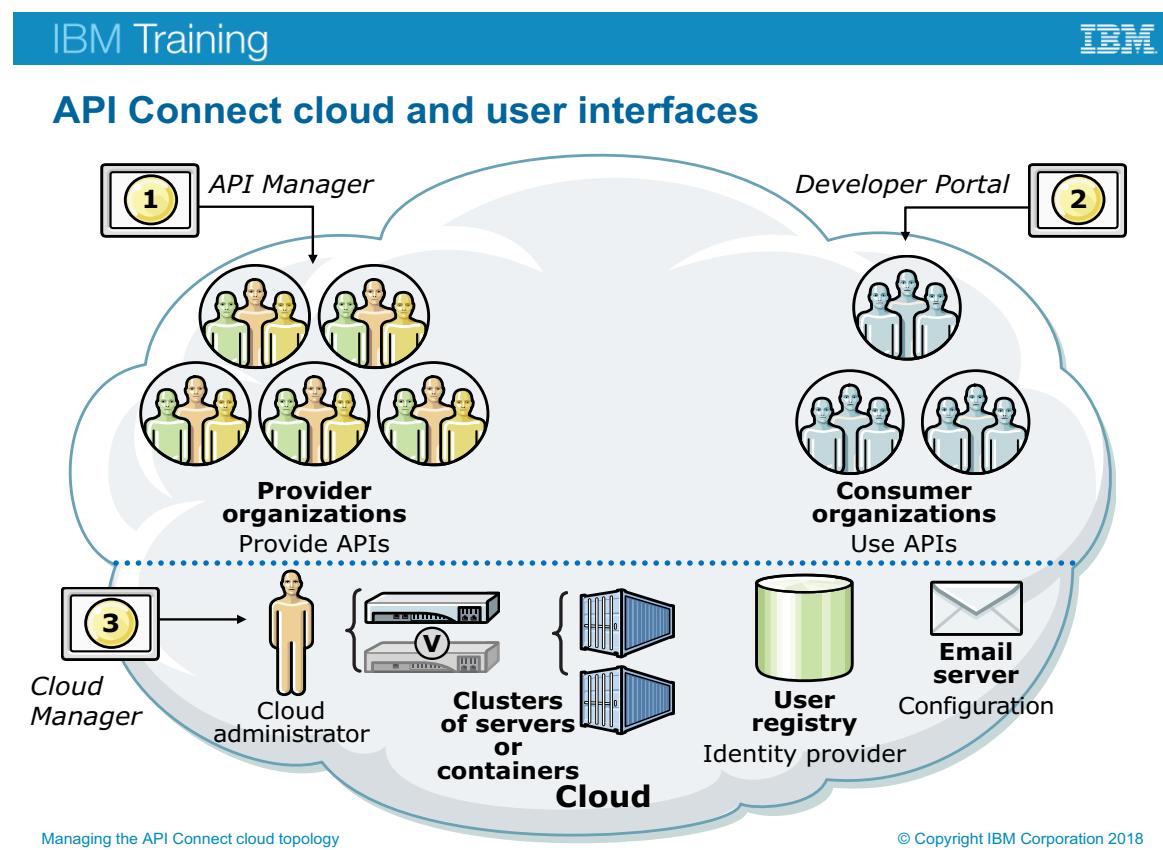


Figure 1-6. API Connect cloud and user interfaces

The diagram shows the infrastructure and organizations for an API Connect on-premises cloud.

1. The API Manager user interface provides authorized access to the APIs, Products, and plans and related linked services capability for the API provider.
2. The Developer Portal provides access for consumer organizations to the Products, plans, and APIs that are published by an API provider organization to a catalog.
3. The Cloud Manager user interface provides access for authorized users to administer the servers and user registries that make up the cloud infrastructure.

Cloud Manager user interface

- Configure Cloud
- Configure topology
- Manage resources
- Manage organizations



Managing the API Connect cloud topology

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Figure 1-7. Cloud Manager user interface

The page shows the Home page for the Cloud Manager user interface of API Connect.

The Cloud administrator signs in to the Cloud Manager. The administrator can click the icons to configure the cloud, configure topology, manage resources, and manage organizations. The Cloud Manager user interface also has a navigation menu on the left side of the page that provides other ways to access the administration functions.

Cloud Manager functions

- Enables a Cloud Administrator to *configure*, and *manage* the API Connect on-premises cloud
 - Not available when running API Connect as a service on IBM Cloud Public
- Configure:
 - Declare settings such as timeout values for invitations to join an organization
 - Configure member roles and role defaults
 - Define user registries
 - Define provider organizations
 - Connect to an existing SMTP mail server
 - Configure endpoints for the analytics, gateway, and portal services
- Manage
 - Register new services and manage existing services
 - Manage Transport Layer Security (TLS) server and client profiles
 - Manage provider organizations

Figure 1-8. Cloud Manager functions

The Cloud Manager user interface is the part of IBM API Connect that enables a Cloud Administrator to define, configure, and manage the API Connect on-premises cloud.

You can use the Cloud Manager to configure the existing API Connect cloud to update settings at the cloud level.

You can use the Cloud Manager to manage organizations.

API Connect may need to transmit data across an untrusted network, for example, when accessing the Gateway, email server, or LDAP server. TLS provides secure network layer transportation of data between two parties.

Role-based administration of the cloud

- Cloud administrator
 - Installation process creates a user ID **admin**
 - Prompted to change the default password on first sign-in to Cloud Manager

Role	Permissions	Actions	Description
Cloud Administrator	Cloud-settings	View, manage	View, define, and configure settings and defaults
	Topology	View, manage	View, register, edit, and delete analytics, gateway, and portal services
	Provider organizations	View, manage	Add, update, and delete provider organizations
	Users	View, edit	View, add, update, and delete Cloud Manager users

Figure 1-9. Role-based administration of the cloud

Cloud Administrator role.

- Installation process creates a user ID **admin**
- Prompted to change the default password on first sign in to Cloud Manager.

The Cloud Manager URL is in the format: <cloud>.<hostname>.<domainname>

In the course, the URL to display the Cloud Manager in the browser is: <https://cloud.think.ibm>

The Cloud Administrator can create users who can be assigned roles that are given some permissions for administering the cloud.

A Topology Administrator is given the same permissions as the Cloud Administrator, except the permissions to view and edit users.

The Cloud Administrator can create, update, and delete provider organizations and their owners.

One of the important first tasks of the Cloud Administrator is to create a provider organization account and add an owner to the account. Then, members can be added to the provider organization to start creating and publishing APIs.

Stand-alone topology

- Non high-availability (HA), single instance deployment
- Single instance of each component that is defined for a non-HA deployment
- Non-HA deployment suitable for small projects and workloads
- HA deployment is recommended for larger projects and workloads, running critical applications



Gateway instance



Analytics instance



Manager instance



Portal instance

Managing the API Connect cloud topology

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Figure 1-10. Stand-alone topology

Depending on what you want to use your API Connect cloud for, consider the topology that you want to implement.

For small projects, install a single instance of each components by specifying the deployment mode of *dev* in the Install Assist YAML file. The other mode option is *standard*.

The standalone topology was used to create the environment for the course exercises.

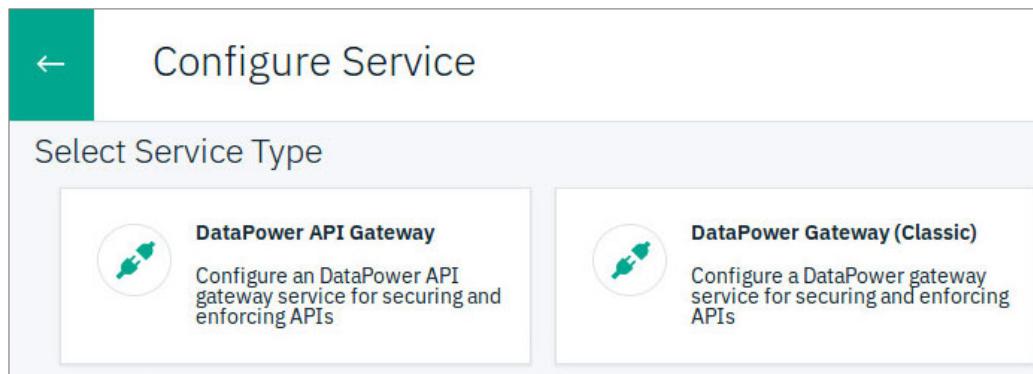


Note

In API Connect 2018.3.4 the deployment mode of *demo* was used for a standalone topology.

Gateway service types

- DataPower gateway (Classic) is a V5-compatible gateway
 - Use for complex API assembly requirements
- DataPower API gateway
 - Newer gateway with performance benefits
 - Does not yet include all the policies that are offered by the V5 gateway
 - Policies to be added over time



Managing the API Connect cloud topology

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Figure 1-11. Gateway service types

The DataPower API Gateway is a new gateway that has been designed with APIs in mind, and with the same security focus as DataPower Gateway (v5 compatible). Where DataPower Gateway (v5 compatible) was built for flexibility, DataPower API Gateway is built specifically for the API use case, with resulting performance benefits.

Since the DataPower API Gateway did not support all the policies that are provided by the v5-compatible gateway, the DataPower Classic gateway is used in the course lab exercises.

For more information see:

https://www.ibm.com/support/knowledgecenter/SSMNED_2018/com.ibm.apic.overview.doc/r_apic_gateway_types.html

Configuring the gateway service

- Management endpoint
 - URL that the Management server connects to the gateway
- API invocation endpoint
 - Base portion of the URL that maps to the base portion of the URL for incoming API traffic
 - A public address (FQDN) with appended with paths that are specific to your API calls

Configure DataPower Gateway Service	
Management Endpoint	
Endpoint	<input type="text" value="https://gwd.think.ibm"/>
TLS Client Profile (optional)	
<input type="button" value="Default TLS client profile"/>	
API Invocation Endpoint	
API Endpoint Base	<input type="text" value="https://gw.think.ibm"/>

Figure 1-12. Configuring the gateway service

When you configure the gateway, you specify the Management endpoint and the API Invocation endpoint.

If the API Connect product is installed into a Kubernetes runtime environment, the endpoints that you specify when you register the gateway service should match the values contained in the apicup installation utility.

You can use Kubernetes and Docker containers to run API Connect. The Install Assist utility program automates the installation process which is initiated by entering apicup init from the command line to start the installation process.

More information on the installation utility is given later in this unit.



Services that are registered in Cloud Manager

- Gateway Service, Portal Service, and Analytics Service are registered

The screenshot shows the "Topology" view in the IBM API Connect Cloud Manager. On the left is a sidebar with icons for Home, Services, Applications, Data Sources, and Monitoring. The main area is titled "Topology" and "Default Availability Zone". It includes a "Create Availability Zone" button and a "Register Service" button. A table lists three registered services:

SERVICE	TYPE	ASSOCIATED ANALYTICS SERVICE	VISIBLE TO
Gateway Service Classic	DataPower Gateway (Classic)	Analytics-service	Public
Portal Service	Portal Service		Public
Analytics Service	Analytics Service		

Managing the API Connect cloud topology

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Figure 1-13. Services that are registered in Cloud Manager

The default availability zone contains the Management Service.

When the Gateway Service, Portal Service, and Analytics Service are registered, the API Connect Cloud is configured for the stand-alone topology that is used in the class exercises.



Configure the cloud environment: SMTP server

- To define the email server, select the **Resources** option
 - Then, selected **Notifications**

The screenshot shows the 'Create Email Server' interface. On the left, there's a sidebar with a back arrow and the title 'Create Email Server'. The main area is titled 'Email Server Configuration' and contains four input fields: 'Title' (Gmail Server), 'Name' (gmail-server), 'Address' (smtp.gmail.com), and 'Port' (587). To the right of the form is a sidebar with the heading 'About email servers' and a brief description: 'Configure an email server to send invitations and notifications to users.' It also includes a 'Learn more' link.

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Figure 1-14. Configure the cloud environment: SMTP server

In the Cloud Manager, you configure an email server from the **Resources > Notifications** option.

You must configure an email server in Cloud Manager.

Email notifications are sent for invitations for members to join a provider organization or a consumer organization. The member joins the organization by responding to the activation link that is sent in the email message.



Example

In the example on the page, the Gmail SMTP server is configured as the email server. The lab files in the course use a different internal email server.

View the cloud environment: Endpoints

- View endpoint settings from Cloud Settings
- API Manager endpoint is the URL used to sign on to the API Manager user interface

The screenshot shows the IBM API Connect Cloud Manager interface. The title bar reads "IBM API Connect Cloud Manager". On the left, there is a navigation menu with icons and labels: Overview, Onboarding, User Registries, Roles, Role Defaults, Endpoints (which is highlighted in blue), and Notifications. The main content area has a header "Cloud Settings" and a sub-header "Endpoints". Below this, there are three sections: "API Manager URL: https://manager.think.ibm/manager", "Platform REST API endpoint for admin and provider APIs: https://platform.think.ibm/api", and "Platform REST API endpoint for consumer APIs: https://consumer.think.ibm/consumer-api".

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Figure 1-15. View the cloud environment: Endpoints

In the Cloud Manager, the **Cloud Settings** option in the navigation menu is used to configure the cloud environment.

From the **Endpoints** option, you can view the endpoints that are configured for the cloud environment.

Working with user registries

- To secure your API Connect catalogs, you authenticate with a user registry
- View the user registries that are configured for Cloud Manager and API Manager
 - In Cloud Manager, select **Cloud Settings > User Registries**
- Default user registry is the local user registry that cannot be configured
- A registry cannot be changed after a user is invited to be the owner of a provider organization

The screenshot shows two separate interfaces for managing user registries.

Cloud Manager: Manage the user registries configured for Cloud Manager. It lists one entry:

TITLE	TYPE	SUMMARY
Cloud Manager Local User Registry	Local User Registry	Cloud Manager Local User Registry

API Manager: Manage the user registries configured for API Manager. It also lists one entry:

TITLE	TYPE	SUMMARY
API Manager Local User Registry	Local User Registry	API Manager Local User Registry

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Figure 1-16. Working with user registries

Registries supported in the Cloud Manager and API Manager:

- Local user registry
- URL authentication
- LDAP

Default user registry is the local user registry that cannot be configured.

The admin user is unique and always remains in the Cloud Manager local user registry.

You can add user registries from the **Resources > User Registries** page in Cloud Manager.

In the Cloud Manager and API Manager, a registry cannot be changed after a user is invited to be the owner of a provider organization, even if the invitation is not yet accepted.

The example that is shown is taken from the Cloud Manager user interface and it displays the user registries that are configured for Cloud Manager and API Manager.

In the example, Cloud Manager and API Manager use separate local user registries.

Authenticating with user registries

- User registries of the following types can be used for authentication in API Connect:

User registry type	Description	Used for:
Local user registry	An internal registry that is stored with API Connect	Authentication of users
LDAP directory	Lightweight Directory Access Protocol (LDAP)	Authentication, API security
Authentication URL	Enables integration with third-party authentication providers	Authentication, API security

Figure 1-17. Authenticating with user registries

By using an enterprise registry such as LDAP, gives you access to all the users that are already defined in the LDAP directory when it is configured in API Connect.

A local user registry cannot be pre-populated since users can only be added by using Cloud Manager, API Manager, or the Developer Portal user interfaces.

TLS profiles

- TLS profiles are used in API Connect to secure transmission of data through websites
- TLS (Transport Layer Security) certificates ensure that information that you submit is not going to be stolen or altered
- API Connect provides a Default TLS profile
 - Uses self-signed certificates
 - Can be used for development and testing

Important

API Connect includes several default TLS profiles to help you get started working with the application. The default profiles should not be used in a production environment. It is important to create your own profiles to ensure a secure network.

Figure 1-18. TLS profiles

In API Connect, TLS profiles are used to secure transmission of data through websites.

Transport Layer Security (TLS) are cryptographic protocols that provide communications security over a computer network.

API Connect may need to transmit data across an untrusted network, for example, when accessing the Gateway, email server, or LDAP server. TLS provides secure network layer transportation of data between two parties.



Note

The course lab environment uses the default TLS profiles that are provided with API Connect.



Default TLS profiles

- A TLS Server Profile is used by the Gateway to configure its endpoint for use during API execution
- A TLS Client profile is used whenever the system needs to communicate with another endpoint over TLS

The screenshot shows two tables within the 'TLS' section of the API Connect interface.

TLS Server Profile:

TLS Server Profile					Create
	Title	Version	Keystore	Truststore	⋮
User Registries	Default TLS server profile	1.0.0	Default TLS server keystore		⋮

TLS Client Profile:

TLS Client Profile						Create	⋮
	Title	Version	Keystore	Truststore	Visible To	⋮	
OAuth Providers	Analytics client TLS client profile	1.0.0	Analytics client keystore	Analytics client truststore	private	⋮	
	Analytics ingestion TLS client profile	1.0.0	Analytics ingestion keystore	Analytics ingestion truststore	private	⋮	
	Portal Director TLS client profile	1.0.0	Portal Director keystore	Portal Director truststore	private	⋮	
Notifications	Default TLS client	1.0.0			public	⋮	

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Figure 1-19. Default TLS profiles

API Connect provides two types of TLS Profiles: a Default TLS Server and Default TLS Client Profile. Information regarding the protocol, self-signed certificate, and cipher settings can be viewed or edited by clicking the relevant profile.



Information

For production systems, consider replacing the certificates with those created by your organization or with one from a certificate authority (CA).

Organizational concept

- Users can belong to one or more *organizations*
 - Users work on the APIs or applications that belong to the organization
- Provider organization
 - These organizations own APIs and associated plans
 - Defines members who can work on products, plans, and APIs
 - Members in the provider organization work mainly with the developer toolkit and the API Manager user interfaces
 - Pre-configured roles are set in Cloud Manager
 - Initial provider organization is defined in Cloud Manager
- Consumer organization
 - Members in these organizations use the APIs by creating applications that call the APIs
 - Pre-defined default roles are set in Cloud Manager
 - Initial consumer organization for a catalog is defined in API Manager

Figure 1-20. Organizational concept

With the infrastructure in place, organizations of members can create and test APIs.

Members can belong to one or more organizations and individually or collectively work on the APIs or applications that belong to the organization.



Role defaults

- Role defaults for provider organizations and consumer organizations are pre-configured in Cloud Manager
- The default permissions can be changed except for the member and owner

The screenshot shows the 'Provider Organization' configuration page. On the left, there's a sidebar with the following menu items: Overview, Onboarding, User Registries, Roles, **Role Defaults**, Endpoints, Notifications, and Catalog Defaults. The 'Role Defaults' item is highlighted with a blue background. The main content area has a title 'Provider Organization' and a subtitle 'Configure the set of roles to use by default when a provider organization is created'. At the top right is a blue 'Add' button. Below this is a table titled 'ROLES' containing the following list of roles, each with a three-dot ellipsis icon on the right side:

Role	Action
Administrator	⋮
API Administrator	⋮
Community Manager	⋮
Developer	⋮
Member	⋮
Owner	⋮
Viewer	⋮

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Figure 1-21. Role defaults

Role defaults for provider organizations and consumer organizations are pre-configured in Cloud Manager.

Except for the owner and member roles, you can edit the roles and change the default permissions by selecting the list of options ellipsis in the row for the role.

API Connect user interfaces: By function

User interface	Function
Cloud Manager	Configure resources
API Manager	Create, assemble, stage, publish, retire, archive, and version APIs
Developer Portal	Search for APIs and register applications

Figure 1-22. API Connect user interfaces: By function

API Connect provides built-in user interfaces to access cloud-based resources:

- **Cloud Manager:** The graphical user interface that is used to configure and manage the resources of the on-premises cloud.
- **API Manager:** A graphical user interface that facilitates the creation, versioning, and lifecycle management of APIs.
- **Developer Portal:** A portal where APIs are published to encourage the development of new applications.

Deployment options

IBM API Connect v2018 can be deployed to any of these environments:

- **Kubernetes** runtime environment
 - Runtime that is used in course lab environment
 - Uses Docker containers that are orchestrated by Kubernetes
- **IBM Cloud Private**
 - Elastic runtime based on Kubernetes
- Into a **VSphere** environment
 - Deploy by using OVA files
 - Implements a Kubernetes runtime
- Deploy to any of these environments with the Install Assist installation method
- **Install Assist** tool contains the **apicup** installation utility program, which provides an automated installation process for API Connect
 - The installation of API Connect to the Kubernetes runtime is already done
 - Configure Cloud Manager settings to set up the cloud environment

Figure 1-23. Deployment options

When IBM API Connect is installed, you choose one of the deployment options: Kubernetes, IBM Cloud Private, or VSphere OVA files.

For the exercises in this class, IBM API Connect was deployed to the Kubernetes runtime environment. The API Connect product is fully installed at the start of the class and students only need to configure some of the settings in Cloud Manager.

Installation utility program (apicup)

- Provides a script-based installation into the Kubernetes runtime environment
 - YAML-based installation script
 - Reference the YAML file when you are registering services in Cloud Manager

```

kind: apiconnect-up
subsystems:
  analytics:
    endpoints:
      - hostname: ai.think.ibm
        name: analytics-ingestion
      - hostname: ac.think.ibm
        name: analytics-client
    kvs:
      coordinating-max-memory-gb: "12"
      data-max-memory-gb: "8"
      data-storage-size-gb: "50"
      enable-persistence: "true"
      extra-values-file: ""
      ingress-type: ingress
      master-max-memory-gb: "8"
      master-storage-size-gb: "5"
      mode: demo
      namespace: apiconnect
      registry: localhost:5000
      registry-secret: my-localreg-secret
      storage-class: velox-block
      target: k8s
      type: analytics
    gw:
      endpoints:
        - hostname: gw.think.ibm

```

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Figure 1-24. Installation utility program (apicup)

API Connect V2018 can be installed by using the Install Assist installation method.

The **Install Assist** tool provides script-based installation into a Kubernetes runtime environment.

The Install Assist tool contains the apicup installation utility program.

An example of the apiconnect-up installation utility programs is shown.

Reference the endpoints that are defined in the installation utility program when you register the Analytics, Gateway, and Portal services in Cloud Manager.

Unit summary

- Explain the concept of the API Connect cloud
- Describe the purpose of the Cloud Manager user interface
- Explain the role of the Cloud administrator
- Review the topology of an API Connect cloud
- Identify the gateway service types
- Examine the configuration of gateway service
- Define an email server
- Describe the purpose of user registries
- Identify the types of supported user registries in Cloud Manager
- Describe the role of Transport Layer Security profiles
- Explain the concept of a provider organization
- Describe the API Connect user interfaces by function
- Identify deployment options for API Connect at installation
- Describe the function of the installation assist utility
- Identify the components of the runtime environment

Figure 1-25. Unit summary

Review questions

1. True or False: The initial owner of the provider organization is set in Cloud Manager.
2. True or False: The default permissions for the owner of the provider organization can be changed in Cloud Manager.
3. True or False: You must configure an email server in Cloud Manager before you can add a provider organization.



Figure 1-26. Review questions

Write your answers here:

- 1.
- 2.
- 3.

Review answers

1. True or False: The initial owner of the provider organization is set in Cloud Manager.

The answer is True.



2. True or False: The default permissions for the owner of the provider organization can be changed in Cloud Manager.

The answer is False.

Neither the owner nor the member roles in the provider organization can be edited.

3. True or False: You must configure an email server in Cloud Manager before you can add a provider organization.

The answer is True.

Figure 1-27. Review answers

Exercise: Configuring the cloud topology

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Figure 1-28. Exercise: Configuring the cloud topology

Exercise objectives

- Test the operation of the private DNS on the image
- Review the Kubernetes runtime components
- Ensure that the API Connect pods are operational
- Sign on to the Cloud Manager graphical interface
- Enable the email notification service for the cloud
- Register the analytics, portal, and gateway services in Cloud Manager
- Associate the analytics service with the gateway
- Review the provider organization in Cloud Manager
- Review the user registries in Cloud Manager
- Review the settings in Cloud Manager



Figure 1-29. Exercise objectives

Unit 2. Managing catalogs and consumer organizations

Estimated time

00:45

Overview

Users in consumer organizations subscribe to products, plans, and APIs that you create in API Connect. In this unit, you learn how to define a catalog and Developer Portal in API Manager. You see where the Developer Portal user registry is defined. You create a consumer organization in the API Manager. Review the Developer Portal user interface.

How you will check your progress

- Review questions
- Lab exercise

Unit objectives

- Describe the interaction between organizations and catalogs
- Explain how to create a catalog and a Developer Portal
- Describe the use of spaces within a catalog
- Configure a Developer Portal for the catalog
- Identify the administration menu options in the Developer Portal
- Describe the relationship between the provider organization owner and the owner of the consumer organization
- Describe how to create a consumer organization
- Describe the management options that are available to the owner of a consumer organization in the Developer Portal
- Describe how to add a member in the Developer Portal
- Describe the consumer roles that are defined in API Manager
- Identify the roles that are defined in the Developer Portal
- Explain the password lockout criteria

Figure 2-1. Unit objectives

Catalogs

- Provider organizations can create separate deployment targets that are called *catalogs* for testing and production
- Each catalog:
 - Is included in the path of a specific API endpoint
 - Has its own Developer Portal
- A default development catalog named "Sandbox" is provided
 - Used for testing
- A catalog is a staging target
 - The URL for API calls and the Developer Portal is specific to a particular catalog

Figure 2-2. Catalogs

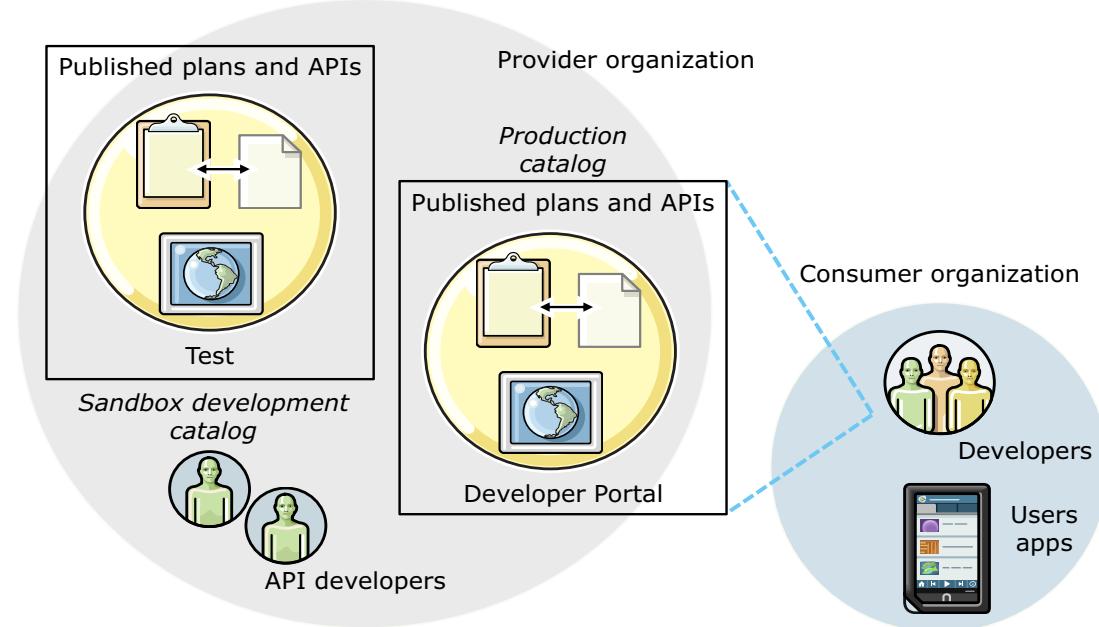
While developing and maintaining APIs, members of a provider organization can create separate deployment targets called *catalogs* for testing and production. Each contained catalog is associated with a specific Developer Portal and endpoints. The URL for API calls and the Developer Portal are specific to a particular catalog.

By default, a development catalog is provided for you.

The development catalog is named *Sandbox*.

Other catalogs are added by the organization owner.

Structure of organizations and catalogs



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Figure 2-3. Structure of organizations and catalogs

To become available to consumers, APIs must be staged and published to a catalog. A catalog has an associated developer portal.

After you create and test APIs, publish one or more plans to expose the plan and API resources on the Developer Portal.

Steps to create a catalog and portal

1. Ensure that Portal service is configured in Cloud Manager
2. Add a user registry in API Manager if you are not using the default local registry for the portal
3. Create the catalog in API Manager
4. Open the catalog in API Manager to manage the settings
5. Set permissions for lifecycle actions
6. Add a gateway setting if default gateway settings are not configured in Cloud Manager
7. Configure the portal from the settings
 - Select the Portal Service that was created in Cloud Manager
8. Save changes to settings in API Manager
9. Portal is created and an email is sent
10. Click the email activation link to open the portal and change the admin password
11. The portal is available for use

Figure 2-4. Steps to create a catalog and portal

The steps that are performed to create a catalog and its associated portal are provided on the slide. The first step is done in the Cloud Manager to ensure that an existing API Connect portal installation is used.

Steps 2 through 9 are done from the API Manager user interface.

The final steps are done on the email server and the Developer Portal.



Create a catalog

- Sign in to API Manager as the owner of the provider organization
 - Select Manage Catalogs from the Home page

The screenshot shows the 'Create Catalog' dialog box and the 'Manage Catalogs' page.

Create Catalog Dialog (Step 1):

- Title:** Staging
- Name:** staging
- Catalog Owner:** Think Owner
- Description:** Enter the catalog summary details; you can fully configure the catalog after you create it.
- Buttons:** Cancel, Create

Manage Catalogs Page (Step 2):

- Sandbox** (Sandbox Catalog)
- Staging** (highlighted with an orange border)

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Figure 2-5. Create a catalog

To add a catalog, sign in to API Manager as the owner of the provider organization.

Select the Manage Catalogs tile from the Home page. Then, click the Add icon to create a catalog. Complete the fields in the dialog, by giving the catalog a name.

Then, click Create.

The catalog is added and is displayed as a tile in the list of catalogs from the Manage page.

Catalog settings: Overview tab

- From the Manage menu item in API Manager
 - Select the catalog tile
 - Select **Settings**
- Overview tab**
 - Toggle Production mode
 - Toggle Spaces
 - Toggle Application lifecycle

The screenshot shows the 'Catalog Settings' interface in API Manager. On the left, a sidebar lists various management categories: Gateway Services, Lifecycle Approvals, Roles, Role Defaults, Onboarding, API User Registries, OAuth Providers, API Endpoints, TLS Client Profiles, Portal, and Properties. The 'Manage / Staging' link is at the top of the sidebar. The main content area is titled 'Settings' and contains three tabs: 'Overview' (which is selected and highlighted in blue), 'Catalog', and 'Properties'. The 'Overview' tab displays several configuration options: 'Title' set to 'Staging', 'Name' set to 'staging', a 'Production Mode' toggle switch set to 'Off', a 'Spaces' toggle switch set to 'Off', and an 'Application Lifecycle' toggle switch set to 'On'.

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Figure 2-6. Catalog settings: Overview tab

From the Manage navigation in API Manager, select the catalog that you want to configure. Then, select **Settings**.

From the Overview tab there are toggles for setting production mode, spaces, and application lifecycle.

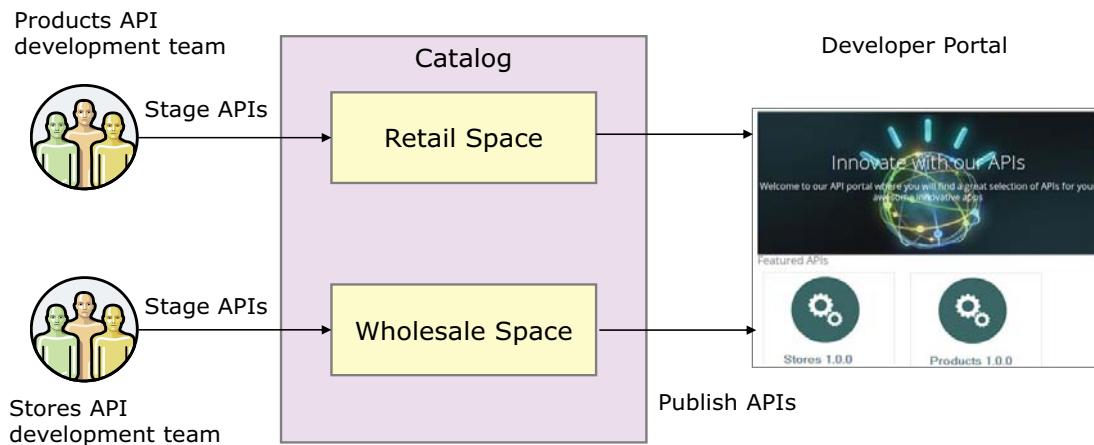
By default, the new catalog is a development catalog.

To use the catalog in production, set the Production Mode slider control to the On position, then click Confirm.

In a development catalog, staging and publishing actions are forced, meaning that if you republish a previously published Product it is overwritten without warning.

Spaces

- You can partition your catalog into spaces
- Each Space is used by a different API provider development team
 - Each team manages their APIs independently
- Coordinated offering on the Developer Portal



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Figure 2-7. Spaces

A catalog can be partitioned into multiple spaces that can be leveraged by different groups of users. A space has its own set of management capabilities for product lifecycle, developers, and subscriptions.

Spaces can be set on from the Overview tab in the Manage catalog page.



Information

The Staging catalog does not use spaces in the course exercises.



Catalog settings: Gateway services

- Configure the gateway service
- Click **Edit** in the gateway service.
- Select the gateway service that was defined in Cloud Manager. Then, **Save**

A screenshot of a web-based configuration interface titled "Manage / Staging" and "Enable Gateway Services". The interface shows a table with one row. The table has columns for "TITLE" and "TYPE". The first row contains a checked checkbox under "TITLE", the title "Gateway Service Classic", and the type "DataPower Gateway (Classic)". At the bottom right of the dialog are two buttons: "Cancel" and "Save".

	TITLE	TYPE
<input checked="" type="checkbox"/>	Gateway Service Classic	DataPower Gateway (Classic)

Figure 2-8. Catalog settings: Gateway services

Configure the gateway service if the default gateway service for all catalogs is not configured in Cloud Manager

Catalog settings: API Endpoints

- Customize the gateway URL
- The default API Connect gateway URL is in the format:
 - `https://gateway_cluster_hostname/organization/catalog`
- If you want to achieve custom branding for APIs that are deployed to API Connect, you can specify a custom gateway URL
 - Specify a custom URL for your enterprise in the **API Endpoints** field of the catalog settings
 - Endpoints in the Developer Portal are displayed with the custom name

The screenshot shows the 'Manage / Staging Settings' interface. On the left, there's a sidebar with links: Overview, Gateway Services, Lifecycle Approvals, Roles, Role Defaults, and API Endpoints (which is highlighted). The main area is titled 'Vanity API Endpoint' with a sub-instruction 'Configure how vanity endpoints are displayed in the developer portal'. It shows a checked checkbox for 'Use gateway URLs' and the URL 'https://gw.think.ibm/think/staging'.

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Figure 2-9. Catalog settings: API Endpoints

You can create a custom gateway URL when you configure the catalog in API Manager.

If you want to achieve custom branding for APIs that are deployed to API Connect, you can specify a custom gateway URL.

Specify a custom URL for your enterprise in the **API Endpoints** field of the catalog settings.

Endpoints in the Developer Portal are displayed with the custom name.

You must configure a DNS entry that maps the custom name to the default name.

Configure APIs so that the gateway enforces them.

Ensure that the same custom gateway URL is not applied to multiple catalogs.

Catalog settings: Portal tab

- Configure a portal from the Portal tab
 - Click **Create** if no portal exists
- Specify:
 - Portal service to use for the catalog
 - Portal URL (usually pre-filled)
 - Click **Create**
- When you create a portal and no user registry is defined in the catalog settings, API Manager automatically creates a *separate* local user registry for the portal

The screenshot shows a configuration panel titled "Portal". The "Portal" section contains the instruction: "Configure the developer portal that is used by application developers to access the APIs in this catalog". Below this are three sections: "Portal Service" (set to "Portal Service"), "Portal URL" (set to "https://portal.think.ibm/think/staging"), and "User Registries" (set to "Staging Catalog User Registry").

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Figure 2-10. Catalog settings: Portal tab

Configure a portal from the Portal tab.

Click **Create** if no portal exists.

Specify:

Portal service to use for the catalog

Portal URL (usually pre-filled)

Click **Create**.

When you create a portal, and no user registry is configured in the settings for the catalog, API Manager automatically creates a *separate* local user registry for the portal

The portal local registry stores members of consumer organizations

The API Manager local registry stores members of the provider organization



Email activation for Developer Portal

- Respond to the email by selecting the activation link for the *admin* user in the email message

A screenshot of a Linux desktop environment showing a terminal window titled "050918011613446.eml (~/received-emails) - gedit". The terminal window displays an email message. The message content includes the subject, from, to, and reply-to fields, followed by a greeting to the 'Administrator (admin)'. The body of the email contains instructions for activating the developer portal site, mentioning a one-time log in link. A red box highlights the activation link: "https://portal.think.ibm/think/staging/user/reset/1/1536167770/0lGhPXTECdbvajmpd620b088CaYFbfVBl68wsNxjdCM/new".

```
Subject: Your new site https://portal.think.ibm/think/staging has been created.
From: owner@think.ibm
Reply-To: owner@think.ibm
To: owner@think.ibm
MIME-Version: 1.0
Content-Type: multipart/alternative;
boundary="=_swift_v4_1536167773_27c940a8a7f1b106afac59375caf7b07_=_
X-Mailer: Drupal

Administrator (admin),

Your Developer Portal site has been created. You can log in as the 'admin' user by using the following one-time log in link. After you have logged in with the following link, you must change the password for the 'admin' user account immediately.

https://portal.think.ibm/think/staging/user/reset/1/1536167770/0lGhPXTECdbvajmpd620b088CaYFbfVBl68wsNxjdCM/new
```

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Figure 2-11. Email activation for Developer Portal

Respond to the email by selecting the activation link for the *admin* user in the email message



One-time sign in for Developer Portal admin user

- The activation link opens the Developer Portal
- Use the one-time link to sign-in and change the password for the *admin* user

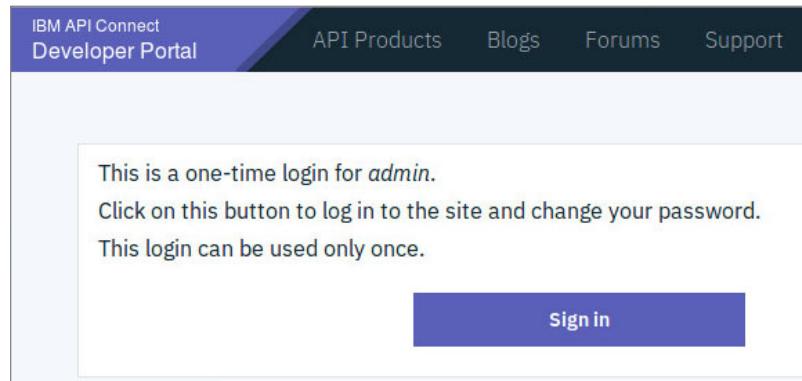


Figure 2-12. One-time sign in for Developer Portal admin user

The screenshot shows a web browser window for the IBM API Connect Developer Portal. The URL in the address bar is <https://portal.think.ibm/think/staging/home>. The top navigation bar includes links for Workbench, Manage, Shortcuts, Content, Structure, Appearance, Extend, Configuration, and People. A user icon labeled 'admin' is visible. Below the navigation bar, a purple header bar displays the text 'IBM API Connect Developer Portal'. The main content area features a large blue background with a white owl logo in the center. To the right of the owl, the text 'Brace yourselves. APIs are coming.' is displayed in bold. Below this, smaller text reads 'Explore, subscribe to and be... We can't wait to see what yo...'. At the bottom right of the content area is a purple button labeled 'Explore API Documentation'. At the very bottom of the page, there are footer links for 'Managing catalogs and consumer organizations' and '© Copyright IBM Corporation 2018'.

Figure 2-13. Signed in to the Developer Portal

The portal for the catalog is created and the admin user is signed in.

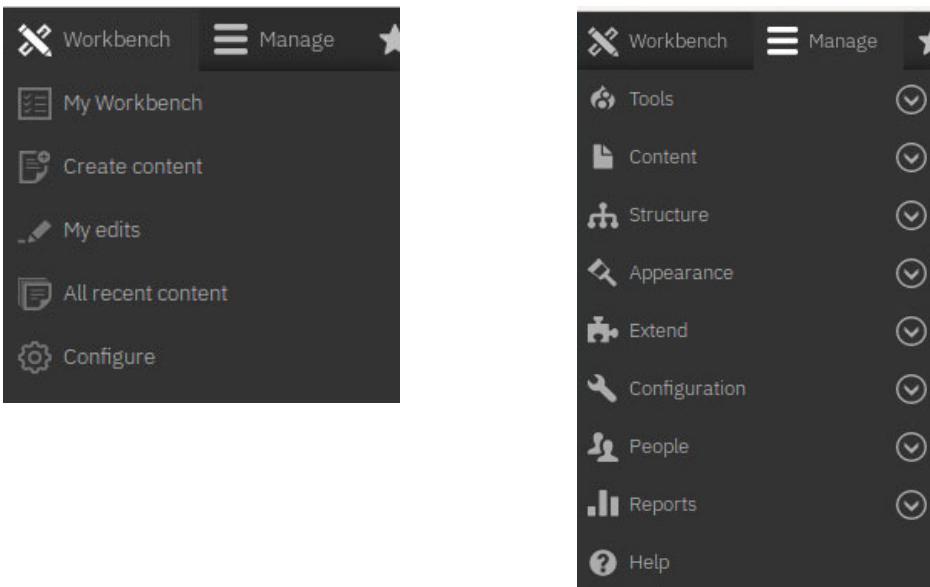
The admin user is used to administer and customize the Developer Portal.

Next, you create a consumer organization in API Manager that will use the APIs that are made available when they are published to the Developer Portal.

IBM Training 

Developer Portal administration menu

- Workbench menu
- Manage menu



The screenshot shows two side-by-side panels of the Developer Portal administration menu. The left panel, titled 'Workbench', contains the following items:

- Workbench
- My Workbench
- Create content
- My edits
- All recent content
- Configure

The right panel, titled 'Manage', contains the following expanded items:

- Tools
- Content
- Structure
- Appearance
- Extend
- Configuration
- People
- Reports
- Help

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Figure 2-14. Developer Portal administration menu

The Developer Portal has responsive web pages and the pages resize according to the browser width.

Displayed on the left side of the page is the admin Workbench menu items.

On the right side of the page are the expanded Manage menu items.

The administration menu the Drupal components of the Developer Portal.

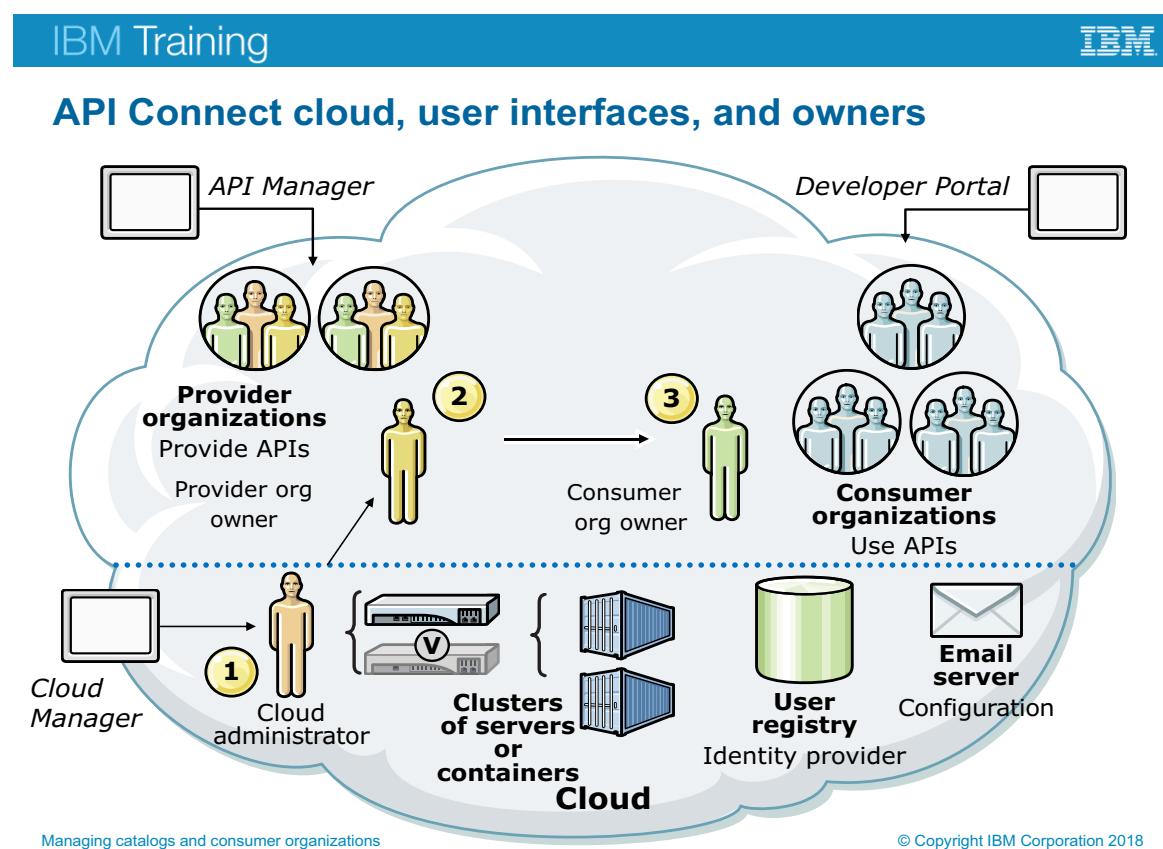


Figure 2-15. API Connect cloud, user interfaces, and owners

The diagram shows the sequence for the creation of users in API Connect.

1. The Cloud Administrator is created when the API Connect product is installed. The administrator signs on to the Cloud Manager user interface to configure the resources and topology of the on-premises cloud. The administrator creates the provider organization and assigns an owner.
2. The owner of the provider organization signs on to the API Manager user interface and creates the members of the provider organization who create APIs, Products, and plans. The owner of the provider organization creates a consumer organization and assigns an owner.
3. The owner of the consumer organization signs on to the Developer Portal to create members of the consumer organization and assign roles. Members of the consumer organization use APIs and create applications and subscribe to Products and plans.

Role of owners of the provider and consumer organizations

- Provider organization exposes business functions as APIs
- **Provider organization owner**
 - Works in the API Manager user interface
 - Manages API developers
 - Creates catalog and configures Developer Portal settings
 - Creates a Consumer Organization and assigns an owner
- **Developer Portal administrator (admin)**
 - Customizes the portal for all Developer organizations
- **Consumer organization owner**
 - Works on the Developer Portal
 - Manage and add members (application developers, administrators, viewers)
- **Application developers**
 - Discover APIs on the Developer Portal
 - Create applications and subscribe to plans
 - Create web or mobile apps that call Products, plans, and APIs with the key (client ID) provided by the application

Figure 2-16. Role of owners of the provider and consumer organizations

After the owner of the provider organization has created a catalog and configured the portal settings, the owner saves the changes in API Manager. At this point, the Developer Portal for the catalog is created.

The administrator of the Developer Portal activates the portal. The administrator does not belong to any consumer organization. The administrator is responsible for the customization of the Developer Portal.

The owner of the provider organization adds the initial consumer organization and owner from the **Community** tab in API Manager.

The owner of the Developer organization then signs on to the Developer Portal to activate the account.

Depending on the permissions set for the Developer Portal in API Manager, the owner of the Developer organization might be able to add more users (application developers) and Developer organizations.

Create a consumer organization

In **API Manager**, as the owner of the provider organization:

- Select the target catalog for the consumer organization
- Select **Consumer Organizations** from the navigation menu
- Select **Add**.
Then, **Create Organization**
- Specify:
 - Title
 - Organization name
 - User registry
 - Specify the owner

Manage / Staging	
Create Consumer Organization	
Consumer Organization	
Enter details of the consumer organization	
Title	Ordinal
Name	ordinal
Owner	
Specify owner of the consumer organization	
User registry	Staging Catalog User Registry
<input type="radio"/> Existing <input type="radio"/> New User	

Figure 2-17. Create a consumer organization

If you have permission to manage developers, you can create consumer organizations.

The Developer Portal must be enabled and configured in API Manager before you perform this task.

Create the consumer organization from the Consumer Organizations menu after you have selected the catalog in API Manager.

In the Create Consumer Organization dialog box, type:

- Title
- Name
- User registry
- Owner information

If New User is selected, specify:

- User Name
- Email address
- First name
- Last name

- Password

Then, click Create.

The consumer organization is added to the list of consumer organizations for the catalog.



Result of adding a consumer organization

- New consumer organization is added to the Consumer Organizations list
- The owner is automatically approved and the state is shown as Enabled

Consumer Organizations		
TITLE	OWNER	STATE
Ordinal	OO Ordinal Owner ordinalowner@consumer.ibm	Enabled

- The owner can sign on to the Developer Portal with the user name and password credentials that were provided during the creation of the consumer organization

Figure 2-18. Result of adding a consumer organization

The consumer organization is added to the catalog and the user is automatically approved as the owner. The owner can sign on to the Developer Portal with the user name and password credentials.

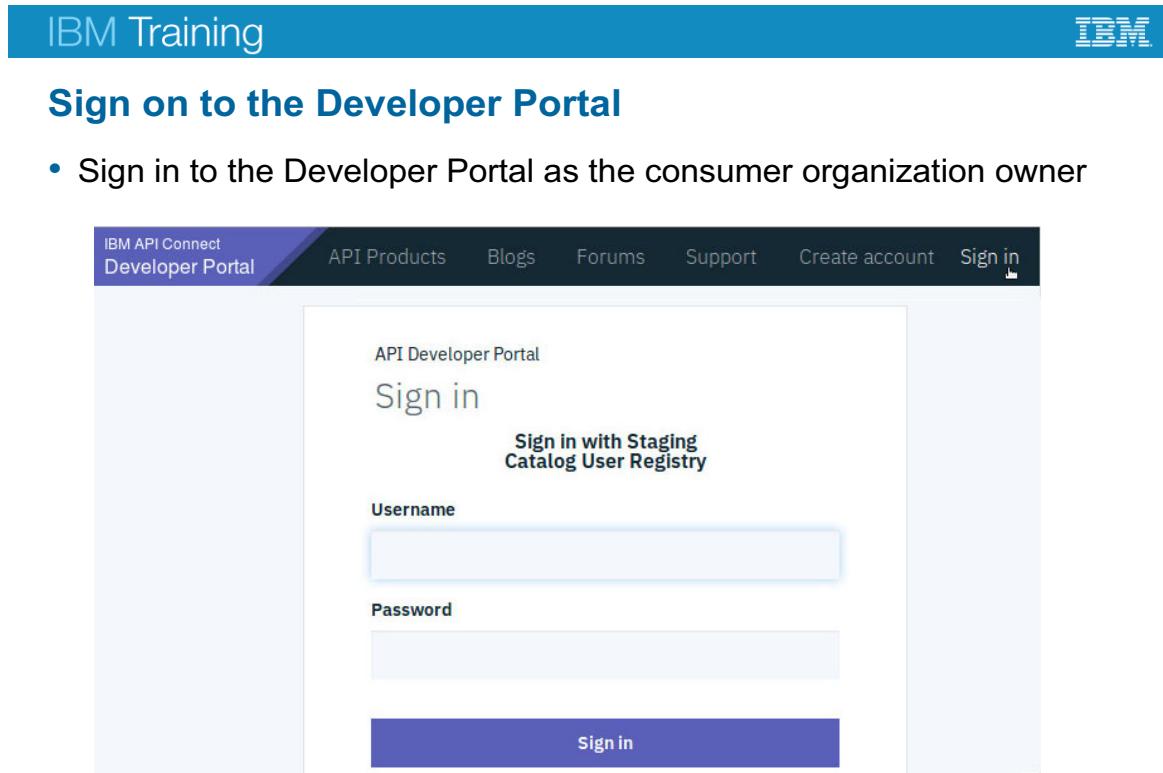


Figure 2-19. Sign on to the Developer Portal

The consumer organization owner can sign on to the Developer Portal. When the owner is signed in, the owner can manage the developer organization from the Developer Portal, and does not use the API Manager user interface. There are tools in the Portal to manage the consumer organization. Next, you see some of the capabilities that the consumer organization owner has on the Developer Portal.



Consumer organization owner manage options

- Manage options for an organization owner in the Developer Portal:
 - My organization
 - Create organization
 - Select organization

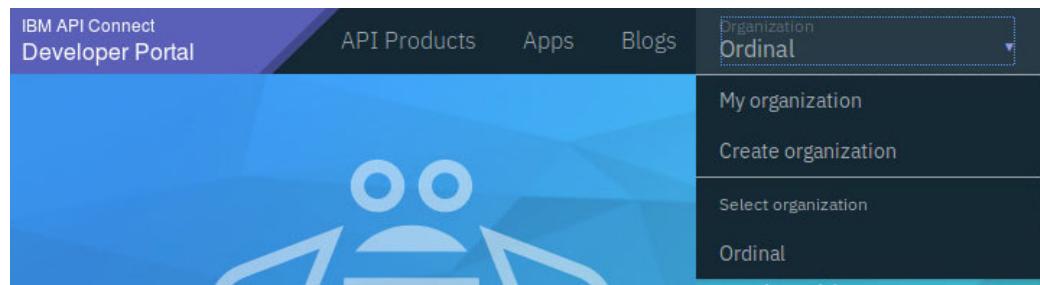


Figure 2-20. Consumer organization owner manage options

After signing on to the Developer Portal, the consumer organization owner can access the manage organization menu from the menu drop-down.

From this menu, owners can manage their own consumer organization.

For development catalogs, the owner can also create a new organization.

IBM Training

Add a member to a consumer organization

- Sign in to the Developer Portal
- Select the organization from the list of consumer organizations
- Select My Organization
- From the **Manage** tab, select **Invite**
- Type the *email* address for the user
- Assign a *role*
- Click **Submit**

Invite a user to join your consumer organization

Email *

Assign Roles

Administrator

Developer

Viewer

[Cancel](#) [Submit](#)

Figure 2-21. Add a member to a consumer organization

The owner of the consumer organization can add members to the consumer organization with the Invite panel. Those members can then access the Developer Portal and use the APIs that have been made available to the consumer organization.

Results:

The member is added to the consumer organization with a status of *pending*, and an email is sent to the member with the subject line: "Invitation to an API consumer organization in the *catalog_name* developer portal". The member must click the link that is provided to activate their account and complete the setup.



Consumer organization member list

- The member accepts the invitation and signs on to the Developer Portal
- The member status is changed to *Active*

NAME	ADMINISTRATOR	DEVELOPER	VIEWER	STATUS
A App Developer appdeveloper@consumer.ibm		✓		Active

[Managing catalogs and consumer organizations](#)

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Figure 2-22. Consumer organization member list

The owner of the consumer organization can view or edit the members of the organization in the Developer Portal. The member that was invited responds to the email invitation and joins the consumer organization by signing on to the Developer Portal.

The member status is changed to *Active* in the list of members.



Consumer organization default roles

- Roles that are defined in Cloud Manager

The screenshot shows the 'Cloud Settings' page in the 'Role Defaults' section for 'Consumer Organization'. The 'ROLES' table lists the following roles:

ROLES
> Administrator
> Developer
> Member
> Owner
> Viewer

Managing catalogs and consumer organizations

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Figure 2-23. Consumer organization default roles

When the owner of a consumer organization invites a member to join the organization, the member is assigned a role. The default roles that the owner can assign are administrator, developer, or viewer. In the previous slides, the role of developer is assigned.

The default roles for a consumer organization are defined in Cloud Manager.

Assign further roles to the member

- Developer Portal (Drupal) roles
- Assigned by the administrator of the Developer Portal by using the administrative menu
 - **Manage > People > Permissions**
- Drupal roles include:
 - Administrator
 - Anonymous user
 - Authenticated user
 - Content author
 - Forum moderator
 - Superuser

NAME	OPERATIONS
⊕ Anonymous user	Edit ▾
⊕ Authenticated user	Edit ▾
⊕ Forum Moderator	Edit ▾
⊕ Content Author	Edit ▾
⊕ Administrator	Edit ▾
⊕ Superuser	Edit ▾

Figure 2-24. Assign further roles to the member

The administrator of the Developer Portal can assign additional portal-related roles to the member of the organization.

Portal roles

- By using roles, you can fine-tune the security and administration of Drupal
 - A role defines a group of users that have certain privileges as defined on the permissions page
- **Anonymous user:** Role that is used for users that do not have a user account or that are not authenticated
- **Authenticated user:** This role is automatically granted to all logged in users
- **Content author:** Role that is used to edit or add content
- **Forum moderator:** Role that controls access to the portal forums
- **Superuser:**
Can see all the site content
Automatically assigned to the Administrator
- **Administrator:**
Manages all other roles

Figure 2-25. Portal roles

You can use roles to fine-tune the security and administration of Drupal. A role defines a group of users that have certain privileges as defined on the permissions page. Examples of roles include: anonymous user, authenticated user, moderator, administrator, and other roles. The administrator can define the names and order of the roles on your site. It is recommended to order your roles from least permissive (anonymous user) to most permissive (administrator).

By default, Drupal comes with two user roles:

- Anonymous user: This role is used for users that do not have a user account or that are not authenticated.
- Authenticated user: This role is automatically granted to all logged in users.

Example of members that are assigned Drupal roles

- Members of the consumer organization have API Connect roles and Drupal roles

USERNAME	STATUS	ROLES	LAST ACCESS	OPERATIONS
AppDeveloper	Active	• Forum Moderator	1 week 2 days ago	Edit
OrdinalOwner	Active		2 days 16 hours ago	Edit
admin	Active	• Administrator • Superuser	10 seconds ago	Edit

Figure 2-26. Example of members that are assigned Drupal roles

Members of the consumer organization can have both API Connect roles and Developer Portal Drupal roles. In the example, the member with an Application Developer role in API Connect also has a Forum Moderator role in the Developer Portal.

Password lockout

- API Connect **Local User Registries** apply a lockout criteria
- Repeated unsuccessful login attempts can lock your account
- Length of time that you are locked out of using the account is based on the number of consecutive failed attempts
 - Length of time increases as the number of consecutive failed attempts increases
 - Locks you out for 15 seconds after five consecutive failed attempts
 - Locks you out for 32 minutes after 12 consecutive failed attempts
- External user registries, such as LDAP, might enforce their own lockout criteria

Figure 2-27. Password lockout

Account lockout only applies to local user registries.

Unit summary

- Describe the interaction between organizations and catalogs
- Explain how to create a catalog and a Developer Portal
- Describe the use of spaces within a catalog
- Configure a Developer Portal for the catalog
- Identify the administration menu options in the Developer Portal
- Describe the relationship between the provider organization owner and the owner of the consumer organization
- Describe how to create a consumer organization
- Describe the management options that are available to the owner of a consumer organization in the Developer Portal
- Describe how to add a member in the Developer Portal
- Describe the consumer roles that are defined in API Manager
- Identify the roles that are defined in the Developer Portal
- Explain the password lockout criteria

Figure 2-28. Unit summary

Review questions

1. Provider organizations can create separate deployment targets for testing and production. These targets are called:
 - A. Catalogs.
 - B. Permissions.
 - C. Roles.
 - D. User registries.

2. True or False: If you do not explicitly configure a user registry in the API User Registries settings of the Manage catalog page in API Manager, then a local user registry is created when the portal is created.



Figure 2-29. Review questions

Write your answers here:

1.

Review answers

1. Provider organizations can create separate deployment targets for testing and production. These targets are called:
 - A. [Catalogs.](#)
 - B. Permissions.
 - C. Roles.
 - D. User registries.

The answer is [A.](#)



2. [True](#) or False: If you do not explicitly configure a user registry in the API User Registries settings of the Manage catalog page in API Manager, then a local user registry is created when the portal is created.

The answer is [True.](#)

Figure 2-30. Review answers

Exercise: Managing catalogs and consumer organizations

Managing catalogs and consumer organizations

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Figure 2-31. Exercise: Managing catalogs and consumer organizations

Exercise objectives



- Create a catalog
- Configure settings for the Developer Portal
- Define a Developer Portal and user registry in API Manager
- Activate the admin user for the Developer Portal
- Configure modules in the Developer Portal
- Create a consumer organization in API Manager
- Add a member to the consumer organization
- Respond to the email message to activate the app developer member
- Manage member roles and permissions in the Developer Portal

Figure 2-32. Exercise objectives

Unit 3. Defining APIs in API Manager

Estimated time

00:30

Overview

This unit describes the options for defining APIs in API Manager. You examine the Assemble feature that are used to tailor your API to include logic and policy constructs. You learn how to use the test feature of API Manager to test APIs.

How you will check your progress

- Review questions
- Lab exercise

Unit objectives

- Describe the features in API Manager for defining APIs, Products, and plans
- Examine the OpenAPI definition file
- Describe the purpose of the Assemble view in API Manager
- Explain how to test API operations in API Manager
- Describe the use of a Product for grouping common APIs
- Describe the role of plans to manage API usage

Figure 3-1. Unit objectives



API Manager for development

- API Manager can be used for development and management of APIs

The screenshot displays the "Welcome to the API Manager" screen. On the left is a vertical toolbar with icons for Home, Create, Catalog, and Settings. The main area contains four large cards:

- Develop APIs**: Edit, assemble, secure and test APIs.
- Develop Products**: Package APIs for publishing to consumers.
- Manage Catalogs**: Manage active APIs and consumers.
- Manage Resources**: Configure user registries, OAuth providers and TLS.

At the bottom left is the text "Defining APIs in API Manager" and at the bottom right is "© Copyright IBM Corporation 2018".

Figure 3-2. API Manager for development

Developers often use the API Connect Designer UI that is installed on their workstations to develop APIs and Products.

The browser-based API Manager user interface also has features for developing APIs and Products, if the user has role-based permission to do so.

In this course, you use API Manager to create and assemble APIs, and add Products and plans for these APIs.

You complete the task of creating your APIs with either the API Designer or the API Manager user interface.



Create an API

Options for creating an API in API Manager:

- API from existing REST service
 - Create a REST proxy API from a REST service
- API from existing SOAP service
 - Create a REST proxy API from a SOAP service
- New API
 - Create an OpenAPI definition from scratch
- Import API
 - Import an existing OpenAPI definition

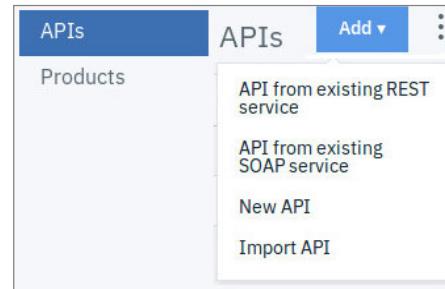


Figure 3-3. Create an API

If you have an existing REST service that you want to expose through an OpenAPI definition, you can create a proxy API and specify the target endpoint by using the API Manager.

If you have an existing SOAP service, you can use the WSDL file to add a REST API definition.

You can add a new API and create an OpenAPI definition.

You can import an existing OpenAPI definition into API Manager.



Edit the API definition: Design view

- Design view
 - You can configure your definition by editing the different sections in the page navigation side bar of the editor

The screenshot shows the "IBM APIM SSmart" interface. At the top, there's a navigation bar with tabs: "Develop" (highlighted in blue), "Design" (selected), "Source", and "Assemble". Below the navigation bar, on the left, is a sidebar with the following options: "API Setup" (selected and highlighted in blue), "Security Definitions", "Security", "Paths", "Definitions", "Properties", "Target Services", "Categories", and "Activity Log". The main content area is titled "Info" with the sub-section "Title" containing the value "IBM APIM SSmart". Below it are "Name" (value "ibm-apim-smart") and "Version" (value "1.0.0").

Figure 3-4. Edit the API definition: Design view

Edit the API definition in the Design view. You can configure your definition by selecting and editing the different sections in the page navigation side bar of the Develop API editor.

For example, from the Paths section of the navigation side bar you can select Paths and then specify the path for the API.

A path is a unit of a REST API that you can call. A path comprises an HTTP verb and a URL path that, when exposed, is combined with the base path of the API. By configuring the path, you define how the API is exposed to your developers.



Edit the API definition: Source view

- Source view
 - Displays the OpenAPI definition in YAML format

The screenshot shows the "Source" tab selected in the top navigation bar of the IBM APIM Smart interface. The main area displays the OpenAPI YAML definition. The code is as follows:

```

1 swagger: '2.0'
2 info:
3   title: IBM APIM Smart
4   x-ibm-name: ibm-apim-smart
5   version: 1.0.0
6   description: |->
7     API resources related to the retail industry.
8
9   Download the swagger.json definition to use in your API Manager.
10 host: $(catalog.host)
11 schemes:
12   - https
13 basePath: /smart/v1
14 produces:
15   - application/json
16 consumes:
17   - application/json
18 securityDefinitions:
19   clientIdHeader:
20     type: apiKey
21     in: header
22     name: X-IBM-Client-Id
23 x-ibm-configuration:
24   phase: realized
25   testable: true
26   enforced: true
  
```

Defining APIs in API Manager

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Figure 3-5. Edit the API definition: Source view

The Source view displays the API definition in YAML format.

The example show the first part of the OpenAPI YAML document.



Syntax

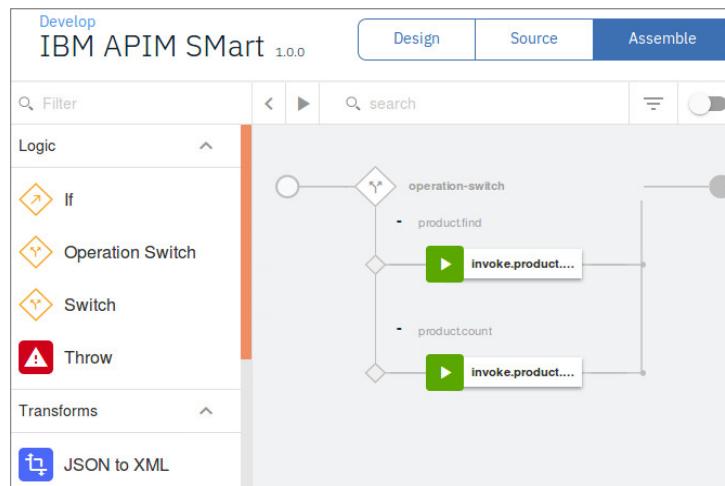
```

swagger: '2.0'
info:
  title: IBM APIM Smart
  x-ibm-name: ibm-apim-smart
  version: 1.0.0  description: |->
    API resources related to the retail industry.
    Download the swagger.json definition to use in your API Manager.
  host: $(catalog.host)
  schemes:
    - https
  basePath: /smart/v1
  produces:
    - application/json
  consumes:
    - application/json
  securityDefinitions:
    clientIdHeader:
      type: apiKey
      in: header
      name: X-IBM-Client-Id
  x-ibm-configuration:
    phase: realized
    testable: true
    enforced: true
  
```

```
- application/json  
consumes: - application/json  
securityDefinitions:  
  clientIdHeader:  
    type: apiKey  
    in: header  
    name: X-IBM-Client-Id
```

Edit the API definition: Assemble view (1 of 2)

- Tailor APIs to include constructs that are linked into an assembly
- Logic or policy constructs
- Applied to calls to and responses from API operations



Defining APIs in API Manager

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Figure 3-6. Edit the API definition: Assemble view (1 of 2)

The Assemble view of API Manager features an Assemble view that you can use to create assemblies.

With assemblies, you can readily tailor your APIs to include logic or policy constructs that are applied to calls to and responses from operations in your API.

The Assemble view includes a palette of logic and policy constructs and a free-form canvas.

Drag the components from the palette onto the canvas.

Components are applied from the left unfilled circle (start) to the right filled circle (end).

The assembly is executed in order from the left filled, circle to the right unfilled, circle. However, branching can occur, when if and operation-switch logic constructs are used.

Edit the API definition: Assemble view (2 of 2)

- Click each component on the canvas to display and edit the component properties

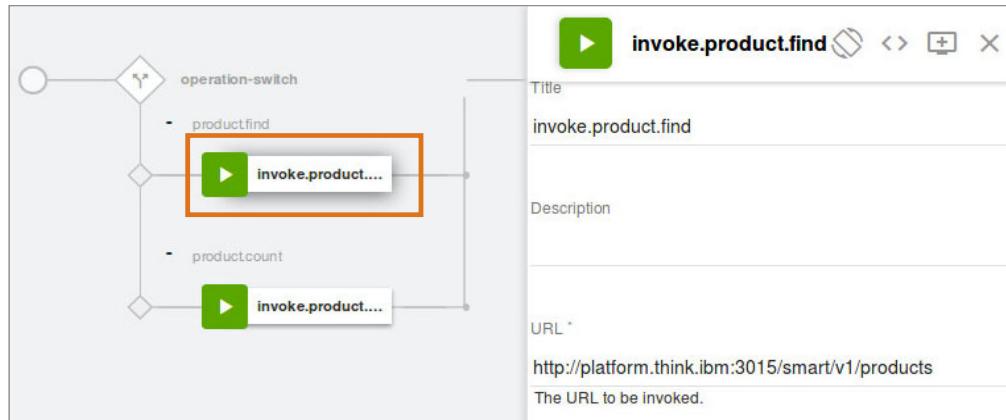


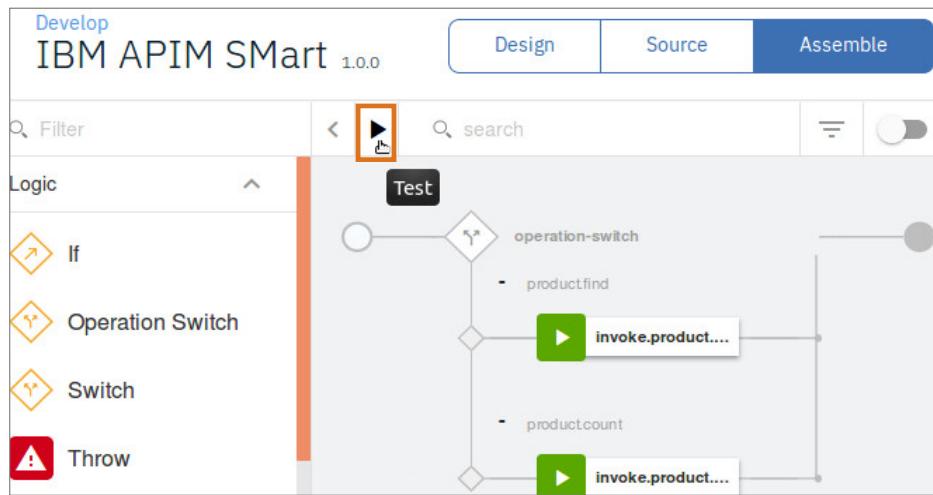
Figure 3-7. Edit the API definition: Assemble view (2 of 2)

Add and edit properties of the component by clicking the component and using the property sheet that is shown on the right of the page.

In the example, the invoke policy calls an application that is running on the target URL that is specified in the properties dialog.

Test an API operation (1 of 5)

- Test feature of the API Assembly
 - Available from the menu in the API Assemble view



Defining APIs in API Manager

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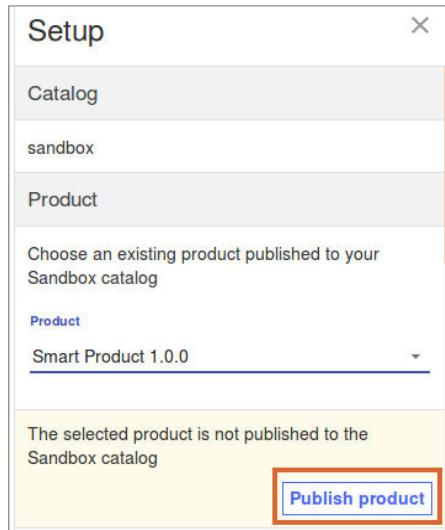
Figure 3-8. Test an API operation (1 of 5)

To test the API definition, use the API Manager test tool by clicking the Test icon in the Assemble view.

The Test dialog opens.

Test an API operation (2 of 5)

- Test dialog: Setup
 - Select the catalog, Product, plan, and test application



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Figure 3-9. Test an API operation (2 of 5)

When you click the Test icon in the Assemble view, the Test feature opens with the Setup dialog.

Specify the target catalog, Product, plan, and test application.

If the Product has not previously been published, you must publish the Product before the test can run.



Test an API operation (3 of 5)

- Test dialog: Setup
 - Subscribe to the application
 - Then, click **Next** to continue with the test

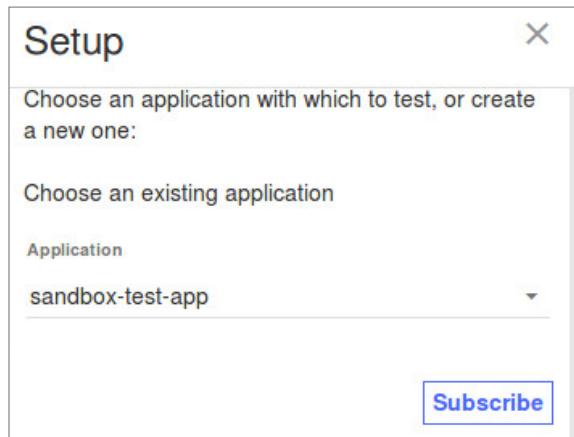
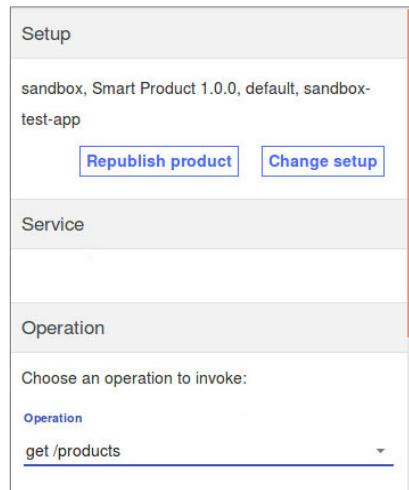


Figure 3-10. Test an API operation (3 of 5)

In this version of API Connect V2018, you must manually subscribe to the sandbox-test-app.

Test an API operation (4 of 5)

- Test dialog: Operation
 - Select the API operation to call
 - Then, click **Invoke**



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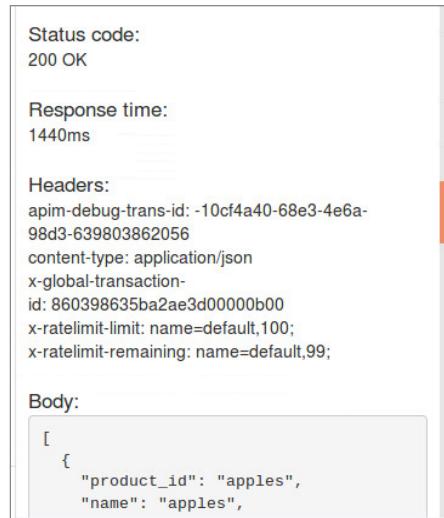
Figure 3-11. Test an API operation (4 of 5)

After the Product is published, select the API operation that you want to test.

Then, click the Invoke icon in the Test feature.

Test an API operation (5 of 5)

- Test dialog: Request and response
 - The test results are displayed



Status code:
200 OK

Response time:
1440ms

Headers:

```
apim-debug-trans-id: -10cf4a40-68e3-4e6a-  
98d3-639803862056  
content-type: application/json  
x-global-transaction-  
id: 860398635ba2ae3d00000b00  
x-ratelimit-limit: name=default,100;  
x-ratelimit-remaining: name=default,99;
```

Body:

```
[  
 {  
 "product_id": "apples",  
 "name": "apples",
```

Figure 3-12. Test an API operation (5 of 5)

The test feature displays the operation request and response messages.

Products

- A set of APIs and plans are grouped into a Product
 - An offering that is made available to developers
- Products must be staged to a catalog and then published to so that developers in consumer organizations can integrate the APIs into their applications
- In a non-production catalog, staging and publishing actions are forced, which means that if you republish a previously published Product version, it is overwritten without warning
 - Overwrites a published Product version on the Developer Portal even if the API operations are being used on the Developer Portal

Figure 3-13. Products

A set of APIs and plans are grouped into a Product, which is an offering that is made available to developers.

In non-production catalogs, publishing actions are forced and previously published Product versions are overwritten.

In production catalogs, you need to create a new Product version if the Product version is already published.



Plans

- Plans are used to control access to APIs and to manage API usage
 - A Plan contains API operations and any rate limits that apply
- Limit the calls that are made to an API by second, minute, hour, day, or week
 - A rate limit at the plan level creates a default limit for all API operations within the plan
 - Specific

NAME	CALLS	PER	UNIT
Default rate-limit	100	1	hour

Defining APIs in API Manager

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Figure 3-14. Plans

A Product includes one or more plans that control access to APIs and manage API usage.

Plans are used to control access to APIs and to manage API usage.

Applying a rate limit at the plan level creates a default rate limit that is shared across all the operations within the plan. If you need to set specific rate limits for specific operations, you must set these within the operations themselves and these settings will override the setting at the plan level.



Publish a Product

- When you publish a Product, you select a target catalog and Developer Portal
- If spaces are configured for the catalog, the target server for the Developer Portal is the same for all spaces of the catalog

The screenshot shows a dialog box titled "Publishing". A checkbox labeled "Publish this product to a catalog" is checked. Below it is a search bar with the placeholder "Search catalogs". A table lists two catalog entries:

Name	Server
Sandbox - Retail Space	https://api.think.ibm/sales/sb
Sandbox - Wholesale Space	https://api.think.ibm/sales/sb

Figure 3-15. Publish a Product

In the example, you are about to publish a Product to a catalog in which two spaces are configured. When you select a catalog for publishing that contains spaces, the URL for the target server is the same for all spaces of the catalog.

Unit summary

- Describe the features in API Manager for defining APIs, Products, and plans
- Examine the OpenAPI definition file
- Describe the purpose of the Assemble view in API Manager
- Explain how to test API operations in API Manager
- Describe the use of a Product for grouping common APIs
- Describe the role of plans to manage API usage

Figure 3-16. Unit summary

Review questions

1. True or False: Spaces enable the management of Products and APIs that are specific to that space. But the target URL on the Portal is the same for all spaces of a catalog.
2. True or False: A rate limit at the plan level overrides a rate limit at the API operation level.



Figure 3-17. Review questions

Write your answers here:

- 1.
- 2.

Review answers

1. True or False: Spaces enable the management of Products and APIs that are specific to that space. But the target URL on the Portal is the same for all spaces of a catalog.
The answer is True.



2. True or False: A rate limit at the plan level overrides a rate limit at the API operation level.
The answer is False.
Setting rate limits for specific operations overrides the setting at the plan level.

Figure 3-18. Review answers

Exercise: Defining an API and Product in API Manager

Defining APIs in API Manager

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Figure 3-19. Exercise: Defining an API and Product in API Manager

Exercise objectives

- Sign in to API Manager
- Create a draft API and import an OpenAPI definition
- Modify the API definition in API Manager
- Create a Product and a plan in API Manager
- Assemble the API operations to control aspects of processing in the gateway
- Specify the target URL for the operation
- Start the back-end NodeJS application
- Test the API in API Manager



Figure 3-20. Exercise objectives

Unit 4. The Product lifecycle

Estimated time

01:15

Overview

This unit explains the concept of the Product lifecycle. The lifecycle management feature controls the staging of a Product version to a catalog. Lifecycle management continues through publishing to make the Product version available to your application developers. The lifecycle governance eventually controls retiring and archiving of the Product and APIs.

How you will check your progress

- Review questions
- Lab exercise

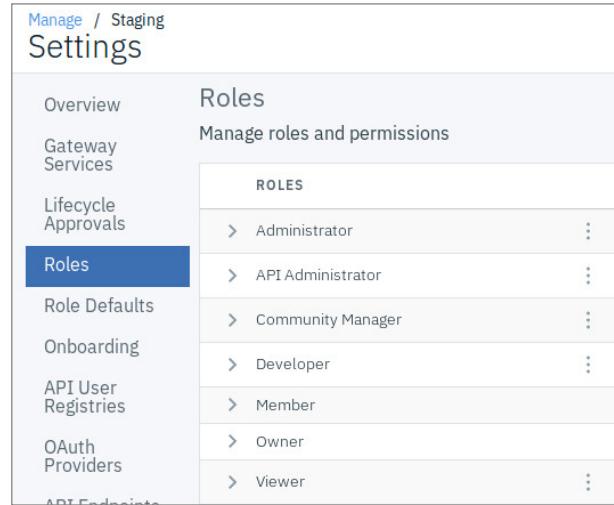
Unit objectives

- Describe provider organization roles and permissions
- Explain the Product lifecycle stages
- Describe how staging and publishing differ in development and production catalogs
- Describe how lifecycle events are managed in API Manager
- Explain the product availability and visibility settings
- Describe how to create versions of Products and APIs
- Explain the concept of replacing and superseding published Products
- Explain how to migrate application subscriptions to a new Product version and plan
- Explain how application subscriptions are created in API Manager
- Describe the state changes that occur when approvals are enabled

Figure 4-1. Unit objectives

Default provider organization roles

- Roles that are defined for a catalog in API Manager
 - Administrator
 - API Administrator
 - Community Manager
 - Developer
 - Member
 - Owner
 - Viewer



The screenshot shows the 'Manage / Staging' interface for 'Settings'. On the left, a sidebar lists several categories: Overview, Gateway Services, Lifecycle Approvals, **Roles**, Role Defaults, Onboarding, API User Registries, and OAuth Providers. The 'Roles' category is highlighted with a blue background. The main content area is titled 'Roles' and contains the sub-header 'Manage roles and permissions'. Below this is a table with a header 'ROLES' and seven rows, each representing a role with a plus sign icon and three dots at the end:

ROLES
> Administrator
> API Administrator
> Community Manager
> Developer
> Member
> Owner
> Viewer

- The organizational owner has all permissions to perform all actions on catalogs, organizations, and spaces.

[The Product lifecycle](#)

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Figure 4-2. Default provider organization roles

In the Settings for a catalog in API Manager, click **Roles**.

Default roles for provider organization catalog are displayed.

The predefined roles for provider organizations are:

- Administrator
- API Administrator
- manager
- Community Manager
- Developer
- Member
- Owner
- Viewer

The organizational owner has all permissions to perform all actions on catalogs, organizations, and spaces. The owner cannot be unassigned from performing these permissions. Any assigned role is automatically also assigned a member role.

**Note**

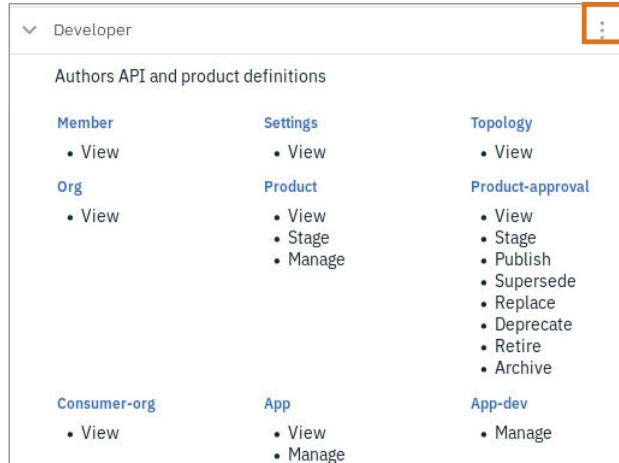
Default roles for provider and consumer organizations are set in Cloud Manager.

The cloud administrator can add other custom roles by clicking the **Add** icon for the provider organization from the Default Roles page.

The roles that are defined in Cloud Manager for a provider organization are inherited in API Manager. The owner of the provider organization can edit these roles and change permissions.

Default provider organization permissions

- Each role is assigned permissions for lifecycle actions
 - View, stage, manage, and so on
- For example, the Developer role has permission to view, stage, and manage Products in the provider organization
 - The owner can change these permissions by clicking the Edit option three buttons



The screenshot shows a table of permissions for the 'Developer' role. The columns are 'Member', 'Org', 'Consumer-org', 'Settings', 'Product', 'App', 'Topology', 'Product-approval', and 'App-dev'. The 'Topology' column contains a list of lifecycle actions: View, Stage, Publish, Supersede, Replace, Deprecate, Retire, and Archive. An orange box highlights the 'Edit' icon in the top right corner of the table header.

Developer								
Authors API and product definitions								
Member	Org	Consumer-org	Settings	Product	App	Topology	Product-approval	App-dev
• View	• View	• View	• View	• View • Stage • Manage	• View • Manage	• View	• View • Stage • Publish • Supersede • Replace • Deprecate • Retire • Archive	• Manage

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Figure 4-3. Default provider organization permissions

Permissions for performing actions on lifecycle events are pre-set for each role. These permissions can be viewed in API Manager.

The example on the page shows that the Developer role has permission to view, stage, and manage Products in the provider organization. The Developer role can also perform many lifecycle changes related to product approval.

The organization owner can change permissions by clicking the Edit ellipsis icon for the particular role.



View members and permissions for a catalog

- Click the tile to open the catalog from the Manage option in API Manager
 - Select **Members**

The screenshot shows the "Manage / Staging" interface with the "Members" section selected. A dropdown menu "View owners" is open, showing three roles: "Think Owner" (Catalog Owner), "Org Owner", and "owner@think.ibm". Below this is a table with columns: NAME, ADMINISTRATOR, API-ADMINISTRATOR, COMMUNITY-MANAGER, DEVELOPER, VIEWER, and STATE. There are two rows of data:

NAME	ADMINISTRATOR	API-ADMINISTRATOR	COMMUNITY-MANAGER	DEVELOPER	VIEWER	STATE
TD Think Developer developer@think.ibm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Enabled

The Product lifecycle

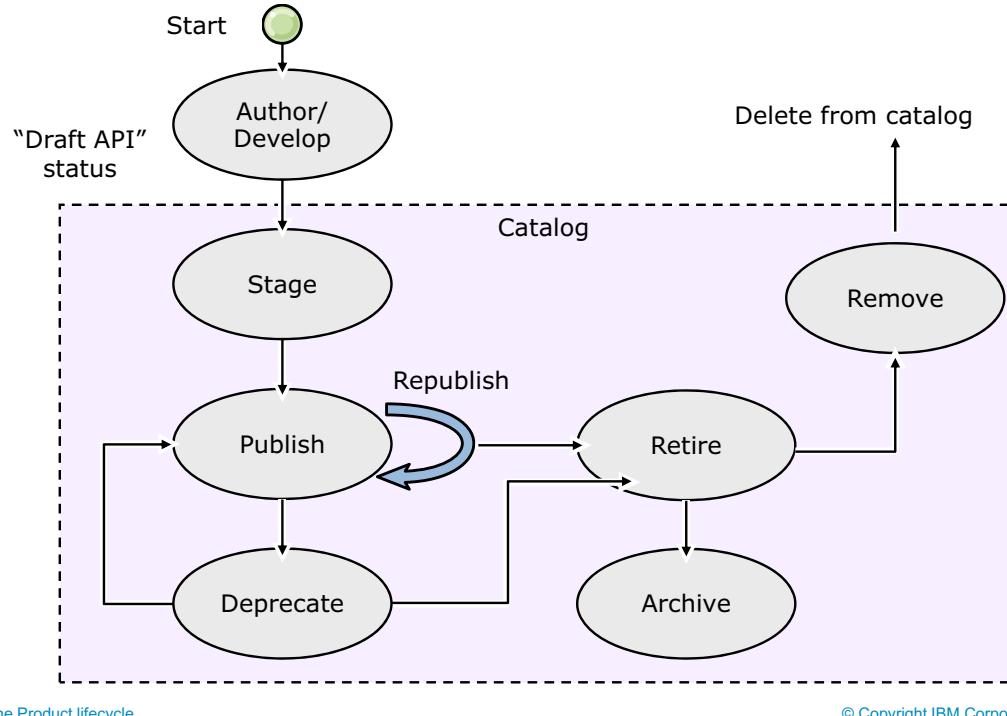
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Figure 4-4. View members and permissions for a catalog

You can display the members and their roles for a catalog in API Manager. Open the catalog, then select the Members option.

The example in the figure shows there are two members that are defined. The owner of the provider organization and a member with a role of developer.

Lifecycle for product versions



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Figure 4-5. Lifecycle for product versions

Here you see a lifecycle for Products and their contained API operations as they move through the different states.

Except for the authoring step, all the actions involve state changes to the Product version and API operations within a particular catalog.

When you first create the API in the draft API status, the API and its requisite Product exist independently of the catalog.

When you manage your Product versions, you move them through a series of lifecycle states, from initially staging a Product version to a catalog, through to publishing to make the Product version available to your application developers, and to eventual retiring and archiving.

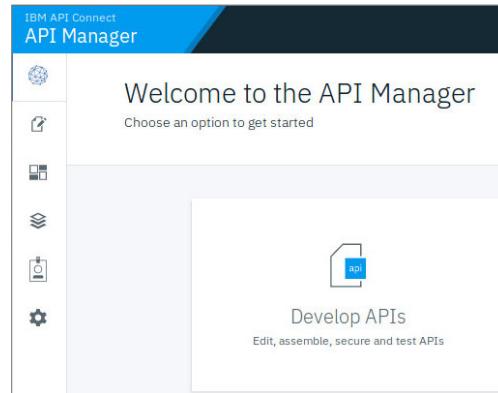
When a Product version is moved to the deprecated state, the plan is visible only to developers whose applications are currently subscribed to the plan version. No new subscriptions to the plan are possible.

A Product version in the retired state cannot be viewed or subscribed to, and all of the associated APIs are stopped.

Archived Products are similar to those in the retired state. However, archived Products are not displayed by default in the Product Management page of the API Manager.

Tools for authoring APIs

- API Designer
 - Workstation-based graphical editor and command line interface
- API Manager
 - Browser-based user interface
 - Defined in the Develop option
 - Create or import APIs
 - Define Products



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Figure 4-6. Tools for authoring APIs

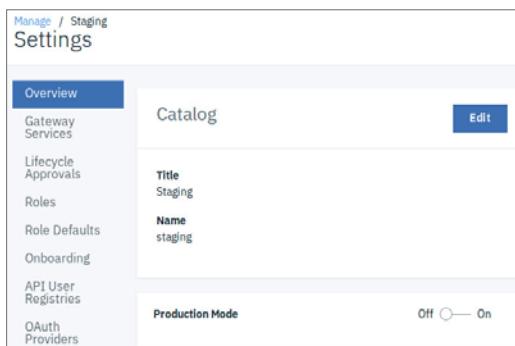
You can author APIs by using the API Designer command line or graphical editor features.

You can author APIs by creating or importing them in API Manager. The APIs and Products are defined in the Develop option of API Manager.

The API Manager use interface is used in this course.

Catalog production mode setting

- Setting a catalog mode as a development or production catalog
- Product versions are overwritten without warning when they are published to development catalogs
 - Overwrites a published Product version on the Developer Portal even if the API operations are being used on the Developer Portal
- In production catalogs, you must create a new Product version if the Product version is already published, unless you are simply changing the Product visibility settings (republishing)



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Figure 4-7. Catalog production mode setting

Some lifecycle state changes happen differently in production versus development catalogs.

When the Production Mode option is Off under the **Settings** tab for a particular catalog, staging and publishing actions are forced.

For the Sandbox catalog and other development catalogs, this means that the existing Product version is overwritten without warning when the Stage or Publish actions are invoked in API Manager.

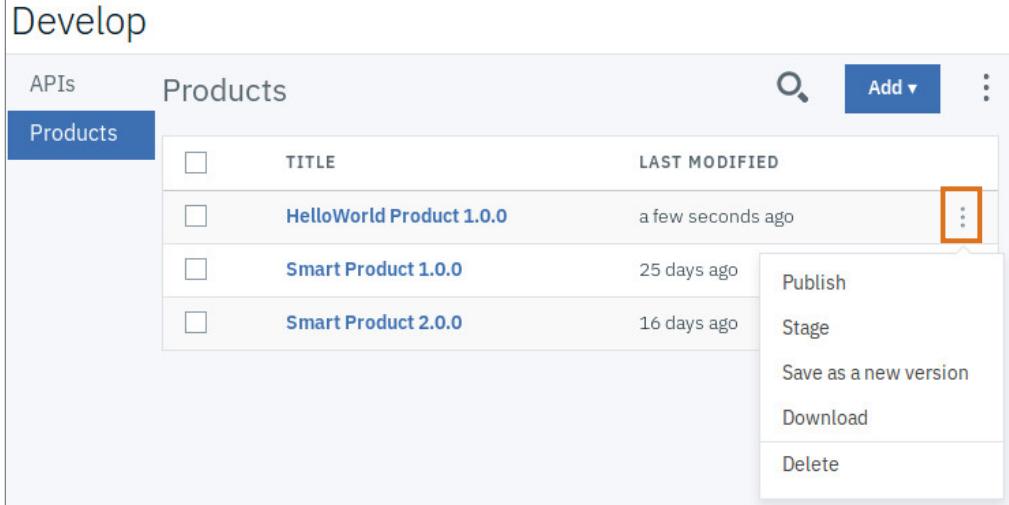
The Sandbox catalog can only be used for development and testing purposes. There is no Production Mode option for the Sandbox catalog.

When publishing a Product version to a production catalog, you should create a new Product version if the original Product version is already in the published state.

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Manage the lifecycle of Products in API Manager

- Products and APIs are created or imported into API Manager
 - The product lifecycle can now be managed from API Manager by using the list of options drop-down



<input type="checkbox"/>	TITLE	LAST MODIFIED
<input type="checkbox"/>	HelloWorld Product 1.0.0	a few seconds ago
<input type="checkbox"/>	Smart Product 1.0.0	25 days ago
<input type="checkbox"/>	Smart Product 2.0.0	16 days ago

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Figure 4-8. Manage the lifecycle of Products in API Manager

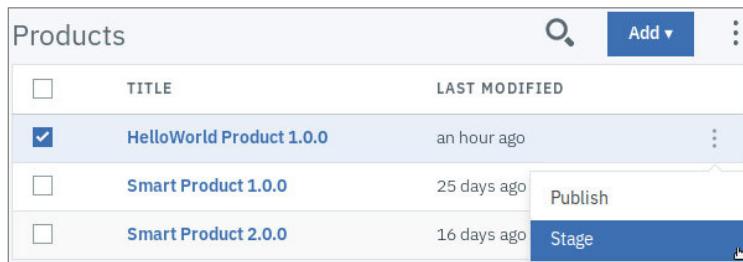
After the Product is created, it is visible on the **Products** tab from the Develop page. The Product can be managed from the manage list of options icon.

From this view, you can move the Products through their lifecycle.

The actions that are available from the manage menu icon change according to the current state of the Product.

Stage a Product to a development catalog (1 of 3)

- Stage the Product to a development catalog
 - Select the Product version to be staged
 - Set the target of the staging step to the development catalog
 - Overwrites a previously staged Product version
- Creates a snapshot of the Product
 - Snapshot is taken of the Product definition and the OpenAPI definition
 - For example:
Hello World Product 1.0.0
HelloWorld 1.0.0 (API)
 - Updates that you make to the Product or API are not reflected in the staged version



The screenshot shows a list of products in a table format. The columns are 'TITLE' and 'LAST MODIFIED'. There are three rows:

- Row 1: HelloWorld Product 1.0.0, last modified 'an hour ago'. A checkmark is next to the title.
- Row 2: Smart Product 1.0.0, last modified '25 days ago'.
- Row 3: Smart Product 2.0.0, last modified '16 days ago'.

 A context menu is open over the first row, with options 'Publish' and 'Stage'. The 'Stage' button is highlighted with a blue background and white text.

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Figure 4-9. Stage a Product to a development catalog (1 of 3)

When you stage a Product, you create a specific version of the Product on a target catalog.

A catalog is a deployment target, and behaves as a logical partition of the gateway and Developer Portal. When you stage a Product, a snapshot or a definitive copy, of the Product is created.

Since it is a snapshot, any updates you make to a Product, are not reflected in the staged version.

Staging a Product that is defined in the Develop page in API Manager is straightforward.

Select the Product version. Then, from the list of options click the **Stage** icon.



Stage a Product to a development catalog (2 of 3)

- Select the target catalog where the Product is to be staged from the list of defined catalogs

A screenshot of a dialog box titled "Stage To". It has a section labeled "Catalog" containing a dropdown menu with "Staging" selected. Below the dropdown is a checkbox labeled "Publish to specific gateway services" which is unchecked. At the bottom right are two buttons: "Cancel" and "Stage".

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Figure 4-10. Stage a Product to a development catalog (2 of 3)

Select the target catalog where the Product is to be staged from the drop-down menu.

The Staging catalog that is selected in the example has been defined as a development catalog. The Sandbox catalog is also a development catalog.



Stage a Product to a development catalog (3 of 3)

- Open the target catalog from the Manage page in API Manager
- The Product is displayed in the list of Products with a state of Staged

Manage / Staging			
Products			
TITLE	NAME	STATE	
> HelloWorld Product	helloworld-product 1.0.0	Staged	⋮
> Smart Product	smart-product 1.0.0	Deprecated	⋮
> Smart Product	smart-product 2.0.0	Published	⋮

Figure 4-11. Stage a Product to a development catalog (3 of 3)

After the Product is staged, you can see its state from the Manage page for the catalog.

If you remove a Product from the staged state, it is removed from the catalog and the Product goes back to the draft state in the Develop area of API Manager.

The Product or API details can be edited and changed. Then, the Product can be staged again.



Publish a Product to a development catalog (1 of 3)

- From the staged product, select the **Publish** option

A screenshot of the API Manager's "Manage / Staging Products" interface. The page shows a table with three products: "HelloWorld Product" (staged), "Smart Product" (deprecated), and "Smart Product" (published). A context menu is open over the first product, with the "Publish" option highlighted and surrounded by an orange rectangle. Other options in the menu include "Edit visibility", "Update gateway services", and "Remove".

TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Staged
> Smart Product	smart-product 1.0.0	Deprecated
> Smart Product	smart-product 2.0.0	Published

Figure 4-12. Publish a Product to a development catalog (1 of 3)

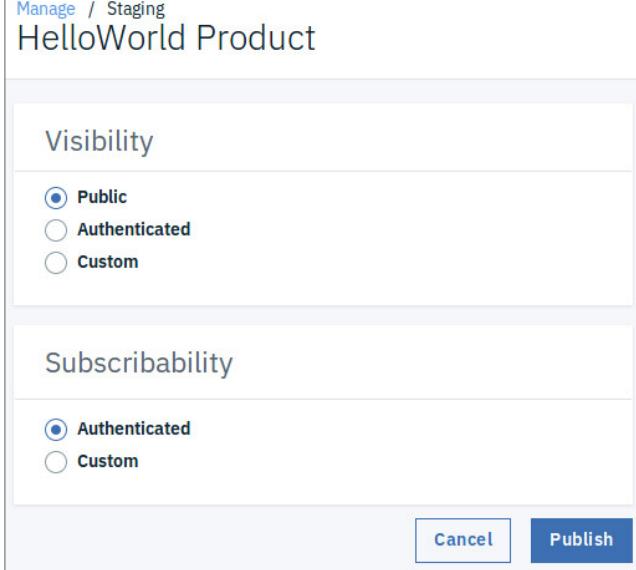
To publish a Product in API Manager, go to the Manage page for the catalog.

Select Publish from the list of options for the Product.

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Publish a Product to a development catalog (2 of 3)

- Select the required visibility and subscribability options
- Then, **Publish**



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Figure 4-13. Publish a Product to a development catalog (2 of 3)

On the second dialog for publishing a Product, select the required options for Product visibility and subscribability.

The default value for visibility is public, which means that non-authenticated users can see the published product on the Developer Portal.

The default value for subscribability is authenticated, which means that only authenticated users can subscribe applications to the published product on the Developer Portal.

Click the Publish button to Publish the Product.

TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Published
> Smart Product	smart-product 1.0.0	Deprecated
> Smart Product	smart-product 2.0.0	Published

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Figure 4-14. Publish a Product to a development catalog (3 of 3)

Clicking the Publish button publishes the Product and makes it available on the Developer Portal, or moves it to a published pending state if approval is required.

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Published Product on the Developer Portal

- Product is visible on the Developer Portal depending on the visibility settings in API Manager

The screenshot shows the IBM API Connect Developer Portal homepage. At the top, there's a banner with a blue background and a white owl logo. The text on the banner reads "Brace yourself APIs are coming" and "Explore, subscribe to and be... We can't wait to see what you...". Below the banner, there's a section titled "API Products" containing two items:

- Smart Product 2.0.0** (represented by a blue circle icon)
- HelloWorld Product 1.0.0** (represented by a pink circle icon)

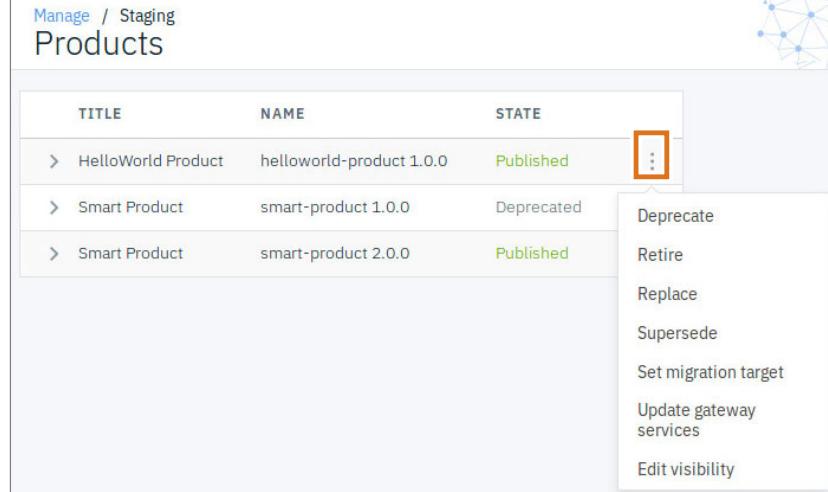
At the bottom left of the page, it says "The Product lifecycle". At the bottom right, it says "© Copyright IBM Corporation 2018".

Figure 4-15. Published Product on the Developer Portal

Published Products are visible when the developer is signed on to the Developer Portal. Non-authenticated users see Products with visibility set to public.

Lifecycle actions for published Products

- Manage options change according to the lifecycle state
 - Current state of the Product is displayed
 - Green label with the text Published is displayed in API Manager
 - Multiple versions of the same Product can be in different states in the catalog



The screenshot shows a list of products in the 'Manage / Staging' section. There are three products listed:

TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Published
> Smart Product	smart-product 1.0.0	Deprecated
> Smart Product	smart-product 2.0.0	Published

A context menu is open over the second product (smart-product 1.0.0), which is Deprecated. The menu options are:

- Deprecate
- Retire
- Replace
- Supersede
- Set migration target
- Update gateway services
- Edit visibility

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Figure 4-16. Lifecycle actions for published Products

Products have visual labels that provide visual cues as to the state of the plan.

Multiple versions of the same Product can be in different states in the catalog.

The actions that are available from the manage menu icon change according to the current state of the Product.

A Product in the published state can be deprecated, retired, replaced, superseded, or republished with a different visibility.



Deprecate a Product version

- Prevents developers from subscribing to the plans in this Product without hiding it from existing subscribers

The screenshot shows a table of products with columns for Title, Name, and State. A context menu is open over the second row, which contains 'Smart Product' and 'smart-product 1.0.0'. The menu items are: Deprecate (selected), Retire, Replace, Supersede, Set migration target, Update gateway services, and Edit visibility.

TITLE	NAME	STATE
>HelloWorld Product	helloworld-product 1.0.0	Published
Smart Product	smart-product 1.0.0	Deprecated
Smart Product	smart-product 2.0.0	Published

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Figure 4-17. Deprecate a Product version

Deprecating a Product prevents new developers from subscribing to the plans in this Product, without hiding it from existing subscribers.

A Product owner might deprecate a Product in anticipation of the next version release, but is forced to keep a previous release for clients that have not yet adopted the new features, or are unwilling to upgrade their code in the short term.

Retire a Product version

- Retire a published or deprecated Product from the Manage icon in API Manager
- When a Product is retired, all associated APIs are taken offline, and any subscriptions become unavailable

The screenshot shows a table of products with columns for TITLE, NAME, and STATE. The STATE column indicates the status of each product. A context menu is open over the third row, which contains a 'smart-product 2.0.0' entry. The menu options are: Deprecate, Retire (which is highlighted in blue), Replace, Supersede, Set migration target, Update gateway services, and Edit visibility.

TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Published
> Smart Product	smart-product 1.0.0	Deprecated
> Smart Product	smart-product 2.0.0	Published

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Figure 4-18. Retire a Product version

The **Retire** operation moves a Product version from the Published to the **Retired** state.

Before a published Product version can be removed from a catalog, it must first be retired.

You can retire a published or deprecated Product by using the Manage icon in API Manager.

When a Product is retired, all associated APIs are taken offline, and any subscriptions become inactive.

Delete from catalog

- A retired Product version can be removed from the catalog

TITLE	NAME	STATE	
> HelloWorld Product	helloworld-product 1.0.0	Retired	
> Smart Product	smart-product 1.0.0	Deprecated	 Re-stage  Edit visibility
> Smart Product	smart-product 2.0.0	Published	 Remove

Figure 4-19. Delete from catalog

In the example, you intend to remove version 1.0.0 of the HelloWorld Product from the Staging catalog.

The Product version is already in the retired state. From the manage icon, select **Remove**. Then, click **Confirm** in the remove product dialog.

The Product version is removed from the catalog.



Product version status

- In the example, version 1.0.0 of the HelloWorld Product is no longer associated with the Staging catalog

Manage / Staging Products			
		NAME	STATE
>	Smart Product	smart-product 1.0.0	Deprecated
>	Smart Product	smart-product 2.0.0	Published

Figure 4-20. Product version status

In the example, there are no HelloWorld Product versions in the selected catalog.

Stage a Product to a production catalog

Creating a new version of a Product and its APIs before they are staged and published to a non-Sandbox catalog is a recommended practice

- Version
 - Stage a Product version that has been tested and is ready for publishing
- API changes
 - API Developers who work on draft APIs should create Product and API versions to add feature enhancements to the APIs
- Not yet visible to consumers
 - Publishing is a later step that makes the Product and its resources visible on the developer portal for that environment

Figure 4-21. Stage a Product to a production catalog

When testing is completed for an API, the containing Product version is staged to the catalog to create a specific snapshot of that Product.

API Developers should make feature enhancements to a new version of the Product and its API resources.

You can create versions of Products and APIs at any time.

Before a Product can be published, you must first stage that Product to a catalog.

A staged Product that has not been published is not visible to the users on the Developer Portal.

Creating new versions of Products and APIs before they are staged and published to a production catalog is a recommended practice.



Change an API version (1 of 3)

- Open the Develop page in API Manager
 - APIs tab is selected
 - Then, select Save as new version from the list of options for the API

The screenshot shows the "IBM API Connect API Manager" interface. The title bar includes "IBM API Connect", "API Manager", and "Organizational Think". The main area is titled "Develop" and has a sidebar with icons for Home, API, Products, Catalog, and Settings. The "APIs" tab is selected. A table lists three APIs: "HelloWorld 1.0.0", "IBM APIM SMart 1.0.0", and "IBM APIM SMart 2.0.0". The "HelloWorld 1.0.0" row has a context menu open with options "Publish" and "Stage". At the bottom of the table, a blue button says "Save as a new version". The status bar at the bottom of the screen shows "The Product lifecycle" on the left and "© Copyright IBM Corporation 2018" on the right.

Figure 4-22. Change an API version (1 of 3)

You can create a new version of an API from the Develop page of API Manager.

With the APIs tab selected, select the Save as a new version option for the API for which you want to create a new version.



Note

Check the provider organization role permissions to verify whether or not the member can create a new version for the API.



Change an API version (2 of 3)

- Type the version number in the dialog
- Then, click **Save**

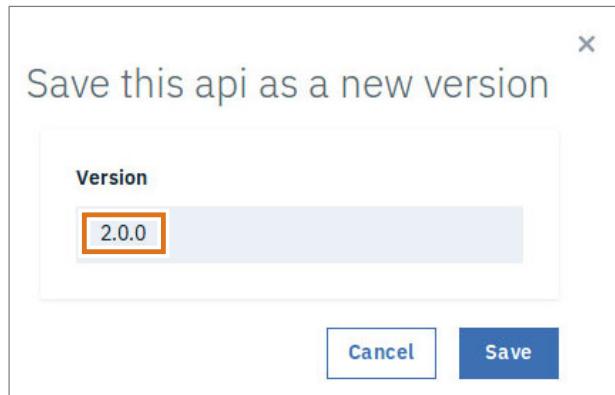


Figure 4-23. Change an API version (2 of 3)

When you save a new version of the API, you are prompted to type the version number. Then, click **Save**.



Change an API version (3 of 3)

- The new version of the API is saved

A screenshot of the IBM API Management interface. The top navigation bar has a blue background with the word "APIs" in white. Below it is a search bar and an "Add" button. The main content area is titled "Products" and shows a table of APIs. The columns are "TITLE", "TYPE", and "LAST MODIFIED". There are five rows:

	TITLE	TYPE	LAST MODIFIED	
<input type="checkbox"/>	HelloWorld 1.0.0	REST	4 days ago	⋮
<input type="checkbox"/>	HelloWorld 2.0.0	REST	a few seconds ago	⋮
<input type="checkbox"/>	IBM APIM SSmart 1.0.0	REST	a month ago	⋮
<input type="checkbox"/>	IBM APIM SSmart 2.0.0	REST	20 days ago	⋮

Figure 4-24. Change an API version (3 of 3)

The new version of the API is saved and is displayed in the list of APIs.



Change a Product version (1 of 3)

- Open the Develop page in API Manager
 - Select the Products option
 - Then, select Save as new version from the list of options for the Product

A screenshot of the IBM API Connect API Manager interface. The title bar says "IBM API Connect API Manager". The left sidebar has icons for Home, APIs, Products, Workspaces, Catalog, and Settings. The main area is titled "Develop" and shows tabs for "APIs" and "Products". The "Products" tab is selected. A table lists products: "HelloWorld Product 1.0.0" (modified 4 days ago), "Smart Product 1.0.0" (modified an hour ago), and "Smart Product 2.0.0" (modified 20 hours ago). A context menu is open over the first product, with options "Publish" and "Stage" visible. At the bottom right of the table, there is a button labeled "Save as a new version".

	TITLE	LAST MODIFIED
<input type="checkbox"/>	HelloWorld Product 1.0.0	4 days ago
<input type="checkbox"/>	Smart Product 1.0.0	an hour ago
<input type="checkbox"/>	Smart Product 2.0.0	20 hours ago

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Figure 4-25. Change a Product version (1 of 3)

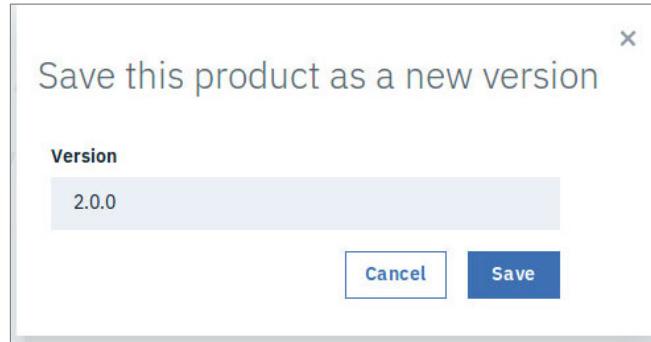
You can change the Product version from the Develop page in API Manager.

Select the Products tab. Then, from the list of options for the API, select Save as a new version.



Change a Product version (2 of 3)

- Type the version number in the dialog
- Then, click **Save**



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Figure 4-26. Change a Product version (2 of 3)

When you save a new version of the Product, you are prompted to type the version number. Then, click **Save**.

When you save a new version of the Product, you are prompted to type the version number. Then, click **Save**.



Change a Product version (3 of 3)

- The new version of the Product is saved.

A screenshot of a web-based application interface titled "HelloWorld Product". The top navigation bar includes tabs for "APIs" and "Products", with "Products" being the active tab. Below the navigation is a search bar and an "Add" button. The main content area displays a table of products with columns for "TITLE" and "LAST MODIFIED". There are five rows in the table:

	TITLE	LAST MODIFIED
<input type="checkbox"/>	HelloWorld Product 1.0.0	4 days ago
<input type="checkbox"/>	HelloWorld Product 2.0.0	a few seconds ago
<input type="checkbox"/>	Smart Product 1.0.0	a month ago
<input type="checkbox"/>	Smart Product 2.0.0	20 days ago

The row for "HelloWorld Product 2.0.0" is highlighted with a red box, indicating it is the selected or modified product.

Figure 4-27. Change a Product version (3 of 3)

The new version of the Product is saved and is displayed in the list of Products.

The next step is to open the Product in the editor and add the new version of the API to the Product.



Add the later version of the API to the Product (1 of 3)

- Open the later Product version (2.0.0) with the editor
- Select **APIs**
- Click **Edit**

The screenshot shows the API Manager interface for the "HelloWorld Product" version 2.0.0. The top navigation bar includes "Develop", "HelloWorld Product 2.0.0", "Design", and "Source". On the left, there are tabs for "Product Setup", "Visibility", "APIs" (which is selected and highlighted in blue), "Plans", and "Categories". The main content area has a table with columns "TITLE", "SUMMARY", and "VERSION". A single row is present with "HelloWorld" in the TITLE column and "1.0.0" in the VERSION column. A large blue "Edit" button is located at the top right of the content area.

TITLE	SUMMARY	VERSION
HelloWorld		1.0.0

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Figure 4-28. Add the later version of the API to the Product (1 of 3)

To assign the latest version of the API to the Product, start by opening the recently-created Product version with the editor in API Manager.

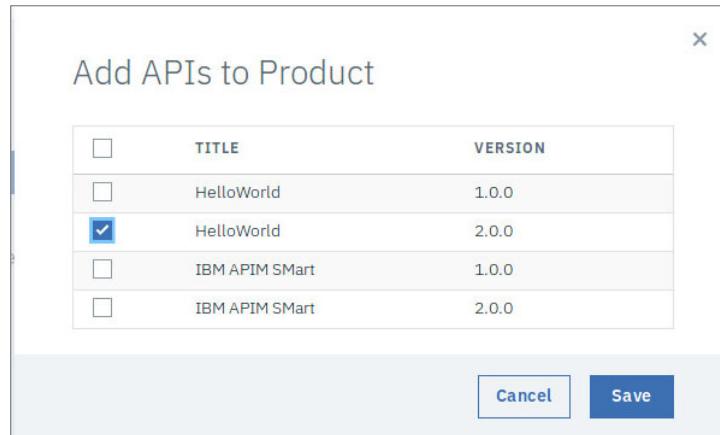
With the Product open in the editor, select the APIs tab. Then, click the Edit button to display the APIs that are associated with the Product version.



Add the later version of the API to the Product (2 of 3)

In the Add APIs to Product dialog:

- Clear the older API version (1.0.0)
- Select the newer API version (2.0.0)
- Click **Save**



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Figure 4-29. Add the later version of the API to the Product (2 of 3)

The list of APIs that are assigned to the Product are displayed. Deselect the older API version 1.0.0 and select the newer API version 2.0.0, in this case.

Save the changes.



Add the later version of the API to the Product (3 of 3)

- The newer API version is now assigned to the Product version

A screenshot of the IBM API Management interface. At the top, it says "Develop" and "HelloWorld Product 2.0.0" with tabs for "Design" and "Source". Below that is a sidebar with "Product Setup", "Visibility", "APIs" (which is highlighted in blue), "Plans", and "Categories". The main area shows a table titled "APIs" with columns "TITLE", "SUMMARY", and "VERSION". There is one row: "HelloWorld" under TITLE, and "2.0.0" under VERSION. A blue "Edit" button is located at the top right of the table area.

TITLE	SUMMARY	VERSION
HelloWorld		2.0.0

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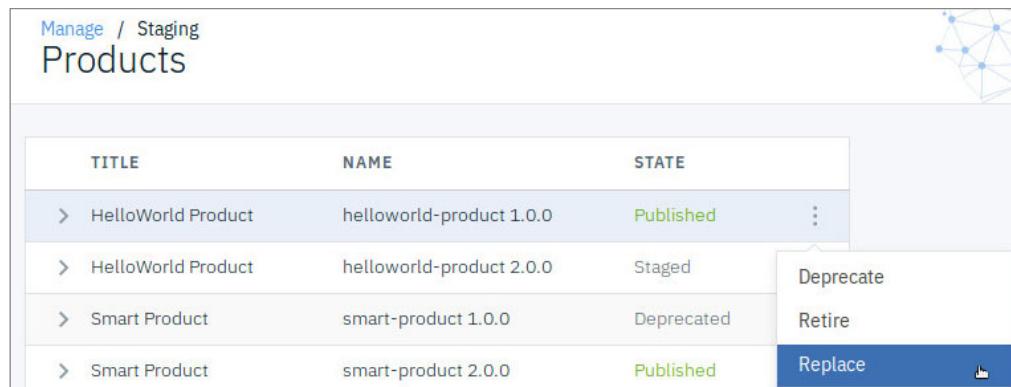
Figure 4-30. Add the later version of the API to the Product (3 of 3)

The newer API version is now assigned to the Product version and is displayed in the list of APIs.

The newer API version is now assigned to the Product version and is displayed in the list of APIs.

Replace a Product version with another version (1 of 4)

- Replace an existing Product version with another Product version
 - Newer version might include fixes
- The replacement Product must be in the Staged or Deprecated state, and the Product to be replaced must be in the Published state



TITLE	NAME	STATE	
> HelloWorld Product	helloworld-product 1.0.0	Published	⋮
> HelloWorld Product	helloworld-product 2.0.0	Staged	Deprecate
> Smart Product	smart-product 1.0.0	Deprecated	Retire
> Smart Product	smart-product 2.0.0	Published	Replace

Figure 4-31. Replace a Product version with another version (1 of 4)

Scenario: Bug fixes to an existing Product version.

This feature is equivalent to swapping an existing Product version with a later version.

In this scenario, a previously published Product version (1.0.0) is going to be replaced by a later staged version (2.0.0) that contains the bug fixes.

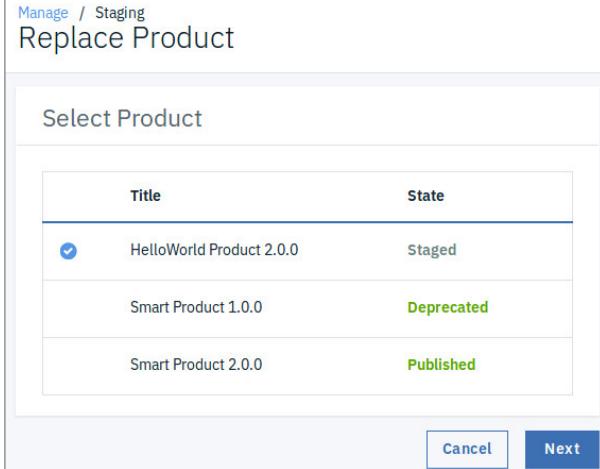
When you replace a Product with another Product, the following actions are taken:

- The replacement Product is published.
- The same visibility, subscriber, and gateway enforcement settings from the original Product are used in the replacement Product.
- The subscribers to the original Product are migrated to the replacement Product.
- The original Product is moved to the Retired state. Products in the Retired state are removed from the Developer Portal; they are no longer visible to the application developers, and any subscriptions to them are canceled.

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Replace a Product version with another version (2 of 4)

- Select the replacement Product from the list



The screenshot shows a dialog box titled "Replace Product". At the top left, there are links for "Manage" and "Staging". The main area is titled "Select Product". A table lists three products:

Title	State
HelloWorld Product 2.0.0	Staged
Smart Product 1.0.0	Deprecated
Smart Product 2.0.0	Published

At the bottom right of the dialog are "Cancel" and "Next" buttons.

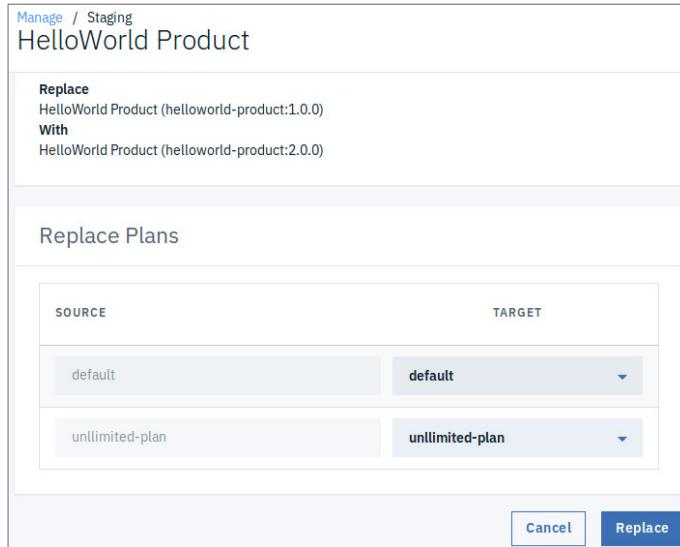
Figure 4-32. Replace a Product version with another version (2 of 4)

The dialog box that is displayed when you choose to replace an existing Product version carries out the following actions:

1. The replacement Product will be published.
2. The same visibility and subscriber settings of the original Product version will be used.
3. The subscribers will be migrated.
4. The Product that is being replaced will be retired.

Replace a Product version with another version (3 of 4)

- Select the plans that are supported in the replacement Product



The Product lifecycle

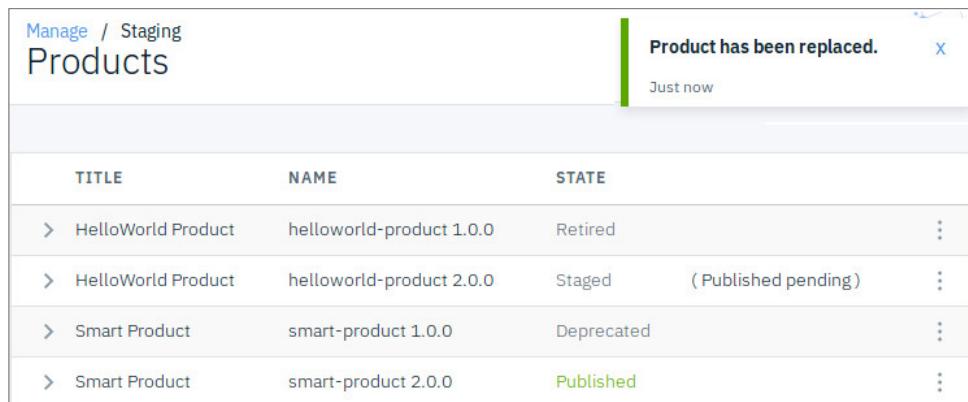
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Figure 4-33. Replace a Product version with another version (3 of 4)

The dialog prompts you to select the plans that are supported in the replacement plan. You can select multiple plans in the dialog.

Replace a Product version with another version (4 of 4)

- Product version 1.0.0 is retired and is replaced by 2.0.0
- Product version 2.0.0 is now published with the bug fixes, or moved to the published pending state when approvals are required for the publishing action



TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Retired
> HelloWorld Product	helloworld-product 2.0.0	Staged (Published pending)
> Smart Product	smart-product 1.0.0	Deprecated
> Smart Product	smart-product 2.0.0	Published

Figure 4-34. Replace a Product version with another version (4 of 4)

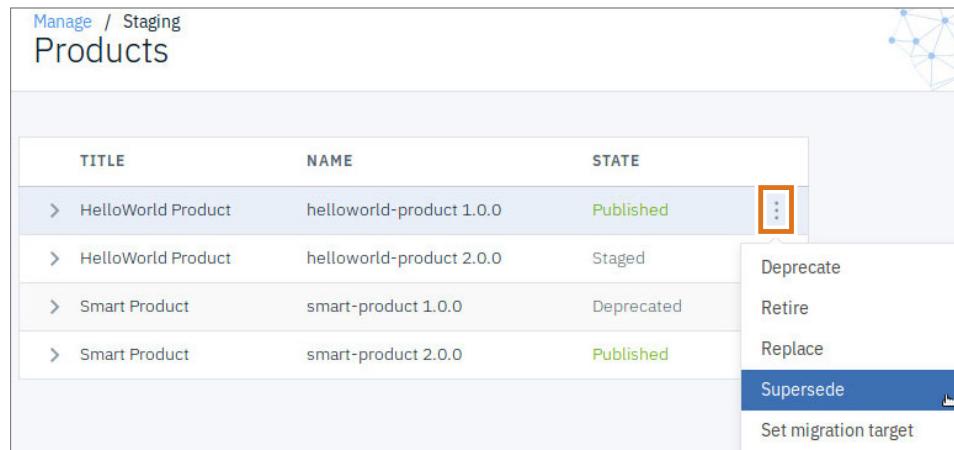
The slide shows the results from the publish with replace feature of API Manager.

The original Product version is retired and the new Product version and plan are published or in the pending publishing state if approvals are required

The subscribers are migrated from the original plan to the plan that is associated with the later Product version.

Supersede a Product version with another version (1 of 4)

The superseding Product must be in the Staged or Deprecated state, and the Product to be superseded must be in the Published state



TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Published
> HelloWorld Product	helloworld-product 2.0.0	Staged
> Smart Product	smart-product 1.0.0	Deprecated
> Smart Product	smart-product 2.0.0	Published

Figure 4-35. Supersede a Product version with another version (1 of 4)

Scenario: Enhancements to a Product version.

Enhancements are made to some APIs that are contained in HelloWorld Product version 2.0.0.

Version 2.0.0 of the HelloWorld Product is staged to the Staging catalog and is about to supersede HelloWorld Product version 1.0.0.



Note

The HelloWorld Product 1.0.0 and 2.0.0 are reused in this example. The two Products are reset to the staged and published states respectively at the start of process.

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Supersede a Product version with another version (2 of 4)

- Select the superseding Product from the list of Products

The screenshot shows a 'Supersede Product' dialog box. At the top, it says 'Manage / Staging' and 'Supersede Product'. Below that, it says 'Select Product' and 'Select a product to supersede helloworld-product 1.0.0:'. A table lists three products:

Title	Name	State
HelloWorld Product	helloworld-product 2.0.0	Staged
Smart Product	smart-product 1.0.0	Deprecated
Smart Product	smart-product 2.0.0	Published

At the bottom right are 'Cancel' and 'Next' buttons.

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Figure 4-36. Supersede a Product version with another version (2 of 4)

Choose the Product that is superseding the published version from the list of Products.

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Supersede a Product version with another version (3 of 4)

- Select the plans that are to be migrated to the superseding Product

Manage / Staging
HelloWorld Product

Supersede
HelloWorld Product (helloworld-product:1.0.0)
With
HelloWorld Product (helloworld-product:2.0.0)

Migrate Plans

SOURCE	TARGET
default	Choose one... ▾
unlimited-plan	unlimited-plan ▾

Cancel **Supersede**

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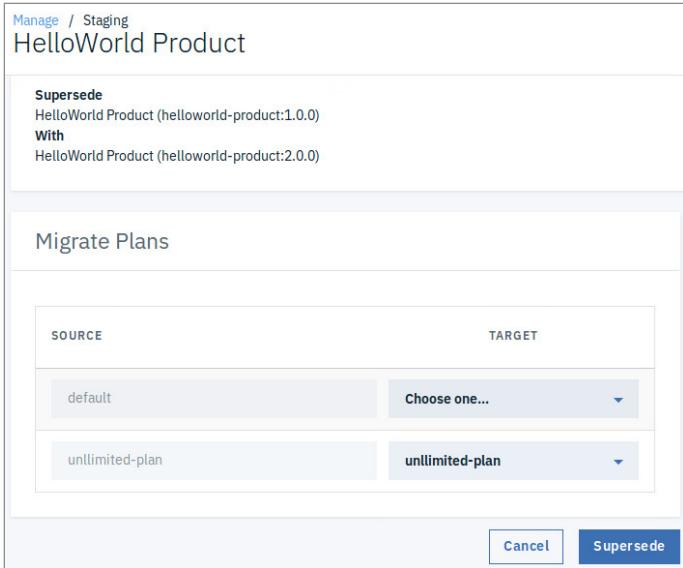


Figure 4-37. Supersede a Product version with another version (3 of 4)

Verify the Products that are being superseded and each plan within the product that is to be migrated.

Supersede a Product version with another version (4 of 4)

- Product version 2.0.0 is deprecated
 - Application developers that are already subscribed to the product can continue to use it, but no new developers can subscribe to the product
- Product version 3.0.0 is now published with the enhancements

Manage / Staging Products			
TITLE	NAME	STATE	
> HelloWorld Product	helloworld-product 1.0.0	Deprecated	:
> HelloWorld Product	helloworld-product 2.0.0	Published	:

Figure 4-38. Supersede a Product version with another version (4 of 4)

When you supersede a Product with another Product, the following actions are taken:

- The superseding Product is published.
- The same visibility, subscriber, and gateway enforcement settings from the original Product are used for the superseding Product.
- The original Product is moved to the Deprecated state. When a Product is deprecated, application developers that are already subscribed to the Product can continue to use it, but no new developers can subscribe to the Product.

Subscribers of the Product version are not automatically migrated. This means that the subscribers will still use the deprecated Product until they subscribe to the new Product version.

The screenshot shows the IBM API Connect Developer Portal landing page. At the top, there's a blue header bar with the text "IBM Training" on the left and the "IBM" logo on the right. Below the header is a main content area with a large blue background featuring a white owl icon. The text "Brace yourselves. APIs are coming." is displayed above a purple button labeled "Explore API Documentation". Above the button, it says "Explore, subscribe to and be creative with our APIs. We can't wait to see what you come up with!". Below this section, there's a grid titled "API Products" with two items: "Smart Product 2.0.0" (blue icon) and "HelloWorld Product 2.0.0" (pink icon). A "See all products" link is located to the right of the grid. At the bottom of the page, there are copyright notices: "The Product lifecycle" on the left and "© Copyright IBM Corporation 2018" on the right.

Figure 4-39. Product on the Developer Portal

The superseding Product version is displayed on the landing page of the Developer Portal.
The superseding Product version is displayed on the landing page of the Developer Portal.



Subscriptions

- An application must subscribe to a plan
 - A plan is a collection of API operations and any rate limits that might apply
- An application plan subscription allows the application to call API resources by the plan
- Application developers initially subscribe their applications to one or more plans by using the Developer Portal

A screenshot of the IBM API Connect Developer Portal. The top navigation bar includes links for "API Products", "Apps", and "Blogs". Below this, there are two buttons: "Select Application" and "Subscribe". The main content area is titled "Select Application" and displays two application cards. The first card is for "SMart Application" with a red icon, and the second is for "HelloApp" with a blue icon. Both cards have a "Description" section below them. At the bottom of each card is a "Select App" button. The overall interface is clean and modern, typical of a developer portal.

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Figure 4-40. Subscriptions

Application developers create applications in the Developer Portal. Then, the developers subscribe their applications to one or more plans by using the Developer Portal.

Applications are generated with a client ID that can be used to authorize the application to call the API operations. The plan that the application subscribes to can restrict the number of API calls the application can make during a time period.

Migrate subscriptions between plans (1 of 3)

- Application developers can migrate their subscribed applications to the newer Product version and plan in the Developer Portal

The screenshot shows the IBM API Connect Developer Portal interface. At the top, there's a navigation bar with 'API Products', 'Apps', 'Blogs', 'Forums', and a search icon. Below the navigation bar, the 'HelloApp' application is selected. The main content area has a 'Subscriptions' tab active. On the left, there's a sidebar for 'Credentials' with fields for 'Client ID' and 'Client Secret', and a 'Verify' button. The main area displays a table titled 'Subscriptions' with columns 'PRODUCT' and 'PLAN'. It lists one entry: 'HelloWorld Product (1.0.0)' with 'unlimited-plan'. To the right of this entry is a tooltip: 'Migrate this subscription to plan 'unlimited-plan' in product 'HelloWorld Product' at version '2.0.0''. At the bottom of the table, another row is visible for 'HelloWorld Product (1.0.0)' with 'unlimited-plan', also accompanied by a migration tooltip.

Figure 4-41. Migrate subscriptions between plans (1 of 3)

After a Product is superseded in API Manager, the published instance of the later Product version is visible to authenticated users on the Developer Portal, along with the deprecated Product version.

The signed-on developer can elect to migrate the application subscription to the newer version of the Product and plan from the Subscriptions tab of the application.

By clicking the link that starts with “Migrate this subscription to plan”, the application migration is triggered.



Migrate subscriptions between plans (2 of 3)

- The migrate subscription confirmation dialog is displayed.

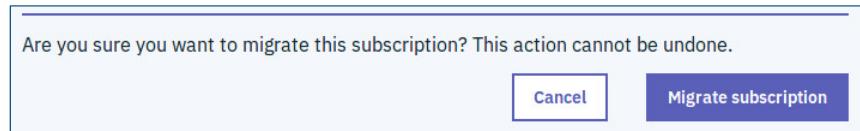


Figure 4-42. Migrate subscriptions between plans (2 of 3)

Proceed with the migration from the deprecated Product version to the newer Product version. Click **Migrate subscription**.



Migrate subscriptions between plans (3 of 3)

- The application subscription is moved from the deprecated Product version and plan to the newer Product version and plan

The screenshot shows the "Subscriptions" section of the IBM Product Lifecycle Management interface. In the "Credentials" panel, there is a "Client ID" field containing a redacted value and a "Client Secret" field with a "Verify" button. In the "Subscriptions" panel, a table lists a single row: "HelloWorld Product (2.0.0)" under "PRODUCT" and "unlimited-plan" under "PLAN". This row is highlighted with an orange border. A small "⋮" icon is to the right of the row.

PRODUCT	PLAN
HelloWorld Product (2.0.0)	unlimited-plan

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Figure 4-43. Migrate subscriptions between plans (3 of 3)

The subscription is migrated to the new Product version and plan, and those subscriptions are removed from the deprecated Product version and plan from which they were migrated.



Unsubscribing from a Product and plan

- An authenticated user can unsubscribe an application from a Product and plan in the Developer Portal

The figure consists of two screenshots of a web-based developer portal interface. Both screenshots have a yellow circle with a number indicating the step.

Screenshot 1: Shows the 'Subscriptions' section. A table lists a single subscription: 'HelloWorld Product (2.0.0)' under 'PRODUCT' and 'unllimited-plan' under 'PLAN'. To the right of the table is a vertical ellipsis menu. A mouse cursor hovers over the 'Unsubscribe' option in a dropdown menu that appears when the ellipsis is clicked. The number '1' is circled in yellow at the top center of the screenshot.

PRODUCT	PLAN
HelloWorld Product (2.0.0)	unllimited-plan

Screenshot 2: Shows the same 'Subscriptions' section after the unsubscribe action. The table now displays the message 'No subscriptions found. Why not browse the available APIs?' instead of listing the previous subscription. The number '2' is circled in yellow at the top center of the screenshot.

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Figure 4-44. Unsubscribing from a Product and plan

An authenticated user can unsubscribe an application from a Product and plan in the Developer Portal.

- The application is unsubscribed from the Product and the plan by selecting the Unsubscribe option.
- The application displays that there are no current subscriptions.



Manage subscriptions in API Manager (1 of 3)

- With the right permissions, a member of a provider organization can create subscriptions from the Applications page for a catalog
- Can be done for Product and plans that do not already have a subscription

The screenshot shows the "Manage / Staging Applications" interface. A table lists two applications: "helloapp" and "smart-application". The "helloapp" row has a context menu open, with the "Subscriptions" option highlighted in blue and a small orange square drawn around it. Other options in the menu include "Edit", "Credentials", "Promote to production", "Disable", and "Delete".

TITLE	APPLICATION TYPE	CONSUMER ORGANIZATION	STATE
> helloapp	Development	ordinal	Enabled
> smart-application	Development	ordinal	

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Figure 4-45. Manage subscriptions in API Manager (1 of 3)

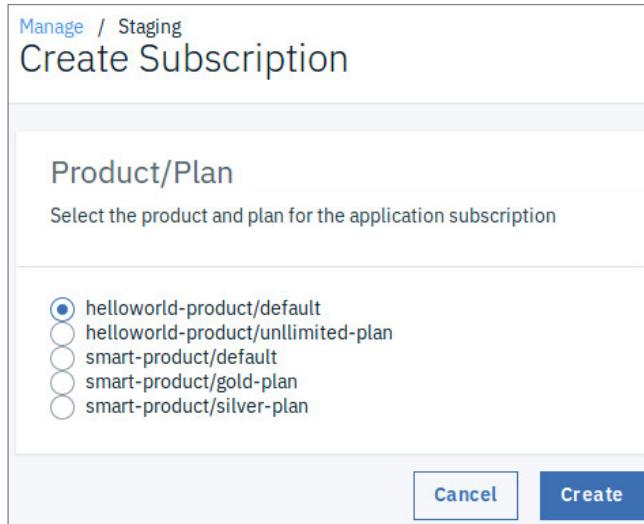
Members of provider organizations who have permission can create subscriptions from the API Manager user interface. Open the catalog. Then, select Applications from the Manage option.

From the Applications page for a catalog, select **Subscriptions** from the manage options for the application.



Manage subscriptions in API Manager (2 of 3)

- Select the Product and plan for the application subscription
- Then, select **Create**



The screenshot shows a modal dialog titled "Create Subscription". At the top left, it says "Manage / Staging". The main section is titled "Product/Plan" with the sub-instruction "Select the product and plan for the application subscription". Below this is a list of five options, each with a radio button:

- helloworld-product/default (selected)
- helloworld-product/unlimited-plan
- smart-product/default
- smart-product/gold-plan
- smart-product/silver-plan

At the bottom right of the dialog are two buttons: "Cancel" and "Create".

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Figure 4-46. Manage subscriptions in API Manager (2 of 3)

In the Create Subscription dialog in API Manager, select the Product and plan for the application subscription. Then, click **Create**.

In the Create Subscription dialog in API Manager, select the Product and plan for the application subscription. Then, click **Create**.

Manage subscriptions in API Manager (3 of 3)

- The subscription is created and can be seen in the application subscriptions on the Developer Portal

Subscriptions		
PRODUCT	PLAN	
HelloWorld Product (2.0.0)	default	⋮

Figure 4-47. Manage subscriptions in API Manager (3 of 3)

Verify that the subscription is created for the application by signing on to the Developer Portal and viewing the subscriptions for the application. You see that the application is subscribed to the Product and uses the default plan.

Verify that the subscription is created for the application by signing on to the Developer Portal and viewing the subscriptions for the application. You see that the application is subscribed to the Product and uses the default plan.



Enable approvals for lifecycle state changes (1 of 2)

- Approvals for lifecycle state changes are configured in the Settings for the catalog
 - Click **Edit** to add or remove lifecycle approvals

A screenshot of the "Lifecycle Approvals" page within the "Settings" section of the IBM Catalog interface. The left sidebar lists several tabs: Overview, Gateway Services, Lifecycle Approvals (which is selected and highlighted in blue), Roles, Role Defaults, Onboarding, and API User. The main content area is titled "Lifecycle Approvals" and contains the message "The following lifecycle actions require approval". A single item, "Publish", is listed with a green checkmark icon. To the right of the list is a blue "Edit" button. At the bottom of the page, there is a toggle switch labeled "Task self approval" with options "Off" and "On", currently set to "On".

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Figure 4-48. Enable approvals for lifecycle state changes (1 of 2)

Approvals for lifecycle state changes are configured in the Settings for the catalog. Then, click the **Lifecycle Approvals** tab.

The page displays the lifecycle states that require approval. In the example, only the Publish option requires approval. Click the **Edit** button to configure approvals for other lifecycle state changes.

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Enable approvals for lifecycle state changes (2 of 2)

- Select the lifecycle events that require approvals
 - Click **Save** to add or remove lifecycle approvals

Lifecycle Approvals

The following lifecycle actions require approval

Stage
 Publish
 Deprecate
 Retire
 Replace
 Supersede

Cancel **Save**

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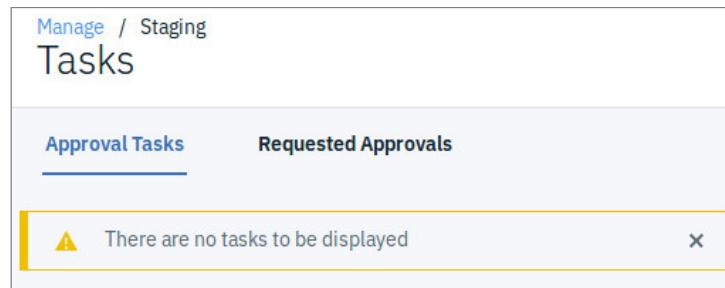
Figure 4-49. Enable approvals for lifecycle state changes (2 of 2)

When the Edit button is clicked from the Lifecycle Approvals page, a dialog is displayed where you can enable or disable lifecycle approvals.

If approval is required for a Product management operation, an approval request is sent and the Product version moves to the pending state. When the request is approved, the operation is completed.

Lifecycle state changes when approvals are enabled

- If approval is required for a product management operation, an approval request is sent and the Product version moves to the Pending state
- This request is displayed on the **Tasks** tab of the catalog, from where the request can be approved or declined
- When the request is approved, the operation is completed and the Product version moves to the next lifecycle state
 - If approval is not required, the operation is completed immediately



The screenshot shows a user interface for managing product lifecycle tasks. At the top, it says "Manage / Staging". Below that is a section titled "Tasks" with two tabs: "Approval Tasks" and "Requested Approvals". The "Approval Tasks" tab is currently selected. A message box in the center of the screen contains a yellow warning icon and the text "There are no tasks to be displayed". There is also a small "X" button in the top right corner of the message box.

Figure 4-50. Lifecycle state changes when approvals are enabled

If approvals for Product lifecycle changes have been enabled for a catalog, then an attempt to change the lifecycle state of a Product results in an approval request being sent. This request is displayed on the **Tasks** tab of the catalog, from where the request can be approved or declined. The authority to approve Product lifecycle state changes is restricted to users in specified roles.

Unit summary

- Describe provider organization roles and permissions
- Explain the Product lifecycle stages
- Describe how staging and publishing differ in development and production catalogs
- Describe how lifecycle events are managed in API Manager
- Explain the product availability and visibility settings
- Describe how to create versions of Products and APIs
- Explain the concept of replacing and superseding published Products
- Explain how to migrate application subscriptions to a new Product version and plan
- Explain how application subscriptions are created in API Manager
- Describe the state changes that occur when approvals are enabled

Figure 4-51. Unit summary

Review questions

1. True or False: An application must subscribe to a plan before it can be used.
2. Which of these statements is true about lifecycle changes in a development catalog?
 - A. Staging and publishing actions overwrite the existing version.
 - B. The system automatically resolves any staging or publishing conflicts.
 - C. All predefined roles can stage and publish API Products.
 - D. A and B
 - E. All of the above.



The Product lifecycle

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Figure 4-52. Review questions

Write your answers here:

- 1.
- 2.

Review answers

1. True or False: An application must subscribe to a plan before it can be used.
The answer is True.

2. Which of these statements is true about lifecycle changes in a development catalog?
 - A. Staging and publishing actions overwrite the existing version.
 - B. The system automatically resolves any staging or publishing conflicts.
 - C. All predefined roles can stage and publish API Products.
 - D. A and B.
 - E. All of the above.**The answer is D.**

In the API Manager Settings for a catalog, select Roles to edit the permissions for the catalog



Figure 4-53. Review answers

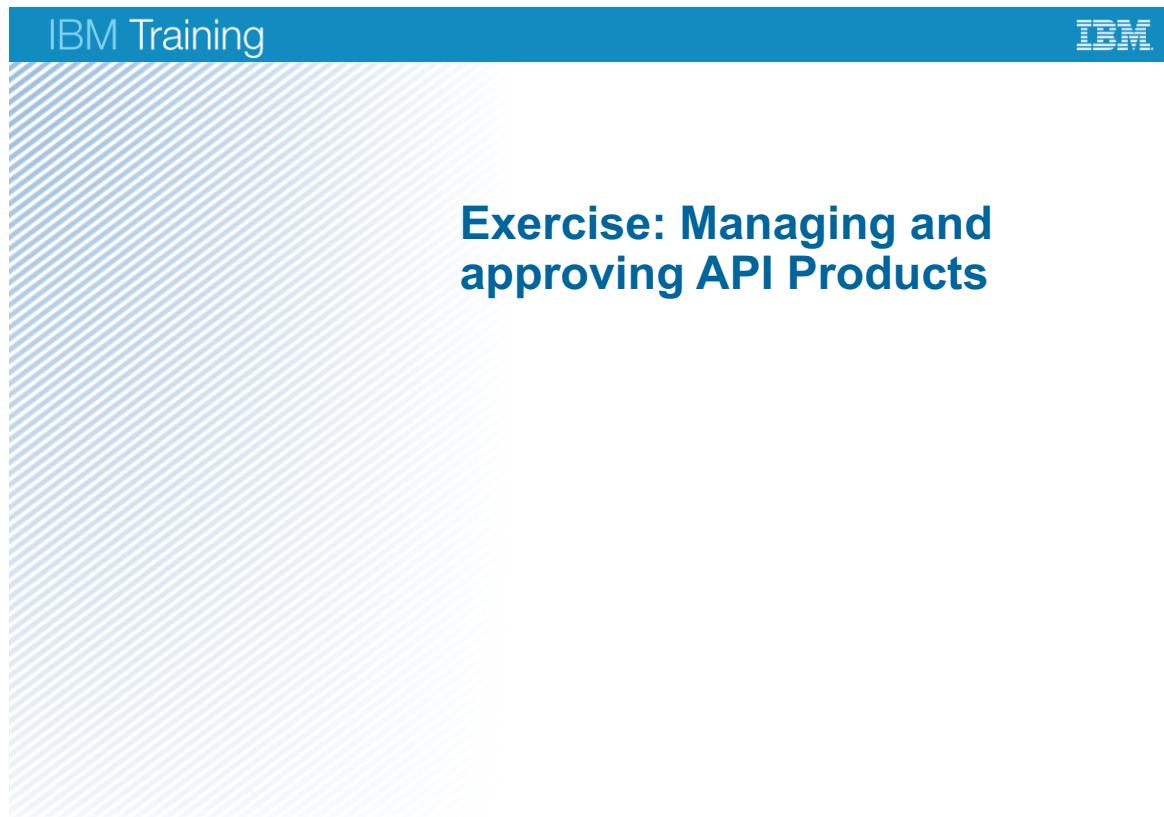


Figure 4-54. Exercise: Managing and approving API Products

Exercise objectives

- Review product availability and visibility settings
- Create and configure plans
- Review the roles and members of the provider organization
- Create a provider organization member with the developer role
- Sign in to API Manager with the owner role
- Configure lifecycle and approval settings
- Publish a Product and APIs to the Staging catalog
- Create a version of the API and Product
- Approve a published Product



Figure 4-55. Exercise objectives

Unit 5. Customizing the Developer Portal

Estimated time

00:45

Overview

As the administrator, you can change the appearance and layout of the Developer Portal. This unit describes the customization options that are available to you. You learn how to customize the Developer Portal through the administration menu, and examine the options for using themes and sub-themes on the Developer Portal.

How you will check your progress

- Review questions
- Lab exercise

Unit objectives

- Briefly explain the purpose of the Developer Portal
- Explain the role of the Drupal open source project in the Developer Portal
- Explain the concept of modules and themes
- List the roles that are defined in the Developer Portal
- Describe the Drupal terminology that is used when administering the portal
- Describe the various ways to create a theme for the Developer Portal
- Describe the use of sub-themes for customizing the standard API Connect Developer Portal theme

Figure 5-1. Unit objectives

Developer Portal

- The Developer Portal provides application developers a set of tools to find, subscribe, and test APIs in the API Connect cloud

API Products

- Smart Product 2.0.0
- HelloWorld 2.0.0

Self-service, customizable developer portal for API users, application registration, and subscription

API discovery and socialization

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Figure 5-2. Developer Portal

The API Connect Developer Portal provides a complete content management, and customizable developer portal for your APIs.

The Developer portal provides application developers a set of tools to find, subscribe, and test APIs that are built in the API Connect cloud.

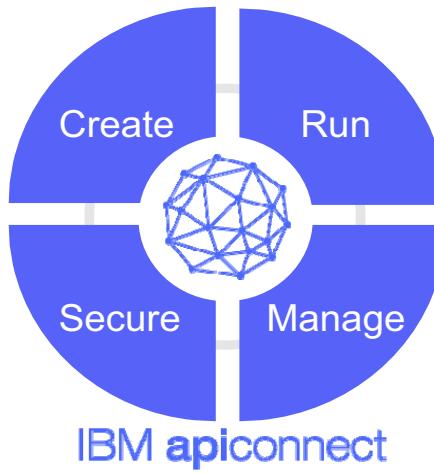
Components of API Connect

Toolkit

- The Development environment for creating APIs and defining the characteristics of the API exposure

Gateway services

- Process and manage security protocols and stores relevant user and appliance authentication data
- The Gateway servers also provide assembly functions that enable APIs to integrate with various endpoints, such as databases or HTTP-based endpoints



Customizing the Developer Portal

Containerized runtime

- A pod of runtime containers for APIs that are started
- Automated deployment, scaling, and management

Management services

- Manage the operations of the various servers in the API Cloud
- The Management servers also provide analytic functions that collect and store information about APIs and API users

Developer Portal services

- The Developer Portal enables API providers to build a customized developer portal for their application developers

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Figure 5-3. Components of API Connect

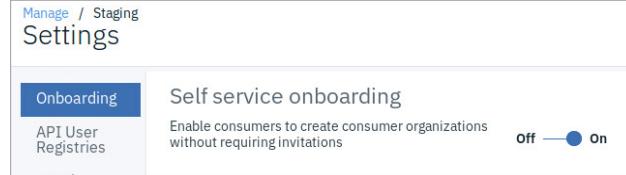
This page shows the components and capabilities of the IBM API Connect solution.

The Developer Portal enables API providers to build a customized developer portal for their application developers.



Features of the Developer Portal

- Self-service account creation (if enabled)
 - User can create an account on the Developer Portal
- Manage consumer organizations (owners)
 - Add users
 - View analytics
 - Create consumer organizations
- Authenticated users
 - Create applications
 - Manage subscriptions
- Portal administrators
 - Import custom themes
 - Customize layout and menus
 - Set permissions



Customizing the Developer Portal

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Figure 5-4. Features of the Developer Portal

Owners of a consumer organization can manage their communities and view analytics from the Developer Portal.

Authenticated Portal users who are granted permission, can create applications and manage subscriptions.

Portal administrators can customize the Developer Portal.

Powered by Drupal

- Drupal is a free, open source web content management tool for content, community, and commerce
 - LAMP (Linux, Apache, MySQL, and PHP) software
- Customizable platform
- Supports responsive websites to deliver optimal visitor experiences from any device
- Flexible content architecture
 - Admin interface
 - Display only the content appropriate for each display with Views
 - Customizable menus
- Content authoring
 - Authentication and permissions for editing workflows and content
- The Developer Portal is based on the open source Drupal 8 content management software
 - Customizable

Customizing the Developer Portal

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Figure 5-5. Powered by Drupal

Drupal is an open-source web content management platform.

The Drupal platform runs on LAMP, a software stack that consists of the Linux operating system, Apache web server, MySQL database, and the PHP scripting language.

The Developer Portal is based on the open source Drupal 8 content management software, and consequently is almost completely customizable.

Drupal modules

- A *module* (usually PHP and CSS) is a software component that makes up or extends Drupal features and function
- “Core”
 - Files and modules that are included with a Drupal version or download
- “Contributed”
 - Modules or themes that are not part of the Core Drupal product
 - Available for separate download from the modules or themes of Drupal.org download site
- You can extend your Developer Portal site by installing custom modules that you created, and also installing contributed modules from the Drupal 8 community
 - You must have administrator access to complete this task

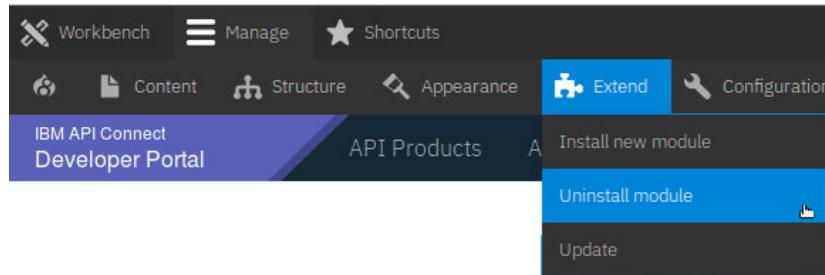
Figure 5-6. Drupal modules

You can extend your Developer Portal site by installing custom modules that you created, and also installing contributed modules from the Drupal 8 community. You must have administrator access to complete this task.



Disable modules

- You can disable an entire module in the Developer Portal to improve performance, or remove functionality
 - You must have administrator access to complete this task
- With the Manage option selected on the administration menu, select **Extend**. Then, select **Uninstall module**



- The list of modules is displayed
 - Select the module to be uninstalled
 - Click the Uninstall icon

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Figure 5-7. Disable modules

You can disable an entire module in the Developer Portal if you want to improve performance, or remove functionality. You must have administrator access to complete this task.

With the Manage option selected on the administration menu, click Extend. Then, select Uninstall module.

From the list of installed modules, select the module to be uninstalled. Then, click the Uninstall icon.



Drupal themes

- A *theme* is a collection of templates, configuration files, and asset files (JavaScript, CSS, images, fonts) which together determine the appearance of a site
- Contains elements such as headers, block layouts, and icons



Customizing the Developer Portal

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Figure 5-8. Drupal themes

A *theme* is a collection of templates, configuration files, and asset files (JavaScript, CSS, images, fonts) which together determine the appearance of a site.

Adminimal is a popular administration theme for Drupal.

Sub-themes

- Sub-themes are just like any other theme, with one difference:
 - The sub-theme inherits resources from the parent theme
 - You can then override specific resources to configure your required customizations
- The Developer Portal comes with a default API Connect theme
 - Directly editing the API Connect theme is not permitted or supported, as edited versions of these files are overwritten when product fixes or upgrades are installed
- Create a custom sub-theme of the standard API Connect theme that the Developer Portal uses by default
 - Your custom sub-theme CSS file needs to contain only the changes or overrides that you want to make from the default theme

Figure 5-9. Sub-themes

Drupal 8 sub-themes are just like any other theme, with one difference: they inherit resources from the parent theme.

The Developer Portal comes with a default API Connect theme.

Directly editing the API Connect theme is not permitted or supported, as edited versions of these files are overwritten when product fixes or upgrades are installed.

The way to create a custom theme is to create a custom sub-theme of the standard API Connect theme that the Developer Portal uses by default. A sub-theme inherits the parent theme's resources, and this means that your custom sub-theme CSS file needs to contain only the changes or overrides that you want to make from the default theme. The CSS file can contain as little or as many updates as you like.

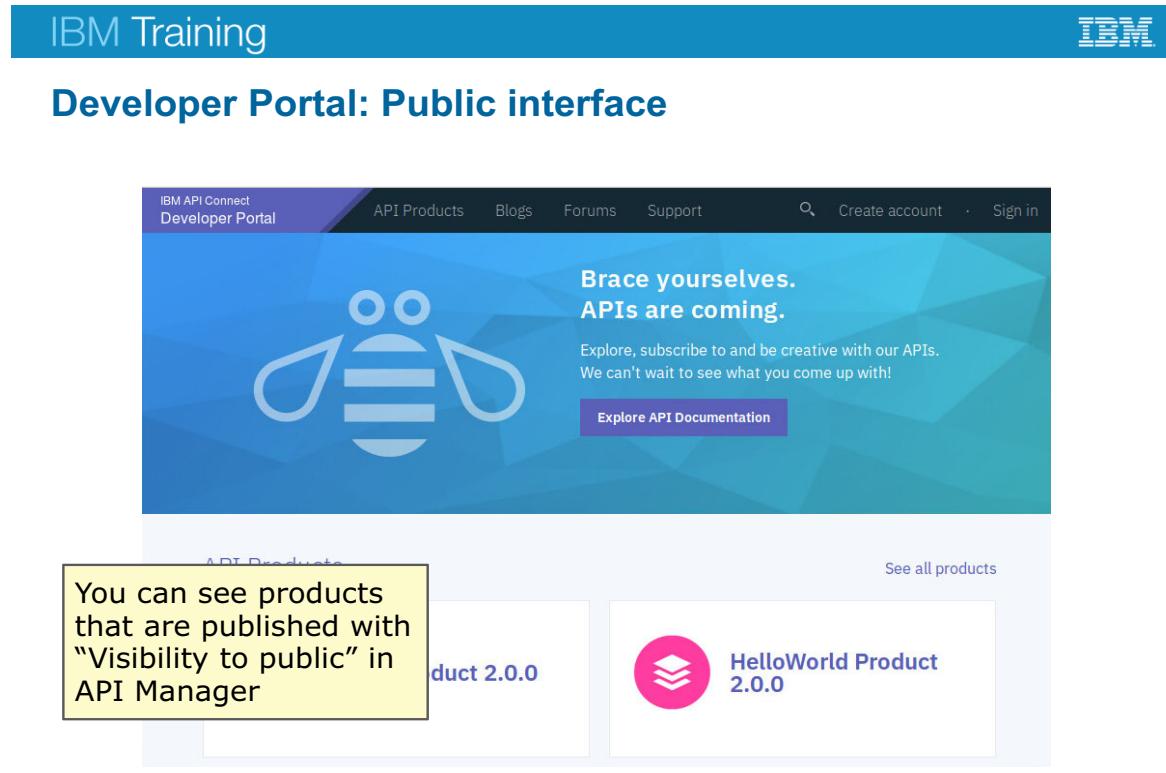


Figure 5-10. Developer Portal: Public interface

Any Products that are published with a visibility option of "Public" are displayed if the user click the **API Products** tab of the Developer Portal. The user does not need to sign on to the Developer Portal to view these Products and APIs.

Products that are published with visibility options other than "Public" are not visible on the portal for unauthenticated users.

You can have visibility set to "Public" and Subscribability set to "Authenticated". In this case, the Products are visible on the public interface of the Developer Portal but only authenticated users can subscribe to use the Product and APIs.



Developer Portal: Authenticated user

- Can see Products that are published with “Authenticated user” in API Manager
- Can also see Products that are published with “Public” in API Manager

A screenshot of the IBM API Connect Developer Portal. The top navigation bar includes links for API Products, Apps, Blogs, Forums, Support, and a search icon. On the far right, there's an 'Organization' dropdown, a user profile icon with the letter 'A', and a sign-in button labeled 'AppDeveloper'. The main content area is titled 'API Products' and displays two product cards. The first card is for 'HelloWorld Prod... 2.0.0' and the second is for 'Smart Product 2.0.0'. Both cards show a small icon, the product name, its version, and a five-star rating. A vertical orange bar is visible on the right side of the page.

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Figure 5-11. Developer Portal: Authenticated user

An authenticated user can see Products that are published with “Authenticated user” in API Manager.

In the example, the user is signed on to the Developer Portal and two Products are displayed with the **API Products** tab selected.

Portal roles

- By using roles, you can fine-tune the security and administration of Drupal
 - A role defines a group of users that have certain privileges as defined on the permissions page
- **Anonymous user:** Role that is used for users that do not have a user account or that are not authenticated
- **Authenticated user:** This role is automatically granted to all logged in users
- **Content author:** Role that is used to edit or add content
- **Forum moderator:**
Role that controls access to the portal forums
- **Administrator:**
Manages all other roles
- **Superuser:**
Access to all content

NAME	OPERATIONS
⊕ Anonymous user	Edit
⊕ Authenticated user	Edit
⊕ Forum Moderator	Edit
⊕ Content Author	Edit
⊕ Administrator	Edit
⊕ Superuser	Edit

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Figure 5-12. Portal roles

You can use roles to fine-tune the security and administration of Drupal. A role defines a group of users that have certain privileges as defined on the permissions page. Examples of roles include: anonymous user, authenticated user, moderator, administrator, and other roles. The administrator can define the names and order of the roles on your site. It is recommended to order your roles from least permissive (anonymous user) to most permissive (superuser).

The superuser role is assigned by default to the admin user when a Developer Portal site is enabled in the API Manager.

By default, Drupal comes with two user roles:

- **Anonymous user:** This role is used for users that do not have a user account or that are not authenticated.
- **Authenticated user:** This role is automatically granted to all logged in users.

The screenshot shows the 'People' list page in the IBM Training Developer Portal. At the top, there are tabs for 'List', 'Permissions', 'Roles', and 'Email'. Below the tabs, there are filters for 'Name or email contains', 'Status', and 'Role', all set to 'Any'. There is also a 'Permission' filter set to 'Any'. A 'Filter' button is present. An 'Action' dropdown menu is open, showing 'Add the Administrator role to the selected user(s)'. A 'Apply to selected items' button is below it. The main table has columns: USERNAME, STATUS, ROLES, MEMBER FOR, LAST ACCESS, and OPERATIONS. The 'MEMBER FOR' column is currently sorted by 'Last Access'. Three users are listed:

USERNAME	STATUS	ROLES	MEMBER FOR	LAST ACCESS	OPERATIONS
AppDeveloper	Active	• Forum Moderator	1 month	4 minutes 11 seconds ago	<button>Edit</button>
OrdinalOwner	Active	• Consumer Organization Owner	1 month	18 hours 27 minutes ago	<button>Edit</button>
admin	Active	• Administrator • Superuser	1 month	35 seconds ago	<button>Edit</button>

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Figure 5-13. List all members displayed in the Developer Portal

You can get a list of members that are defined on the Developer Portal by selecting the **People** option from the administration Manage menu.

By default, members are defined with a role of authenticated user.

You can define additional roles for a user on the Developer Portal by selecting the member, then selecting a role from the **Action** options sub-menu.



Information

From the standpoint of the default roles for the consumer organization, members are classified as administrators, owners, developers, or viewers in the settings for the catalog. The roles that are defined by the portal administrator are Drupal roles for managing the content that is provided in the Developer Portal.

Developer Portal terminology

- Regions
 - Specific areas of a Developer Portal site in which content can be placed
- Blocks
 - Boxes of content that are displayed in regions on the Developer Portal page
 - *Blocks* can be made available to your Developer Portal site by enabling specific modules
 - After a block is created, its appearance, size, and position can be modified
- Fields
 - Data types that can be added to an element
 - For example, Title, Body, Tags, Image
- Nodes
 - Each piece of content in a Developer Portal site is a *node*
 - For example, an article, blog entry, forum topic, or page
- Panels
 - A drag-and-drop Content Manager that you can use to visually design a layout, and place content within that layout

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Figure 5-14. Developer Portal terminology

You are recommended to understand the various Drupal concepts and terminology that are referenced throughout the Developer Portal.

For more information, see the topic “Concepts in the Developer Portal” in the IBM Knowledge Center for API Connect at

https://www.ibm.com/support/knowledgecenter/SSMNED_2018/com.ibm.apic.devportal.doc/capic_portal_devportal_concepts.html



Administration menu

- Menu is displayed when the *admin* user signs on to the Developer Portal
 - Responsive multi-level menu for administering the Portal



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Figure 5-15. Administration menu

The administration menu is displayed when the admin user logs in to the Developer Portal.

The menu is displayed either as a drop-down enabled responsive menu or the menu is displayed horizontally along the top of the Developer Portal on an expanded page.

Responsive web pages are mobile-friendly and they change according to the page size.

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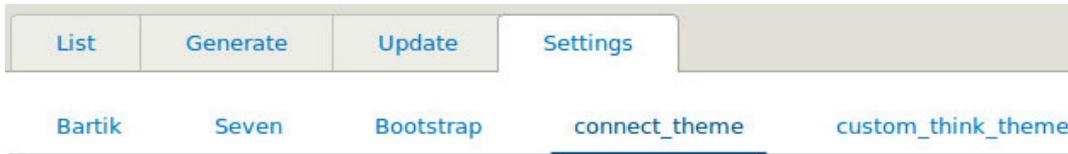
Figure 5-16. Status report

The status report gives an overview of the Developer Portal parameters and any problems that are detected with the installation. It might be useful to paste this information into support requests that are filed with IBM API Connect or drupal.org support forums.



View the enabled themes (1 of 2)

- From the Administration menu, select **Appearance > Settings**
- The **Settings** tab displays Global settings and settings for any other enabled themes
 - Global settings apply to all themes
- Five themes are enabled in the example
 - Bartik: A mobile first theme
 - Seven: An administration theme
 - Bootstrap: Built to use the Bootstrap framework for web pages
 - connect_theme: Default theme for the Developer Portal
 - custom_: Customized theme based on the IBM API Connect Theme
- One of the enabled themes is set as the default theme that is used by the Developer Portal



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Figure 5-17. View the enabled themes (1 of 2)

From the administration menu, select **Appearance**, then select **Settings**.

The tabs in the settings include the global settings and tabs for currently enabled themes.

Global settings control the default display settings for your entire site, across all themes. Unless they have been overridden by a specific theme, these settings are used.



View the enabled themes (2 of 2)

- From the Administration menu, select **Appearance > Settings**
 - Click the **List** tab to see screen captures of the enabled themes
 - The Administration menu can have its own theme
- In the example, the Seven theme is used as the administration theme
 - Selects the fonts, check boxes, and style for the administration of the Developer Portal

A screenshot of a web-based configuration interface titled "ADMINISTRATION THEME". It shows a dropdown menu labeled "Administration theme" with "Seven" selected. Below the dropdown is a note: "Choose 'Default theme' to always use the same theme as the rest of the site." There is a checkbox labeled "Use the administration theme when editing or creating content" followed by the text "Control which roles can 'View the administration theme' on the [Permissions page](#)". At the bottom is a blue "Save configuration" button.

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Figure 5-18. View the enabled themes (2 of 2)

Click the **List** tab from the settings menu to see thumbnail icons of the enabled themes.

You can select an administration theme in the dialog box by scrolling down when the **List** tab of the settings is selected.

You can choose to use the default scheme to use the same theme as the rest of the site, or you can use a different theme for the appearance of the content when working with the administration of the Developer Portal.

Theme creation

- Enable a theme in one of these ways:
 - a. Identify and use a theme that is provided by the Drupal community at drupal.org/project/project_theme

The screenshot shows the 'Install new theme' page. At the top, there's a message: 'There is a security update available for your version of Drupal. [available updates](#) page for more information and to install your update.' Below this, it says: 'You can find [modules](#) and [themes](#) on drupal.org. The following file ext...'. A red box highlights the word 'themes'. There's also a section for 'Install from a URL' with an input field and an example URL: 'For example: <https://ftp.drupal.org/files/projects/name.tar.gz>'.

- b. Extend the code of an existing theme by creating a sub-theme
 - Creating a sub-theme is the only supported option for changing the theme of the IBM-supplied API Connect Developer Portal

Figure 5-19. Theme creation

You can use themes to control the appearance of your Developer Portal site.

You can install a new theme from the administration Manage menu by selecting the option Appearance. Then, select Install new theme.

When you go to the drupal.org website, you can discover themes by using the search filter. For example, you can search for administration themes on the Drupal site. The Adminimal theme is one of the administration themes.



Note

You can import a different administration theme and replace the Seven administration theme.

Directly editing or replacing the API Connect theme entirely is not permitted or supported, as edited versions of these files are overwritten when product fixes or upgrades are installed.



Generate a sub-theme

- Generate a sub-theme of the latest Developer Portal theme from the administration Manage menu item. Select **Appearance**. Then, select **Generate sub-theme**
 - Give the sub-theme a name
 - Select the sub-theme type: CSS or SCSS
 - Choose one of the IBM-supplied templates for the theme

Sub-theme name*

A custom theme name, for example: 'mycustom_theme' or 'banka_theme'. The name does not need to end in '_theme' but it is a common convention.

Sub-theme type

CSS
 SCSS

Your sub-theme can be setup to use either CSS or SCSS. SCSS is an extension to CSS and is for more advanced theme developers.

Template

Default Connect Theme

Business Mono

Sapphire Blue

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Figure 5-20. Generate a sub-theme

Generate a sub-theme of the latest Developer Portal theme from the administration Manage menu item and give it a name. From the administration Manage menu, select **Appearance**. Then, select **Generate sub-theme**.

Provide a name for the sub-theme. Select the sub-theme style type. The choices are CSS or SCSS. Select one of the IBM-supplied color templates for the sub-theme. Then, click **Generate**.

Customize the sub-theme

- A compressed file with the sub-theme is generated and can be downloaded from the Developer Portal

 Success. Your sub-theme can be downloaded here: [custom_think_theme.zip](#).

- Download and expand the compressed sub-theme file
- Overwrite any style specifications in the sub-theme with the customizations that you require
 - A sub-theme inherits all the settings of its parent scheme, unless the settings are overridden
 - Most changes are made to the `overrides.css` file in the CSS folder
 - Refer to the Drupal documentation for customizing styles
- When customizations are completed, create an archive file for uploading to the Developer Portal

Figure 5-21. Customize the sub-theme

Download the generated sub-theme from the Developer Portal and then expand the archive. A sub-theme inherits all the settings of its parent scheme, unless the settings are overridden. Overwrite any style specifications in the sub-theme with the customizations that you require. Style changes can be made to the `overrides.css` file in the CSS folder in the expanded archive. Refer to the Drupal documentation for creating a sub-theme at [https://www.drupal.org/docs/8/theming-drupal-8/creating-a-drupal-8-sub-theme-or-sub-theme-of-su-b-theme](https://www.drupal.org/docs/8/theming-drupal-8/creating-a-drupal-8-sub-theme-or-sub-theme-of-sub-theme). When customizations are completed, create an archive file that is ready for uploading to the Developer Portal.



Install the sub-theme

- Install the customized sub-theme on the Developer Portal theme from the administration Manage menu item. Select **Appearance**. Then, select **Install new theme**
 - Then, upload the theme archive to install

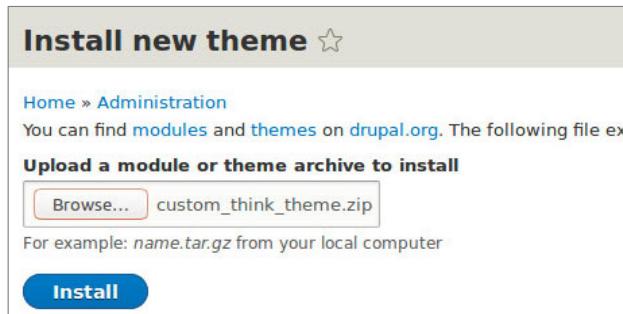


Figure 5-22. *Install the sub-theme*

You can install a theme from the Appearance > Install new theme option of the administration menu.

In the example, the theme is uploaded from an archive file.



Enable the theme

- When the new theme is installed, you can enable the theme in the Developer Portal

A screenshot of the "API Developer Portal Update manager". The title bar says "API Developer Portal" and "Update manager". Below the title, a green box contains the message "✓ Installation was completed successfully." Underneath, there is a section titled "custom_think_theme" with the sub-item "Installed custom_think_theme successfully". At the bottom, there is a "Next steps" section with two items: "Enable newly added themes" and "Administration pages".

Figure 5-23. Enable the theme

The page shows that the custom theme is successfully installed.

The next step is to enable the newly added theme.

You do this by clicking the Enable newly added themes link in the dialog.



Set the customized theme as the default

- When the new theme is enabled, you can set the theme as the default theme in the Developer Portal
 - The custom theme is now the theme that is used

The screenshot shows the IBM API Connect Developer Portal interface. At the top, there's a navigation bar with links for 'Developer Portal', 'API Products', 'Apps', 'Blog', 'Issues', and 'Support'. Below the navigation, there's a large banner with a bee icon and the text 'Brace yourselves. APIs are coming.' followed by 'Explore, collaborate and be creative with our APIs. You can't wait to see what you come up with!'. Underneath the banner, there are three main buttons: 'Sign up' (with a brief description: 'Create a new account and get started with our APIs. It's free to join.'), 'Explore our APIs' (with a brief description: 'Take a look at our APIs products and building first APIs to consume a fully functional application.'), and 'Create' (with a brief description: 'Subscribe to a plan and create your application to make use of our APIs.'). At the bottom of the page, there's a call-to-action button labeled 'Get started! Start building with our APIs today!' with a 'Explore API Documentation' link below it. To the right of the portal screenshot, there's a text box containing the following information:

custom_think_theme
Sub-theme of connect_theme.
[Settings](#) | [Disable](#) **[Set as default](#)**

Figure 5-24. Set the customized theme as the default

The newly added theme is enabled. You can now set the theme as the default theme in the Developer Portal.

When the theme is set as the default, the custom theme becomes the theme that is used by the Developer Portal.

Unit summary

- Briefly explain the purpose of the Developer Portal
- Explain the role of the Drupal open source project in the Developer Portal
- Explain the concept of modules and themes
- List the roles that are defined in the Developer Portal
- Describe the Drupal terminology that is used when administering the portal
- Describe the various ways to create a theme for the Developer Portal
- Describe the use of sub-themes for customizing the standard API Connect Developer Portal theme

Figure 5-25. Unit summary

Review questions

1. True or False: Public APIs are displayed on the public interface and on the interface for authenticated users of the Developer Portal.
2. True or False: Themes that you import should match the Drupal version



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Figure 5-26. Review questions

Write your answers here:

- 1.
- 2.

Review answers

1. True or False: Public APIs are displayed on the public interface and on the interface for authenticated users of the Developer Portal.
The answer is True.

2. True or False: Themes that you import should match the Drupal version.
The answer is True.



Figure 5-27. Review answers

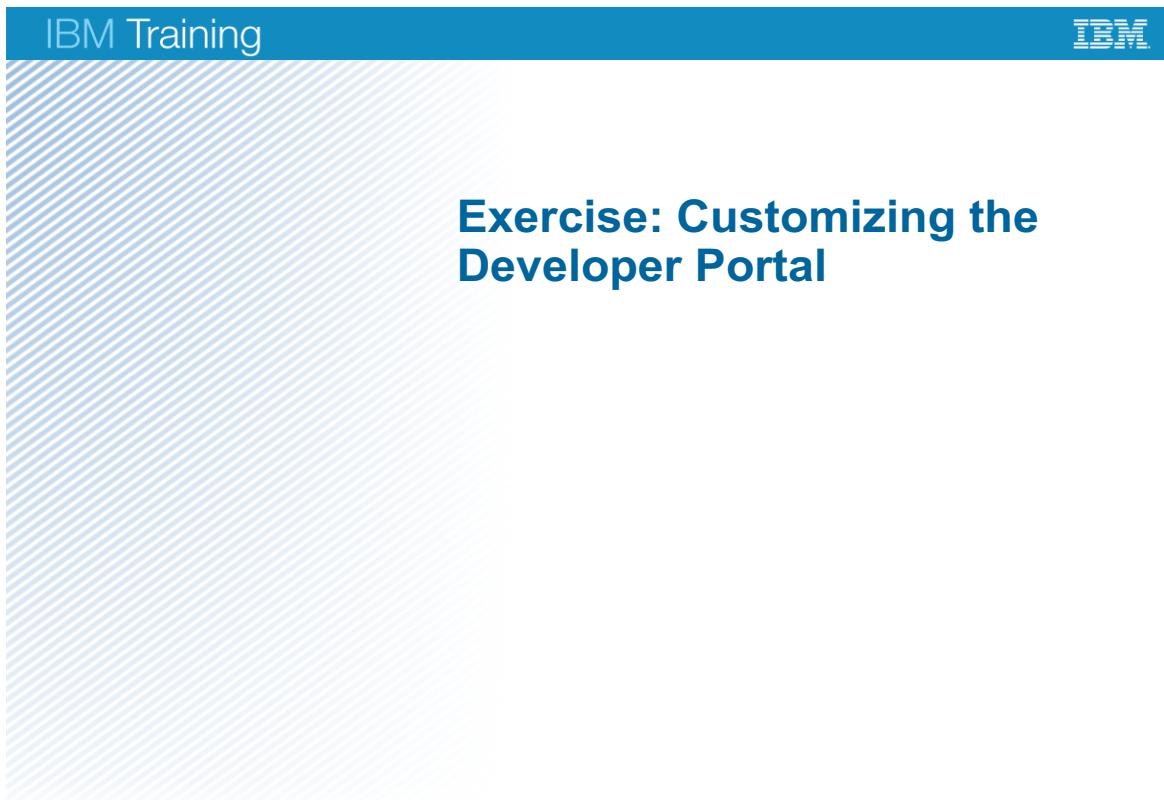


Figure 5-28. Exercise: Customizing the Developer Portal

Exercise objectives

- Sign in to the Developer Portal as a Portal administrator
- Generate a Developer Portal sub-theme
- Review and customize the sub-theme
- Install the sub-theme on the Developer Portal
- Review the forum features in the Developer Portal



Figure 5-29. Exercise objectives

Unit 6. Creating an application and subscribing to a plan

Estimated time

00:30

Overview

This unit covers the creation of an application and subscribing the application to a Product and plan on the Developer Portal. An application developer discovers APIs, plans, and Products that are published to the Developer Portal. The developer can review the details of the APIs and plans and can optionally test the API operations in the Developer Portal. To use APIs, an application developer creates an application in the Developer Portal, and then subscribes the application to a plan that is associated with the API and Product.

How you will check your progress

- Review questions
- Lab exercise

Unit objectives

- Review the published Products in API Manager
- Review the visibility settings for published Products and APIs
- Discover Products, plans, and APIs in the Developer Portal
- Describe how to create an application in the Developer Portal
- Describe how to subscribe to a Product plan

Figure 6-1. Unit objectives



Example: Review published Products

- List of published Products for a catalog in API Manager

The screenshot shows a table with three rows of product information:

TITLE	NAME	STATE
> HelloWorld Product	helloworld-product 1.0.0	Published
> Smart Product	smart-product 1.0.0	Deprecated

A context menu is open over the first row, listing options: Deprecate, Retire, Replace, Supersede, Set migration target, Update gateway services, and Edit visibility. The 'Edit visibility' option is highlighted.

Figure 6-2. Example: Review published Products

You can display the Products that are published by opening the catalog in API Manager. Then, go to the Products option from the navigation menu.

In the example, there is an helloworld-product 1.0.0 that is published and two versions of smart-product.

Next, you review the visibility for the helloworld-product 1.0.0 by selecting the Edit visibility from the list of options.

Example: Published Product visibility options

- The visibility options can be viewed or set for the published Product
- The Product is:
 - Visible to the public on the Developer Portal
 - Subscribable by authenticated users on the Developer Portal

The screenshot shows a user interface for managing a product's visibility. At the top, it says "Manage / Staging" and "HelloWorld Product". Below this, there are two main sections: "Visibility" and "Subscribability". In the "Visibility" section, there are three radio buttons: "Public" (selected), "Authenticated", and "Custom". In the "Subscribability" section, there are also three radio buttons: "Authenticated" (selected) and "Custom".

Visibility	
<input checked="" type="radio"/> Public	<input type="radio"/> Authenticated
<input type="radio"/> Custom	

Subscribability	
<input checked="" type="radio"/> Authenticated	<input type="radio"/> Custom

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Figure 6-3. Example: Published Product visibility options

From the **Products** tab for the catalog, select the Edit visibility option for a published Product.

The visibility options are displayed and can be changed.

The visibility and subscription options include:

- Public
- Authenticated
- Custom

The subscription options include:

- Authenticated
- Custom

Use the Custom option to make the Product visible or subscribable to a selected consumer organization.



Example: Display applications in API Manager

- View the applications and their subscriptions in API Manager
 - The smart-application is the only application in the example

The screenshot shows a table titled 'Manage / Staging Applications'. The table has columns: TITLE, APPLICATION TYPE, CONSUMER ORGANIZATION, and STATE. There is one row for 'smart-application', which is of type 'Development', associated with 'ordinal' consumer organization, and is 'Enabled'. To the right of the table is a context menu with options: Edit, Credentials, Subscriptions, Promote to production, Disable, and Delete.

TITLE	APPLICATION TYPE	CONSUMER ORGANIZATION	STATE
> smart-application	Development	ordinal	Enabled

Figure 6-4. Example: Display applications in API Manager

With the catalog opened, click Applications from the navigation menu in API Manager.

The list of applications is displayed.

If there are no subscriptions already for an application, you can create a subscription for the application, Product, and plan by selecting the Subscriptions option from the options list.



Discover the Products in the Developer Portal (1 of 2)

- View the publicly available Products by opening the Developer Portal

A screenshot of a web browser showing the "Acme Bark" developer portal. The URL in the address bar is https://portal.think.ibm/think/staging/. The page features a large blue banner with a bee icon and the text "Brace yourselves. APIs are coming. Explore, subscribe to and be creative with our APIs. We can't wait to see what you come up with! Explore API Documentation". Below the banner, there's a section titled "API Products" containing two items: "Smart Product 2.0.0" (blue icon) and "HelloWorld Product 1.0.0" (pink icon).

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Figure 6-5. Discover the Products in the Developer Portal (1 of 2)

View the publicly available Products by opening the Developer Portal.

The HelloWorld Product visibility is set to public, so it is visible on the public interface of the Developer Portal.



Discover the Products in the Developer Portal (2 of 2)

- View the APIs and plans for the Product

A screenshot of a product page titled "HelloWorld Product 1.0.0". The page shows a rating of 5 stars. Under "APIs", there is one entry: "HelloWorld 1.0.0". Under "Plans", there are two options: "Default Plan" and "Unllimited Plan". Each plan has a "Subscribe" button. A note at the bottom states: "In order to subscribe, you must create an account or sign in." A "View details" link is also present.

HelloWorld Product 1.0.0 ★★★★★

APIs

HelloWorld 1.0.0

Plans

In order to subscribe, you must create an account or sign in.

Default Plan	Unllimited Plan ↗
Subscribe	Subscribe

View details ▾

[Creating an application and subscribing to a plan](#)

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Figure 6-6. Discover the Products in the Developer Portal (2 of 2)

View the APIs and plans that are associated with this Product.

To create an application and subscribe to a plan, you must sign on.

Earlier, you saw that the subscribability option for the Product is set to authenticated user.

Application creation

- An **Application Developer** creates an application to use a Product and its associated APIs
- Then, the application must subscribe to a plan that is defined for the Product
 - By subscribing to a plan, the application establishes the contract for use of the Product and APIs
- An **API Developer** in the provider organization might add a **client ID** security requirement to the API
- The application that is registered to use the API must then provide a client ID to successfully call the API

Figure 6-7. Application creation



Questions

Why might the API developer enforce the client ID requirement for an application to access the API?

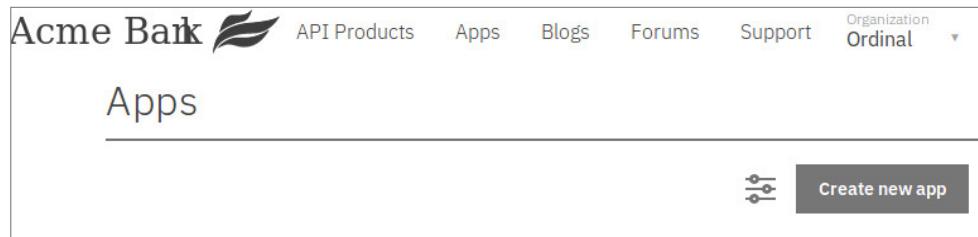
Answers:

1. To restrict API access to authorized applications or users.
2. To reset the client ID to exclude errant application usage.
3. For analytics, to monitor and track API usage by a particular client.



Create an application (1 of 4)

- Sign on to the Developer Portal as an application developer
- Select **Apps** from the menu
- Then, click **Create new App**



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Figure 6-8. Create an application (1 of 4)

Sign-in to the Developer Portal. Then, click the Apps link on the menu. The link that is named **Create new App** is available from the **Apps** tab on the Developer Portal.



Create an application (2 of 4)

- Type the name in the Title field and optional description
- Click **Submit**

Create a new application

Title *

Description

Application OAuth Redirect URL(s)

Add another item Remove

Submit

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Figure 6-9. Create an application (2 of 4)

In the first dialog box, you specify a title.

Optionally, specify a description and an OAuth redirect URI.



Create an application (3 of 4)

- Application is created
- Select the **Show** check box to display the client secret and client ID

The screenshot shows a 'Success' message: 'Application created successfully.' Below it is the 'API Key and Secret' section. It displays two generated keys: 'Key' and 'Secret', each followed by a 'Show' checkbox. A note below the keys says: 'The Secret will only be displayed here one time. Please copy your API Secret and keep it for your records.' At the bottom right is a 'Continue' button.

[Creating an application and subscribing to a plan](#)

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Figure 6-10. Create an application (3 of 4)

You can require that, when calling an API operation, an application must provide either a client ID, or a client ID and client secret.

The identification requirements for calling an API are specified in the API security definitions in API Manager.

These requirements include supplying a client ID, client ID and client secret, or none.

Select the **Show** check box to display the client secret and client ID.



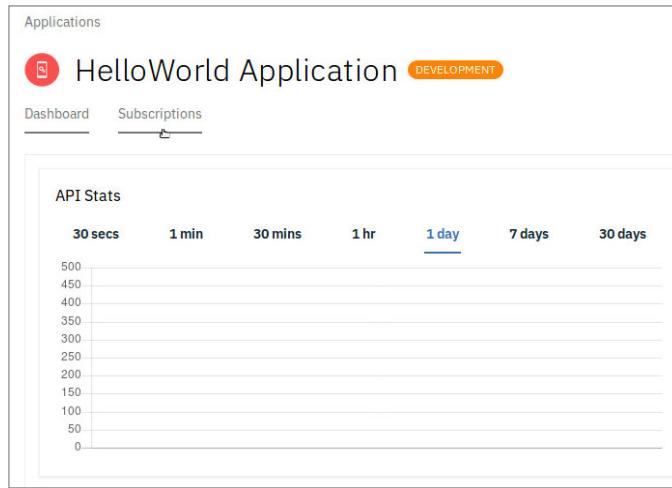
Information

If the API definition includes security such as requiring a client ID (`apiKey`) or client secret, then you must select the Show option to display these values. You must also record these values for later use.



Create an application (4 of 4)

- The application dashboard is displayed
- Select the **Subscriptions** link to view subscriptions



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Figure 6-11. Create an application (4 of 4)

The application is created and the application dashboard is displayed.

Next, you click the Subscriptions tab to create a subscription for the application.

Subscribe an application to a Product plan (1 of 6)

- You can browse the available APIs at the bottom of the registration form and subscribe to a plan
- Click the **available APIs** link

The screenshot shows a user interface for managing application credentials and subscriptions. At the top, there's a header bar with the IBM logo and the text "IBM Training". Below this, the main content area has two main sections: "Credentials" and "Subscriptions".
Credentials: This section contains fields for "Client ID" and "Client Secret". The "Client ID" field is filled with a long string of characters, and there is a "Show" link next to it. The "Client Secret" field is also filled with a long string of characters.
Subscriptions: This section has columns for "PRODUCT" and "PLAN". A message "No subscriptions found" is displayed, followed by a link "Why not browse the available APIs?". This link is highlighted with a red rectangular box.

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Figure 6-12. Subscribe an application to a Product plan (1 of 6)

The **available APIs** link is at the bottom of the page with the Client ID and Client secret.

Clicking the available APIs link takes you to the list of Products and their associated APIs. You can also navigate there from the API Products link on the Developer Portal menu.

Subscribe an application to a Product plan (2 of 6)

- The list of Products is displayed
- Click the link for the Product

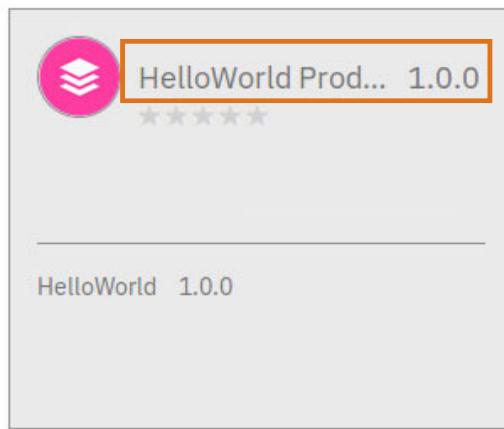


Figure 6-13. Subscribe an application to a Product plan (2 of 6)

Click the link for the Product to open the Product and view the list of APIs and plans.



Subscribe an application to a Product plan (3 of 6)

- Go to the Plans section
- Subscribe to a plan

The screenshot shows the HelloWorld Product page. At the top, there's a product icon and the text "HelloWorld Product 1.0.0" with a 5-star rating. Below that is a "APIs" section containing a single API entry: "HelloWorld 1.0.0". The main focus is the "Plans" section, which displays two plans side-by-side: "Default Plan" and "Unllimited Plan". Each plan has a "Subscribe" button below it. The "Default Plan" button is highlighted with an orange border. A "View details" link is located between the plans. At the bottom of the plans section, there's a note: "Requires subscription approval".

[Creating an application and subscribing to a plan](#)

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Figure 6-14. Subscribe an application to a Product plan (3 of 6)

You see the APIs for the Product.

Go to the Plans section of the Product page to view and subscribe to a plan.



Information

An application can only subscribe to one plan from a specific Product. Multiple plans within a single Product are useful in that they can fulfill similar purposes but with differing levels of performance. For example, you can have a "Demo Plan", which makes a single API available, and a "Full Plan", which makes several APIs available.

In this case, you need to register two different applications that each use a different plan from the Product.

Subscribe an application to a Product plan (4 of 6)

- Select the application that is to be subscribed to the plan
- Click **Select App**

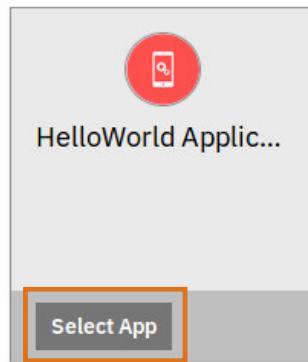


Figure 6-15. Subscribe an application to a Product plan (4 of 6)

Select the application that is being subscribed to the plan.

Subscribe an application to a Product plan (5 of 6)

- Confirm the subscription
- Click **Next**

Confirm Subscription

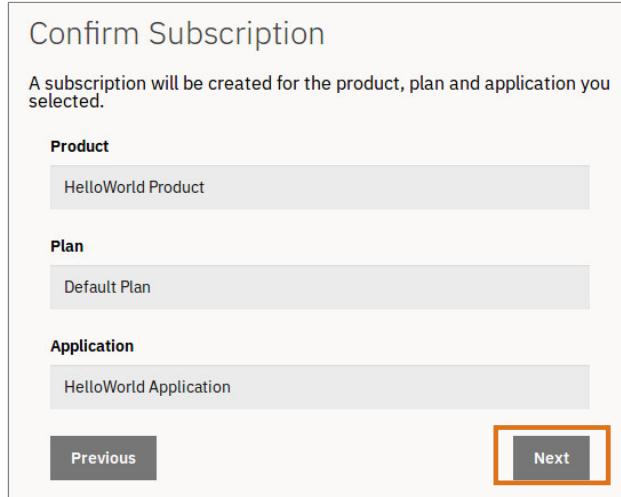
A subscription will be created for the product, plan and application you selected.

Product
HelloWorld Product

Plan
Default Plan

Application
HelloWorld Application

Previous **Next**



Creating an application and subscribing to a plan

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Figure 6-16. Subscribe an application to a Product plan (5 of 6)

The application is subscribed to the plan and can now call the APIs.

Subscribe an application to a Product plan (6 of 6)

- The subscription is complete
- The application can now call and test the APIs

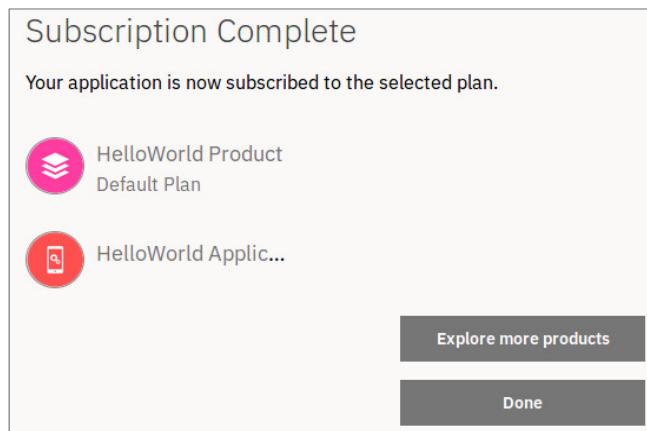
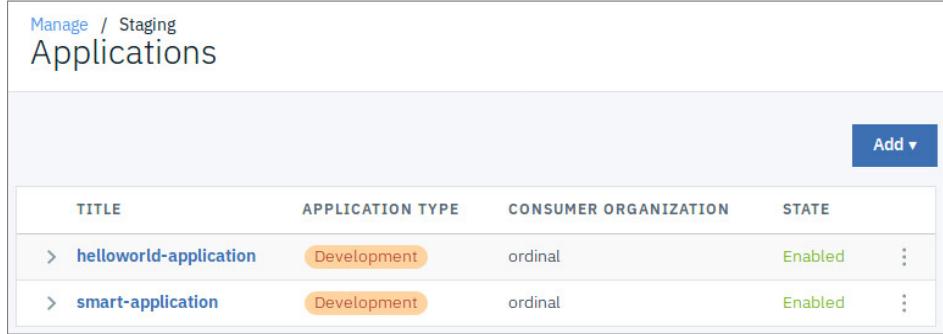


Figure 6-17. Subscribe an application to a Product plan (6 of 6)

The application is subscribed to the plan and can now call the APIs.



The screenshot shows the 'Applications' page in the IBM API Manager interface. At the top, there's a blue header bar with the text 'IBM Training' on the left and the 'IBM' logo on the right. Below the header, the title 'Application is visible in API Manager' is displayed in bold blue text. A bulleted list below the title states: '• The application is visible in API Manager'. The main content area is a table titled 'Manage / Staging Applications'. The table has columns: TITLE, APPLICATION TYPE, CONSUMER ORGANIZATION, and STATE. It contains two rows of data:

TITLE	APPLICATION TYPE	CONSUMER ORGANIZATION	STATE
> helloworld-application	Development	ordinal	Enabled
> smart-application	Development	ordinal	Enabled

Figure 6-18. Application is visible in API Manager

After the application is created and subscribed to a Product, it can be viewed and managed by the owner of the Provider organization in API Manager.

Unit summary

- Review the published Products in API Manager
- Review the visibility settings for published Products and APIs
- Discover Products, plans, and APIs in the Developer Portal
- Describe how to create an application in the Developer Portal
- Describe how to subscribe to a Product plan

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Figure 6-19. Unit summary

Review questions

1. True or False: The subscribable option can limit which consumer organization can subscribe to a Product plan if the subscribable option is set to Custom.
2. True or False: An application can subscribe to more than one plan from a specific Product.



Figure 6-20. Review questions

Write your answers here:

- 1.
- 2.

Review answers

1. **True** or False: The subscribable option can limit which consumer organization can subscribe to a Product plan if the subscribable option is set to Custom.

The answer is **True**.

Select **Custom** from the Subscribable by drop-down and then type an organization name, for example, **Ordinal**.



2. True or **False**: An application can subscribe to more than one plan from a specific Product.

The answer is **False**.

An application can subscribe to only one plan from a specific Product. Create a different application for each Product plan that you subscribe to.

Figure 6-21. Review answers

Exercise: Creating an application and subscribing to a plan

Creating an application and subscribing to a plan

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Figure 6-22. Exercise: Creating an application and subscribing to a plan

Exercise objectives

- Sign on as a developer to the Developer Portal
- Create an application that uses the published Product
- Subscribe to a plan
- Sign on to API Manager as the owner of the provider organization
- Stage a new version of the Product
- Supersede the published Product on the Staging catalog
- Review the results in the Developer Portal



Creating an application and subscribing to a plan

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Figure 6-23. Exercise objectives

Unit 7. API analytics

Estimated time

00:45

Overview

This unit describes the API analytics features in IBM API Connect. API analytics is built on the Kibana open source analytics and visualization platform. You review some default dashboards and visualizations that are provided with the API Connect analytics service.

How you will check your progress

- Review questions
- Lab exercise

Unit objectives

- Describe what is API Connect analytics
- Describe the role of the Kibana open source platform in the API Connect API analytics feature
- Describe where analytics are configured and captured
- Identify which user interfaces in API Connect provide access to analytical data
- Review analytics in the Developer Portal
- Describe the purpose of default dashboards
- Review the features of default visualizations
- Create a visualization
- Describe API events and event records
- Describe how to export analytics and API event data

Figure 7-1. Unit objectives



API analytics

- API Connect provides the capability to filter, sort, and aggregate your API event data
 - The data is then presented within correlated charts, tables, and maps
 - Help you manage service levels, set quotas, establish controls, and analyze trends
- The data for analytics is collated from API events that are logged when API operations are called on the gateway
- The analytics server provides analytic functions that collect and store information about APIs and applications

Default Availability Zone <small>Management</small>				Register Service	⋮
Register new services and manage existing services					
SERVICE	TYPE	ASSOCIATED ANALYTICS SERVICE	VISIBLE TO		
Gateway Service Classic	DataPower Gateway (Classic)	Associate Analytics Service	Public	⋮	⋮
Portal Service	Portal Service		Public	⋮	⋮
Analytics Service	Analytics Service			⋮	⋮

API analytics

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Figure 7-2. API analytics

API Connect provides the capability to filter, sort, and aggregate your API event data. This data is then presented within correlated charts, tables, and maps to help you manage service levels, set quotas, establish controls, and analyze trends.

The data for analytics is collated from API events that are logged when API operations are called on the gateway.

The analytics service provides analytic functions that collect and store information about APIs and applications.

The analytics service, gateway service, and portal service are configured in Cloud Manager. The analytics service is also associated with a gateway service in the Cloud Manager user interface.

You can disable all analytics collection by un-associating the analytics service from the gateway.

Open source analytics and visualization platform

- API analytics is built on the Kibana open source analytics and visualization platform, which is designed to work with the Elasticsearch real-time distributed search and analytics engine

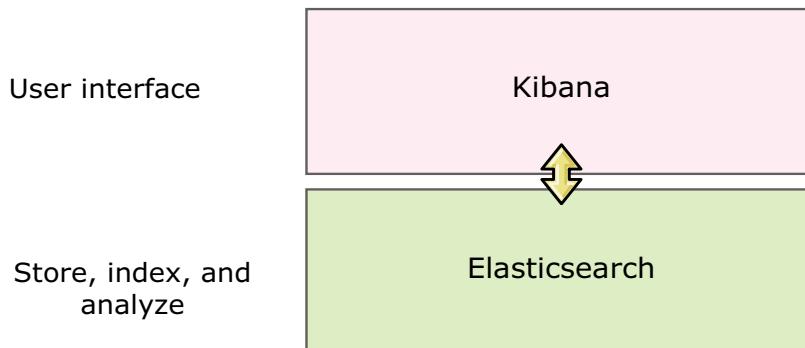


Figure 7-3. Open source analytics and visualization platform

API analytics in API Connect is built on the Kibana V5.5.1 open source analytics and visualization platform, which is designed to work with the Elasticsearch real-time distributed search and analytics engine.

The Elasticsearch engine performs logging, indexing, and analysis of log and metric data.

Data is retrieved from indexed data for all API events



Where analytics are accessed in API Connect

- Analytics data and the analytics visualization features are accessed in these user interfaces:
 - API Manager** for provider organizations
 - Developer Portal** for consumer organizations
- Access is controlled through the roles and permissions that are assigned to the members of the provider or consumer organizations

The screenshot shows the 'Role Defaults' section of the 'Consumer Organization' settings. It lists roles and their associated permissions. A red box highlights the 'App-analytics' permission under the 'Product' category.

Role	Permissions
Member	• View
Settings	• View
Org	• View
Product	• View • App-analytics
App	• View • Manage
App-dev	• Manage
Subscription	• View • Manage

Figure 7-4. Where analytics are accessed in API Connect

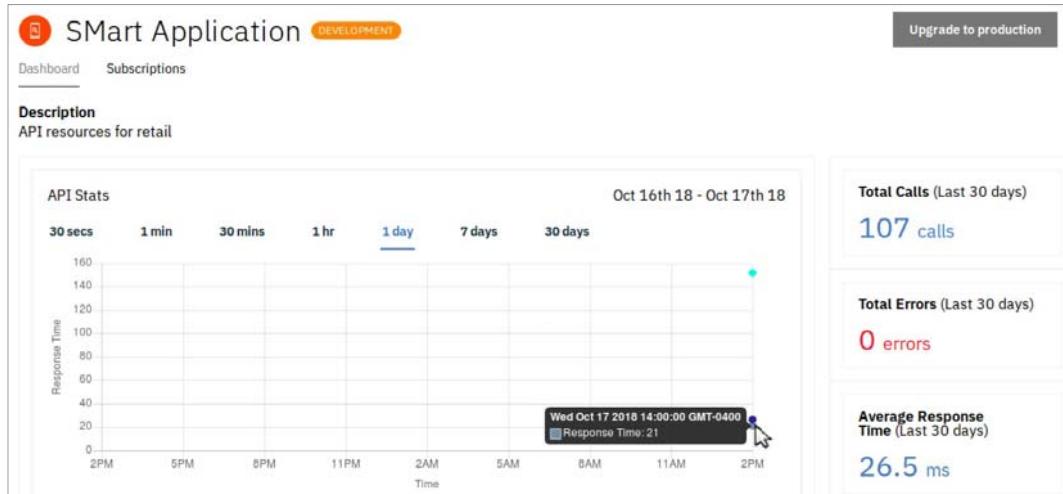
Access to the analytics data, and to the analytics functions, can be managed by using catalogs in the API Manager user interface.

You can view predefined or customized analytics information for your API Connect catalogs within dashboards.



Analytics in the Developer Portal (1 of 2)

- From the **Apps** menu
 - Dashboard tab displays graphs and metrics for the application



API analytics

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Figure 7-5. Analytics in the Developer Portal (1 of 2)

You can view analytics for APIs in the Developer Portal at the application and organization levels.

The information is displayed in dashboard views that show the analytics metrics in the form of visualizations, represented as charts.



Information

The analytics service uses the Client ID (apiKey) to map the application to the APIs that are called on the gateway. No analytical data is available in the Developer Portal for applications that use APIs where no security is configured.

IBM Training

Analytics in the Developer Portal (2 of 2)

- From the **My organization** drop-down menu of an organization owner
 - Analytics tab displays graphs and metrics for the application

Figure 7-6. Analytics in the Developer Portal (2 of 2)

From the Developer Portal, you can view interactive analytic information for all of the APIs within an organization.

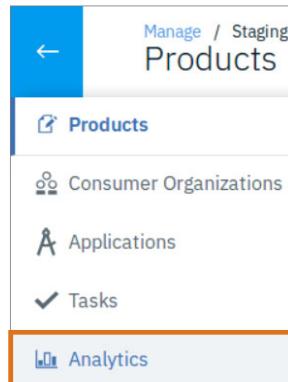
Information

In the example, the statistical values that are displayed are the same values for the organization as they are for the application that is shown previously.



Analytics in API Manager

- Open the catalog
- Select **Analytics** from the navigation menu
 - Then, you can view predefined or customized analytics information for your IBM API Connect catalogs within dashboards

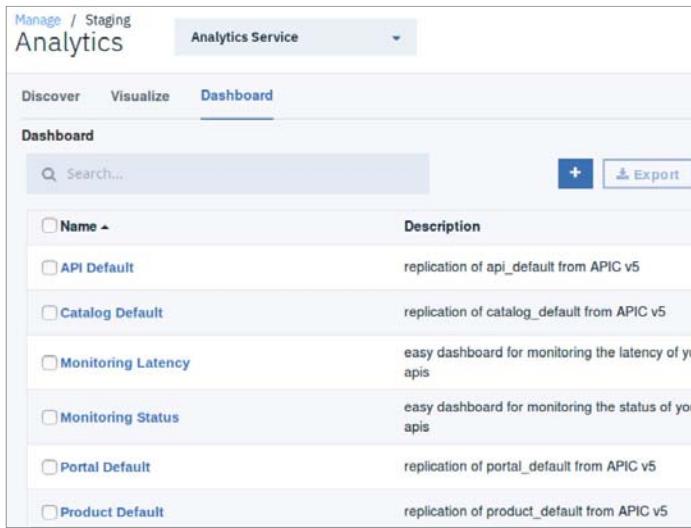


API analytics

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Figure 7-7. Analytics in API Manager

You can view predefined or customized analytics information for your IBM API Connect catalogs within dashboards. If spaces are enabled in your catalogs, you can also view predefined or customized analytics information for your API Connect spaces within dashboards.



The screenshot shows the 'Analytics dashboard for catalogs' interface. At the top, there's a navigation bar with 'Manage / Staging' and 'Analytics Service'. Below it, a menu bar has 'Discover', 'Visualize', and 'Dashboard' tabs, with 'Dashboard' being the active one. A search bar labeled 'Search...' and an 'Export' button are also present. The main area displays a table of dashboards:

Name	Description
API Default	replication of api_default from APIC v5
Catalog Default	replication of catalog_default from APIC v5
Monitoring Latency	easy dashboard for monitoring the latency of your apis
Monitoring Status	easy dashboard for monitoring the status of your apis
Portal Default	replication of portal_default from APIC v5
Product Default	replication of product_default from APIC v5

At the bottom left is a link 'API analytics', and at the bottom right is a copyright notice '© Copyright IBM Corporation 2018'.

Figure 7-8. Analytics dashboard for catalogs

API Connect analytics provides some preconfigured dashboards to view common analytics data.

A list of dashboards is displayed when you open the default dashboards page for the first time. These dashboards provide examples of the data that you can view when using the analytics dashboards. You can use these dashboards as they are, or clone them to customize them to your needs.



Example dashboard: Catalog default

- Information about the most used Products and APIs in your catalog

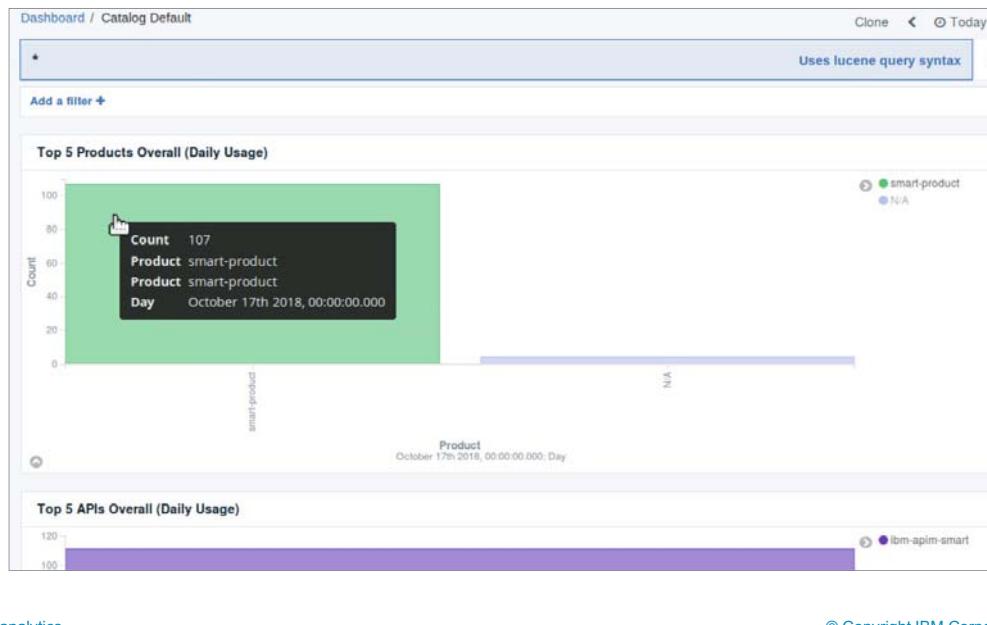


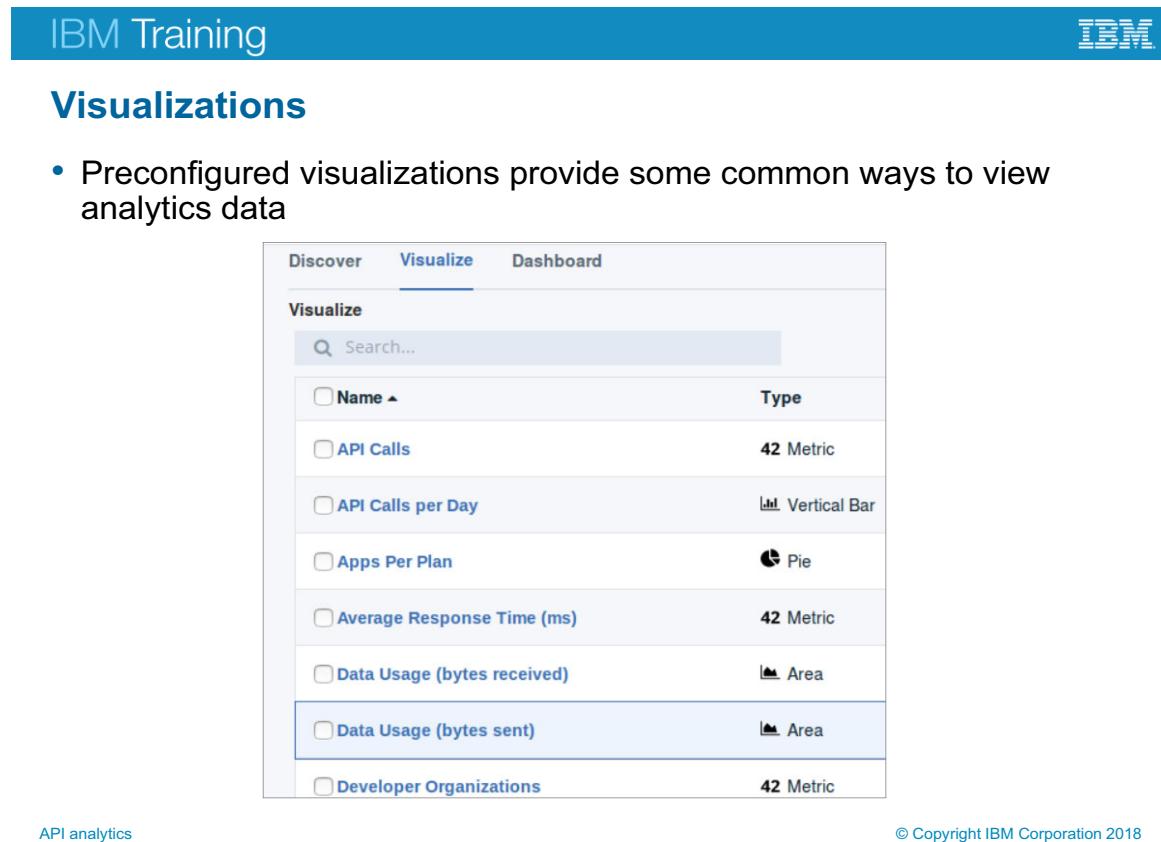
Figure 7-9. Example dashboard: Catalog default

The catalog default dashboard includes these visualizations:

- Top 5 Products overall (daily usage)
- Top 5 APIs overall (daily usage).

Dashboards are aggregations of visualizations.

Visualizations are described next.



The screenshot shows the 'Visualizations' section of the IBM Training interface. At the top, there are tabs for 'Discover', 'Visualize' (which is selected), and 'Dashboard'. Below the tabs is a search bar labeled 'Search...'. A table lists eight visualizations, each with a checkbox, a name, and a type icon:

	Name	Type
<input type="checkbox"/>	API Calls	42 Metric
<input type="checkbox"/>	API Calls per Day	Vertical Bar
<input type="checkbox"/>	Apps Per Plan	Pie
<input type="checkbox"/>	Average Response Time (ms)	42 Metric
<input type="checkbox"/>	Data Usage (bytes received)	Area
<input type="checkbox"/>	Data Usage (bytes sent)	Area
<input type="checkbox"/>	Developer Organizations	42 Metric

At the bottom left is the text 'API analytics' and at the bottom right is the copyright notice '© Copyright IBM Corporation 2018'.

Figure 7-10. Visualizations

Visualizations apply a series of search criteria to the indexed data and then graphically present the results in a convenient format for analysis or review.

A list of visualizations is displayed when you open the visualization application page for the first time, or when you select Visualize in the application selector on the Analytics page.

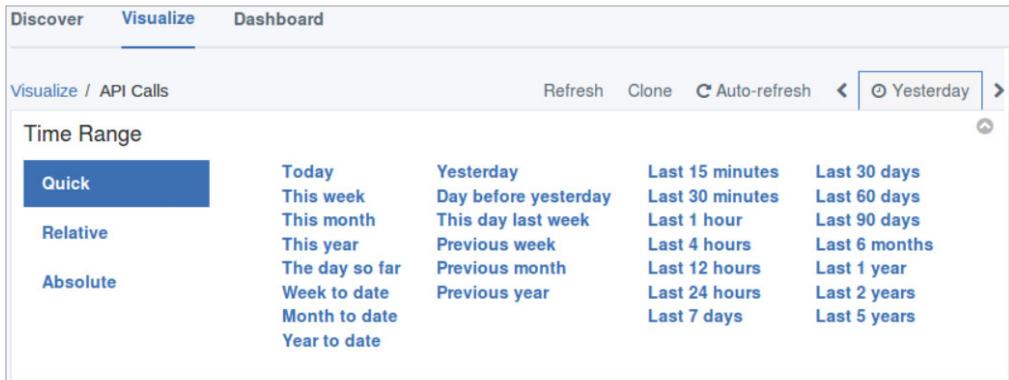
For more information on the default visualizations, see the IBM Knowledge Center for API Connect 2018 at

https://www.ibm.com/support/knowledgecenter/SSMNED_2018/com.ibm.apic.apionprem.doc/rapi_m_analytics_default_visualizations.html

The screenshot shows the IBM Training interface with the 'Visualize' tab selected. The main title is 'Example visualization: API calls'. Below it, the visualization title is 'API Calls'. A large number '111' is displayed under the heading 'Total API Calls'. The interface includes a search bar with the placeholder 'Uses lucene query syntax' and a filter button 'Add a filter +'. Navigation buttons for 'Refresh', 'Clone', and date range 'Yesterday' are also visible.

Figure 7-11. Example visualization: API calls

API calls is one of the default visualizations that is provided with API Connect analytics.



The screenshot shows the 'Visualize' tab selected in the top navigation bar. Below it, the 'API Calls' section is active. A dropdown menu titled 'Time Range' is open, showing three categories: 'Quick', 'Relative', and 'Absolute'. The 'Quick' category is highlighted with a blue background. It contains several pre-defined time ranges: Today, Yesterday, Last 15 minutes, Last 30 days; This week, Day before yesterday, Last 30 minutes, Last 60 days; This month, This day last week, Last 1 hour, Last 90 days; This year, Previous week, Last 4 hours, Last 6 months; The day so far, Previous month, Last 12 hours, Last 1 year; Week to date, Previous year, Last 24 hours, Last 2 years; Month to date, Year to date, Last 7 days, Last 5 years.

Figure 7-12. Visualization filters



Example visualization: Top 5 APIs overall daily usage

- Horizontal chart of top 5 API calls made filtered by time period

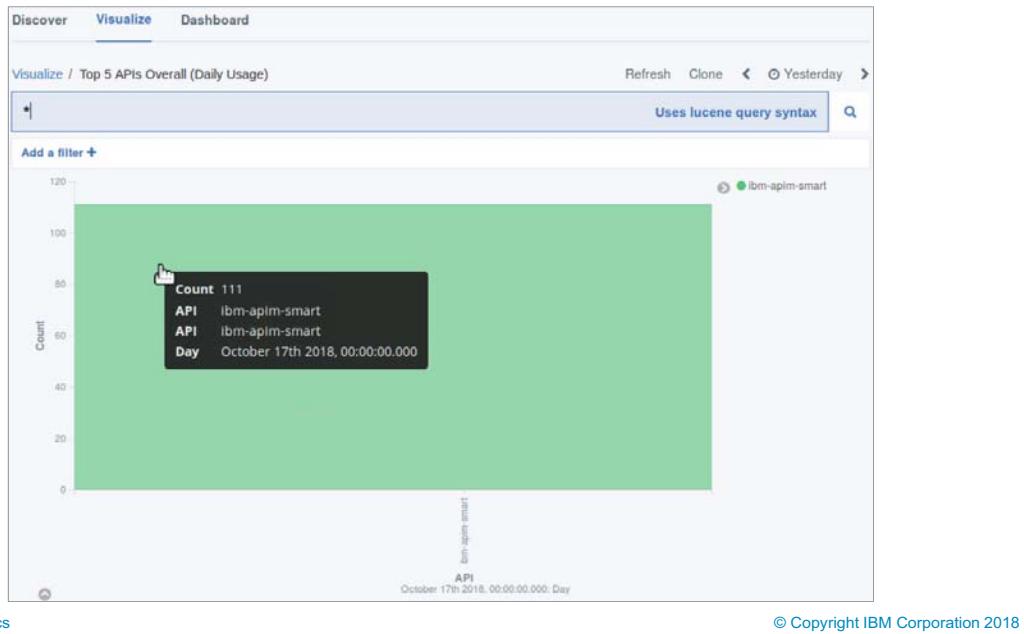


Figure 7-13. Example visualization: Top 5 APIs overall daily usage

The visualization of the top 5 APIs overall by daily usage displays a graph of the 5 APIs that get the most calls on a daily basis.



Example visualization: Status codes (detailed)

- Pie chart of status codes for API calls made filtered by time period
- Hover of different areas of the chart to display detailed values

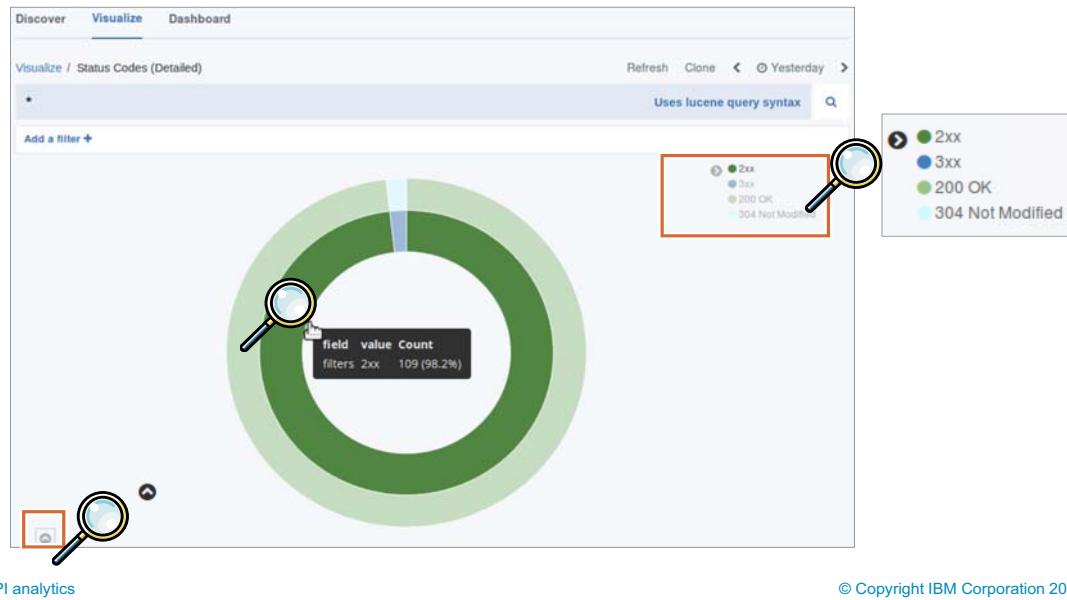


Figure 7-14. Example visualization: Status codes (detailed)

Status codes (detailed) lists the status codes for the API calls.

You can hover over the different areas of the pie chart to display the metrics for the different status codes.

The legend can be toggled to be displayed or hidden.

By clicking the selector at the bottom left on the page, you open the page to the table of the metrics for the pie chart. The table is shown on the next page.



Example visualization: Status codes (detailed)

- Table with the different status codes
- Toggle at the lower left returns you to the pie chart

Visualize / Status Codes (Detailed) Refresh Clone < ⏪ Yesterday ⏩ [Uses lucene query syntax](#) [Q](#)

Add a filter +

Table

filters	Count	status_code.keyword: Descending	Count
1xx	0		
2xx	109	200 OK	109
3xx	2	304 Not Modified	2
4xx	0		
5xx	0		

Export: Raw [Raw](#) Formatted [Formatted](#) Page Size

API analytics

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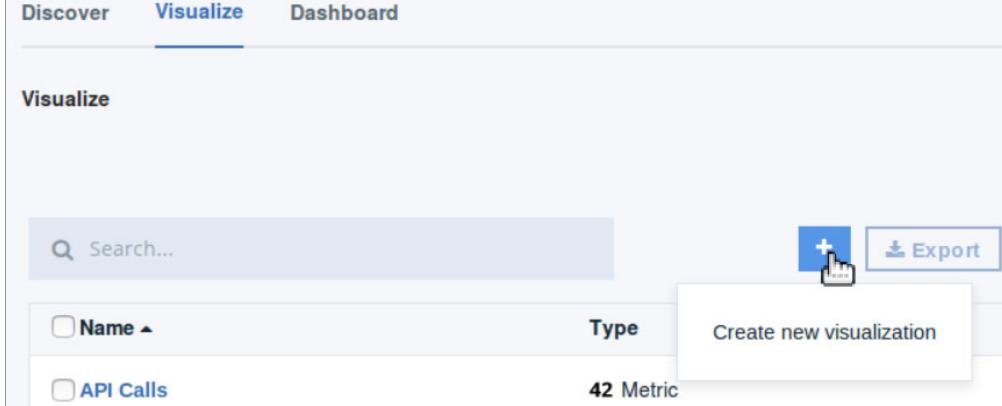
Figure 7-15. Example visualization: Status codes (detailed)

When the selector switch on the pie chart is clicked, the table with the different status codes and their count is displayed. Clicking the selector switch from the table returns you to the pie chart.

IBM Training 

Create visualizations (1 of 7)

- You can create visualizations from the default visualizations
 - Click **Create new visualization** from the Visualize page



The screenshot shows the API Manager Analytics interface. The top navigation bar has tabs for 'Discover', 'Visualize' (which is selected and highlighted in blue), and 'Dashboard'. Below the tabs is a search bar with the placeholder 'Search...'. To the right of the search bar are two buttons: a blue '+' button with a hand cursor icon and a white 'Export' button with a download icon. A tooltip 'Create new visualization' is displayed over the '+' button. Below the search bar is a table with two rows. The first row has columns for 'Name' (with a dropdown arrow) and 'Type'. The second row has columns for 'API Calls' and '42 Metric'. The bottom left corner of the interface shows 'API analytics' and the bottom right corner shows '© Copyright IBM Corporation 2018'.

Figure 7-16. Create visualizations (1 of 7)

Create your own analytical graphs from the API Manager Analytics Visualize tab by clicking the Create new Visualization icon.



Create visualizations (2 of 7)

- Select from one of the available visualization types

A screenshot of a user interface for creating visualizations. It is divided into sections: "Basic Charts" containing icons for Area, Heat Map, Horizontal Bar, Line, Pie, and Vertical Bar charts; and "Data" containing icons for Data Table, Gauge, Goal, and Metric. The "Data Table" icon is highlighted with a blue border and a cursor icon, indicating it is selected. The interface has a light gray background with white cards for each visualization type.

API analytics

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Figure 7-17. Create visualizations (2 of 7)

Select from one of the available visualization types, such as Data Table.



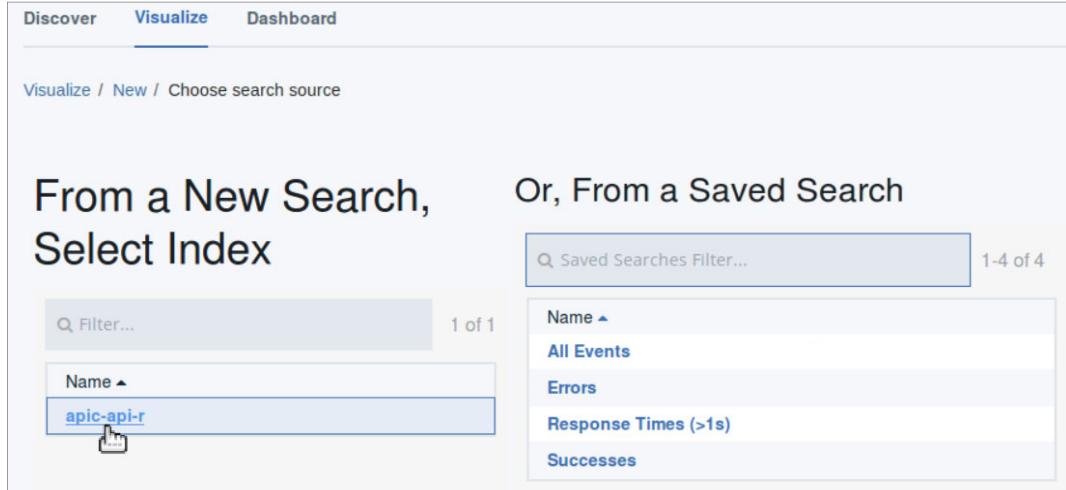
Information

Creating your own visualization from a visualization type such as Area chart or Line chart requires some knowledge of the underlying data indexes and the type of metrics and bucket types that you want to display on the X- and Y- axis.

IBM Training 

Create visualizations (3 of 7)

- Select the index for the search
 - The default API Connect search index is used in the example



The screenshot shows the 'Visualize' tab selected in the top navigation bar. Below it, the path 'Visualize / New / Choose search source' is displayed. The main area is split into two sections: 'From a New Search, Select Index' on the left and 'Or, From a Saved Search' on the right.

From a New Search, Select Index: This section contains a search bar labeled 'Filter...' and a table with one row. The table has columns for 'Name' and 'Count'. The single row shows 'apic-api-r' with a count of 1. A cursor icon is positioned over the 'apic-api-r' entry.

Or, From a Saved Search: This section includes a search bar labeled 'Saved Searches Filter...', a page number '1-4 of 4', and a table with five rows. The table has columns for 'Name' and 'Count'. The rows are: 'All Events' (Count 1), 'Errors' (Count 0), 'Response Times (>1s)' (Count 0), and 'Successes' (Count 0).

Figure 7-18. Create visualizations (3 of 7)

Choose the index that is used by the search. In the example, the default API Connect index is used.

The screenshot shows the IBM Analytics Service interface. At the top, there's a blue header bar with the text "IBM Training" on the left and the "IBM" logo on the right. Below the header, the title "Create visualizations (4 of 7)" is displayed in a large, bold, dark blue font. Underneath the title, there's a bullet point list: "Configure Data and Options". The main content area is a web-based configuration tool. It has a navigation bar with tabs: "Discover", "Visualize" (which is currently selected), and "Dashboard". Below the tabs is a search bar with placeholder text "Search... (e.g. status:200 AND extension:PHP)". To the right of the search bar are buttons for "Save", "Refresh", "Clone", and "Today". A "Uses lucene query syntax" link and a magnifying glass icon are also present. On the left side of the main area, there's a sidebar for a dataset named "apic-api-r". The sidebar has three tabs: "Data", "Options", and "metrics". The "metrics" tab is active, showing a single metric named "Metric" with a "Count" field set to 1. There's also a "buckets" section with a "Select buckets type" dropdown containing "Split Rows" and "Split Table" options. On the right side of the main area, there's a visualization panel titled "Count" with the value "111". At the bottom of the interface, there are two footer links: "API analytics" on the left and "© Copyright IBM Corporation 2018" on the right.

Figure 7-19. Create visualizations (4 of 7)

Configure any changes that you wish to make to the Data and Options for the visualization.
Then, click **Save**.

The screenshot shows a web-based IBM training interface. At the top, there's a blue header bar with the text "IBM Training" on the left and the "IBM" logo on the right. Below the header, the title "Create visualizations (5 of 7)" is displayed in a large, bold, dark blue font. Underneath the title, there are two bullet points: "Give the visualization a title" and "Then, save the configured visualization". The main content area is a light gray box containing a form titled "Save Visualization". Inside the form, there is a text input field with the placeholder "My table Visualization" and a blue "Save" button at the bottom. At the very top of this content area, there are navigation tabs: "Discover", "Visualize" (which is underlined, indicating it's the active tab), and "Dashboard". Above the "Save" button, there are several small, faint icons: a gear, a magnifying glass, a person icon, and a refresh symbol. To the right of the "Save" button, there are links for "Save", "Refresh", "Clone", and date/time controls ("Today").

Figure 7-20. Create visualizations (5 of 7)

Give the visualization a title and save the new visualization.



Create visualizations (6 of 7)

- The new visualization is displayed in the visualizations list
- Select the newly created visualization in the Visualization Filter

A screenshot of the Analytics Service interface. The top navigation bar shows "Manage / Staging" and "Analytics Service". The main area displays a list of visualizations with columns for name, type, and owner.

Name	Type	Owner
Data Usage (bytes received)	Area	ADMIN
Data Usage (bytes sent)	Area	ADMIN
Developer Organizations	42 Metric	ADMIN
Errors	Vertical Bar	ADMIN
Maximum Response Time (ms)	42 Metric	ADMIN
Minimum Response Time (ms)	42 Metric	ADMIN
My table Visualization	Data Table	CATALOG
Response Times (ms)	Line	ADMIN

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Figure 7-21. Create visualizations (6 of 7)

Select the newly-created visualization from the visualizations list.



Create visualizations (7 of 7)

- The new visualization is displayed on the page

A screenshot of the IBM Watson Studio interface. The top navigation bar has tabs for "Discover", "Visualize" (which is selected), and "Dashboard". Below the tabs, the title is "Visualize / My table Visualization". There are buttons for "Save", "Refresh", "Clone", and a refresh icon. A search bar says "Search... (e.g. status:200 AND extension:PHP)". To the right, it says "Uses lucene query s". Below the search bar is a button "Add a filter +". A table row is shown with a circular icon, the label "Count", and the value "111".

Count	111

Figure 7-22. Create visualizations (7 of 7)

The visualization is displayed on the page.

API events and records

- An *API event* is logged each time an API operation is called
- An *event record* is generated for each API event in the gateway server
 - Contains information about the API call
- When an analytics service is associated with a gateway, events are captured
- The captured event data can be viewed in the API Manager or offloaded to third-party systems

Figure 7-23. API events and records

An API event is logged each time an API operation is invoked, and an event record is generated for each API event in the gateway server.

The API event record contains information about the API call and the content of the record depends on the logging policy that is set for the operation.

The API event records are stored by the Analytics component of API Connect.



Export data from visualizations (1 of 3)

- Export visualization event data
 - Select the visualization
 - Then, click Export

A screenshot of the IBM API Connect Visualize interface. The top navigation bar has tabs for "Discover", "Visualize" (which is selected and highlighted in blue), and "Dashboard". Below the tabs, the page title is "Visualize". There is a search bar with the placeholder "Search...". To the right of the search bar are two buttons: a red square with a white trash icon and a blue square with a white export icon. The export icon is highlighted with a red box. Below the search bar is a table header with columns "Name" and "Type". Under "Name", there is a checkbox next to "API Calls" which is checked. Under "Type", it says "42 Metric". At the bottom left of the interface, it says "API analytics".

API analytics

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Figure 7-24. Export data from visualizations (1 of 3)

You can export visualizations so they can be imported by other IBM API Connect users, or into other catalogs on your system.



Export data from visualizations (2 of 3)

- Choose to save the file, which is named `export.json` by default, or open it with an application that is configured for your browser

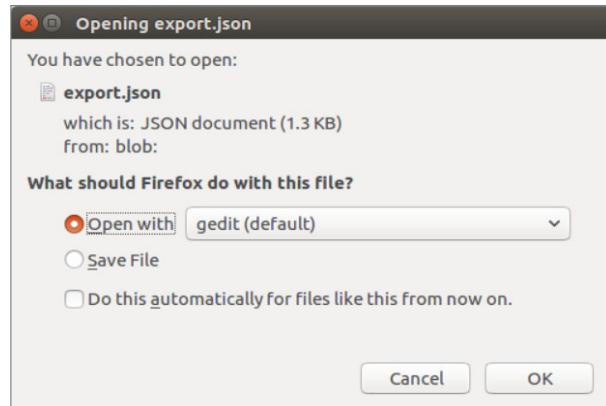


Figure 7-25. Export data from visualizations (2 of 3)

Choose to save the file, which is named `export.json` by default, or open it with an application that is configured for your browser.

Export data from visualizations (3 of 3)

- The exported JSON file is displayed in the editor

```
[{"_type": "visualization",
"_source": {
  "title": "API Calls",
  "visState": "{\"title\":\"API Calls\",\"type\":\"metric\",\"params\":{\"addTooltip\":true,\"addLegend\":false,\"type\":\"gauge\"},\"gauge\":[
    {"verticalSplit":false,\"autoExtend\":false,\"percentageMode\":false,\"gaugeType\":\"Metric\",\"gaugeStyle\":\"Full\",\"backStyle\":\"Full\",
    \"orientation\":\"vertical\",\"colorSchema\":\"Green to Red\",\"gaugeColorMode\":\"None\",\"useRange\":false,\"colorsRange\":[{\"from\":0,\"to\"
    \":0}],\"invertColors\":false,\"labels\":[{\"show\":true,\"color\":\"black\"},\"scale\":[{\"show\":false,\"labels\":false,\"color\":\"#333\"},\"width\"
    \":2],\"type\":\"simple\"},\"style\":{\"fontSize\":\"60px\",\"bgFill\":\"#000000\",\"bgColor\":false,\"labelColor\":false,\"subText\":\"\"}],\"ags\"
    \":[],\"id\":\"1\",\"enabled\":true,\"type\":\"count\"},\"schema\":\"metric\",\"params\":{\"CustomLabel\":\"Total API Calls\"}},\"listeners\":{}},
  "ulStateJSON": "[{"vis":{\\"defaultColors\\":{\\\"0 - 0\\\":\\\"rgb(0,104,55)\\\"},\\"legendOpen\\":false}}]",
  "description": "",
  "version": 1,
  "kibanaSavedObjectMeta": {
    "searchSourceJSON": "{\"index\":\"apic-apl-r\", \"query\": {\"query_string\": {\"query\": \"*\", \"analyzeWildcard\": true}}, \"filter\": []}"
  },
  "default": true
}}
]
```

Figure 7-26. Export data from visualizations (3 of 3)

The example shows the JSON file for API calls opened in the editor.

Unit summary

- Describe what is API Connect analytics
- Describe the role of the Kibana open source platform in the API Connect API analytics feature
- Describe where analytics are configured and captured
- Identify which user interfaces in API Connect provide access to analytical data
- Review analytics in the Developer Portal
- Describe the purpose of default dashboards
- Review the features of default visualizations
- Create a visualization
- Describe API events and event records
- Describe how to export analytics and API event data

Figure 7-27. Unit summary

Review questions

1. True or False: The Portal service captures API events.
2. True or False: All visualizations that you create are added to a list of saved visualizations, and can be used in any dashboard.



Figure 7-28. Review questions

Write your answers here:

- 1.
- 2.

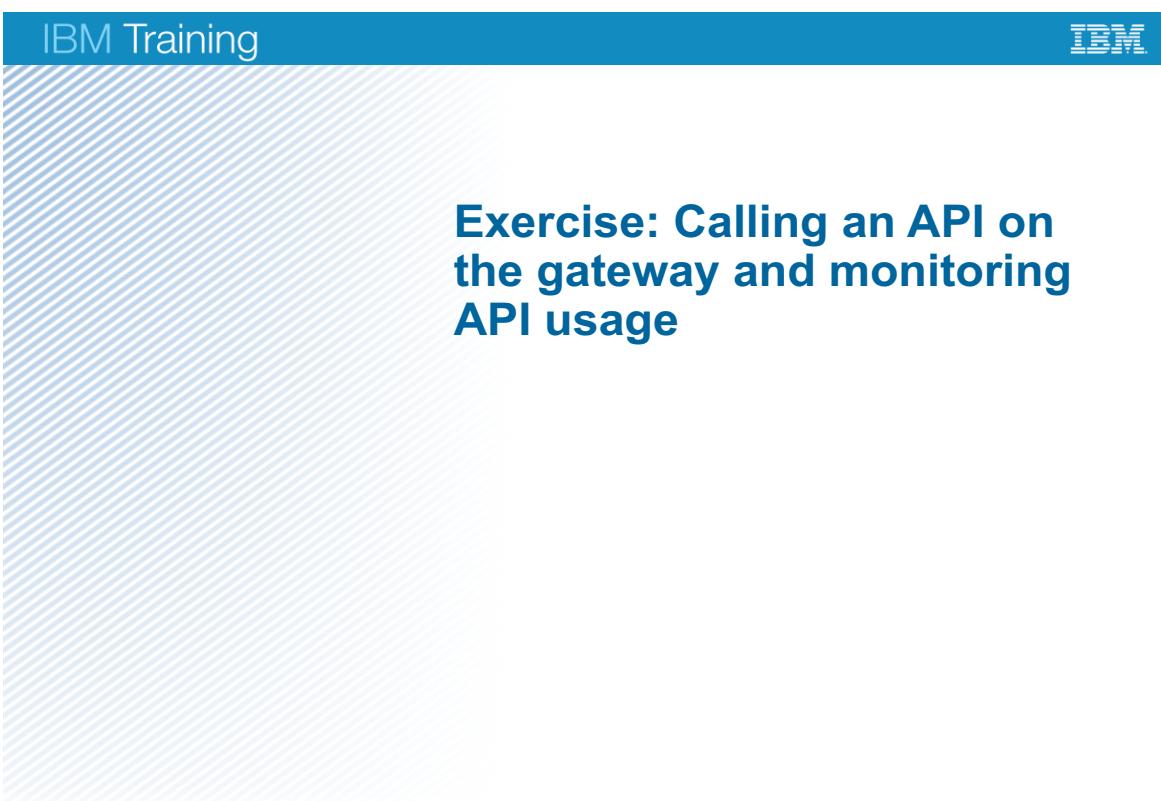
Review answers

1. True or False: The Portal service captures API events.
The answer is False.
The Gateway service captures API events.

2. True or False: All visualizations that you create are added to a list of saved visualizations, and can be used in any dashboard.
The answer is True.



Figure 7-29. Review answers



API analytics

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Figure 7-30. Exercise: Calling an API on the gateway and monitoring API usage

Exercise objectives

- Run the test feature in the Developer Portal
- Identify the API endpoints in the gateway
- Run a script to generate multiple calls to the API gateway
- View the analytics dashboard for the catalog
- Change the time period filter for a visualization
- View API event data
- Export API event data



Figure 7-31. Exercise objectives

Unit 8. Course summary

Estimated time

00:05

Overview

This unit summarizes the course and provides information for future study.

Unit objectives

- Explain how the course met its learning objectives
- Access the IBM Training website
- Identify other IBM Training courses that are related to this topic
- Locate appropriate resources for future study

[Course summary](#)

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Figure 8-1. Unit objectives

Course objectives

- Configure services in Cloud Manager for an on-premises installation of API Connect V2018
- Identify the container runtime infrastructure that supports the API Connect services
- Create a catalog and Developer Portal
- Create a consumer organization
- Manage member roles and permissions in the Developer Portal
- Define APIs, Products, and plans in API Manager
- Identify the API lifecycle stages

Course summary

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Figure 8-2. Course objectives

Course objectives

- Stage, publish, version, migrate, deprecate, and retire Products and APIs
- Review and approve API lifecycle requests
- Customize the Developer Portal
- Create an application and subscribe to a plan
- Review API analytics in the Developer Portal
- Review analytics dashboards and visualizations in API Manager

Course summary

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Figure 8-3. Course objectives

References

- IBM API Connect 2018 IBM Knowledge Center
 - https://www.ibm.com/support/knowledgecenter/SSMNED_2018/
- API Connect: IBM Developer Center
 - <https://developer.ibm.com/apiconnect/>

Course summary

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Figure 8-4. References

Enhance your learning with IBM resources

Keep your IBM Cloud skills up-to-date

- IBM offers resources for:
 - Product information
 - Training and certification
 - Documentation
 - Support
 - Technical information



- To learn more, see the IBM Cloud Education Resource Guide:
 - www.ibm.biz/CloudEduResources

Course summary

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Figure 8-5. Enhance your learning with IBM resources

Unit summary

- Explain how the course met its learning objectives
- Access the IBM Training website
- Identify other IBM Training courses that are related to this topic
- Locate appropriate resources for future study

[Course summary](#)

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Figure 8-6. Unit summary

IBM Training

IBM

Course completion

You have completed this course:

API Lifecycle Governance with IBM API Connect V2018

Any questions?



[Course summary](#)

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Figure 8-7. Course completion

Appendix A. List of abbreviations

A

API application programming interface

B

C

CA certificate authority

CMS Certificate Management System

CPU central processing unit

CSS Cascading Style Sheets

CSV comma-separated variables

D

DB database

DHCP Dynamic Host Configuration Protocol

DMZ demilitarized zone

DN distinguished name

DNS Domain Name System

E

F

G

GB gigabyte

GUI graphical user interface

H

HA high availability

HTML Hypertext Markup Language

HTTP Hypertext Transfer Protocol

HTTPS HTTP over SSL

I

IBM International Business Machines Corporation

IE Internet Explorer

I/O	input/output
IP	Internet Protocol
IPSEC	IP Security

J**K****L**

LAMP A software stack that consists of the Linux operating system, Apache web server, MySQL database, and the PHP scripting language

LDAP Lightweight Directory Access Protocol

M

MB megabyte

N**O**

OS operating system

OVA Open Virtual Appliance

P

PaaS Platform as a Service

Q**R**

RAM random access memory

REST Representational State Transfer

RSS Rich Site Summary

S

SaaS Software as a Service

SCIM System for Cross-domain Identity Management

SDK software development kit

SMTP Simple Mail Transfer Protocol

SOAP A lightweight, XML-based protocol for exchanging information in a decentralized, distributed environment. Usage note: SOAP is not an acronym; it is a word in itself (formerly an acronym for Simple Object Access Protocol)

SSH Secure Shell

SSL	Secure Sockets Layer
T	
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Transport Layer Security
U	
UI	user interface
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
UTF	Unicode Transformation Format
V	
VM	virtual machine
VPN	virtual private network
W	
WS	web services
WSDL	Web Services Description Language
X	
XML	Extensible Markup Language
Y	
Z	



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