

Course Exercises Guide

API Lifecycle Governance with IBM API Connect v2018

Course code WD509 / ZD509 ERC 4.0



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Exercises description

This course includes the following exercises:

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

In the exercise instructions, you can check off the line before each step as you complete it to track your progress.

Most exercises include required sections, which should always be completed. It might be necessary to complete these sections before you can start later exercises. If you have sufficient time and want an extra challenge, some exercises might also include optional sections that you can complete.



Important

Online course material updates might exist for this course. To check for updates, see the Instructor wiki at: <http://ibm.biz/CloudEduCourses>

Before you begin

Kubernetes Certificates

Client certificates generated by `kubeadm` expire after 1 year by default. At the time this course was created, certificate rotation was not implemented. Due to certificate expiration, the date in the environment has been reset to December 1, 2019. You review the certificates in the first exercise.



Important

Do not change the date or time on the Ubuntu VM. Doing so will corrupt the environment. The date and time is configured in the bios settings for the Virtual Machines. Additionally, the VMs are configured not to get the current time from the Internet. Do NOT change any of these date and time settings.

Review the environment

You complete the instructions in this exercise on the remote lab environment. Leave the virtual machines running while you are busy working on the class exercises. When you are finished for the day, shut down both images by following the procedures below.

Review the next four sections (Start, Suspend, Restart and Reset procedures) to become familiar with the environment and how to access it. When you receive your IBM Remote Lab Platform, make sure that the virtual machines are in the **Powered off** state as described below. Follow the procedures below to start them.



Important

Do not **STOP** the WD509 Ubuntu VM after starting it. Due to certificate expiration, the date in the environment has been reset to December 1, 2019. If you **STOP** the VM, the date will be reset to December 1, 2019 which can potentially cause problems with labs since your APIs will exist with a future date / time.

-
- ___ 1. Examine the connection to the IBM Remote Lab Platform for the virtual machines that are used in this course.
 - ___ 2. There are 2 virtual machines for this class. Verify the status for both is **Powered off**.
 - WD509 Ubuntu image
 - WD509 DataPower image

Start Environment Procedures

When starting the environment, make sure you start the WD509 DataPower VM first and ensure it's running before you start the Ubuntu VM. This will ensure proper synchronization.

- 1. To start the environment, click **Run this VM** on the WD509 DataPower image.

IBM

WD514G

Region: US-Central

VMs: 2

	Powered off	Sort by name	
<input checked="" type="checkbox"/> WD509 Datapower	Endpoints: 1 (datapowerko - 10.0.0.20)		
<input checked="" type="checkbox"/> WD509 Ubuntu	Endpoints: 1 (ubuntuko - 10.0.0.10)		

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16 GB ▾ 32 GB --

A1

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32 GB ▾ 300 GB --

A1

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- 2. Verify the background color changes to green and the status changes to **Running**.
- 3. Click **Run this VM** on the WD509 Ubuntu image.

	Running	
<input checked="" type="checkbox"/> WD509 Datapower	Endpoints: 1 (datapowerko - 10.0.0.20)	
<input checked="" type="checkbox"/> WD509 Ubuntu	Endpoints: 1 (ubuntuko - 10.0.0.10)	

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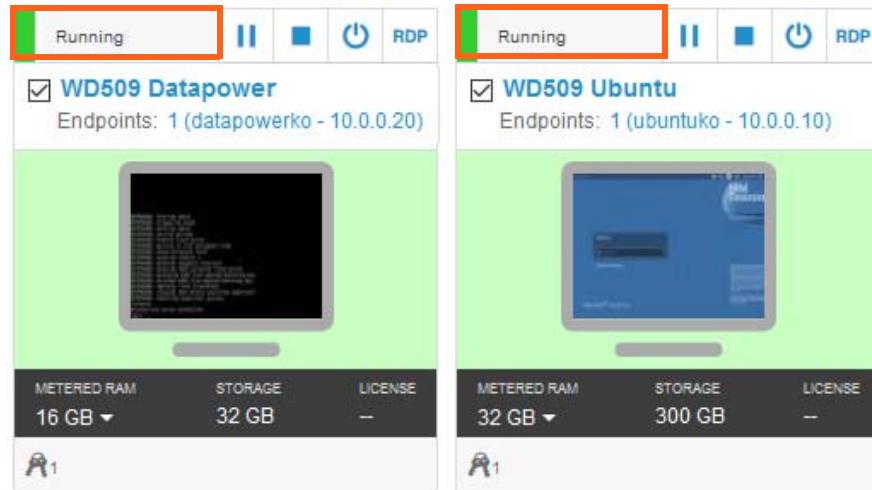
A1

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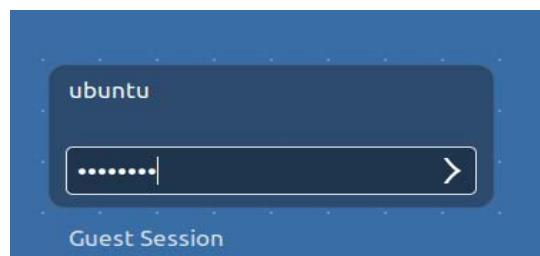
32 GB ▾ 300 GB --

A1

- ___ 4. Verify the background color changes to green and the status changes to **Running**.



- ___ 5. Make sure you wait at least 10 minutes to allow the synchronization to complete and for all pods to start.
- ___ 6. Click the picture of the desktop in the Ubuntu image pane.
- ___ 7. Log into the Ubuntu VM using `passw0rd` as the password.



Information

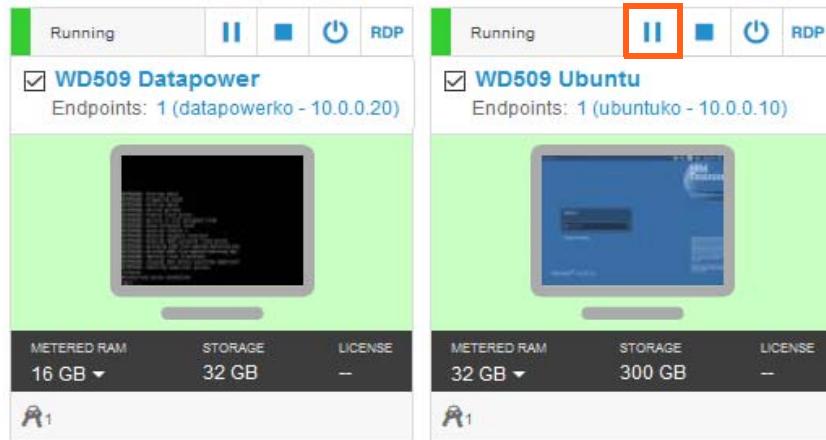
The Ubuntu student workstation opens to the desktop. If you need to sign on to the image, or if you shutdown and restart the Ubuntu server, you can sign on with the credentials:

- User: localuser
- Password: `passw0rd`

Suspend Environment Procedures

When you are finished for the day, follow these instructions to ensure proper synchronization between API Connect and the IBM DataPower Gateway appliance.

- ___ 1. Click **Suspend this VM** on the WD509 Ubuntu image.



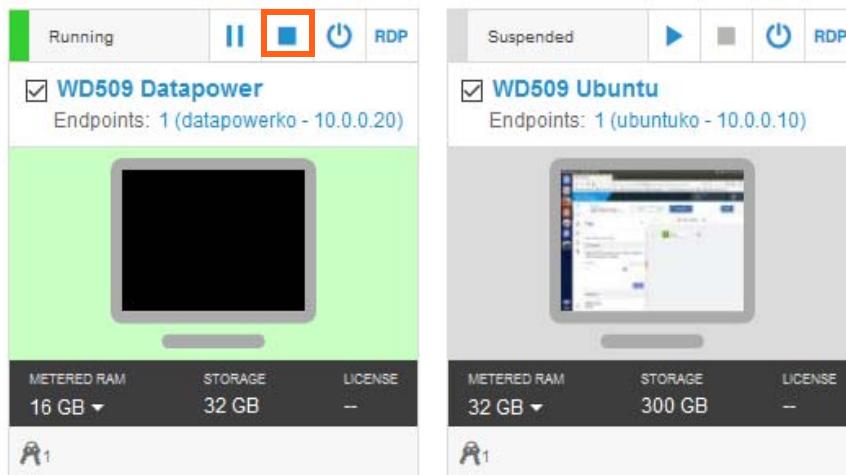
Upon VM suspension, the clock pauses at the specific date and time that you suspended the VM. The date and time remains paused as long as the VM is in a suspended state.



Troubleshooting

If the VM appears to be busy for several minutes without responding, try refreshing the browser to return the current state of the image.

- ___ 2. After the WD509 Ubuntu VM is in a Suspended state, click **Shutdown this VM** on the WD509 DataPower image.

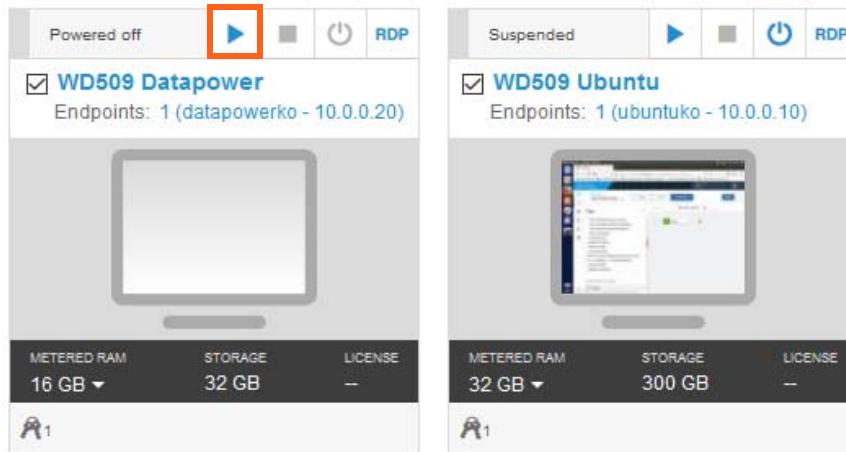


- ___ 3. When restarting the environment, reverse these procedures.

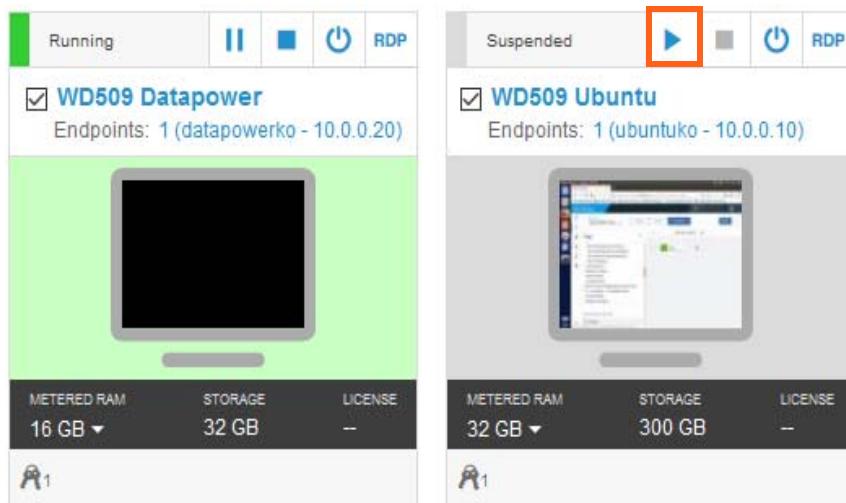
Restart Environment Procedures

When restarting the environment at the beginning of the day, make sure you start the WD509 DataPower VM first and ensure it's running before you start the Ubuntu VM. This will ensure proper synchronization.

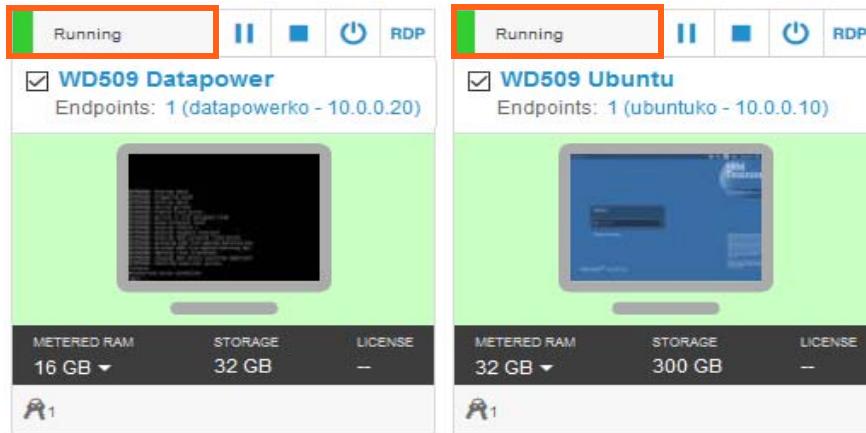
- ___ 1. Verify the **WD509 DataPower** VM is in a Powered off state and the **WD509 Ubuntu** VM is in a Suspended state.
- ___ 2. Click **Run this VM** on the WD509 DataPower image.



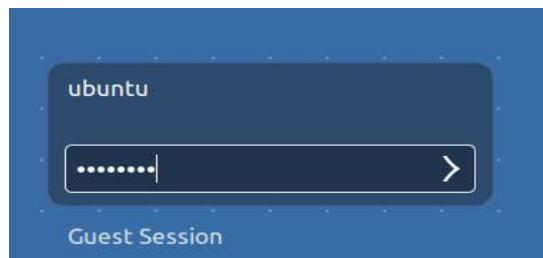
- ___ 3. Verify the background color changes to green and the status changes to **Running**.
- ___ 4. Click **Run this VM** on the WD509 Ubuntu image.



- ___ 5. Verify the background color changes to green and the status changes to **Running**.



- ___ 6. Make sure you wait at least 10 minutes to allow the synchronization to complete and for all pods to start.
___ 7. Click the picture of the desktop in the Ubuntu image pane.
___ 8. Log into the Ubuntu VM using `passw0rd` as the password.



Reset Environment Procedures

The IRLP Skytap environment suspends the virtual machines after 10 hours of inactivity. This can lead to the DataPower and the IBM Connect system on the Ubuntu VM getting out of sync. If this happens, an environment reset is needed. Appendix B covers general problem solving including when it may be appropriate to reset the environment. To reset synchronization if the environment becomes suspended, follow these procedures:

- ___ 1. Suspend / shutdown the VMs
 - ___ a. Click **Suspend this VM** on the WD509 Ubuntu image.
 - ___ b. Wait for the WD509 Ubuntu VM to enter a Suspended state
 - ___ c. Click **Shutdown this VM** on the WD509 DataPower image.
- ___ 2. Restart environment
 - ___ a. Verify the **WD509 DataPower** VM is in a Powered off state and the **WD509 Ubuntu** VM is in a Suspended state.
 - ___ b. Click **Run this VM** on the WD509 DataPower image
 - ___ c. Verify the background color of the WD509 DataPower image changes to green and the status changes to **Running**.
 - ___ d. Click **Run this VM** on the WD509 Ubuntu image
 - ___ e. Verify the background color changes to green and the status changes to **Running**.
 - ___ f. Make sure you wait at least 10 minutes to allow the synchronization to complete and for all pods to start.
 - ___ g. Click the picture of the desktop in the Ubuntu image pane.
 - ___ h. Log into the Ubuntu VM using `passw0rd` as the password.



Questions

What happens when you start the VMs from a suspended state?

The time now continues. For example, if the time on the VMs was December 1, 10:00 AM EST when you suspended the VMs, the clock stays at 10:00 AM EST for as long as the VMs are suspended. So, for example, if the VMs are suspended for three hours, the time is still December 1, 10:00 AM for the suspended VMs. When you start the VM after three hours of suspension, the clock is no longer paused and continues on from December 1, 10:00 AM. After running the VM for one hour it will then be December 1, 11:00 AM EST.

Course exercise files

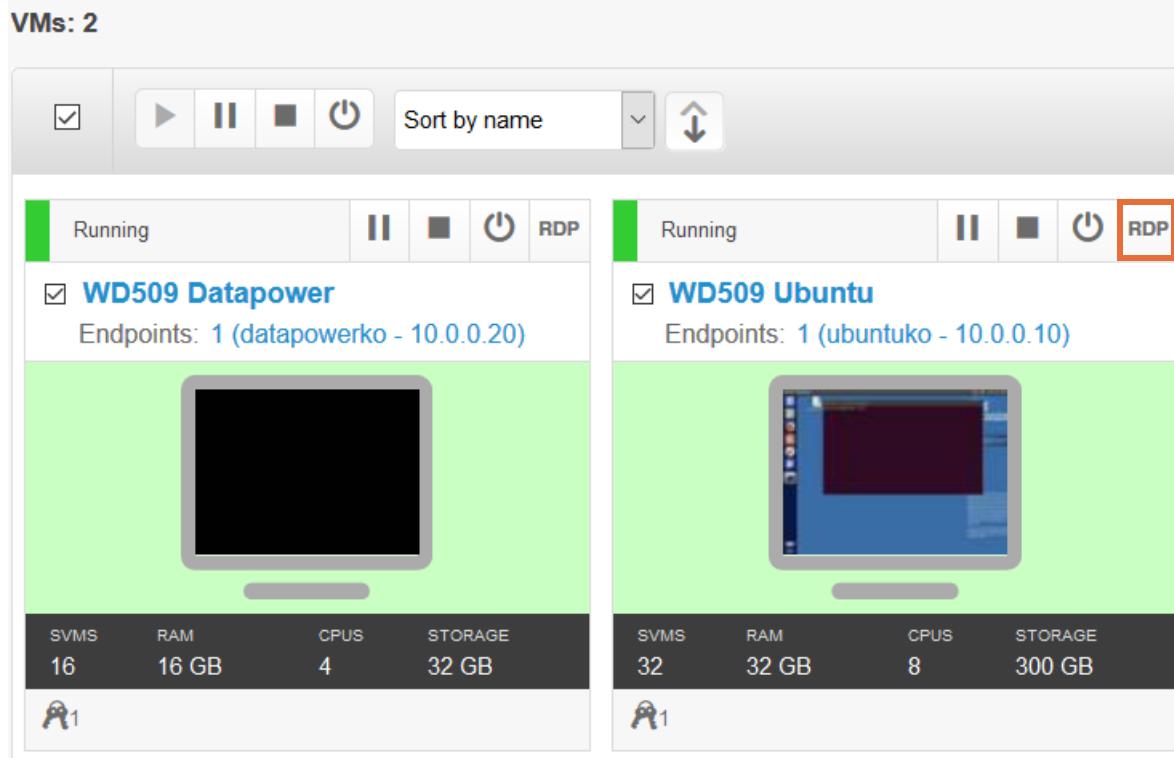
The exercises in this course use a set of lab files that might include scripts, applications, files, solution files, and others. The course lab files can be found in the following directory:

- `/home/localuser/lab_files` for the Ubuntu operating system

The exercises point you to the lab files as you need them.

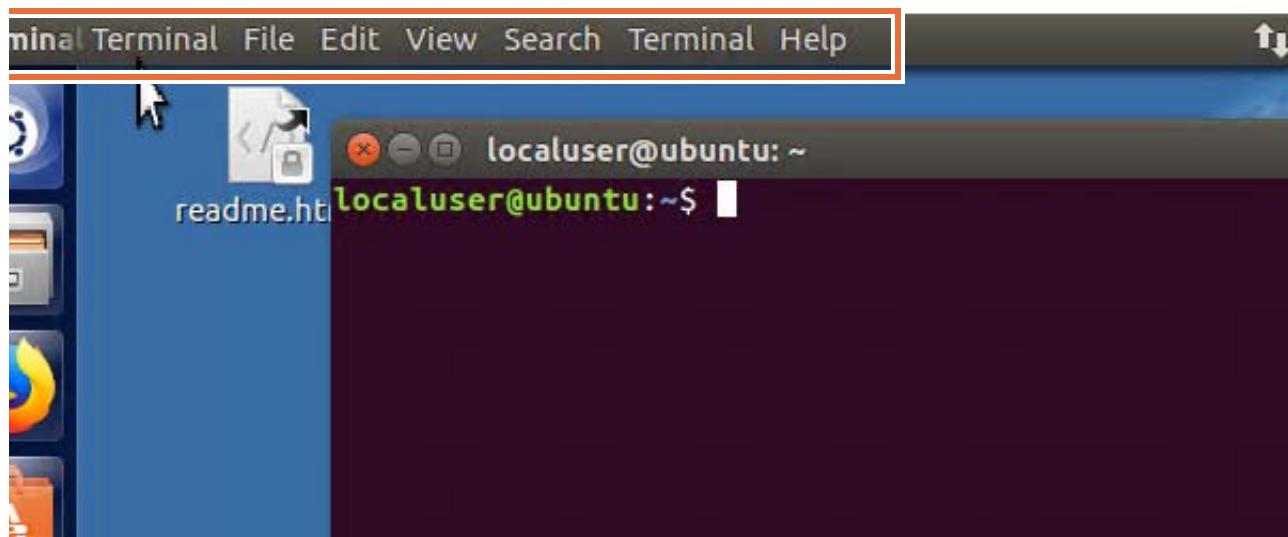
Remote Desktop Access

You can access the course images either with a web browser or by using a remote desktop connection. If you want to access the student image with a remote desktop connection, click the RDP icon on the Ubuntu image and download the RDP file, or open it with a remote desktop application that is installed on your workstation.

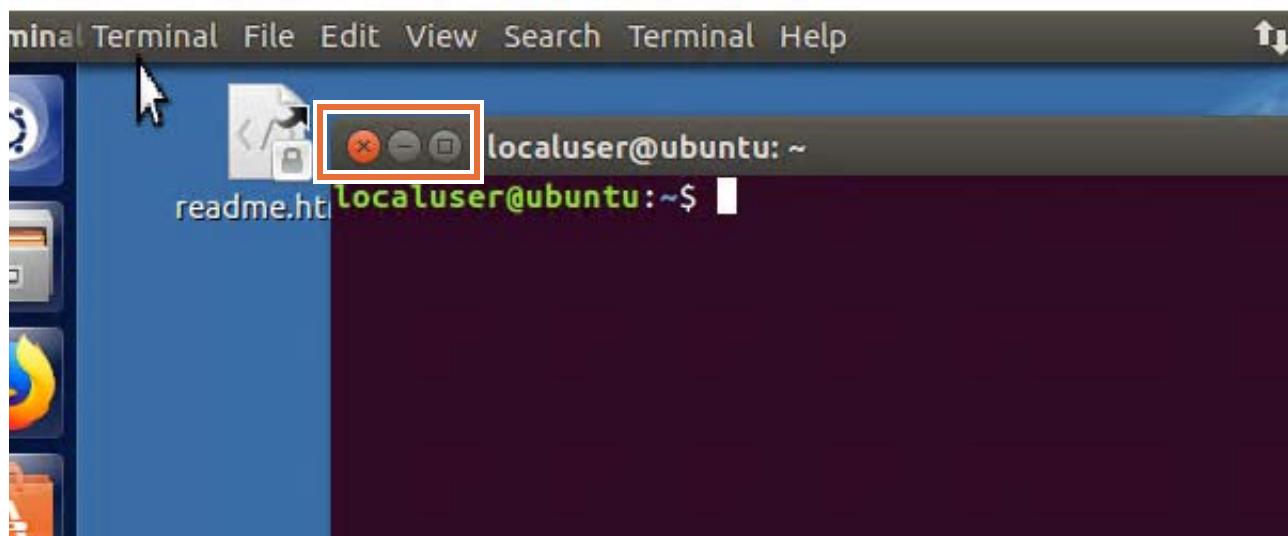


Unity Desktop

The supplied course image is Ubuntu 16.04 LTS. The desktop for Ubuntu is the Unity desktop. Unity uses a global menu. Which means application menus are not located in the window for the application. They are on the top pane. When a window is the active window, that window does not have any menu items, but the application type is displayed in the black bar that spans the top of the desktop. You cannot see the menu for the application until you hover your mouse over the top pane. When you hover your move over the black bar, the menu items for the active window are displayed.



In the corner of the application, you have the close, minimize, and full screen options.



When you maximize the application window, the close, minimize, and full screen options also appear in the top pane.

Exercise 1. Configuring the cloud topology

Estimated time

00:45

Overview

In the first part of the exercise, you test internet connectivity and that your private domain name service is working. You review and validate the Kubernetes runtime environment and API Connect processes are running. In the next part, you sign on as the administrator to the Cloud Manager user interface. You review analytics, portal, and gateway services in the Cloud Manager. Review the provider organization that publishes the APIs.

Objectives

After completing this exercise, you should be able to:

- 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.

Requirements

You can complete this exercise by using the Ubuntu course image that is supplied with the course.

The image on the IBM Remote Platform requires these resources:

- 8 CPUs
- 32 GB RAM
- 300 GB HDD

Exercise instructions

Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

1.1. Review the network connectivity and domains

In this part, you validate your connectivity to the internet and the function of the private DNS.

The network on the student image is configured as a private DNS server on Ubuntu with the BIND package. In the exercises, you use the `think.ibm` domain that is configured on the primary DNS server, which is the student image itself (IP address 10.0.0.10).

- ___ 1. The network connectivity and naming lookup.
 - ___ a. Open a terminal from the desktop. In the terminal, type `nslookup google.com`.
The result is displayed.

```
localuser@ubuntu:~$ nslookup google.com
Server: 10.0.0.10
Address: 10.0.0.10#53
```

Non-authoritative answer:
Name: google.com
Address: 172.217.2.238

- ___ b. In the terminal, type `nslookup cloud.think.ibm`.
The result is displayed.

```
localuser@ubuntu:~$ nslookup cloud.think.ibm
Server: 10.0.0.10
Address: 10.0.0.10#53
```

Name: cloud.think.ibm
Address: 10.0.0.10

- ___ c. In the terminal, type `nslookup apigw.think.ibm`.
The result is displayed.

```
localuser@ubuntu:~$ nslookup cloud.think.ibm
Server: 10.0.0.10
Address: 10.0.0.10#53
```

Name: cloud.think.ibm
Address: 10.0.0.10

1.2. Review the Kubernetes certificates

For this course, IBM API Connect runs on a Kubernetes environment, sometimes abbreviated as K8. As mentioned, client certificates generated by `kubeadm` expire after 1 year by default. At the time this course was created, certificate rotation was not implemented. Due to certificate expiration, the date in environment has been reset to December 1, 2019.

When the Ubuntu VM is started for the first time, the date that is set on the VM is December 1, 2019. Enter the `date` command to check the date of the VM when you first access the Ubuntu VM. The actual date will vary depending on how long the environment has been running before you run the `date` command.

- ___ 1. Verify the system date. In the terminal, type `date`.
The result is displayed.

```
localuser@ubuntu:~$ date
Sun Dec 1 8:19:07 EST 2019
```

- ___ 2. Verify Kubernetes certificate expiration dates.

- ___ a. To view the current expiration date on the x509 certificate, enter the following command:

```
openssl x509 -in /etc/kubernetes/pki/apiserver.crt -noout -text |grep 'Not '
```

The result is displayed.

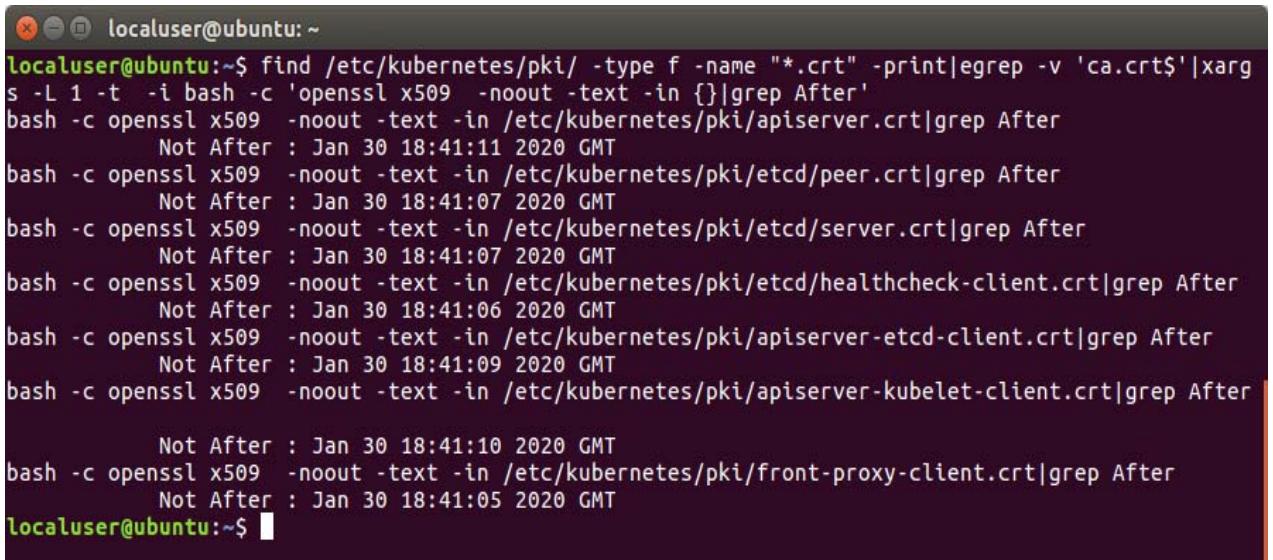
```
Not Before: Jan 30 18:41:10 2019 GMT
Not After : Jan 30 18:41:11 2020 GMT
```

Notice the system date is within the window of the x509 certificate.

- ___ b. To check all certificate expiration dates, enter the following command:

```
find /etc/kubernetes/pki/ -type f -name "*.crt" -print|egrep -v 'ca.crt$'|xargs -L 1 -t -i bash -c 'openssl x509 -noout -text -in {}|grep After'
```

The result is displayed.



```
localuser@ubuntu:~$ find /etc/kubernetes/pki/ -type f -name "*.crt" -print|egrep -v 'ca.crt$'|xargs -L 1 -t -i bash -c 'openssl x509 -noout -text -in {}|grep After'
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/apiserver.crt|grep After
    Not After : Jan 30 18:41:11 2020 GMT
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/etcd/peer.crt|grep After
    Not After : Jan 30 18:41:07 2020 GMT
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/etcd/server.crt|grep After
    Not After : Jan 30 18:41:07 2020 GMT
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/etcd/healthcheck-client.crt|grep After
    Not After : Jan 30 18:41:06 2020 GMT
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/apiserver-etcd-client.crt|grep After
    Not After : Jan 30 18:41:09 2020 GMT
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/apiserver-kubelet-client.crt|grep After
    Not After : Jan 30 18:41:10 2020 GMT
bash -c openssl x509 -noout -text -in /etc/kubernetes/pki/front-proxy-client.crt|grep After
    Not After : Jan 30 18:41:05 2020 GMT
localuser@ubuntu:~$
```

Notice the system date is within the window of each certificate.



Important

Do not change the date or time on the Ubuntu VM. Doing so will corrupt the environment. The date and time is configured in the **BIOS** settings for the Virtual Machines. Additionally, the VMs are configured not to get the current time from the Internet. Do **NOT** change any of these date and time settings.

__ 3. Verify Internet access.

Due to the system date being modified, access to external websites is limited. This will prevent you from accessing websites that use security certificates with expiration dates.

__ a. Open the Firefox browser and attempt access to the following site:

<http://www.ibm.com>

__ b. Verify the connection failed. The browser returns the following response:

The screenshot shows a Firefox browser window with the title bar "Problem loading page - Mozilla Firefox". The address bar displays "https://www.ibm.com". Below the address bar, the status bar shows "Most Visited" and links to "Getting Started", "Cloud Manager", "API Manager", and "API Developer Portal". The main content area displays the error message "Secure Connection Failed" in large bold letters. Below the message, it says "An error occurred during a connection to www.ibm.com. The OCSP response is not yet valid (contains a date in the future). Error code: SEC_ERROR_OCSP_FUTURE_RESPONSE". There are two bullet points: "The page you are trying to view cannot be shown because the authenticity of the received data could not be verified." and "Please contact the website owners to inform them of this problem.". At the bottom left, there is a link "Learn more...". To the right of the link is a checkbox labeled "Report errors like this to help Mozilla identify and block malicious sites". On the far right, there is a blue button labeled "Try Again".



Note

As a consequence of the system date being modified, you cannot access the IBM Knowledge center from inside the Ubuntu VM.

1.3. Review the Kubernetes runtime environment

For this course, IBM API Connect runs on a Kubernetes environment, sometimes abbreviated as K8. The Kubernetes environment supports scalability and failover. For this course, Kubernetes is set up with a single master node and all the processes run on the same virtual machine. This configuration is not scalable and is used only for demonstration purposes. Kubernetes manages the Docker containers that provide the runtime environment. These components start automatically when the student image is started. You might need to wait up to 15 minutes for all the processes to start and for the API Connect environment to become fully operational.

- 1. Review the Helm charts that are defined on the image.

Helm is the Kubernetes package manager.

- a. Click the Terminal in the list of applications on the Ubuntu desktop.
- b. Type `helm list`.

The list of deployed releases is displayed.

NAME	REVISION	UPDATED	STATUS	CHART	APP VERSION
NAMESPACE					
ingress	1	Wed Jan 30 16:23:08 2019	DEPLOYED	nginx-ingress-1.2.2	
0.22.0	apiconnect				
r2484482d49	2	Wed Jul 24 16:28:47 2019	DEPLOYED	apic-portal-2.0.0	
apiconnect					
r674f0bc86d	2	Wed Jul 24 15:52:57 2019	DEPLOYED	apiconnect-2.0.0	
apiconnect					
r8e789c134d	2	Wed Jul 24 15:52:46 2019	DEPLOYED	cassandra-operator-1.0.0	
1.0.1	apiconnect				
re266d79975	2	Wed Jul 24 16:22:26 2019	DEPLOYED	apic-analytics-2.0.0	
apiconnect					



Note

If you get a message: Error: could not find tiller

Type: `export TILLER_NAMESPACE=apiconnect`

In the terminal.

Retry the helm list command.

- 2. Display the pods that are running on the apiconnect namespace.

- a. In the Terminal type:

```
kubectl get pods -n apiconnect
```

__ b. The list of pods is displayed.

NAME	READY	STATUS
RESTARTS	AGE	
hostpath-provisioner-77d68bd579-vqqjq 22 304d	1/1	Running
ingress-nginx-ingress-controller-58frc 45 304d	1/1	Running
ingress-nginx-ingress-default-backend-7f7bf55777-7rzc8 24 304d	1/1	Running
r2484482d49-apic-portal-db-0 9 129d	2/2	Running
r2484482d49-apic-portal-nginx-54d4bbd48-wnjtw 4 129d	1/1	Running
r2484482d49-apic-portal-www-0 10 129d	2/2	Running
r674f0bc86d-analytics-proxy-76bf67449b-wxghb 4 129d	1/1	Running
r674f0bc86d-apiconnect-cc-0 5 129d	1/1	Running
r674f0bc86d-apiconnect-cc-cassandra-stats-1549470600-42jkg 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549470600-cdpqj 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549470600-dkvtf 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549470600-gs2df 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549470600-hzm28 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549470600-zl8sw 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549474200-m2542 0 297d	0/1	Completed
r674f0bc86d-apiconnect-cc-cassandra-stats-1549488600-62nfvf 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549488600-bj6cv 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549488600-pkgft 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549488600-q9s4s 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549488600-qtcjw 0 297d	0/1	Completed
r674f0bc86d-apiconnect-cc-cassandra-stats-1549488600-vnck2 0 297d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549578600-57f2c 0 296d	0/1	Error
r674f0bc86d-apiconnect-cc-cassandra-stats-1549578600-76rrm	0/1	Error

0	296d		
r674f0bc86d-apiconnect-cc-cassandra-stats-1549578600-7h4qt		0/1	Error
0	296d		
r674f0bc86d-apiconnect-cc-cassandra-stats-1549578600-vdx6t		0/1	Completed
0	296d		
r674f0bc86d-apiconnect-cc-cassandra-stats-1549578600-xd5p2		0/1	Error
0	296d		
r674f0bc86d-apiconnect-cc-cassandra-stats-1549672200-gbgjn		0/1	
ContainerCreating	0	295d	
r674f0bc86d-apiconnect-cc-repair-1549674000-995mg		0/1	
ContainerCreating	0	295d	
r674f0bc86d-apiconnect-cc-repair-1564016400-6d2sj		0/1	Completed
0	127d		
r674f0bc86d-apiconnect-cc-repair-1564016400-jqfzt		0/1	Error
0	127d		
r674f0bc86d-apiconnect-cc-repair-1564275600-4qt6d		0/1	Completed
0	124d		
r674f0bc86d-apiconnect-cc-repair-1575162000-5hwpg		0/1	Completed
0	4h24m		
r674f0bc86d-apiconnect-cc-repair-1575162000-pdtz2		0/1	Error
0	4h25m		
r674f0bc86d-apim-schema-upgrade-job-2-5m2tl		0/1	Completed
0	129d		
r674f0bc86d-apim-v2-5cff887d9d-z5q5r		1/1	Running
6	129d		
r674f0bc86d-client-dl-srv-797c85ff6b-4nkns		1/1	Running
5	129d		
r674f0bc86d-juhu-864b949895-bxxhh		1/1	Running
4	129d		
r674f0bc86d-ldap-6b45b4b9bd-472xr		1/1	Running
4	129d		
r674f0bc86d-lur-schema-upgrade-job-2-dsr8d		0/1	Completed
0	129d		
r674f0bc86d-lur-v2-75889998bc-dsbw4		1/1	Running
8	129d		
r674f0bc86d-ui-f984c96cc-82tq7		1/1	Running
4	129d		
r8e789c134d-cassandra-operator-644b49cbb9-vqps6		1/1	Running
4	129d		
re266d79975-analytics-client-846944559c-mzl9w		1/1	Running
5	129d		
re266d79975-analytics-cronjobs-retention-1554168600-srwxn		0/1	Completed
0	243d		
re266d79975-analytics-cronjobs-rollover-1575211500-z95rs		0/1	Completed
0	22m		
re266d79975-analytics-ingestion-7bdf8cbb75-j4hv4		1/1	Running
5	129d		
re266d79975-analytics-mtls-gw-bf4c47669-68hxt		1/1	Running

```

4           129d
re266d79975-analytics-operator-7dbf7c45d5-c6ttp      1/1     Running
5           129d
re266d79975-analytics-storage-coordinating-7bd55b8ddc-d5llz  1/1     Running
4           129d
re266d79975-analytics-storage-data-0                 1/1     Running
5           129d
re266d79975-analytics-storage-master-0               1/1     Running
4           129d
tiller-deploy-6b69b77955-4hcjp                     1/1     Running
25          304d

```

- c. Most of the pods should have a status of "Running" or "Completed" as shown. Reissue the command if some of the pods are initializing. It is acceptable when some of the cassandra-stats pods have a status of error
 - d. The system is ready to run API Connect.
-

Information

You can also run the command `docker ps`. The system can sometimes take more than 10 minutes to start all the docker containers. Wait about 10 minutes for all the processes to start.

Other commands that you can type to check the status of the Kubernetes runtime environment, are:

```
localuser@ubuntu:~$ kubectl get nodes
```

NAME	STATUS	ROLES	AGE	VERSION
ubuntu	Ready	master	304d	v1.13.2

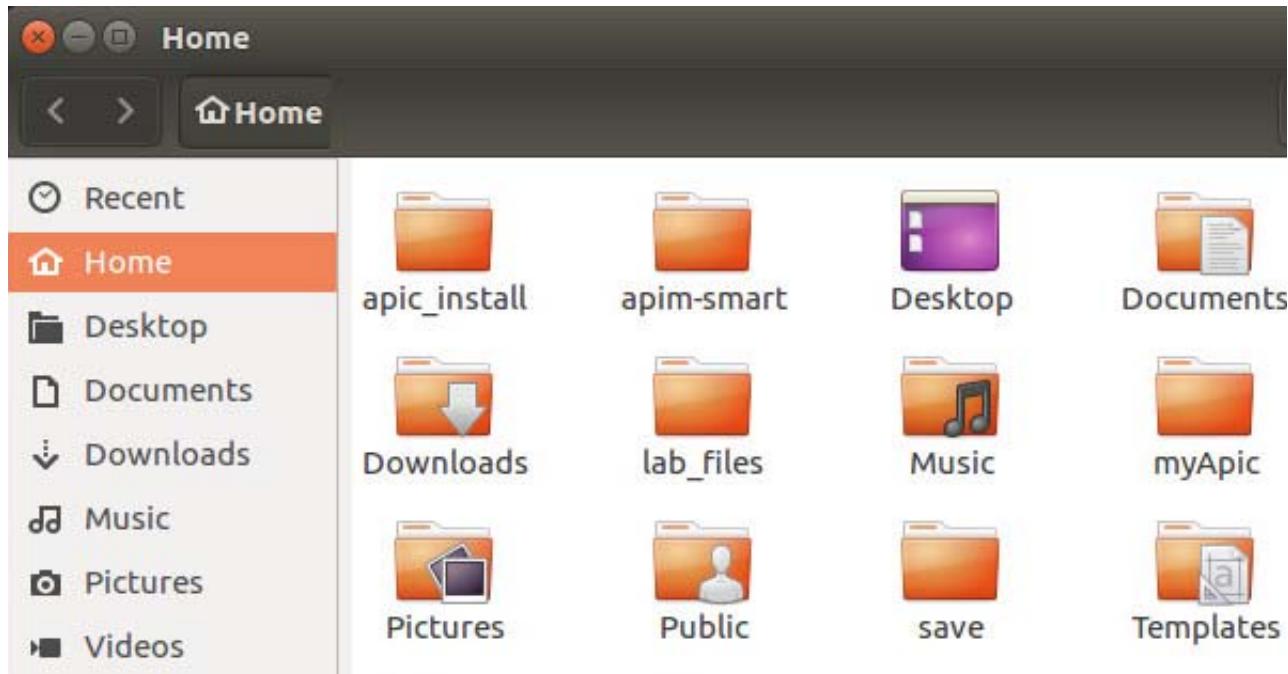
```
localuser@ubuntu:~$ kubectl get pods -n kube-system
```

NAME	READY	STATUS	RESTARTS	AGE
calico-etcd-x58fk	1/1	Running	26	304d
calico-kube-controllers-89d649f4f-6c6k8	1/1	Running	31	304d
calico-node-rsbnd	1/1	Running	28	304d
coredns-86c58d9df4-chrbp	1/1	Running	24	304d
coredns-86c58d9df4-thqb2	1/1	Running	24	304d
etcd-ubuntu	1/1	Running	56	304d
kube-apiserver-ubuntu	1/1	Running	50	304d
kube-controller-manager-ubuntu	1/1	Running	35	304d
kube-proxy-tq2pn	1/1	Running	26	304d
kube-scheduler-ubuntu	1/1	Running	34	304d

1.4. Review the API Connect installation file

API Connect V2018 uses the `apicup` installation utility to create and install the required Kubernetes and API Connect components. Each command that is typed with the APICUP utility is written to a YAML file in the directory from where the commands are typed.

- 1. Open the installation configuration file.
 - a. Click the File Manager icon in the list of applications in the Ubuntu desktop.
 - b. Open the **myApic** folder in the Home directory.



- c. Right-click the file `apiconnect-up.yml`. Then, select Open With gedit from the context menu.



The file opens in the editor.

- ___ d. The file displays some of the configuration values that were used during the installation of API Connect to the Kubernetes runtime environment. Notice some of the host names that are used for endpoints for the analytics, management, and portal servers. These endpoint values are referenced later when you register some services in Cloud Manager.

```

apiVersion: v1
kind: apic.ibm.com/APIConnectCluster
metadata:
  creationTimestamp: "2019-01-04T23:16:18Z"
  name: myApic
spec:
  secret-name: myApic
  subsystems:
    - apiVersion: v1
      kind: apic.ibm.com/ManagementSubsystem
      metadata:
        creationTimestamp: "2018-11-16T22:06:01Z"
        name: manager
      spec:
        ApplianceProperties: null
        CloudProperties:
          mode: dev
          namespace: apiconnect
          registry: localhost:5000
          registry-secret: my-localreg-secret
          storage-class: velox-block
        SubsystemProperties:
          secret-name: myApic-manager
          target: kubernetes
      endpoints:
        api-manager-ui: manager.think.ibm
        cloud-admin-ui: cloud.think.ibm
        consumer-api: consumer.think.ibm
        platform-api: platform.think.ibm
      settings:
        cassandra-max-memory-gb: 5
    status: {}
  - apiVersion: v1
    kind: apic.ibm.com/AnalyticsSubsystem
    metadata:
      creationTimestamp: "2018-11-16T22:34:49Z"
      name: analytics
    spec:
      ApplianceProperties: null
      CloudProperties:
        mode: dev
        namespace: apiconnect
        registry: localhost:5000

```

```

    registry-secret: my-localreg-secret
    storage-class: velox-block
  SubsystemProperties:
    secret-name: myApic-analytics
    target: kubernetes
  endpoints:
    analytics-client: ac.think.ibm
    analytics-ingestion: ai.think.ibm
  settings:
    coordinating-max-memory-gb: 12
    data-max-memory-gb: 8
    data-storage-size-gb: 200
    master-max-memory-gb: 8
    master-storage-size-gb: 5
  status: {}
- apiVersion: v1
  kind: apic.ibm.com/PortalSubsystem
  metadata:
    creationTimestamp: "2018-11-16T22:45:47Z"
    name: portal
  spec:
    ApplianceProperties: null
    CloudProperties:
      mode: dev
      namespace: apiconnect
      registry: localhost:5000
      registry-secret: my-localreg-secret
      storage-class: velox-block
    SubsystemProperties:
      secret-name: myApic-portal
      target: kubernetes
    endpoints:
      portal-admin: padmin.think.ibm
      portal-www: portal.think.ibm
    settings:
      site-backup-host: ""
      site-backup-path: ""
      site-backup-port: 0
    status: {}
  status:
  Ready: false

```

- ___ e. Close the YAML file and File Manager when you are finished reviewing the file.

1.5. Configure resources in Cloud Manager Console

In this part, you configure the email server in the Cloud Manager web interface of API Connect.

- 1. Open the Cloud Manager in a browser.
 - a. In another tab of the Firefox browser, type `https://cloud.think.ibm/admin/` in the address area of the browser.



Note

If the Cloud Manager page returns an API Error, you might need to wait a while longer for the API Connect environment on Kubernetes to start. It might take as much as 10 minutes for the environment to properly initialize.

__ b. Sign on to Cloud Manager with the administrator credentials:

- User name: admin
- Password: Passw0rd!

The screenshot shows a web browser window with the following details:

- Title Bar:** API Connect
- Address Bar:** https://cloud.think.ibm/auth/admin/sign-in/
- Page Content:**
 - Header:** IBM API Connect Cloud Manager
 - Text:** Sign in using the Cloud Manager User Registry
 - Form Fields:**
 - Username:** admin
 - Password:** (password masked)
 - Buttons:** Sign In (large green button)
 - Links:** Forgot Password?

The user is signed in to Cloud Manager.

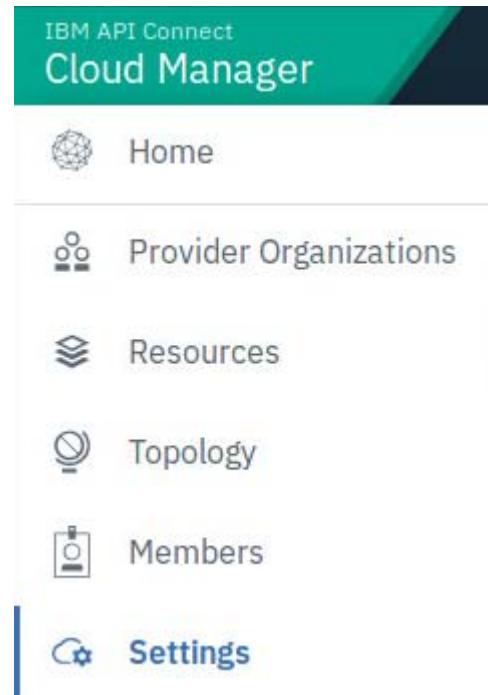
- ___ 2. Review the email Servers that are defined.
- ___ a. Click **Resources** in the Navigation menu. Then, click **Notifications**. Notice that an email server is already defined for you.

Resources

The screenshot shows the 'Email Servers' section of the IBM API Connect Cloud Manager. On the left, there are navigation links: 'User Registries', 'TLS', 'OAuth Providers', and 'Notifications' (which is highlighted in blue). On the right, there is a 'Create' button. The main area displays a table with one row:

	TITLE	MAIL SERVER
<input type="checkbox"/>	SMTP Server	10.0.0.10

- ___ 3. Review the email server in the settings.
- ___ a. Click **Settings** in the Navigation menu.



- ___ b. Click **Notifications**.

- ___ c. The email server is already configured.

The screenshot shows the 'Sender & Email Server' configuration page. On the left, a sidebar lists navigation options: Overview, Onboarding, User Registries, Roles, Role Defaults, Endpoints, Notifications (which is selected and highlighted in blue), and Catalog Defaults. The main content area has a title 'Sender & Email Server' and a subtitle 'Configure the sender name, address and the email server used to send invitations and notifications to users'. A blue 'Edit' button is located in the top right corner. Below this, there are two sections: 'Name' (set to 'APIC Administrator') and 'Email' (set to 'apic-admin@think.ibm'). At the bottom, a section titled 'Email Server' states 'This is the currently configured notification server.' and displays a table with one row: 'TITLE' (SMTP Server) and 'MAIL SERVER' (10.0.0.10). A vertical ellipsis '...' is at the end of the table row.

TITLE	MAIL SERVER
SMTP Server	10.0.0.10

1.6. Review the configured services in Cloud Manager Console

In this part, you review the analytics, portal, and gateway services that are configured in the Cloud Manager web interface of API Connect.

- 1. Configure the analytics service in Cloud Manager.
 - a. Click the Configure Topology tile or **Topology** from the navigation menu.

The topology page is displayed. A Management service is already configured in the default availability zone when API Connect is installed.

- b. A management service and three other services are configured in the default availability zone.

Service	Type	Associated Analytics Service	Visible To
DP API Gateway	DataPower API Gateway	analytics-service	Public
Portal Service	Portal Service		Public
Analytics Service	Analytics Service		

- c. The Gateway is associated with the analytics service.

- __ d. Click each of the service links in turn to see the configuration details for each service. Do not change any settings. Click **Cancel** after you review each service configuration.

1.7. Review the provider and consumer organization settings and user registries

- ___ 1. Review the provider organization that is already defined.
 - ___ a. Click **Provider Organizations** in the left navigation bar.
 - ___ b. A provider organization that is named Think is displayed in the list of provider organizations. The owner of the provider organization is Think Owner.

Provider Organizations

TITLE	OWNER	STATE	
Think	TO Think Owner owner@think.ibm	Enabled	⋮

In a later exercise, you sign on to the API Manager user interface with the credentials of Think Owner.

- ___ 2. Review the user registries.
 - ___ a. Click **Resources** in the left navigation bar.
 - ___ b. You see the two local user registries that are defined.

<input type="checkbox"/>	TITLE	TYPE	VISIBLE TO	⋮
<input type="checkbox"/>	API Manager Local User Registry	Local User Registry	Private	⋮
<input type="checkbox"/>	Cloud Manager Local User Registry	Local User Registry	Private	⋮

- ___ c. You cannot directly open the local user registries to view the users. However, you can indirectly query members in the local user registries, as you see in a later exercise.
- ___ d. The admin user was created in the Cloud Manager local user registry during product installation.
- ___ e. The ThinkOwner user was created in the API Manager local user registry when the Think provider organization was added.

- ___ 3. Review the Cloud Manager settings.
 - ___ a. Click **Settings** in the left navigation bar.
 - ___ b. On the Settings page, click **Role Defaults**. You see a list of the predefined roles for Provider Organizations in API Connect.

Provider Organization

Configure the set of roles to use by default when a provider organization is created

Add

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

- __ c. Expand **Owner** to see the permissions of the owner of the provider organization.

Owner	
Owns and administers the API provider organization	
Member	Settings
<ul style="list-style-type: none">• View• Manage	<ul style="list-style-type: none">• View• Manage
Topology	Org
<ul style="list-style-type: none">• View• Manage	<ul style="list-style-type: none">• View
Drafts	Product
<ul style="list-style-type: none">• View• Edit	<ul style="list-style-type: none">• View• Stage• Manage
Product-approval	Consumer-org
<ul style="list-style-type: none">• View• Stage• Publish• Supersede• Replace	<ul style="list-style-type: none">• View• Manage

The Owner has permissions for all functions in the Provider Organization.

- ___ d. Collapse the Owner and review the roles for Consumer Organizations in API Manager.

Consumer Organization

Configure the set of roles to use by default when a consumer organization is created

Add

ROLES
> Administrator
> Developer
> Member
> Owner
> Viewer

- ___ e. You mostly use the Owner role for the Provider Organization and Consumer Organization in the exercises, since the Owners have the permissions to perform all functions. You use a role with more restricted permissions in a later exercise. You need to review the role permissions again later.
- ___ 4. Sign out of Cloud Manager by selecting the **Sign Out** option from the drop-down menu.



End of exercise

Exercise review and wrap-up

In the exercise, you worked with the IBM API Connect Cloud Manager.

The Cloud Manager is used to define your API Connect topology and Provider Organizations.

In the first part, you reviewed the network connectivity and verified that the private DNS is working.

Next, you looked at some of the Kubernetes pods where API Connect is running.

Finally, you reviewed the registered services in Cloud Manager and you reviewed the Provider Organization and some of the default role settings in Cloud Manager.

Exercise 2. Managing catalogs and consumer organizations

Estimated time

01:00

Overview

This exercise shows you how to manage consumer organizations through the API Manager and Developer Portal web interfaces. You review the role of the provider organization owner in creating a consumer organization. You also learn how to manage members and configure member roles and permissions in the Developer Portal.

Objectives

After completing this exercise, you should be able to:

- 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

Introduction

In this exercise, you first create a Staging catalog and configure the settings for the Developer Portal. You sign on to the Developer Portal with the admin user to validate the Portal installation.

You create a consumer organization and sign on to the Developer Portal as the owner of the consumer organization. Add a user in the Developer Portal.

Requirements

You can complete this exercise by using the Ubuntu Linux course image that is supplied with the course.

Exercise instructions

Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

2.1. Sign in to API Manager

When the Think Provider Organization was created, a default Sandbox catalog is created.

You sign on to the API Manager user interface as the organization owner to view the existing catalog.

- ___ 1. Open the API Manager in a browser.
 - ___ a. Open the Firefox browser, type `https://manager.think.ibm/` in the address area of the browser.
 - ___ b. The API Manager sign in page is displayed.

2. Sign on to API Manager as the owner of the provider organization:

- User name: ThinkOwner
- Password: Passw0rd!

The screenshot shows a web browser window titled "API Connect". The address bar displays the URL <https://manager.think.ibm/auth/manager/sign-in/>. The main content area is titled "IBM API Connect API Manager" and features a large heading "Sign in using the API Manager User Registry". Below this, there are two input fields: "Username" containing "ThinkOwner" and "Password" containing a masked password. A blue "Sign In" button is centered below the fields, and a "Forgot Password?" link is located just below it.

- ___ 3. You are signed on to API Manager as the owner of the Think organization.

The screenshot shows the IBM API Connect API Manager dashboard. At the top, it displays "IBM API Connect" and "API Manager" on the left, and "Organization Think" on the right. The main area features four large, light-gray rectangular tiles arranged in a 2x2 grid. A vertical navigation bar on the left side contains five icons: a globe, a document with a checkmark, a square with a plus sign, a gear, and a clipboard. The first tile on the top-left is titled "Welcome to the API Manager" and "Choose an option to get started". It contains a large icon of a document with a blue pencil and the text "Develop APIs and Products" followed by a description: "Edit, assemble, secure and test APIs. Package APIs using products for publishing to consumers.". The second tile on the top-right is titled "Manage Catalogs" and "Manage active APIs and consumers". It features a blue and white icon of three overlapping squares and a description. The third tile on the bottom-left is titled "Manage Resources" and "Configure user registries, OAuth providers and TLS". It has a blue and white icon of three overlapping rectangles and a description. The fourth tile on the bottom-right is titled "Manage Settings" and "Edit settings for roles, notifications and more". It features a blue and white icon of three interlocking gears and a description.

- ___ 4. Review the existing catalog.
___ a. Click the **Manage Catalogs** tile on the page.

- __ b. You see that a Sandbox catalog exists for the organization.

Manage

A catalog hosts a collection of API products portal when published



Sandbox

Sandbox Catalog

Before you add a catalog, you must first start the email server that receives the notification.

2.2. Open the email server

You open the email server on the course image. Later, you respond to email messages to activate an account on the Developer Portal.

- ___ 1. Open the email server.

The email server runs as a Java application on the course image.

- ___ a. Open a terminal from the application list on the Ubuntu desktop.
Ensure that you are in the /home/localuser directory.

In the terminal type:

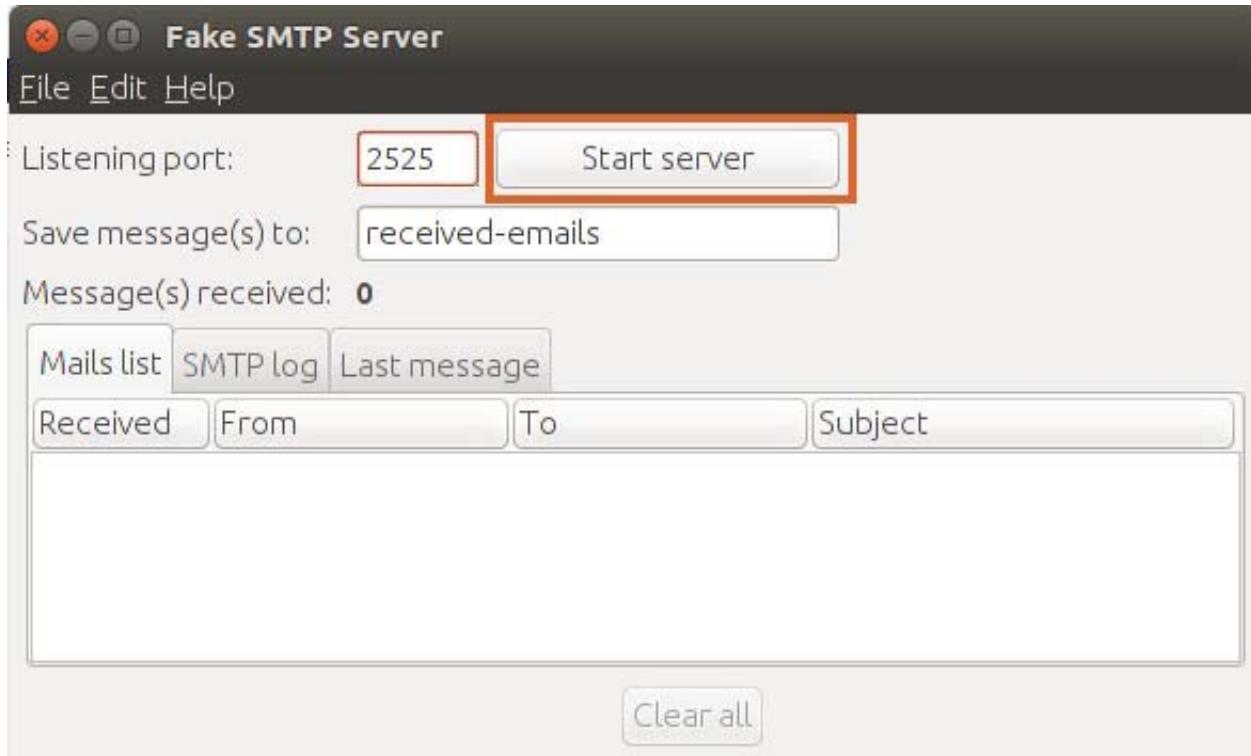
```
java -jar /usr/local/bin/fakeSMTP-2.0.jar -p 2525
```



Information

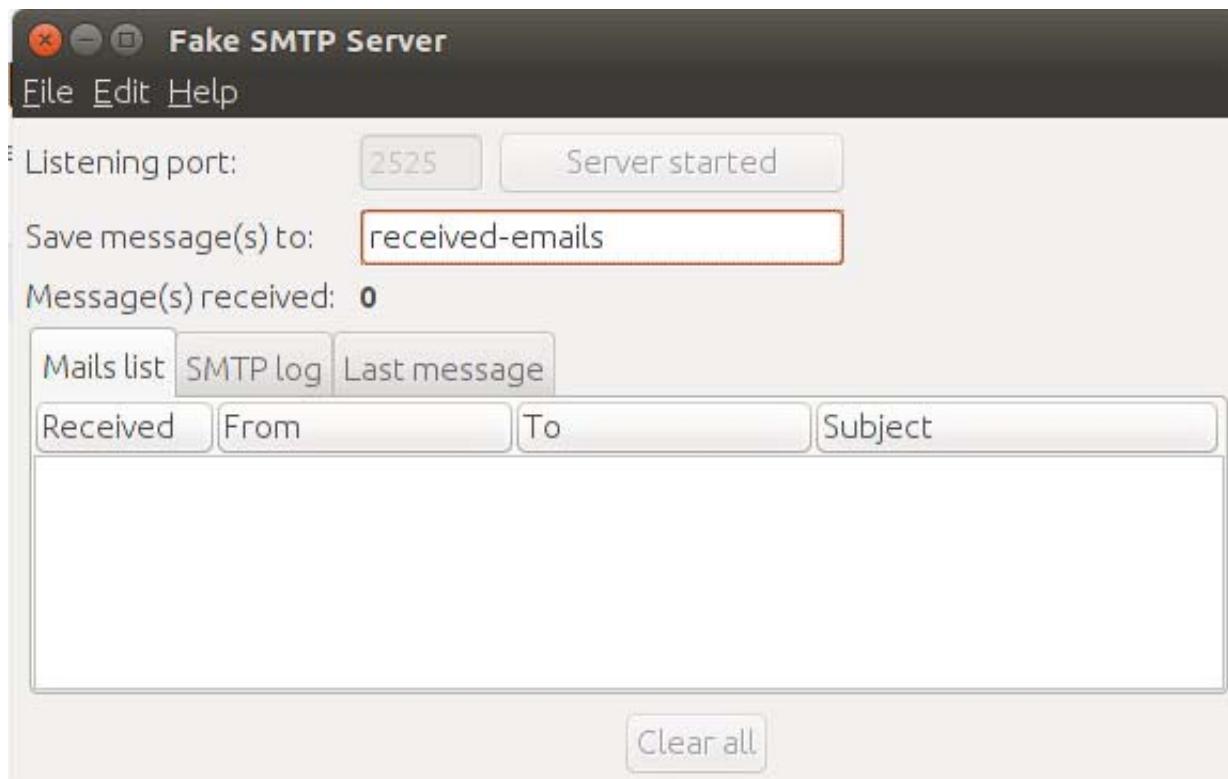
If the fakeSMTPServer is in the application list on the Ubuntu desktop, you can select the icon to start the email server. The server is already started when the application opens.

- ___ b. The fakeSMTP application is displayed.



Click **Start Server**.

- __ c. Leave the email server open on the desktop.



Hint

When the Fake SMTP server is started, the icon is displayed in the application list of Ubuntu. Right-click the Fake SMTP server, then select **Lock to Launcher**.



Later on, when you need to start the Fake SMTP Server you can click the icon in the application list instead of typing the command.

When emails are sent when the email server is running, they are displayed in the Mails list in the Fake SMTP Server. However, if you exit from the SMTP Server and restart it, they are not displayed again. You need to check in the received-emails folder for previously sent messages.

2.3. Create a Staging catalog

In this part, you create a non-development catalog named Staging.

- __ 1. Create a Staging catalog.
 - __ a. Return to the API Manager in the browser.
 - __ b. If you are not already on the Manage page, click the Manage Catalogs tile.
 - __ c. Click **Add**. Then, select **Create catalog**.
 - __ d. Type **Staging** in the Title field. Leave the default name that is specified in the Name field.

The screenshot shows the 'Create Catalog' dialog box. At the top, it says 'Create Catalog' and has a placeholder text: 'Enter the catalog summary details; you can fully configure the catalog after you create it'. Below this, there's a 'Select user' section with a dropdown menu showing 'Think Owner (thinkowner), owner@think.ibm'. Under 'Title', the input field contains 'Staging'. Under 'Name', the input field contains 'staging'. At the bottom left, there's a note: 'Click **Create**. The catalog is added.'

Create Catalog

Enter the catalog summary details; you can fully configure the catalog after you create it

Select user

Think Owner (thinkowner), owner@think.ibm

Title

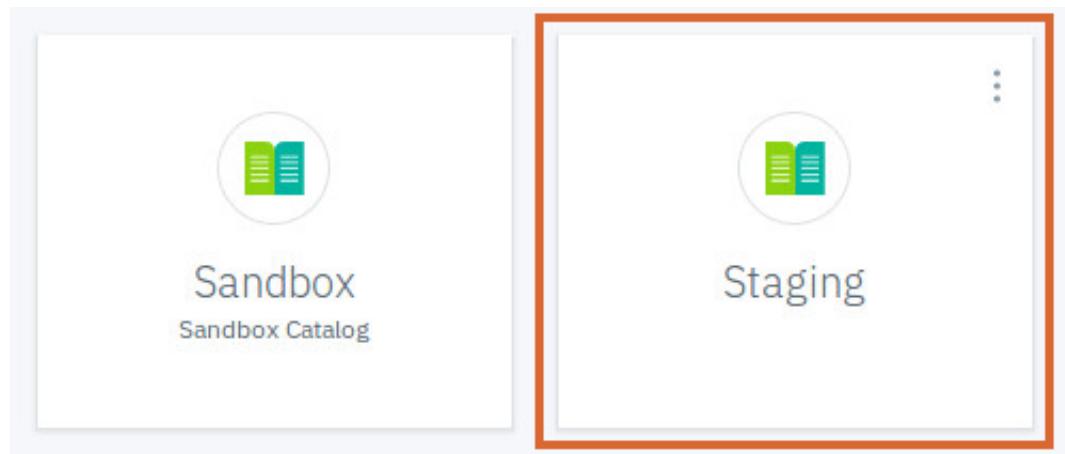
Staging

Name

staging

Click **Create**.
The catalog is added.

- ___ 2. Open the catalog and change the settings.
 - ___ a. Click the **Staging catalog** tile to open the catalog.



- ___ b. Click the **Settings** tab in the navigation menu.

- ___ 3. Set and review the settings for the catalog.
 - ___ a. With the **Overview** tab selected, slide the toggle to enable **Application Lifecycle**. You are prompted to confirm your changes.

Manage / Staging Settings

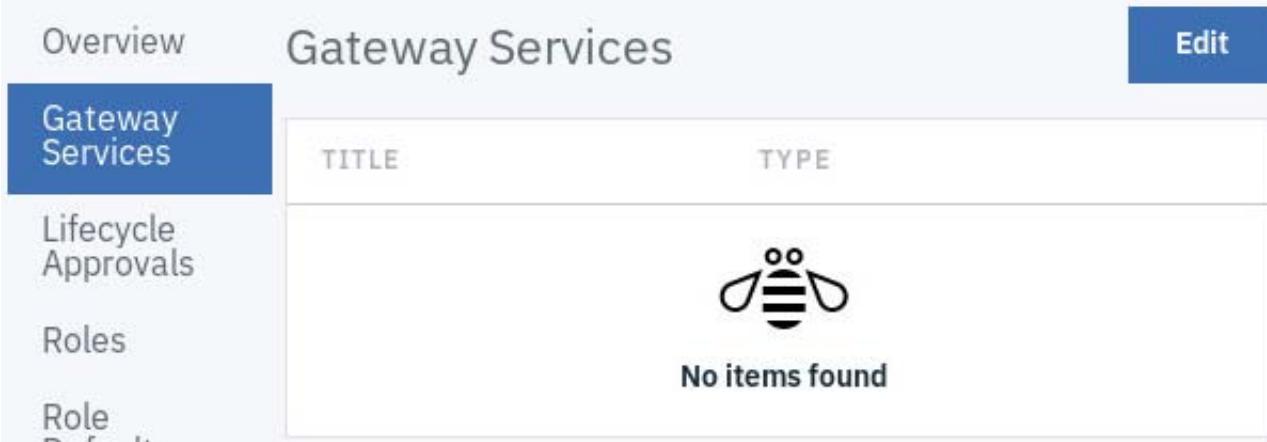
The screenshot shows the Apic Connect Settings interface. On the left, a sidebar lists various settings categories: Overview (selected), Gateway Services, Lifecycle Approvals, Roles, Role Defaults, Onboarding, API User Registries, OAuth Providers, API Endpoints, TLS Client Profiles, Portal, and Properties. The main content area is titled "Catalog". It displays the following configuration:

Title	Staging
Name	staging
Production Mode	Off <input type="checkbox"/> — <input checked="" type="checkbox"/> On
Spaces	Off <input type="checkbox"/> — <input checked="" type="checkbox"/> On
Application Lifecycle	Off <input type="checkbox"/> — <input checked="" type="checkbox"/> On

Information

When installing the Management service on the Kubernetes runtime for this course, development mode was chosen in the apiconnect-up.yml file. Development mode does not support production environments.

- ___ b. Change the settings by clicking the **Gateway Services** tab. Click **Edit** to configure the gateway service.



The screenshot shows the 'Gateway Services' page. On the left, there is a vertical navigation bar with tabs: 'Overview', 'Gateway Services' (which is selected and highlighted in blue), 'Lifecycle Approvals', 'Roles', and 'Role Defaults'. At the top right, there is a blue 'Edit' button. The main content area has a title 'Gateway Services' and a table with two columns: 'TITLE' and 'TYPE'. Below the table, there is a small icon of a person with a crown and a speech bubble, followed by the text 'No items found'.

- ___ c. On the Enable Gateway Service page, select the Gateway Service that was created earlier in Cloud Manager. Then, select **Save**.



The screenshot shows a modal dialog box titled 'Enable Gateway Service'. It contains a table with two columns: 'TITLE' and 'TYPE'. There are two rows, both of which have a checked checkbox in the first column. The first row is 'DP API Gateway' (DataPower API Gateway). At the bottom right of the dialog are two buttons: 'Cancel' and a blue 'Save' button.

- ___ d. The gateway service is added.



The screenshot shows the 'Gateway Services' page again. The table now has one item: 'DP API Gateway' (DataPower API Gateway). The 'Edit' button is visible at the top right.



Troubleshooting

If you get an error when you try to add the gateway service, this is most likely due to the VMs being out of sync.

A Server Error occurred

An error occurred communicating with the gateways subsystem at 'https://apigwd.think.ibm:3000' (error: 'connect ECONNREFUSED 10.0.0.20:3000').

500 API Error

Perform the steps in the **Reset Environment Procedures** section under the Before you Begin section.

- ___ e. Click the **Portal** tab on the settings page. Click **Create**.
- ___ f. Configure the portal configuration settings:
 - Portal Service: **Portal Service**
 - URL: <https://portal.think.ibm/think/staging>

Manage / Staging

Create Portal

Portal Service

Configure the portal service for the catalog

Select the portal service to use for this catalog

Portal Service

URL (optional)

<https://portal.think.ibm/think/staging>

Click **Create**.

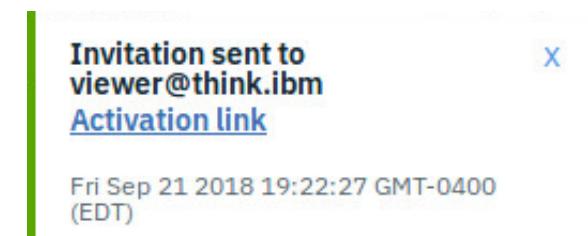
- __ g. You see a dialog that indicates that the portal is being provisioned.

The screenshot shows the 'Portal' configuration page. At the top, it says 'Configure the developer portal that is used by application developers to access the APIs in this catalog'. Below this, there is a green-bordered callout box containing a checkmark icon and the text: 'Provisioning of the developer portal has been initiated. It will take a few minutes to complete. Once complete, you will receive an email containing a link to set the password for the portal admin account.' To the right of the callout box is a small 'X' icon. Further down the page, under 'Portal Service', it shows 'Portal Service' and 'Portal URL' with the value 'https://portal.think.ibm/think/staging'. Under 'User Registries', it shows 'User Registries' and 'Staging Catalog User Registry'.

A Staging Catalog User Registry is automatically created.

Information

Leave the API Manager user interface running for a while. You might see a message that includes an Activation link similar to the one shown.



Also check the email server for an email message. It is better to use the Activation link than the email link, since the links in the email message have some formatting issues that require a workaround. Click the Activation link if it appears, then continue to [Step 2](#) on page 2-17. Otherwise, wait until you see the email message in the SMTP server.

2.4. Sign on to the Developer Portal with the admin user

An email message is sent to the email server.



Note

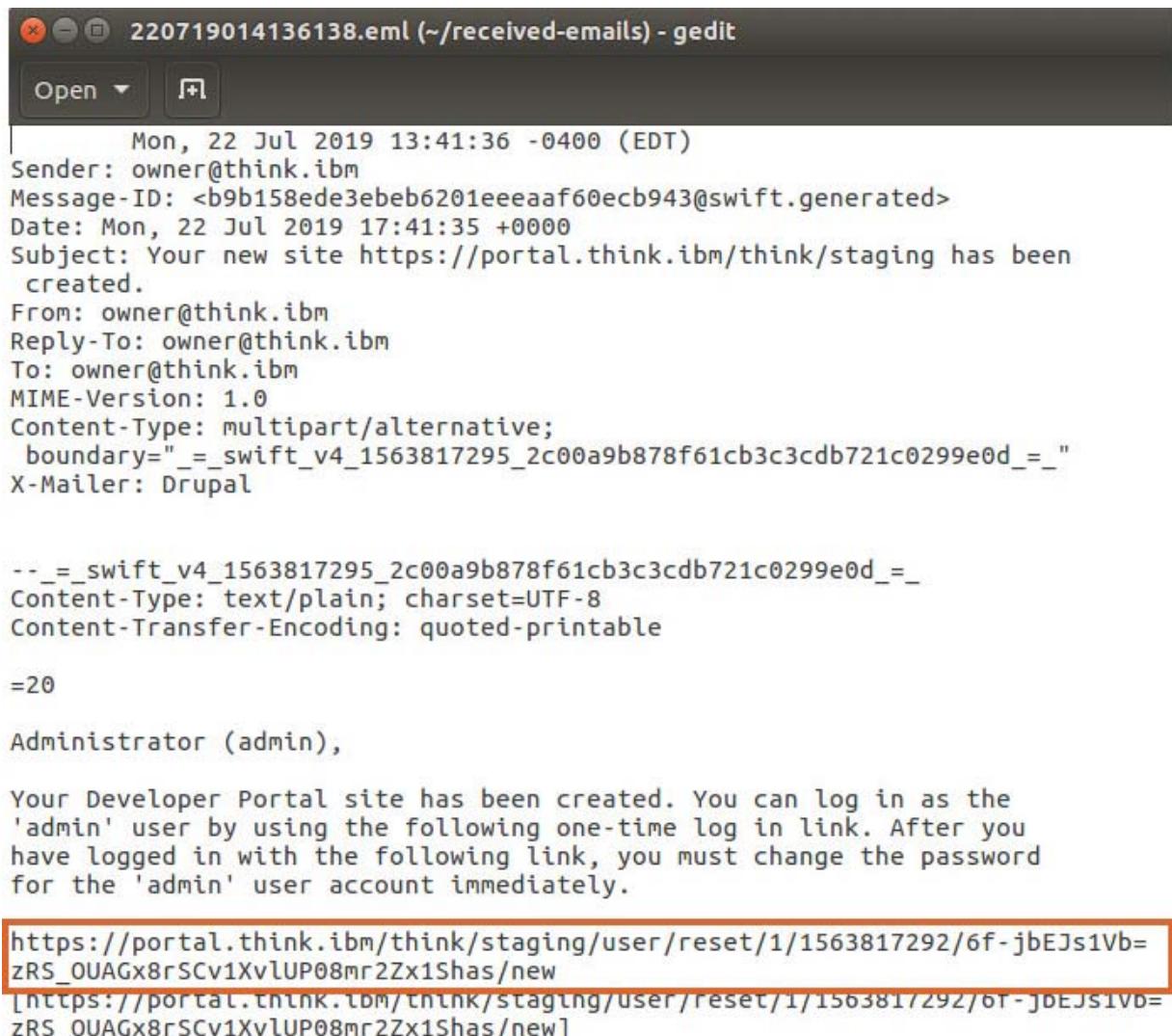
It might take some time for the message to be displayed in the email list. The delay might be in the range of 10 minutes.

- ___ 1. Respond to the email message that API Manager sent.
 - ___ a. Go to the email server that is opened on the desktop.
 - ___ b. Double-click the most recently received message to open it.

The screenshot shows the 'Fake SMTP Server' application window. The title bar says 'Fake SMTP Server'. The menu bar includes 'File', 'Edit', and 'Help'. The main area displays the following information:

- Listening port: 2525 (highlighted)
- Server started
- Received message(s) to: received-emails (highlighted)
- Message(s) received: 1
- Mails list (highlighted)
- SMTP log
- Last message
- Received: 2:42:35 PM
- From: owner@think.ibm
- To: owner@think.ibm
- Subject: Your new site https://portal.think..

- ___ c. Highlight and copy the URL that starts with `https://portal.think.ibm.` and ends with `/new` in the message.



```

Mon, 22 Jul 2019 13:41:36 -0400 (EDT)
Sender: owner@think.ibm
Message-ID: <b9b158ede3ebcb6201eeeeaf60ecb943@swift.generated>
Date: Mon, 22 Jul 2019 17:41:35 +0000
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_1563817295_2c00a9b878f61cb3c3cdb721c0299e0d_="
X-Mailer: Drupal

--=_swift_v4_1563817295_2c00a9b878f61cb3c3cdb721c0299e0d_=
Content-Type: text/plain; charset=UTF-8
Content-Transfer-Encoding: quoted-printable

=20

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/1/1563817292/6f-jbEJs1VbzRS\_OUAGx8rSCv1XvlUP08mr2Zx1Shas/new
[https://portal.think.ibm/think/staging/user/reset/1/1563817292/6f-jbEJs1VbzRS\_OUAGx8rSCv1XvlUP08mr2Zx1Shas/new]

```



Important

The email link adds an extra character (=) at the end of the line. You need to perform this workaround to get the one-time login to work.

Open another gedit text document and copy and paste the lines from the eml document to the untitled document. Then, remove the offending = character.



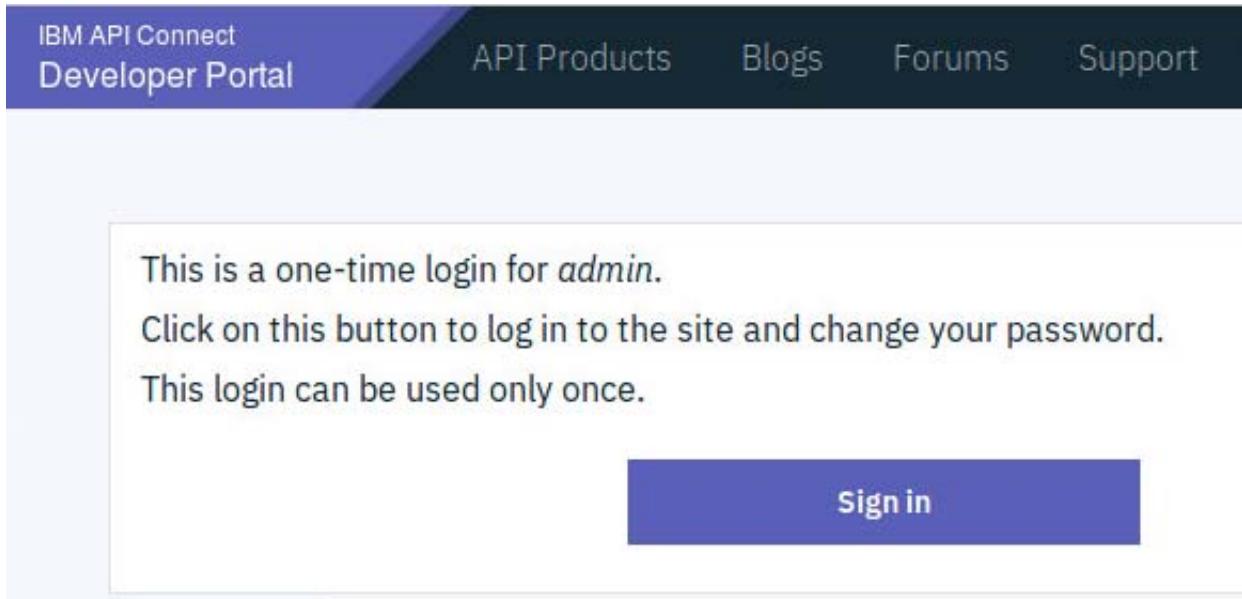
```

220719014136138.eml *Untitled
https://portal.think.ibm/think/staging/user/reset/1/1563817292/6f-
jbEJs1VbzRS_OUAGx8rSCv1XvlUP08mr2Zx1Shas/new

```

Now select everything from the untitled document and copy the URL string into the address area of a new tab in the Firefox browser.

- ___ 2. Activate the admin user with the link that is generated by API Manager.
 - ___ a. The link is pasted into the Firefox browser address area.
 - ___ b. In the Firefox browser, you might see a page that your connection is not secure. Click **Advanced**. Then, click **Add Exception**. Click **Confirm Security Exception**.
 - ___ c. The Developer Portal opens in the browser with a button for a one-time login to the admin user account.



- ___ d. Click **Sign in**.

- ___ e. You are prompted to change the password for the admin user.

 You have just used your one-time login link. It is no longer necessary to use this link to log in. Please change your password.

Change your password

Change your password.

Password must contain at least 3 types of characters from the following character types: lowercase letters, uppercase letters, digits, punctuation.

Password length must be at least 8 characters.

New role was added or existing password policy changed. Please update your password.

The password has a score of 0 but the policy requires a score of at least 2

Password *

- ___ f. Type the new password:

- Password: Passw0rd!
- Confirm password: Passw0rd!

- ___ g. Click **Submit**.

- __ h. You are signed on to the staging Developer Portal as the admin user.

The screenshot shows the IBM API Connect Developer Portal at the URL <https://portal.think.ibm/think/staging/>. The page displays a success message: "Your password has been changed." Below this, there is a large blue banner with the text "Brace yourselves. APIs are coming." and a call-to-action button labeled "Explore API Documentation". On the left side of the banner is a stylized white icon of a person with a gear-like torso and a striped shirt.

- __ 3. Sign out of the admin user.

- __ a. Click the icon on the upper right side of the page. Then, select **Sign out**.

The screenshot shows the IBM API Connect Developer Portal at the URL <https://portal.think.ibm/think/staging/home>. The top navigation bar includes icons for back, forward, search, and user profile. The user profile icon shows the name "admin". A "Sign out" link is visible in the bottom right corner of the header.

- __ 4. Sign on to the Developer Portal again to verify the password you recently created.

- __ b. From the Developer Portal page, click **Sign in**.

- __ c. On the Sign-in Page, type:

- User name: admin

- __ d. Password: Passw0rd!

__ e. Click **Sign in**.

You are signed on to the Developer Portal with the admin user with the password that you specified.

2.5. Disable the module in the Developer Portal that verifies real domain names

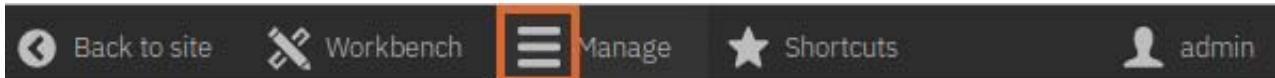
In this part, you uninstall the module that checks whether the email domain has a DNS record during user registration.



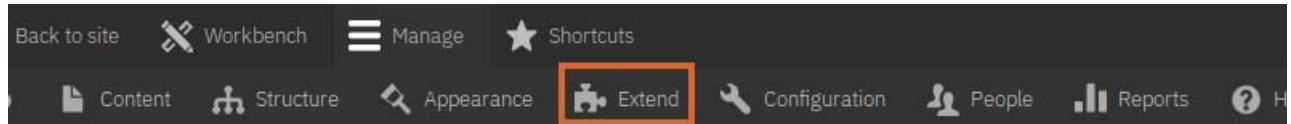
Information

In this course, you use simulated domain names and email addresses. You remove the module from the Developer Portal that prevents you from adding a user email address that includes an unrecognized domain name.

- ___ 1. Navigate in the administration menu.
 - ___ a. The Developer Portal administration menu is displayed in the black area above the IBM API Connect Developer Portal menu. The menu is responsive meaning that it changes according to the size of the browser window.



- ___ b. Click the Manage icon to display the Manage submenu.
- ___ c. Click Extend.



- ___ 2. Uninstall the module that checks for a valid domain record.
 - ___ a. Click the **Disable module** tab on the page.

- __ b. Type `check` in the Filter by name or description field.

The screenshot shows a 'Disable' page with a star icon. At the top, there are four buttons: 'List', 'Update', 'Disable' (which is highlighted), and 'Delete'. Below the buttons, the URL is 'Home » Administration » Extend'. A sub-header says 'The disable process removes all data related to a module.' There is a search bar containing 'check' and a placeholder 'Enter a part of the module name or description'. A table lists modules with columns 'DISABLE', 'NAME', and 'DESCRIPTION'. The 'check_dns' module has a checked checkbox in the 'DISABLE' column. The 'NAME' column shows 'check_dns' and the 'DESCRIPTION' column states: 'Checks if email domain has DNS Record before user registration.'

DISABLE	NAME	DESCRIPTION
<input type="checkbox"/>	Better Exposed Filters	Provides advanced options (such as links, checkboxes, or jQueryUI widgets). The following reason prevents Better Exposed Filters from being uninstalled: <ul style="list-style-type: none">Required by: IBM APIC, Consumer organization, Application, Product, API, Content Browser, Mail Subscribers, IBM APIC Sub-theme Generator
<input checked="" type="checkbox"/>	check_dns	Checks if email domain has DNS Record before user registration.

Then, select the option to uninstall the `check_dns` module.

- __ c. Scroll down, then click **Disable**.
 __ d. On the Confirm disable page, click **Disable**.

The screenshot shows a 'Confirm disable' page with a star icon. At the top, the URL is 'Home » Administration » Extend » Disable'. A message says 'The following modules will be disabled for your site, and *all data from these modules will be lost!*' followed by a bulleted list: '• check_dns'. Below this, a question asks 'Would you like to continue with disabling the above?'. At the bottom are two buttons: a blue 'Disable' button and a white 'Cancel' button.

- ___ e. The module is disabled.

The screenshot shows a user interface titled 'Disable' with a star icon. Below it are four buttons: 'List', 'Update', 'Disable' (which is highlighted in blue), and 'Delete'. The background shows a breadcrumb navigation path: Home » Administration » Extend. A green success message box contains the text: '✓ The selected modules have been disabled.'

You can now add users with non-standard email domains to the Developer Portal.



Note

The DNS record check is a security feature and should not be disabled in production environments.

- ___ 3. Sign out of the Developer Portal.

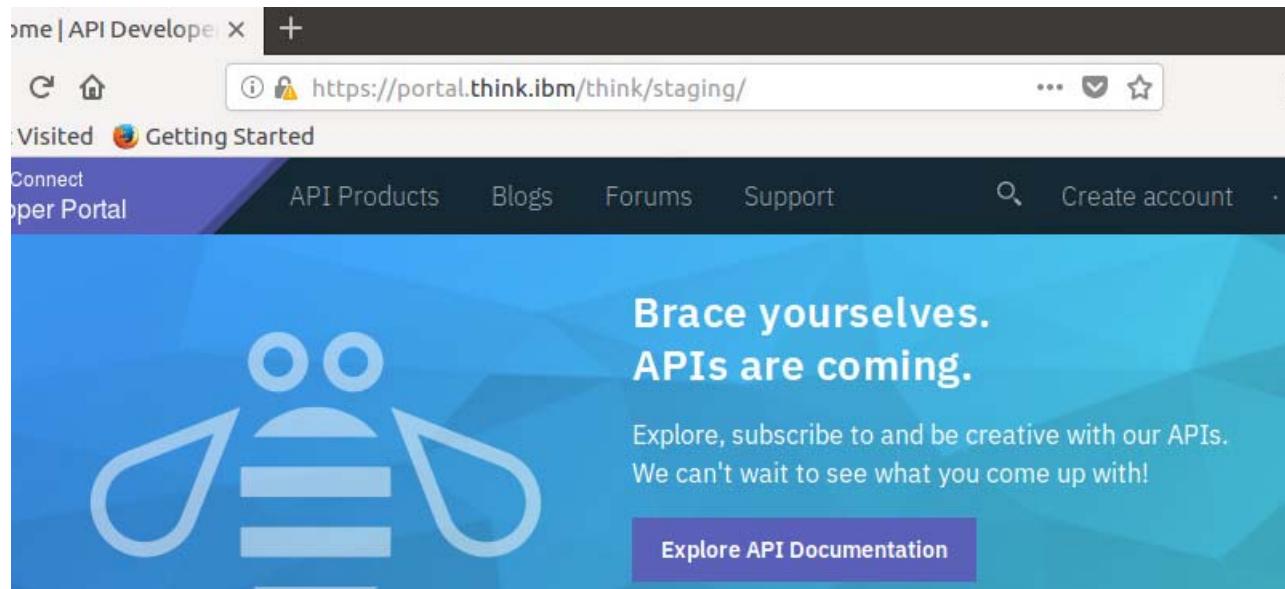
The screenshot shows the top navigation bar of the Developer Portal. It includes links for Manage, Shortcuts, Content, Structure, Appearance, Extend, Configuration, People, Reports, API Products, Apps, Blogs, Forums, and Support. On the right side, there is a user profile for 'admin' and a sign-out link labeled 'Sign out'.



Note

You might need to click **Back to site** from the administration menu or resize the browser window to see the sign-out option on the right side of the page.

- ___ 4. You see the public page for the Developer Portal of the Staging catalog.



- ___ 5. Close the opened email messages.
___ 6. Click **Clear all** in the email server to clear the incoming message list.
___ 7. Leave the email server running on the desktop.

2.6. Create a Developer Organization in API Manager

In this part, you assume the role of the owner of the provider organization. You create developer organizations that are given access to the Products and APIs that you publish to the Developer Portal.

- __ 1. Sign on to the API Manager.
 - __ a. In the browser address area, type the URL:

`https://manager.think.ibm/manager/`

Sign on to API Manager with the credentials of the owner of the Sales organization:

- User: ThinkOwner
- Password: Passw0rd!

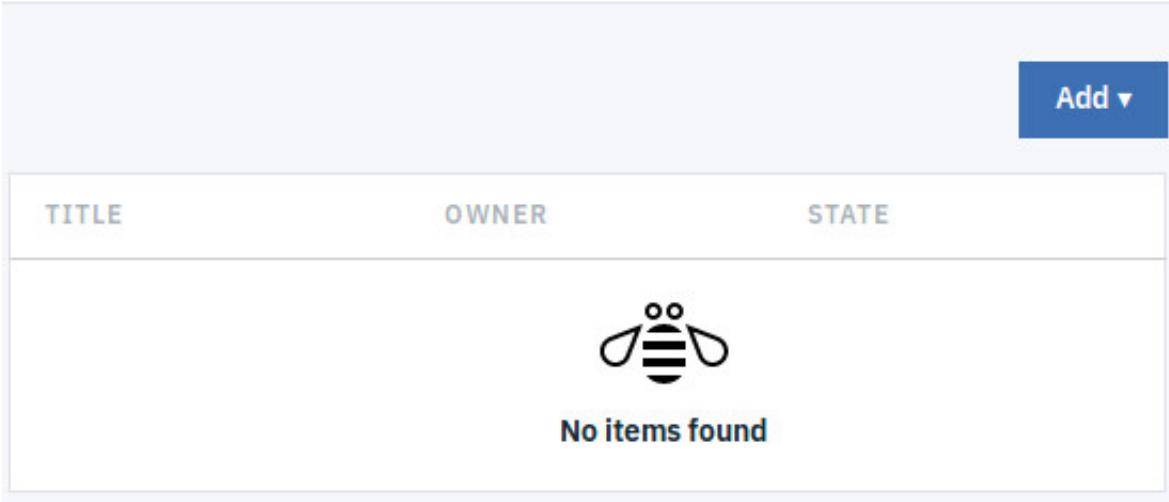
With Home selected in the navigation menu, click **Manage Catalogs**.

Click the **Staging** catalog.

- __ 2. Add the Developer Organization.
 - __ a. Click the **Consumer Organizations** in the navigation menu.

Manage / Staging

Consumer Organizations



TITLE	OWNER	STATE
		No items found

- __ b. Click **Add**. Then, click **Create Organization**.

__ c. In the Add organization dialog box, type or select:

- Title: Ordinal
- Name: ordinal
- User registry: Staging Catalog User Registry
- Specify Owner: **New User**
- User name: OrdinalOwner
- Email: ordinalowner@consumer.ibm
- First Name: Ordinal
- Last Name: Owner
- Password: Passw0rd!
- Confirm Password: Passw0rd!

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

Existing New User

Username
OrdinalOwner

Click **Create**.

- ___ d. The organization is created and added to the list of consumer organizations.

TITLE	OWNER	STATE
Ordinal	Ordinal Owner ordinalowner@consumer.ibm	Enabled

- ___ e. The OrdinalOwner user is added to the Staging Catalog user registry, and the user is able to sign on to the Staging catalog Developer Portal.

2.7. Sign on to the Consumer Organization in the Developer Portal

In this part, you sign on to the Developer Portal with the newly created owner of the Consumer Organization.

- 1. Sign on to the Developer Portal.
 - a. In another tab of the browser, type the URL for the staging Developer Portal in the address area:
`https://portal.think.ibm/think/staging/`
 - b. Click **Sign in**.
-



Important

You must sign on to the staging Developer Portal. There might be a bookmark in the browser for the sandbox developer portal. You must not use this bookmark.

___ c. In the sign-in prompts, type:

- User name: OrdinalOwner
- Password: Passw0rd!

The screenshot shows the IBM API Connect Developer Portal sign-in interface. At the top, there's a purple header bar with the text "IBM API Connect" and "Developer Portal". Below the header, the main title "API Developer Portal" and the "Sign in" button are visible. A prominent link "Sign in with Staging Catalog User Registry" is displayed. The sign-in form has two fields: "Username" containing "OrdinalOwner" and "Password" containing a masked value. A large blue "Sign in" button is at the bottom of the form.

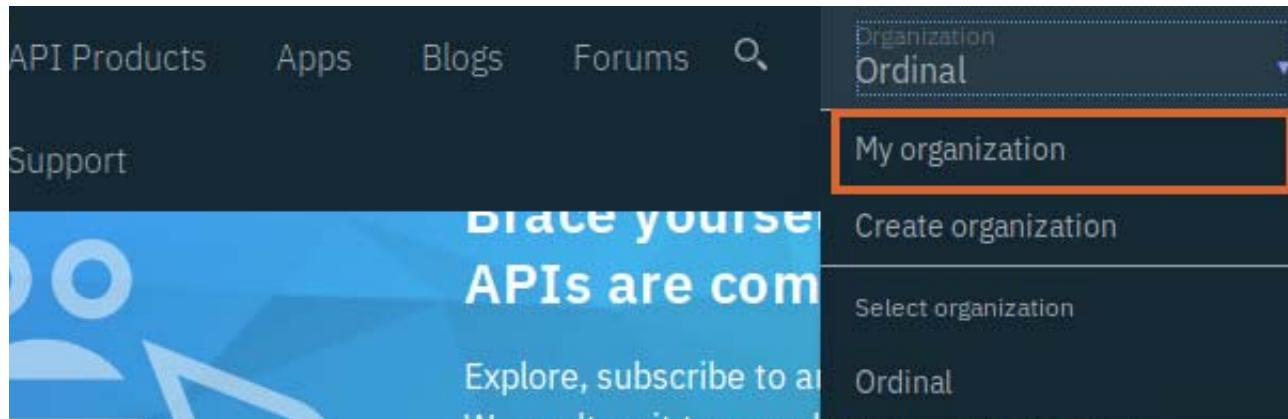
___ d. Click **Sign in**.

___ e. You are signed on to the Developer Portal as the owner of the Ordinal Organization.

2.8. Create a user in the Developer Portal

You are signed in on the Portal with the developer organization owner account. The organization Ordinal is displayed at the top of the page.

- 1. Open the settings for the organization.
- a. Click the drop-down list from the user account in the Developer Portal. Then, select **My organization**.



- 2. Ensure that the Fake SMTP Server is still running and that the Server is started.
- 3. Add a user.
- a. In the Manage dialog box, click **Invite**.

The screenshot shows the "Manage" dialog box. At the top, there are tabs for "Manage" and "Analytics", with "Manage" being active. Below this, there is a section for "Ordinal Owner" (Owner) with the email "ordinalowner (ordinalowner@consumer.ibm)". Under the "Members" heading, there is a blue "Invite" button. A table below lists member roles: "ADMINISTRATOR", "DEVELOPER", "VIEWER", and "STATUS". There is also a column for icons. A message "Members will be listed here" is displayed below the table.

NAME	ADMINISTRATOR	DEVELOPER	VIEWER	STATUS

Members will be listed here

__ b. Specify the properties for the user:

- Email address: appdeveloper@consumer.ibm
- Assign Roles: **Developer**

Invite a user to join your consumer organization

Email *

appdeveloper@consumer.ibm

Assign Roles

Administrator

Developer

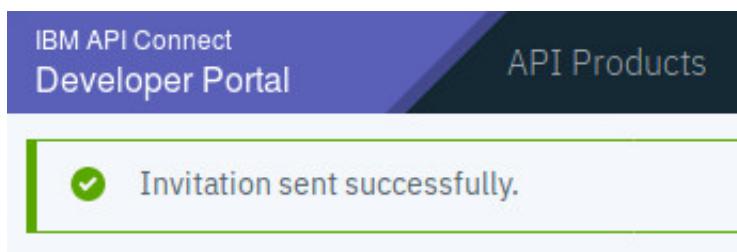
Viewer

Cancel

Submit

Click **Submit**.

__ c. You see a message that the invitation was successfully sent.



Ordinal

Manage Analytics

__ 4. **Sign out** the Ordinal Owner from the Developer Portal. This sign-out is necessary so that you can sign on with the new user.

- ___ 5. Open the email invitation in the email server. You might need to wait up to 5 minutes for the email to be displayed in the email list box.
 - ___ a. Double-Click the latest message in the email server to display the contents of the email.
 - ___ b. Highlight and copy the URL that starts with `https://portal.think` and ends with the end of the message.

**Important**

The email link adds an extra character (=) at the end of the line, and 3D line feed characters that need to be edited out. Do not remove the (=) before the first 3D character. The characters to be removed are highlighted. You need to perform this workaround to get the one-time login to work.

```
https://portal.think.=
ibm/think/staging/user/invitation?activation=3DZXlKaGJHY2lPaUpJVXpJMU5pSXNJ=
bli1Y0NJNkrcFhWQ0o5LmV5SnFkR2tpT2lKaE4yUXhaVFk0WXkwd01EY3dMVFEwWwpjdFLUTTF=
PQzFoWlRVNVl6bGhNvFJqTUdRaUxDsNVzFsYzNCaFkyVwlPaUpqYkc5MvpDSXNJbUYxWknJnk=
ltNHZZU0lzsW50MVLpSTZJbTR2WNVJc0ltVnRZV2xzSWpvaVLYQndaR1YyWld4dmNHVnlRR052Y=
m50MWJXVnLmbWxpYlNJc0ltbHpjeUk2SWtsQ1RTQkJVRWtnUTI5dWJtVmPkQ0lzsW5SdmEyVnVY=
M1I1Y0dVaU9pSnBiblpwZEdGMGF0XVJaXdpYVdGMElqb3h0VFl6T0RJd09UWTVMQ0psZUhBaU9=
qRTFOak01T1RNM05qa3NJbk5qyjNCbGN5STZleUpwYm5acGRHRjBhVzl1SWpvaUwyTnZibk4xYl=
dWeUxXRndhUzl2Y21kekwyUmhaV1l4TnpWbExUsmtNRGt0TkRReLLTMDVZVGhsTFRneVlxUmtZV=
1JsTkdGbU9DOXRaVzFpWlhJdGFXNTJhWFJ0ZEsdmJuTXZNak13WXpsaE0yTXRzbVZrWVmWE1U=
RXdMV0kyTnpVdE1qazRPR016WVdGa01qSXhJaXdpZfhKc0lqb2lMMk52Ym50MWJXVn1MV0Z3YVM=
5dmNtzHpmMmlJoWldZeE56VmxMVEprTURrdE5EUxpZuza1WVRobExUz3lZV1JrWVdsbE5Hrm1PQz=
l0WlcxaVpYSXRhVzUyYVhSaGRhbHZibk12TwpNd1l6bGhNmK10WW1Wa1LTMDBNVEV3TFdJmk56V=
XRNames0T0dNellXRmtNakl4Swl3aVlXTjBhVzl1Y3lJNld5SnlaV2RwYzNSbGnpSXNJbUZqWTJW=
d2RDSmRMQ0p5WldGc2JTSTZJbU52Ym50MWJXVnlpamRqWVRsbE9UWTJMVEEwTwpZdE5EVXlNUzF=
oTURFeExXTm1ZMLuzWXpBeU9XRmhaRG95T1dZek1XSmtOQzFoWVRVMExUUTJOMlV0T1RReU1DMW=
pabVJtWVdaak1UUmhNeIVpZlgwLk5ZZW42Y1o0Y2RqeWdLclpvUVR5NjlkSLV0cEJWaUlnN2xBQ=
S1kRFM0d2s=3D
```

Open another gedit text document and copy and paste the lines from the eml document to the untitled document. Then, remove the offending characters.

```
https://portal.think.
ibm/think/staging/user/invitation?activation=ZXlKaGJHY2lPaUpJVXpJMU5pSXNJ
bli1Y0NJNkrcFhWQ0o5LmV5SnFkR2tpT2lKaE4yUXhaVFk0WXkwd01EY3dMVFEwWwpjdFLUTTF
PQzFoWlRVNVl6bGhNvFJqTUdRaUxDsNVzFsYzNCaFkyVwlPaUpqYkc5MvpDSXNJbUYxWknJnk
ltNHZZU0lzsW50MVLpSTZJbTR2WNVJc0ltVnRZV2xzSWpvaVLYQndaR1YyWld4dmNHVnlRR052Y
m50MWJXVnLmbWxpYlNJc0ltbHpjeUk2SWtsQ1RTQkJVRWtnUTI5dWJtVmPkQ0lzsW5SdmEyVnVY
M1I1Y0dVaU9pSnBiblpwZEdGMGF0XVJaXdpYVdGMElqb3h0VFl6T0RJd09UWTVMQ0psZUhBaU9
qRTFOak01T1RNM05qa3NJbk5qyjNCbGN5STZleUpwYm5acGRHRjBhVzl1SWpvaUwyTnZibk4xYl
dWeUxXRndhUzl2Y21kekwyUmhaV1l4TnpWbExUsmtNRGt0TkRReLLTMDVZVGhsTFRneVlxUmtZV
1JsTkdGbU9DOXRaVzFpWlhJdGFXNTJhWFJ0ZEsdmJuTXZNak13WXpsaE0yTXRzbVZrWVmWE1U
RXdMV0kyTnpVdE1qazRPR016WVdGa01qSXhJaXdpZfhKc0lqb2lMMk52Ym50MWJXVn1MV0Z3YVM
5dmNtzHpmMmlJoWldZeE56VmxMVEprTURrdE5EUxpZuza1WVRobExUz3lZV1JrWVdsbE5Hrm1PQz
l0WlcxaVpYSXRhVzUyYVhSaGRhbHZibk12TwpNd1l6bGhNmK10WW1Wa1LTMDBNVEV3TFdJmk56V
XRNames0T0dNellXRmtNakl4Swl3aVlXTjBhVzl1Y3lJNld5SnlaV2RwYzNSbGnpSXNJbUZqWTJW
d2RDSmRMQ0p5WldGc2JTSTZJbU52Ym50MWJXVnlpamRqWVRsbE9UWTJMVEEwTwpZdE5EVXlNUzF
oTURFeExXTm1ZMLuzWXpBeU9XRmhaRG95T1dZek1XSmtOQzFoWVRVMExUUTJOMlV0T1RReU1DMW
pabVJtWVdaak1UUmhNeIVpZlgwLk5ZZW42Y1o0Y2RqeWdLclpvUVR5NjlkSLV0cEJWaUlnN2xBQ
S1kRFM0d2s
```

Now select everything from the untitled document and copy the URL string into the address area of a new tab in the Firefox browser.

The sign-up page to register the user is displayed in the browser.

__ 6. Complete the user registration in the Developer Portal.

__ a. In the account activation form, type:

- User name: AppDeveloper
- Email address: appdeveloper@consumer.ibm
- First Name: App
- Last Name: Developer
- Password: Passw0rd!
- Confirm password: Passw0rd!

The screenshot shows the 'Sign up' page of the API Developer Portal. The title 'API Developer Portal' is at the top left, followed by 'Sign up'. Below it is a sub-header 'To complete your invitation, fill out any required fields below.' A button labeled 'Sign up with Staging Catalog User Registry' is present. The form fields are as follows:

Username *	AppDeveloper
Email address *	appdeveloper@consumer.ibm
<small>A valid email address. All emails from the system will be sent to this address. The email address is not made public and will only be used if you wish to receive a new password or wish to receive certain news or notifications by email.</small>	
First Name *	App
Last Name *	Developer

Type the required values for the captcha.

Password *
.....
Password strength: Weak

Confirm password *
.....

Your password meets the password policies required for this site

K 6 S b S

What code is in the image? *
K6SbS

Enter the characters shown in the image.

Sign up

Click **Sign up**.

The public Developer Portal page is displayed with message that the invitation process is complete.

IBM API Connect
Developer Portal API Products Blogs Forums Support Create account Sign in

✓ Invitation process complete. Please login to continue. X

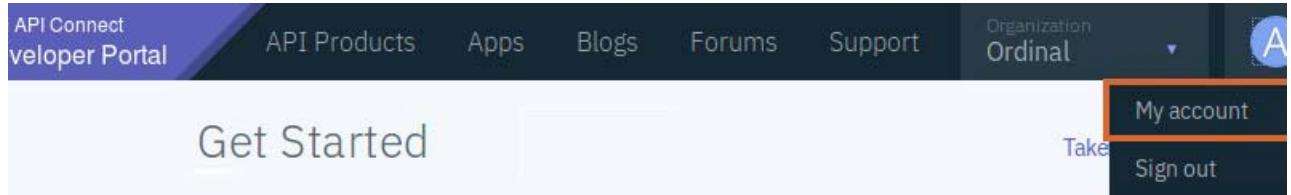
__ 7. Sign in to the Developer Portal with the newly created user.

- __ b. Click **Sign in**.
- __ c. In the Sign-in dialog box, type:
 - User name: AppDeveloper
 - Password: Passw0rd!

Click **Sign in**.

You are signed in on the Portal as a developer in the Ordinal Organization.

- ___ 8. Select **My account** from the AppDeveloper icon.



- ___ 9. The user details are displayed.

A screenshot of the user profile page for 'App Developer'. The page has a header 'AppDeveloper'. On the left, there's a sidebar with three buttons: 'Edit', 'Change Password', and a blue 'View' button which is currently selected. On the right, the user's details are listed: 'First Name' (App), 'Last Name' (Developer), and 'Member for 10 minutes 43 seconds'. Below this is a 'Picture' section featuring a large blue square with a white letter 'A' in the center.

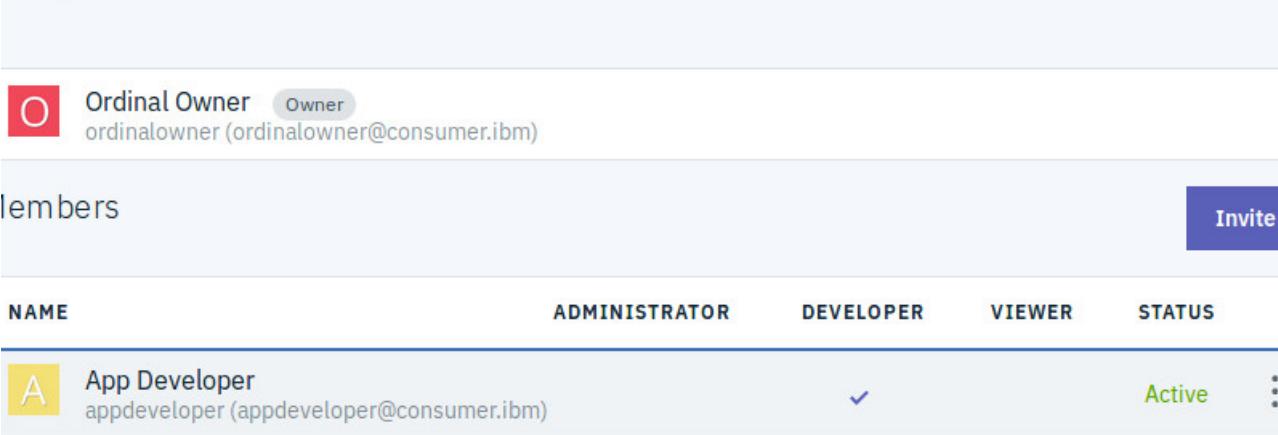
- ___ 10. **Sign out** of the AppDeveloper on the Developer Portal.

2.9. Review the organization in the Developer Portal

Now that you have added a user in the Developer Portal you sign on as the owner of the consumer organization to review the list of users.

- 1. Sign on to the Developer Portal.
 - a. With the staging Developer Portal in the address area:
<https://portal.think.ibm/think/staging/>
 - b. Click **Sign in**.
 - c. In the sign-in prompts, type:
 - User name: OrdinalOwner
 - Password: Passw0rd!
 Click **Sign in**.
- 2. Click the drop-down list from the Ordinal Organization in the Developer Portal. Then, select **My organization**.
- 3. The page displays the owner of the organization and the members.

Ordinal



The screenshot shows the 'Members' section of the 'Ordinal' organization in the IBM Developer Portal. At the top, there are tabs for 'Manage' and 'Analytics'. Below the tabs, the 'Ordinal Owner' is listed with the role 'Owner' and the email 'ordinalowner@consumer.ibm'. A blue 'Invite' button is visible. The 'Members' table has columns: NAME, ADMINISTRATOR, DEVELOPER, VIEWER, and STATUS. One member, 'App Developer', is listed with the email 'appdeveloper@consumer.ibm'. The status is 'Active' with a checkmark. To the right of the member's row is a vertical ellipsis menu icon.

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

- 4. **Sign out** of the owner on the Developer Portal.



Information

The roles that you just viewed are API Connect defined roles for the Developer Portal. A Developer can register applications, subscribe to plans, and test APIs. A viewer can view applications and application activity.

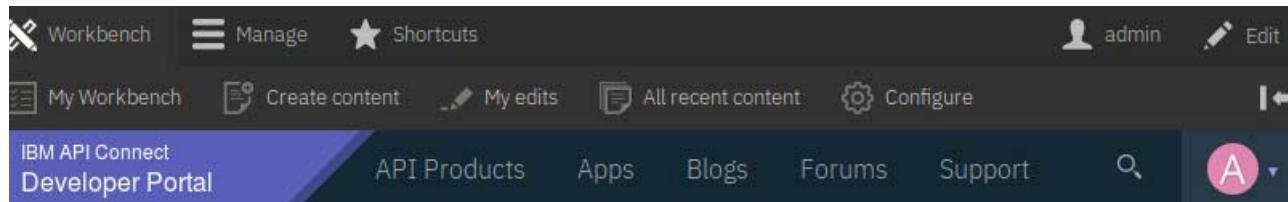
The default roles for consumer organizations are defined in the Cloud Manager. You reviewed these roles in an earlier exercise. See the topic ["Review the provider and consumer organization settings and user registries"](#) on page 1-19.

You can use more roles to fine-tune the administration and security of the Drupal components of the Developer Portal, and you can set them with the admin user of the Developer Portal. You review that next.

2.10. Manage user permissions in the Developer Portal

The admin user can manage the users, roles, and permissions for the Drupal components of the Developer Portal.

- ___ 1. Log in to the Staging Developer Portal <https://portal.think.ibm/think/staging/> with the *admin* user that was created earlier in the exercise.
- ___ 2. The black administration menu is displayed either as a drop-down menu, or expanded when the browser is maximized.



- ___ 3. List the users and permissions in the Developer Portal for the Staging catalog.
 - ___ a. From the administration menu, select the **Manage** collapsed icon. Then, select **People > Permissions**.

- ___ b. Click the **List** tab to view the list of users.

The screenshot shows the 'People' administration page. At the top, there are tabs: 'List' (selected), 'Permissions', 'Roles', and 'Email'. Below the tabs, the URL is 'Home » Administration'. There are three filter dropdowns: 'Name or email contains' (empty), 'Status' ('- Any -'), and 'Role' ('- Any -'). A 'Permission' dropdown is set to '- Any -'. A 'Filter' button is below the filters. An 'Action' dropdown is set to 'Add the Administrator role to the selected user(s)'. A 'Apply to selected items' button is present. A table lists users: AppDeveloper (Active, member for 17 minutes 17 seconds), OrdinalOwner (Active, member for 37 minutes 24 seconds), and admin (Active, member for 1 hour 26 minutes). The 'admin' row shows roles: 'Administrator' and 'Superuser'.

<input type="checkbox"/>	USERNAME	STATUS	ROLES	MEMBER FOR
<input type="checkbox"/>	AppDeveloper	Active		17 minutes 17 seconds
<input type="checkbox"/>	OrdinalOwner	Active		37 minutes 24 seconds
<input type="checkbox"/>	admin	Active	• Administrator • Superuser	1 hour 26 minutes

The users that were created earlier are displayed.

- ___ 4. Currently, the AppDeveloper and OrdinalOwner have authenticated user permissions only for the Drupal components in the Developer Portal.
- ___ 5. Add the forum moderator permissions to the AppDeveloper.
- ___ a. With the **List** tab of the People option selected, select the **AppDeveloper** check box.

- ___ b. Then, from the Action list, select **Add the Forum Moderator role to the selected user(s)**.

Action

Add the Forum Moderator role to the selected user(s)

Apply to selected items

<input type="checkbox"/>	USERNAME	STATUS	ROLES	MEMBER FOR
<input checked="" type="checkbox"/>	AppDeveloper	Active		17 minutes 17 seconds
<input type="checkbox"/>	OrdinalOwner	Active		37 minutes 24 seconds
<input type="checkbox"/>	admin	Active	<ul style="list-style-type: none"> • Administrator • Superuser 	1 hour 26 minutes

Apply to selected items

Click **Apply to selected items**.

The forum moderator role is added to the user.

<input type="checkbox"/>	USERNAME	STATUS	ROLES	MEMBER FOR
<input type="checkbox"/>	AppDeveloper	Active	<ul style="list-style-type: none"> • Forum Moderator 	23 minutes 17 seconds
<input type="checkbox"/>	OrdinalOwner	Active		43 minutes 24 seconds
<input type="checkbox"/>	admin	Active	<ul style="list-style-type: none"> • Administrator • Superuser 	1 hour 32 minutes

- ___ c. Click **Back to site** on the page. Then, **sign out** the admin user from the Developer Portal.

End of exercise

Exercise review and wrap-up

In the exercise, you worked with the API Manager and Developer Portal user interfaces.

First, you created a Staging catalog and configured the portal settings.

You activated the admin user for the Developer Portal of the Staging catalog.

Next, you added a Consumer Organization in API Manager. The owner of the Consumer Organization is automatically added to the Developer Portal, you signed on to the Developer Portal as the organization owner and you added an application developer user.

Finally, you added the forum moderator role to the user from the administration options in the Developer Portal.

Exercise 3. Defining an API and Product in API Manager

Estimated time

00:45

Overview

In this exercise, you work with the API Manager web user interface. You sign in to the API Manager web interface in the role of the organization owner for the API provider. You define an API interface by importing a set of API REST operations and data definitions in an OpenAPI (Swagger V2.0) document. You create a plan and a Product. You use the assembly feature in API Manager to define the operations that are made available on the gateway. You then test the assembly by publishing it to the Sandbox catalog.

Objectives

After completing this exercise, you should be able to:

- Sign in to API Manager
- Create an API by importing 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 server
- Specify the target URL for the operation
- Start the back-end NodeJS application
- Test the API in API Manager

Introduction

In many cases, an API Developer creates an API in the API Designer. In this exercise, you use the API Manager to create a draft API by importing an OpenAPI Swagger definition. You create a plan and a Product for the API. You test the API in the Sandbox catalog of API Manager.

Requirements

You can complete this exercise by using the Ubuntu Linux course image that is supplied with the course.

Before doing this exercise, you must complete exercises 1 and 2.

Exercise instructions

Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

3.1. Create an API, Product, and plan in API Manager

You can create APIs by using the API Designer application, or by using the browser-based API Manager user interface. In this part, you create the API in API Manager by importing an OpenAPI (Swagger 2.0) file.

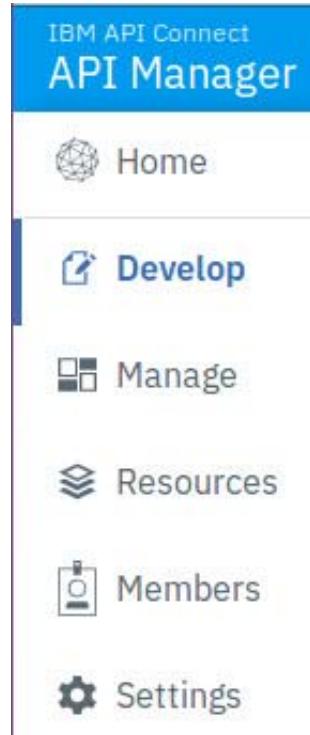
- 1. Open the API Manager web user interface.
 - a. Open a Firefox web Browser window.
 - b. Open API Manager with the URL:
`https://manager.think.ibm/`
 - c. Sign on to API Manager with the credentials of the owner of the Think organization:
 - User: ThinkOwner
 - Password: Passw0rd!

Click **Sign in**.

You are signed in to API Manager. The home page is displayed.

The screenshot shows the IBM API Connect API Manager interface. At the top, there's a header bar with the text "IBM API Connect" and "API Manager" on the left, and "Organization Think" on the right. Below the header, the main content area has a title "Welcome to the API Manager" and a sub-instruction "Choose an option to get started". There are two main cards: one on the left labeled "Develop APIs and Products" with a description and a pencil icon, and one on the right labeled "Manage Catalogs" with a description and a blue and white icon. On the far left, there's a vertical sidebar with several icons: a globe, a document, a grid, a gear, and another gear.

- __ d. Click the **Develop** option from the navigation menu.

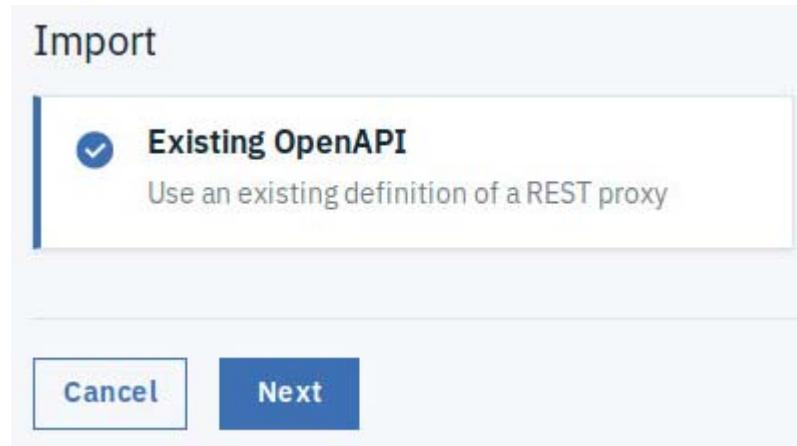


You see that currently no draft APIs or products are in API Manager.

A screenshot of the "APIs and Products" page. At the top left is the title "APIs and Products". To its right is a blue button labeled "Add ▾". The main area is a light gray box containing a large blue icon of a stack of three boxes with stars floating above them. Below the icon is the text "You haven't added any APIs or Products".

- __ 2. Create an API by importing an OpenAPI file.
__ a. From the Develop page, click the **Add** icon. Then, select **API**.

- __ b. Scroll down the page. Then, select the **Existing OpenAPI** option from the menu.

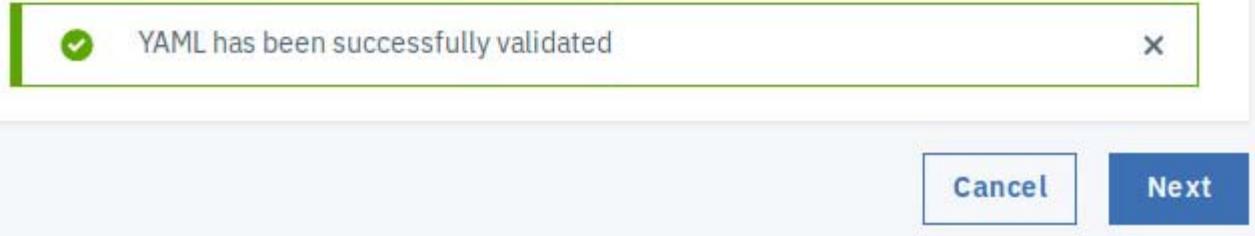
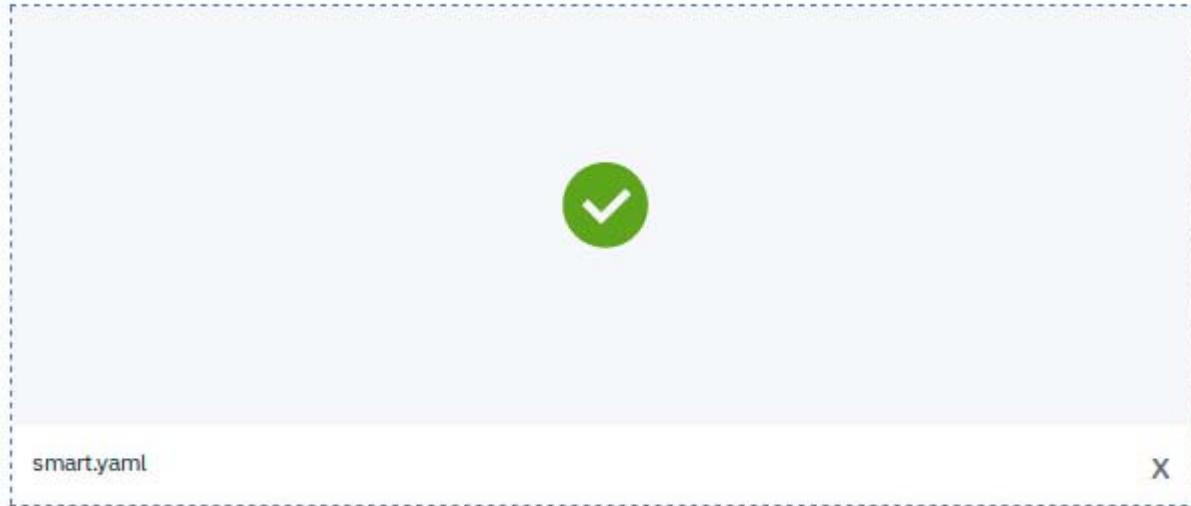


Click **Next**.

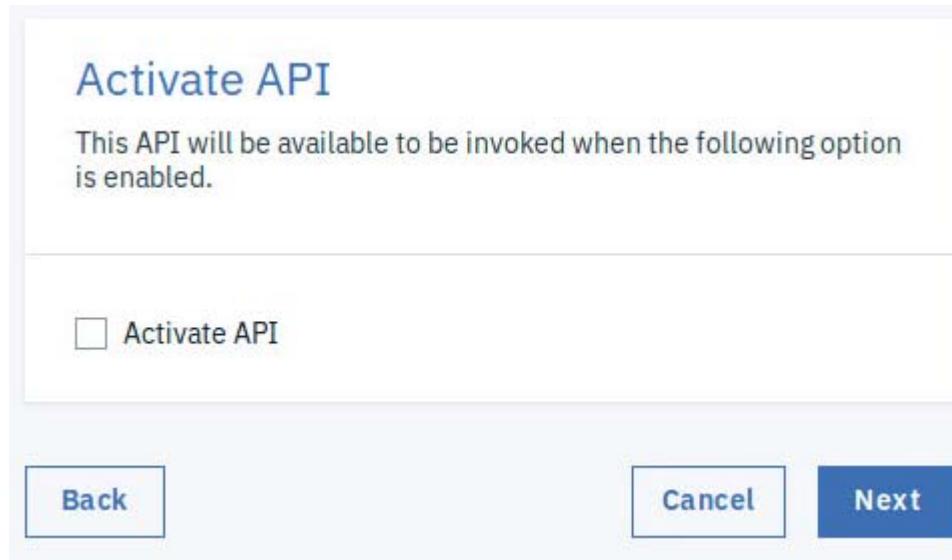
- __ c. In the Import API dialog box, click **Browse**.
__ d. Then, navigate to:
`/home/localuser/lab_files/smart/smart.yaml`
Click **Open**.

Import from file

Select the API definition file to import from



- ___ e. Click **Next**.
- ___ f. Leave the Activate API option cleared.



Click **Next**.

- ___ g. The OpenAPI 2.0 definition is generated.



Click **Edit API**.

h. The API is created and displayed in the Design tab on the page.

The screenshot shows the 'IBM APIM S-Mart' API setup interface. The left sidebar has a 'Develop' tab and lists 'API Setup', 'Security Definitions', 'Security', 'Paths', 'Definitions', 'Properties', 'Target Services', 'Categories', and 'Activity Log'. The main area is titled 'Info' with the sub-instruction 'Enter the API summary details'. It contains fields for 'Title' (set to 'IBM APIM S-Mart'), 'Name' (set to 'ibm-apim-smart'), and 'Version' (set to '1.0.0'). Below these, there is a section for 'Description (optional)' containing the text 'API resources related to the retail industry.' and a link to 'Download the swagger.json definition to use in your API Manager.'

- ___ 3. Review the properties of the imported API.
- ___ a. With the Design tab selected, scroll down to view the properties of the API. Notice that the **Base path** value is set to /smart/v1. Also, notice the **Lifecycle values**.

The screenshot shows the IBM APIM Smart interface. At the top, there's a navigation bar with tabs: 'Develop' (highlighted in blue), 'IBM APIM SMart 1.0.0', 'Design' (highlighted in blue), 'Source', and 'Assemble'. On the left, a sidebar menu lists: 'API Setup' (highlighted in blue), 'Security Definitions', 'Security', 'Paths', 'Definitions', 'Properties', 'Target Services', and 'Categories'. The main content area is titled 'Lifecycle' and contains a section 'Lifecycle (optional)' with a status 'Realized'. Below this, there are several checkboxes: 'Enforced' (checked), 'Testable' (checked), 'CORS' (checked), and 'Application authentication' (unchecked).

- ___ b. Scroll to the bottom of the page for the API Setup. You notice that the **Gateway Type** for this API defaults to DataPower API Gateway.

Gateway Type

Select the gateway type for this API

- DataPower Gateway (v5 compatible)
- DataPower API Gateway

The screenshot shows the 'Gateway Type' section of the API setup. It displays two radio button options: 'DataPower Gateway (v5 compatible)' and 'DataPower API Gateway' (which is selected). Below the radio buttons, a warning message is displayed: 'The selected gateway type will render the following policies in your assembly as invalid. You will need to delete these policies before you can run this API.' A yellow warning icon is next to the message. At the bottom right, there are 'Cancel' and 'Save' buttons.

- ___ 4. Add the target URL property for the API.
- ___ a. Click **Properties** in the list of API options.
- ___ b. Click the **target-url** link to edit the property.
- ___ c. Set the values for the property:
- Name: target-url
 - Default value: http://platform.think.ibm:3015/smart/v1

Name	target-url
Default value (optional)	http://platform.think.ibm:3015/smart/v1
Description (optional)	The URL of the target service
<input type="checkbox"/> Encoded	

Click **Save**.

- ___ 5. Change the security settings for the API.
- ___ a. Click **Security** in the list of API options.
- ___ b. With the Security selected, click **Add**.

API Setup	Security						
Security Definitions	Security definitions selected here apply across the API, but can be overridden for individual operations. Learn more						
Paths	<table border="1"> <thead> <tr> <th>SECURITY DEFINITIONS</th> <th>ORDER</th> <th>DELETE</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	SECURITY DEFINITIONS	ORDER	DELETE			
SECURITY DEFINITIONS	ORDER	DELETE					

- __ c. Select the **clientIdHeader apiKey** in the security definitions.

SECURITY DEFINITIONS	ORDER	DELETE
<input checked="" type="checkbox"/> clientIdHeader apiKey		

Save

- __ d. Click **Save** to save the changes to the imported API.
__ e. Reopen the security definition. Ensure that **client ID** is selected for the clientIdHeader value.

clientIdHeader

Description (optional)

Type

API Key Basic OAuth2

Located In

Header

Key Type (optional)

Client ID

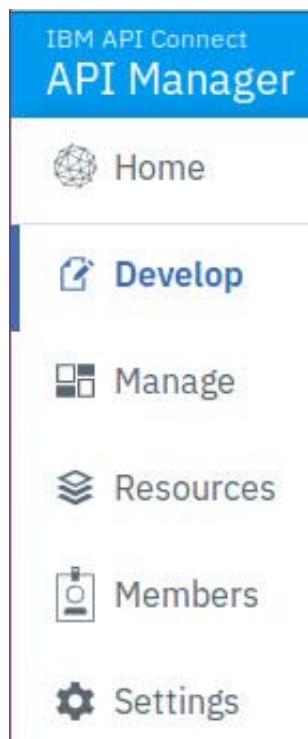
Parameter Name (optional)

X-IBM-Client-Id

Cancel **Save**

Click **Save**.

- ___ 6. Create a Product and plan for the API.
 - ___ a. Click the Develop option in the API Manager navigation menu.



- ___ b. The list of APIs is displayed.

APIs and Products		Add ▾
TITLE	TYPE	
IBM APIM SMart-1.0.0	API (REST)	

- ___ c. Click the **Add** icon. Then, click **Product**.
- ___ d. Select **New product**.
Click **Next**.
- ___ e. Set the Product values:
 - Title: Smart Product
 - Name: smart-product
 - Version: 1.0.0Click **Next**.

- ___ f. Check the option to add the IBM APIM SMart API to the Product.

	TITLE	VERSION	DESCRIPTION
<input checked="" type="checkbox"/>	IBM APIM SMart	1.0.0	API resources related to the retail industry. Download the swagger.json definition to use in your API Manager.

Back **Cancel** **Next**

Click **Next**.

- ___ g. Select the **Default Plan** to add to the Product.

Click **Next**.

- ___ h. Accept the default options on the publish page.

Click **Next**.

- ___ i. The Product is created.

Create New Product

Summary

- ✓ Created new product
- ✓ Added APIs
- ✓ Added rate limits

- ___ j. Click the return arrow icon to go to the Develop page.

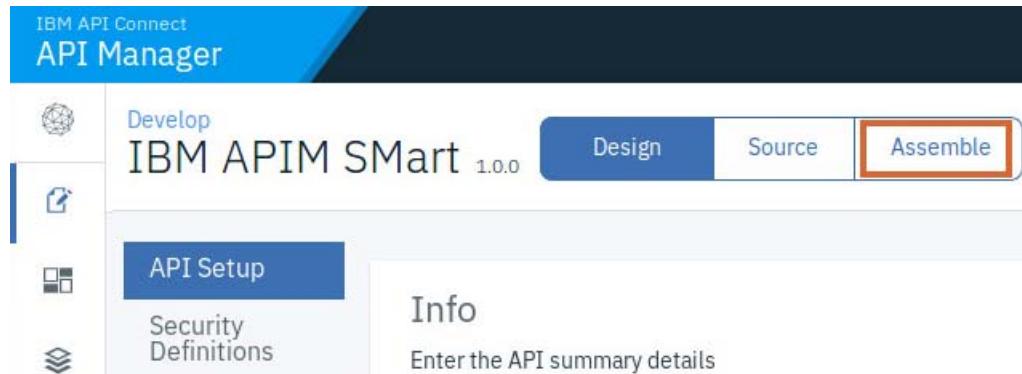
You created a Product with a default plan, and added the API whose lifecycle you manage in a later exercise.

3.2. Update the assembly to control the processing of the API

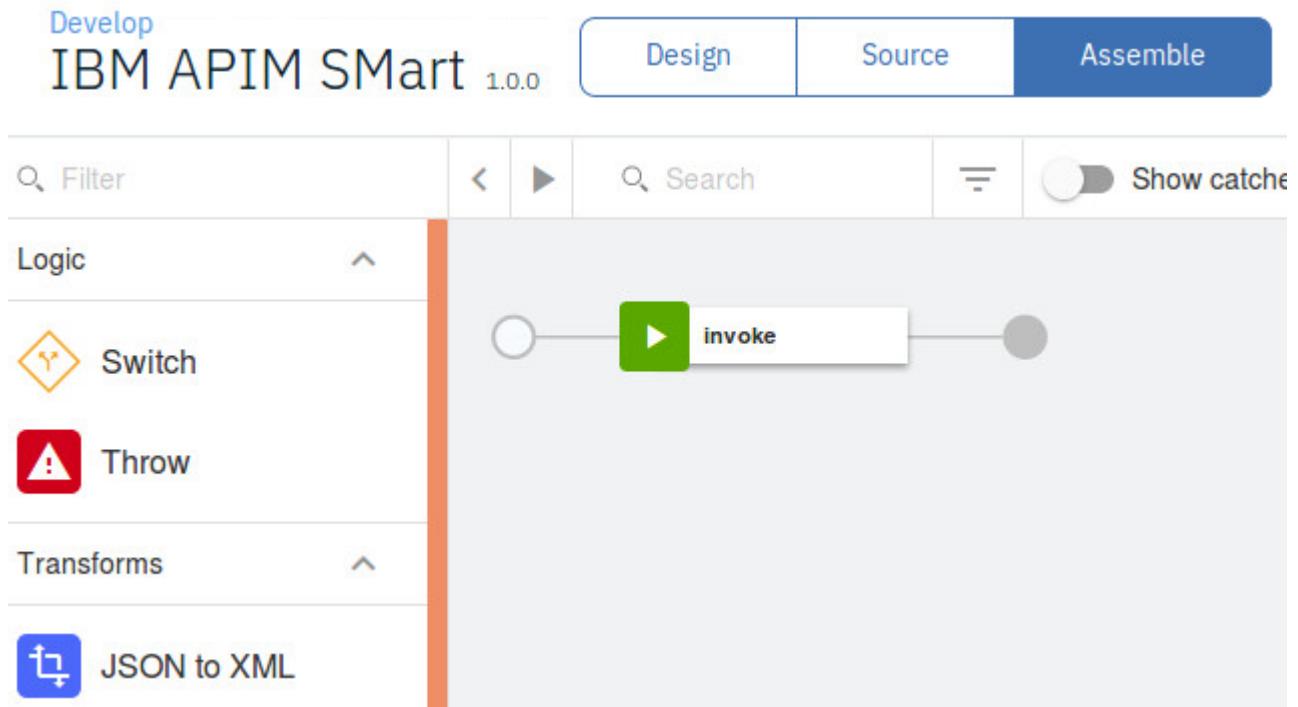
You created an API from an OpenAPI definition. In this part, you assemble the API operations to control aspects of processing in the gateway server.

You expose a subset of the REST operations for the API that was imported into API Manager by creating an assembly of these operations. The assembly includes logic constructs and calls to the back-end REST services.

- 1. Open the API definition in API Manager.
 - a. From the navigation menu, click the Develop icon.
 - b. Click the IBM APIM SSmart 1.0.0 link to open the API.
- 2. Modify the assembly to control which API operations are callable from the gateway.
 - a. With the IBM APIM SSmart API opened on the Develop navigation item in API Manager, click the **Assemble** tab.



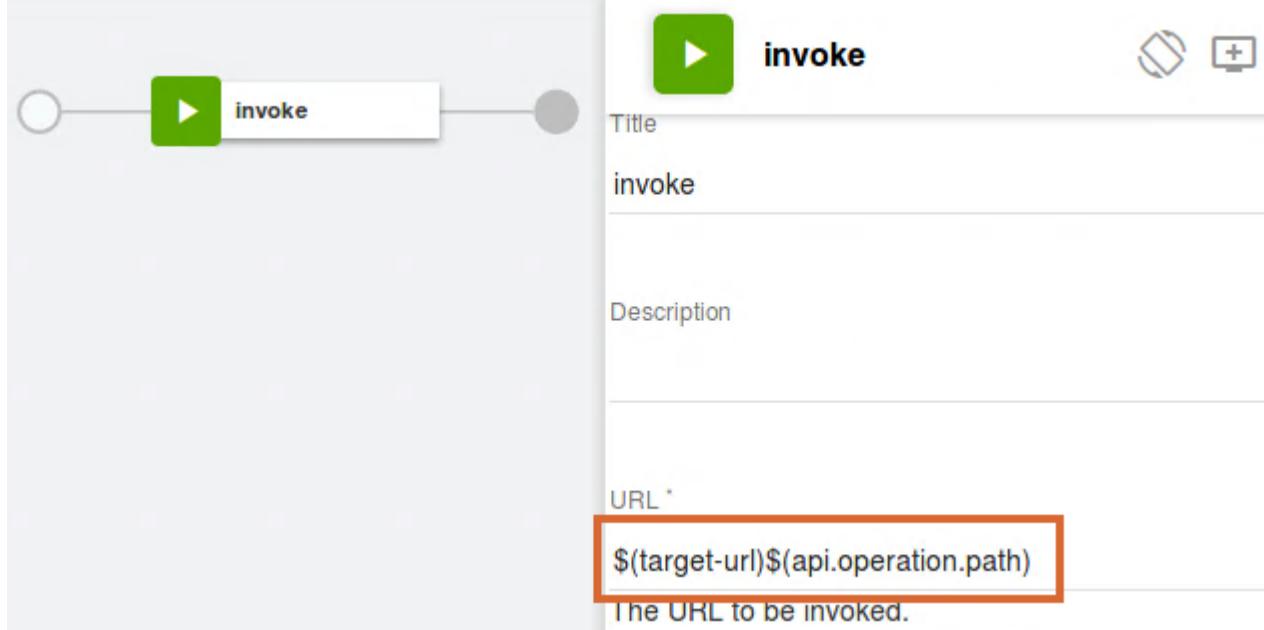
- ___ b. A default assembly flow opens on the **Assemble** tab with a start and end icon and a proxy policy.



The policy palette is displayed on the left side of the page. The actual assembly is displayed in the free form area on the center of the page. The palette contains a list of DataPower policies.

- ___ c. Click the **Invoke** policy in the free form area.
The Property editor opens on the right side of the page.
- ___ d. Change the value in the URL field to:

`$(target-url)$(api.operation.path)`



- e. **Save** the changes.
The API is saved.
- f. The completed assembly diagram contains a single invoke policy.

3.3. Start the back-end application

The back-end application that you call from the API assembly runs as a local Loopback application.

- ___ 1. Open a terminal interface.
 - ___ a. Click **Terminal** from the Ubuntu list of applications.
- ___ 2. Install the modules for the back-end application.
 - ___ a. Change to the apim-smart directory in the terminal.
`cd ~/apim-smart`
 - ___ b. Issue the command:
`npm install`
- ___ 3. Run the apim-smart NodeJS application.
 - ___ a. Ensure that you are in the apim-smart directory in the terminal.
`cd ~/apim-smart`
 - ___ b. Issue the command:
`node .`



Information

The command is **node** followed by a period. Alternatively, type **npm start**.

- ___ c. The application starts in the terminal.

```
localuser@ubuntu:~/apim-smart
luser@ubuntu:~$ cd ~/apim-smart
luser@ubuntu:~/apim-smart$ node .

user model "User" is attached to an application that does not specify a session invalidation strategy. Other sessions should be invalidated when a password or email has changed. Session invalidation is important for security reasons as it allows users to recover from various account breach situations.

I recommend turning this feature on by setting "invalidateSessionsOnSensitiveChanges" to true in server/config.json (unless you have implemented your own solution for token invalidation).

Also recommend enabling "injectOptionsFromRemoteContext" in server's settings (typically via common/models/*.json file). This setting is required for the invalidation algorithm to keep current session valid.

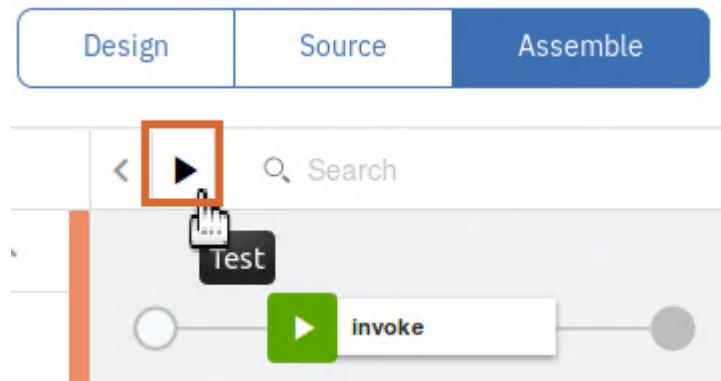
For more information see https://loopback.io/doc/en/lb2/AccessToken-invalidation.html

Fileware allow-cors registered
server listening at: http://0.0.0.0:3015
use your REST API at http://0.0.0.0:3015/explorer
```

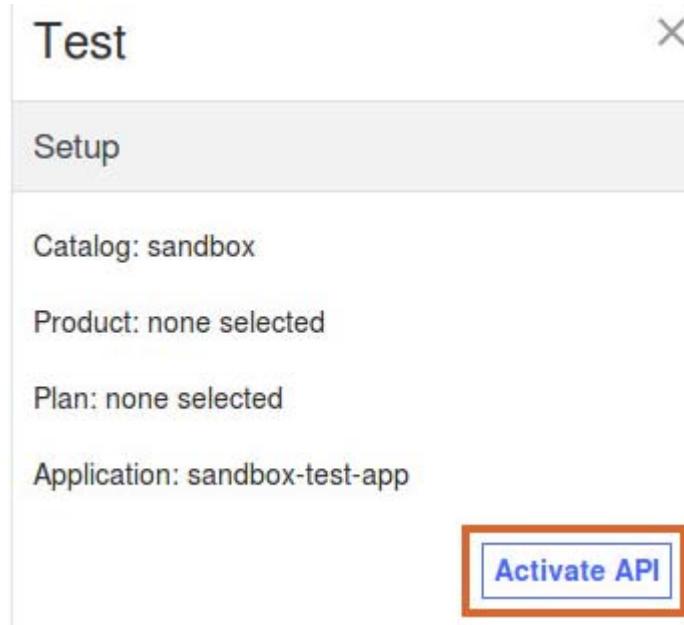
- ___ d. Leave the terminal running.

3.4. Test the API in API Manager

- ___ 1. Open the API to the assembly if the API is not already opened.
 - ___ a. Click Develop icon from the navigation menu.
 - ___ b. Click **IBM APIM SMart 1.0.0**.
 - ___ c. Click the **Assemble** tab.
- ___ 2. Test the API in API Manager.
 - ___ a. Click the **Test** icon in the assembly diagram.



- ___ b. The test setup dialog box opens in the left pane.
Click **Activate API**.



- ___ c. The test facility inserts these options:
 - Catalog: sandbox
 - Product: ibm-apim-smart-auto-product
 - Plan: Default Plan
 - Application: sandbox-test-app

- ___ d. You see that the product is auto-published.
- ___ e. In the operation drop-down list, select **get /products**.

The screenshot shows the API Manager interface. At the top, there are two tabs: "Setup" (which is currently selected) and "Operation".

Setup Tab:

- Catalog: sandbox
- Product: ibm-apim-smart-auto-product
- Plan: Default Plan
- Application: sandbox-test-app

Republish product button (highlighted in blue)

Operation Tab:

Choose an operation to invoke:

- Operation: get /products

- ___ f. A client ID is generated for you.
- ___ g. Scroll down. Then, click **Invoke**.

- ___ h. The first time that you call the operation, you might receive a response with a status code -1 that includes a message that indicates the lack of CORS support on the target server.

The screenshot shows the 'Invoke' button at the top right. Below it is a 'Response' section. Under 'Status code:' it says '-1'. A note below states: 'No response received. Causes include a lack of CORS support on the target server, the server being unavailable, or an untrusted certificate being encountered.' At the bottom, there's a link: 'Clicking the link below will open the server in a new tab. If the browser displays a certificate issue, you may choose to accept it and return here to test again.' followed by the URL <https://apigw.think.ibm/think/sandbox/smart/v1/products>.

Response time:
114ms

- ___ i. Click the link in the Test area.
___ j. The web page prompts that your connection is not secure, click **Advanced**. Then, click **Add Exception**.

Warning: Potential Security Risk Ahead

Firefox detected a potential security threat and did not continue to apigw.think.ibm. If you visit this site, attackers could try to steal information like your passwords, emails, or credit card details.

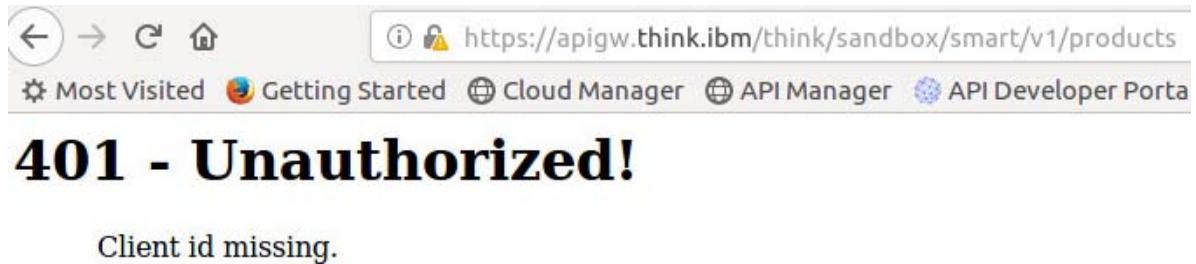
[Learn more...](#)

[Go Back \(Recommended\)](#)

[Advanced...](#)

- ___ k. In the subsequent dialog, click **Accept the Risk and Continue**.

- __ l. The output response is displayed on the page.



The screenshot shows a browser window with the following details:

- Address bar: <https://apigw.think.ibm/think/sandbox/smart/v1/products>
- Page title: 401 - Unauthorized!
- Message: Client id missing.
- Information section: A blue circle with a white 'i' icon followed by the word "Information".
- Page navigation: Back, Forward, Stop, Home.
- Top menu: Most Visited, Getting Started, Cloud Manager, API Manager, API Developer Porta.

Since the call in the browser did not include the client ID header that is required as part of the security that was configured in the API definition, the browser displays some XML with the error. The test feature in API Manager supplies the client ID that you see in the next step.

The equivalent command in curl that includes the client ID header is:

```
curl -k --request GET --url  
'https://apigw.think.ibm/think/sandbox/smart/v1/products' --header  
'x-ibm-client-id:<client ID copied from test facility>'
```

- __ m. Return to the **API Manager** tab and click **Invoke** to rerun the test.

- n. You see the result of the test.

Response

Status code:
200 OK

Response time:
48ms

Headers:

```
content-type: application/json; charset=utf-8
x-ratelimit-limit: name=default,100;
x-ratelimit-remaining: name=default,99;
```

Body:

```
[
  {
    "product_id": "apples",
    "name": "apples",
    "description": "An optional description",
    "image": "/images/apples.png",
```



Troubleshooting

If you get a status code 404 indicating that there is no such method, check that you typed the URL correctly in the invoke properties. Change the value to the correct value, save the API, and republish the product. Then, rerun the test.

If you receive other errors, refer to the Troubleshooting appendix.

- o. Close the Test pane.
- 3. Stop the LoopBack application.
 - a. In the terminal, press Ctrl+C to stop the back-end application.
You start it again when needed.

End of exercise

Exercise review and wrap-up

In this exercise, you defined an API interface by importing a set of API REST operations and data definitions from an OpenAPI file. You created a Product with a default plan. You created an API assembly in API Manager that controls aspects of processing in the gateway server.

You tested the assembly in the Sandbox catalog against a back-end Node application.

Developers usually do the initial testing of the APIs against the Sandbox catalog. When the APIs have been fully tested, the APIs, Products, and plans are published to other catalogs such as the Staging catalog that is defined earlier in this course. When the APIs are published, they are made available on the portal that is associated with that catalog.

Exercise 4. Managing and approving API Products

Estimated time

01:00

Overview

This exercise shows you how the Product lifecycle is managed in API Manager. You review Product and API availability and visibility settings, and create and plans. You configure lifecycle settings and approval settings for a catalog. You examine how to define a user for the provider organization. You manage Product and API versions. You publish artifacts to the Staging catalog, and then review and approve the lifecycle stage for a published Product.

Objectives

After completing this exercise, you should be able to:

- Review product availability and visibility settings in API Manager
- 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

Introduction

Managing Products and APIs through their lifecycle states can be done by the owner of the provider organization or parts can be delegated to users in other roles. In the exercise, you assume the API Manager roles of owner and developer.

Requirements

You can complete this exercise by using the Ubuntu Linux course image that is supplied with the course.

Before doing this exercise, you must complete the previous exercises.

Exercise instructions

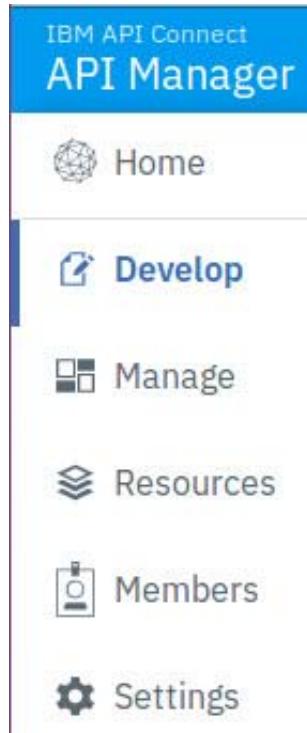
Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

4.1. Review availability settings and change the plans for a Product

In this part, you review the visibility and availability settings for the Product that was generated in an earlier exercise. You change the plan details for the Product.

- 1. Open the API Manager web user interface.
 - b. In the Firefox browser, open API Manager with the URL:
`https://manager.think.ibm/`
 - c. Sign on to API Manager with the credentials of the owner of the Think organization:
 - User: ThinkOwner
 - Password: Passw0rd!Click **Sign In**.
- 2. Select the Develop icon from the API Manager navigation menu.



- 3. The list of APIs and Products is displayed.
- 4. Click **Smart Product** 1.0.0.
The Product opens in the Design view.

- ___ 5. Select **Visibility** in the left pane. The visibility options are displayed.

These options are used when you publish the Product to the Developer Portal.

- ___ 6. Open the plans for the Product.
___ a. Click the **Plans** option on the page.

The Default Plan is displayed. If you edit the Default Plan, you see that it is a rate limited plan with a limit of 100 calls per hour.

- ___ 7. Add a Gold plan to the Product.
___ a. Click the **Add** icon to add a plan.

___ b. Complete the plan detail options:

- Title: Gold Plan
- Name: gold-plan
- Description: Unlimited plan
- Approval: Checked
- Rate limits: Unlimited (Click the trash can icon to delete)
- Burst limits: No burst limits defined (Click the trash can icon to delete)

Title

Gold Plan

Name

gold-plan

Description (optional)

Unlimited plan

Approval

Hard limit

Rate Limits

Add

NAME	CALLS	PER	UNIT	DELETE
------	-------	-----	------	--------

Burst Limits

Add

NAME	CALLS	PER	UNIT	DELETE
------	-------	-----	------	--------

___ c. **Save** the changes to the Gold plan.

- __ d. You see the Default Plan and a Gold Plan in the list of plans.

The screenshot shows the 'Plans' section of the IBM API Connect interface. On the left, there is a sidebar with tabs: 'Product Setup', 'Visibility', 'APIs', 'Plans' (which is highlighted in blue), and 'Categories'. The main area has a title 'Plans' with a sub-instruction 'Add plans to product' and a large 'Add' button. Below this, there are two sections: 'Default Plan' (containing 'Default Plan') and 'Gold Plan' (containing 'Unlimited plan'). Each section has a three-dot menu icon on the right.

4.2. Create a user and review API provider roles in API Manager

Currently, the owner of the provider organization that is named *Think* is the only user that is defined in the API Manager local user repository. The user ID of the organization owner is `ThinkOwner`.

You add another user with a developer role. Together, these two users and roles are going to manage the lifecycle of the Products and APIs in API Manager. The owner, who has all permissions, also fulfills the product-approval role in the exercise.



Important

The Fake SMTP email server should be started and be minimized or visible on the desktop. To start the SMTP server, ensure that you are in the `/home/localuser` directory.

In the terminal type:

```
java -jar /usr/local/bin/fakeSMTP-2.0.jar -s -p 2525
```

You can clear all previous messages from the mail list. You respond to an email message that gets sent when a user is created. Click **Clear all** in the Fake SMTP Server to clear out all previous messages.

- ___ 1. Review the registries in API Manager.
 - ___ a. From the navigation menu, select the **Resources** icon. The list of user registries is displayed.

User Registries	User Registries		Create
	TITLE	TYPE	
TLS	Sandbox Catalog User Registry	Local User Registry	:
OAuth Providers	Staging Catalog User Registry	Local User Registry	:



Information

The Sandbox Catalog User Registry is created by default when the API Connect product is installed. When the Think provider organization was created, the ThinkOwner was added to the Sandbox user registry. For the purposes of the exercises in this course, the Sandbox user registry is used for the members of the provider organization that is named Think. The Staging user registry is used for members of the consumer organization named Ordinal.

- ___ 2. Review the roles in API Manager.
- ___ 3. From the navigation menu, select the **Settings** icon. Then, click the **Roles** option.

Settings

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

These are the roles for the provider organization.

- ___ 4. Review the details for the Developer role.
- ___ a. On the Roles page, expand the Developer role.

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

Notice that the Developer can only view Settings. Later, you must sign on again as the organization owner to change settings for lifecycle approvals.

- ___ 5. Review the members in API Manager.
 - ___ a. From the navigation menu, select the **Members** icon. Then, click the option to view owners.

Members

The screenshot shows the 'Members' page in API Manager. At the top left, there is a checkbox labeled 'View owners' which is checked. Below it, a card displays a member named 'Think Owner' with the role 'Org Owner' and the email 'owner@think.ibm'. A large blue button at the bottom right of the card says 'Invite member'. Below this card, there is a table header with columns: NAME, ADMINISTRATOR, API-ADMINISTRATOR, COMMUNITY-MANAGER, DEVELOPER, VIEWER, and STATE. Underneath the header, there is a single row containing a small bee icon and the text 'No items found'.

The organization owner is displayed. The owner is the only member currently in the Think provider organization.

- ___ 6. Add a member to the Think organization with a role of developer.
 - ___ a. Click **Invite member**.

- ___ b. In the Invite Member dialog box, type developer@think.ibm for the user email. Select the **Developer** check box.

Invite Member

Specify Email
Enter the email address of the user to invite as a member of the provider organization

developer@think.ibm

Assign Roles (optional)

Administrator
Administers the API provider organization

API Administrator
Manages the API product lifecycle

Community Manager
Manages application developer communities

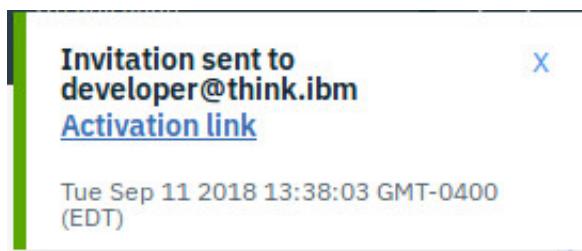
Developer
Authors API and product definitions

Viewer
Views the API provider organization

Cancel **Invite**

Click **Invite**.

- ___ c. A dialog is displayed at the top of the page that shows that an invitation is sent to developer@think.ibm. Click the **Activation link** in the dialog.



- ___ d. Another dialog is displayed with the activation link.

The screenshot shows a modal dialog titled "Activation link". Inside the dialog, there is a URL: <https://manager.think.ibm/auth/manager/register?activation=ZXIKaGJHY>. Below the URL is a blue "Copy" button. A descriptive text below the button says, "Send the activation link to a user to invite them to sign in or register." In the top right corner of the dialog, there is a close button (an "X").

Click **Copy**.

- ___ e. Close the dialogs and **sign out** of the owner in API Manager.



Note

You must sign out ThinkOwner from API Manager, since the browser does not allow two users to be signed on simultaneously to API Manager.

- ___ f. Paste the copied activation link into the address area in the browser.

- __ g. The page to sign up with the API Manager user registry is displayed. Type the information:

- User name: ThinkDeveloper
- Email: developer@think.ibm
- First name: Think
- Last name: Developer
- Name: gold-plan
- Password: Passw0rd!
- Confirm password: Passw0rd!

The screenshot shows the 'Sign up with API Manager User Registry' page. It has fields for Username, Email, First name, Last name, Password, and Confirm password. The 'Username' field contains 'ThinkDeveloper', 'Email' contains 'developer@think.ibm', 'First name' contains 'Think', 'Last name' contains 'Developer', 'Password' and 'Confirm password' both contain 'Passw0rd!' (represented by six dots). A blue 'Sign up' button is at the bottom.

API Manager

Sign up with API Manager User Registry

Username

ThinkDeveloper

Email

developer@think.ibm

First name

Think

Last name

Developer

Password

.....

Confirm password

.....

Sign up

Click **Sign up**.

- ___ h. The registration is completed successfully. Now you can sign in to validate the user and password that you created.

The screenshot shows the IBM API Connect API Manager interface. At the top, it says "IBM API Connect" and "API Manager". Below that, a large box displays the message "Registration completed successfully" and "Congratulations, you are now registered.". Another section titled "Next step" lists three options: "Log in with your credentials to work in the API Connect cloud.", "- Manage your organization", "- Manage members for your organization", and "- Log in with the credentials you registered with". At the bottom, a box contains the instruction "Click the button below to login" and a blue "Sign In" button.

Click **Sign In**.

- ___ i. Sign on to API Manager with the credentials as the developer that you created:
- User: ThinkDeveloper
 - Password: Passw0rd!

Click **Sign In**.

You are signed in as a developer in the Think provider organization.

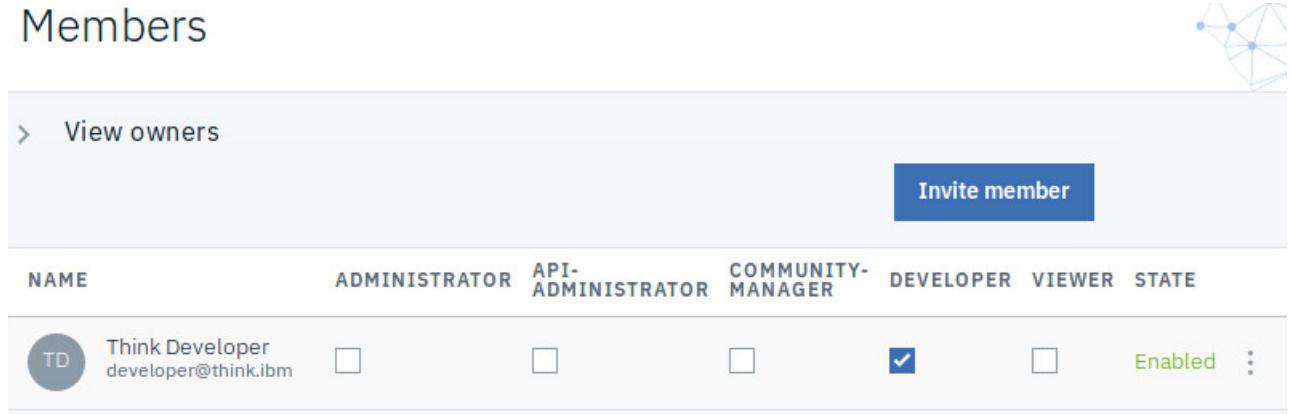
- ___ 7. **Sign out** of the Developer in API Manager.

4.3. Configure lifecycle and approval settings in the Staging catalog

- ___ 1. Sign on to API Manager with the credentials of the owner of the Think organization:
 - User: ThinkOwner
 - Password: Passw0rd!

Click **Sign In**.
- ___ 2. From the navigation menu, select the **Members** icon.
 Notice that the member that is named ThinkDeveloper is added with a Developer role with a status of enabled.

Members

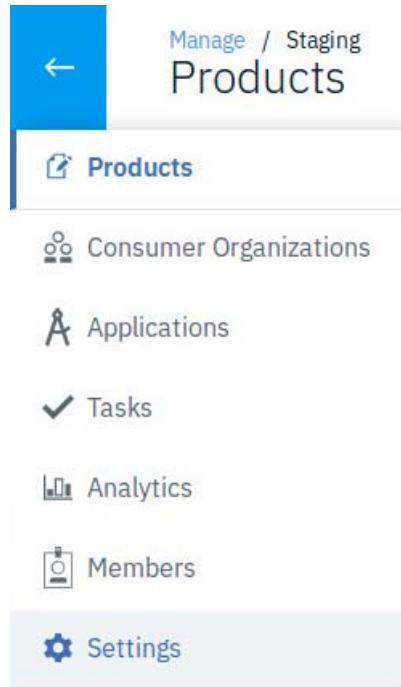


The screenshot shows the 'Members' page in the API Manager interface. At the top right is a network graph icon. Below it is a blue button labeled 'Invite member'. On the left, there's a link 'View owners'. The main area is a table with columns: NAME, ADMINISTRATOR, API-ADMINISTRATOR, COMMUNITY-MANAGER, DEVELOPER, VIEWER, and STATE. A single row is visible for 'Think Developer' (developer@think.ibm). The 'DEVELOPER' column has a checked checkbox, and the 'STATE' column shows 'Enabled'.

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

- ___ 3. Configure the lifecycle settings for the Staging catalog.
 - ___ a. Click the **Home** icon from the navigation menu.
 - ___ b. Click the **Manage Catalogs** tile. Then, click the **Staging** tile.

- __ c. With the Staging option selected, click the icon to open the **Settings** option.



- __ d. Click **Lifecycle approvals**.

The screenshot shows the 'Settings' page with the 'Lifecycle Approvals' tab selected. The main content area displays the following information:

Lifecycle Approvals

The following lifecycle actions require approval

Task self approval Off On

There are no lifecycle approvals enabled

No lifecycle approvals are enabled.

- __ e. Click **Edit** on the lifecycle approvals page.

- ___ f. Enforce approvals for the publishing state change by selecting the **Published** check box.

The screenshot shows a 'Lifecycle Approvals' page with a list of actions requiring approval. The 'Publish' checkbox is checked, while 'Stage', 'Deprecate', 'Retire', 'Replace', and 'Supersede' are unchecked. At the bottom right are 'Cancel' and 'Save' buttons.

Click **Save**.

By selecting the publish option, approval is required when anyone attempts to publish a Product. Leaving the other options cleared means that no approval is required for any of the other lifecycle state changes.

The organization owner must approve the publish state change when the developer publishes a Product.

- ___ g. Lifecycle updates are saved.

The screenshot shows the same 'Lifecycle Approvals' page after saving. The 'Publish' checkbox is checked. Below it, a 'Task self approval' section has a slider switch set to 'Off'. A note at the bottom states: 'The Developer cannot self-approve the published Product.'

The Developer cannot self-approve the published Product.

- ___ 4. **Sign out** of the Owner in API Manager.

4.4. Publish the Product to the Staging catalog

In this part, you publish the Product and APIs as the developer of the provider organization. When you publish the Product, API Manager automatically stages the Product, and publishes the Product pending approval by the owner.

Publishing a Product and its associated APIs performs two functions:

- The Product and its associated APIs become visible on the Developer Portal
- The APIs become callable on the API gateway.

___ 1. Sign on to API Manager with the credentials as the developer that you created:

- User: ThinkDeveloper
- Password: Passw0rd!

Click **Sign In**.

___ 2. Publish the Product to the Staging catalog.

- ___ a. From the Navigation menu, click **Develop**.
- ___ b. The list of APIs and Products is displayed.

The Smart Product 1.0.0 is displayed in the list of Products.



Information

The default visibility values for the Product are:

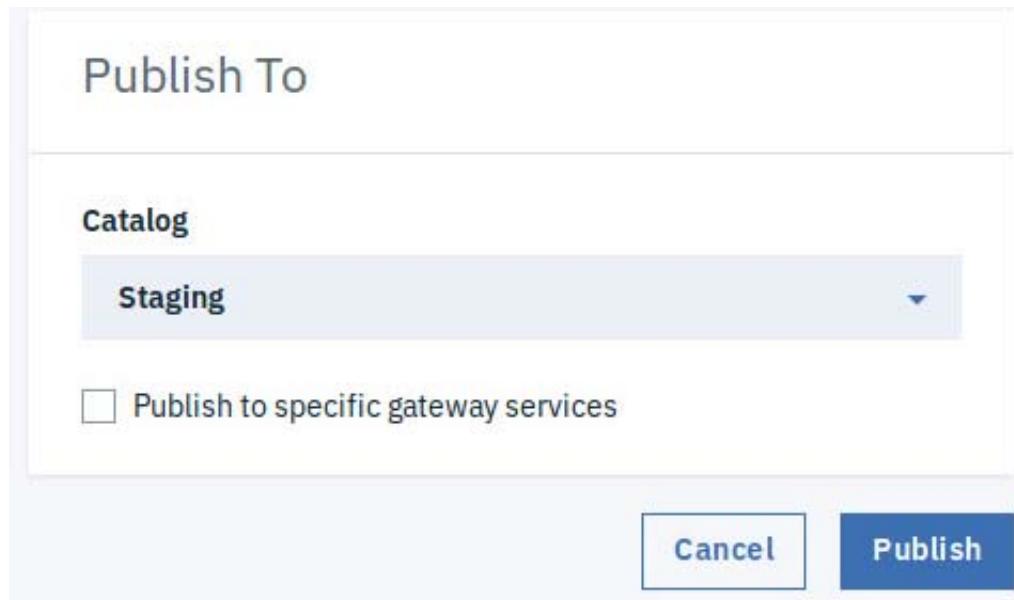
- Visible to: Public
- Subscribable by: Authenticated

___ c. Click the list of options ellipsis icon (three dots). Then, select **Publish**.

TITLE	TYPE	LAST MODIFIED
IBM APIM SMart-1.0.0	API (REST)	18 hours ago
IBM APIM SMart auto product-1.0.0	Product	18 hours ago
Smart Product-1.0.0	Product	44 minutes ago

Items per page: 50 | 1-3 of 3 items 1 of 1 pages < Publish Stage

- __ d. Select the **Staging** catalog in the Publish To dialog.



Click **Publish**.

A dialog is displayed with the message that publishing is pending approval.

- __ e. **Sign out** of ThinkDeveloper.
- __ f. Next, you create a version and approve the Product and API from the owner of the producer organization.
- __ 3. Review the email notification that is sent.
 - __ a. Go to the fakeSMTP email server. Notice that an email is sent to the owner from the developer requesting approval of a published Product.
 - __ b. When you open the email, the email contents displays the message.

```
Sun, 01 Dec 2019 13:47:31 -0500 (EST)
Content-Type: text/plain
From: APIC Administrator <apic-admin@think.ibm>
To: owner@think.ibm
Subject: Request for approval to publish an API product in the Staging
catalog
Message-ID: <e216f664-75b6-501a-705f-1136b7db2326@think.ibm>
Content-Transfer-Encoding: 7bit
Date: Sun, 01 Dec 2019 18:47:31 +0000
MIME-Version: 1.0
```

4.5. Version the API and the product

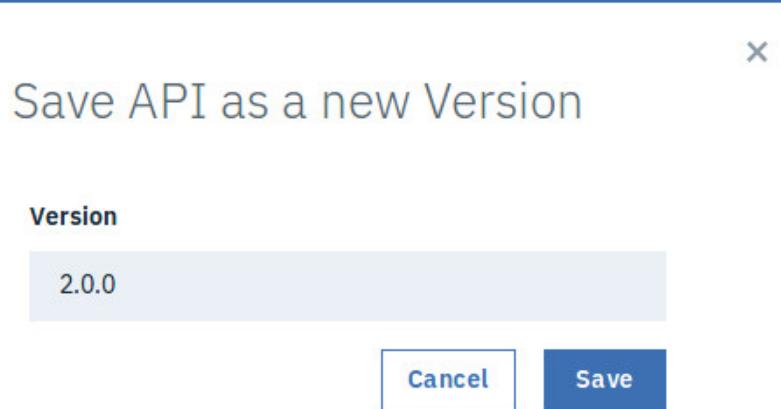
It is a suggested practice that you create versions of an API and product for developers to work on when you publish a product. You create these versions as the provider organization owner just before you approve the publishing of the product.

- 1. Sign on to API Manager as the owner of the provider organization.
 - User: ThinkOwner
 - Password: Passw0rd!

Click **Sign In**.
- 2. From the Navigation menu, click **Develop**.
- 3. Create a version of the API.
 - a. The list of draft APIs and Products is displayed.
 - b. Select **IBM APIM SMart 1.0.0**. Then, from the list options ellipsis, select **Save as a new version**.

APIs and Products			
TITLE	TYPE	LAST MODIFIED	
IBM APIM SMart-1.0.0	API (REST)	18 hours ago	...
IBM APIM SMart auto product-1.0.0	Product	18 hours ago	Publish
Smart Product-1.0.0	Product	an hour ago	Stage Save as a new version

- ___ c. In the Save this api as a new version dialog box, type 2.0.0 in the Version field.



Click **Save**.

You now see two API versions in the list of APIs.

APIs and Products		Add ▾
TITLE	TYPE	
▼ ibm-apim-smart	API (REST)	API (REST)
IBM APIM SMart-1.0.0	API (REST)	18 hours ago
IBM APIM SMart-2.0.0	API (REST)	a few seconds ago

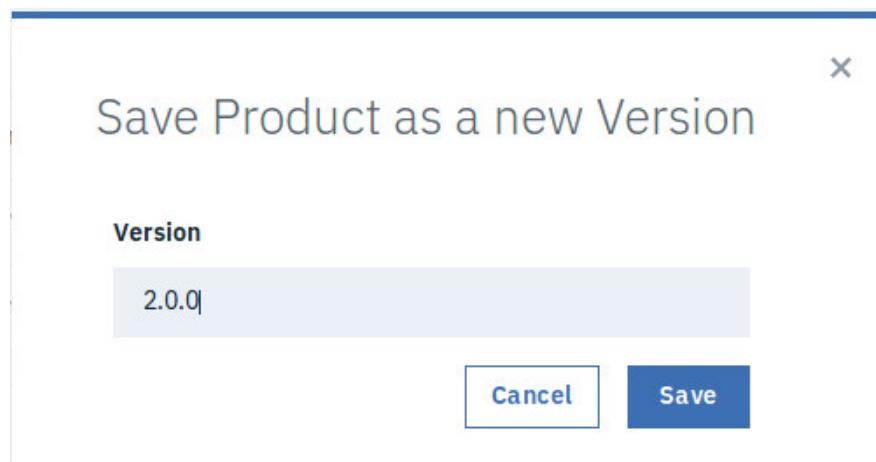
- __ 4. Create a version of the Product.
- __ a. In the Design view of the Product, click the **More Actions** icon (three dots). Then, click **Save as a new version**.

TITLE	TYPE	LAST MODIFIED
> ibm-apim-smart	API (REST)	
IBM APIM SSmart auto product-1.0.0	Product	18 hours ago
Smart Product-1.0.0	Product	an hour ago

Items per page: 50 | 1-4 of 4 items 1 of 1 pages < :>

Publish
Stage
Save as a new version
Download

- __ b. In the Save this product as a new version dialog box, type 2.0.0 in the Version field. Click **Save**.



A new version of the Product is saved.

- ___ 5. Change the API version number in the new Product version to reflect the newer API version number.
 - ___ a. On the APIs and Products page, expand **smart-product**. Then, click the **Smart Product 2.0.0** link to open the details for the Product.

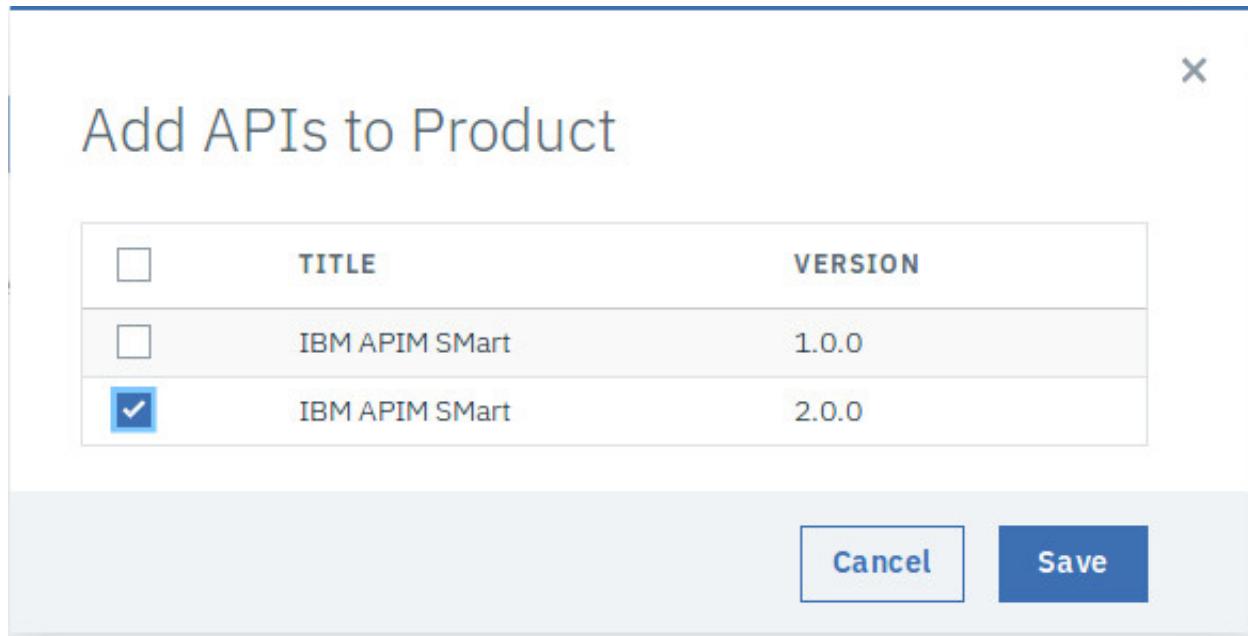
APIs and Products		Add ▾
TITLE	TYPE	
> ibm-apim-smart		API (REST)
IBM APIM SMart auto product-1.0.0		Product
▼ smart-product		Product
Smart Product-1.0.0	Product	an hour ago
Smart Product-2.0.0	Product	3 minutes ago

- ___ b. Click the **APIs** tab.

Product Setup	APIs	Edit	
Visibility	TITLE	SUMMARY	VERSION
APIs	IBM APIM SMart		1.0.0
Plans			

Then, click **Edit**.

- ___ c. In the Add APIs to Product dialog box, clear the **IBM APIM SMart 1.0.0** check box, and select the **IBM APIM SMart 2.0.0** check box.



Click **Save**.

- ___ d. The Product is saved with the later version of the API.

Developers can be notified that a new version of the Product and API is available.

4.6. Approve the publishing of the Product to the Staging catalog

In this step, you approve the publishing task that the user in the developer role generated.

This step makes the Product and API available on the Developer Portal.

You are signed on to API Manager as the owner of the provider organization.

- 1. Approve the published Product.
 - a. From the Navigation menu, select the **Manage** icon.
 - b. Click the **Staging** catalog tile.
 - c. On the Staging page, you see the Smart Product in the list with the state of Staged with publish pending.
 - d. Click the **Tasks** icon in the navigation menu.
 - e. You see the request for publishing approval that the user in the developer role submitted.

[Manage](#) / [Staging](#)

Tasks

The screenshot shows the 'Tasks' section of the API Manager interface. At the top, there are two tabs: 'Approval Tasks' (which is selected) and 'Requested Approvals'. Below the tabs, a single task is listed:

Published approval task for product smart-product:1.0.0 requested by thinkdeveloper

Product Lifecycle 29 minutes ago

Buttons for 'Decline' and 'Approve' are visible on the right.

Click **Approve**.

The approval tasks contain no approvals.

[Manage](#) / [Staging](#)
Tasks

Task has been updated.

Just now

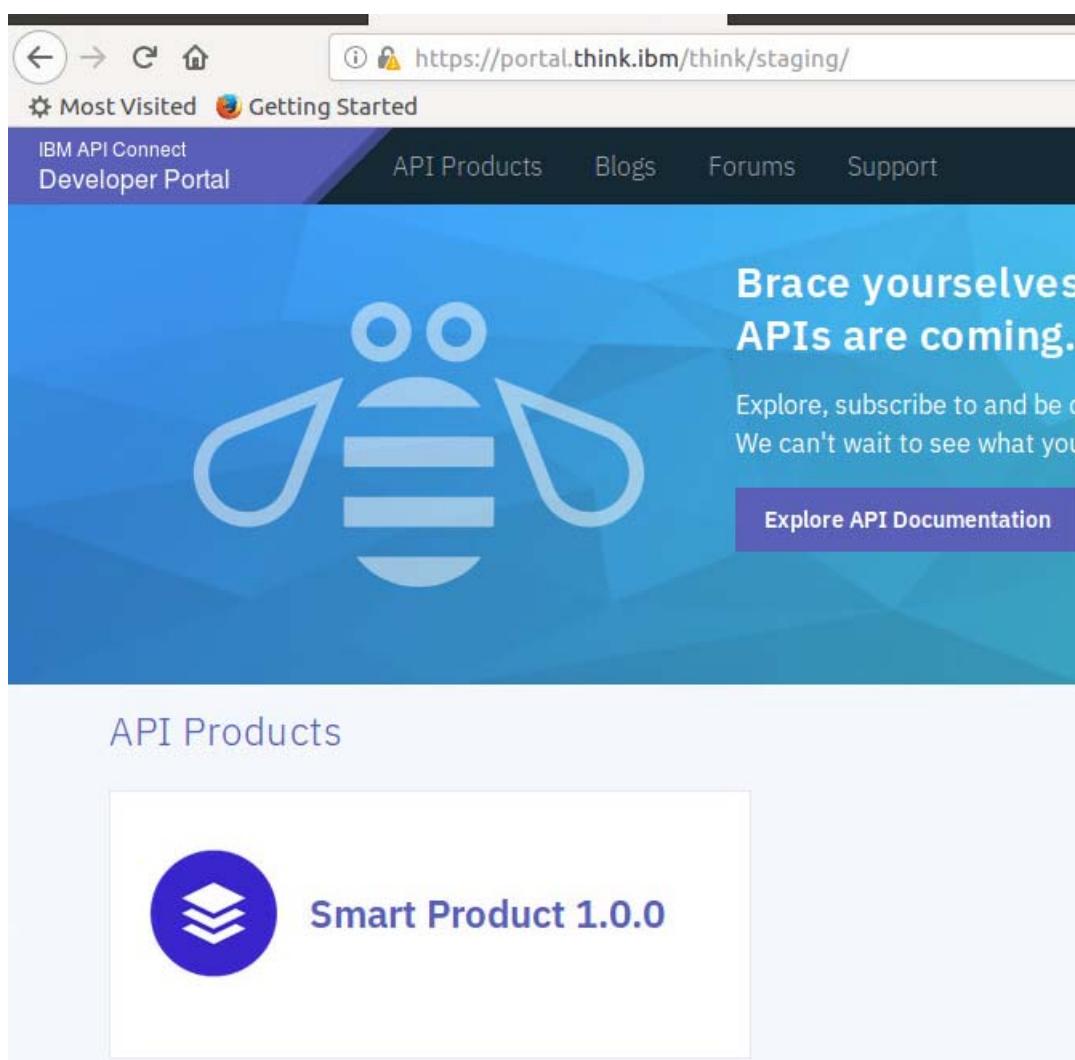
The screenshot shows the 'Tasks' section of the API Manager interface. At the top, there are two tabs: 'Approval Tasks' (selected) and 'Requested Approvals'. A message box at the bottom left states: 'There are no tasks to be displayed'.

- __ 2. Click the **Products** icon in the navigation menu. Notice that the Smart Product now displayed as Published.

TITLE	NAME	STATE	
> Smart Product	smart-product 1.0.0	Published	:

- __ 3. View the published Product in the Developer Portal.

- __ a. In another tab in the browser, type:
<https://portal.think.ibm/think/staging/>
- __ b. The Developer Portal for the Staging catalog is displayed.



The screenshot shows a web browser displaying the IBM API Connect Developer Portal. The URL in the address bar is <https://portal.think.ibm/think/staging/>. The page features a large blue background with a white owl logo. On the right side, there is promotional text: "Brace yourselves APIs are coming. Explore, subscribe to and be c We can't wait to see what you". Below this is a purple button labeled "Explore API Documentation". The main content area is titled "API Products" and displays a card for "Smart Product 1.0.0" with a blue circular icon containing three stacked squares.

Since the public interface of the Developer Portal is displayed and the visibility for the Smart Product 1.0.0 was set to public, you see the Smart Product (v1.0.0) that has been published.

In other words, you did not need to sign on to the Developer Portal to view the list of public APIs.

End of exercise

Exercise review and wrap-up

The owner of the provider organization can manage products and APIs through their lifecycle states, or parts can be delegated to users in other roles. In the exercise, you assumed the provider organization roles of owner and developer.

You created plans and staged and published a Product and API to a Staging catalog. You created new versions of an API and a Product. You reviewed the published Product in the Developer Portal.

Exercise 5. Customizing the Developer Portal

Estimated time

00:45

Overview

This exercise shows you the customization options in the Developer Portal. You sign in to the Developer Portal with a Portal administrator account, add and configure a Drupal sub-theme, and review some of the standard features of the Developer Portal.

Objectives

After completing this exercise, you should be able to:

- 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

Introduction

In this tutorial, the Think organization wants to create their own brand for the Developer Portal. You create this brand by installing a custom sub-theme on the Staging Developer Portal.

Requirements

You can complete this exercise by using the Ubuntu Linux course image that is supplied with the course.

Before doing this exercise, you must complete all previous exercises.

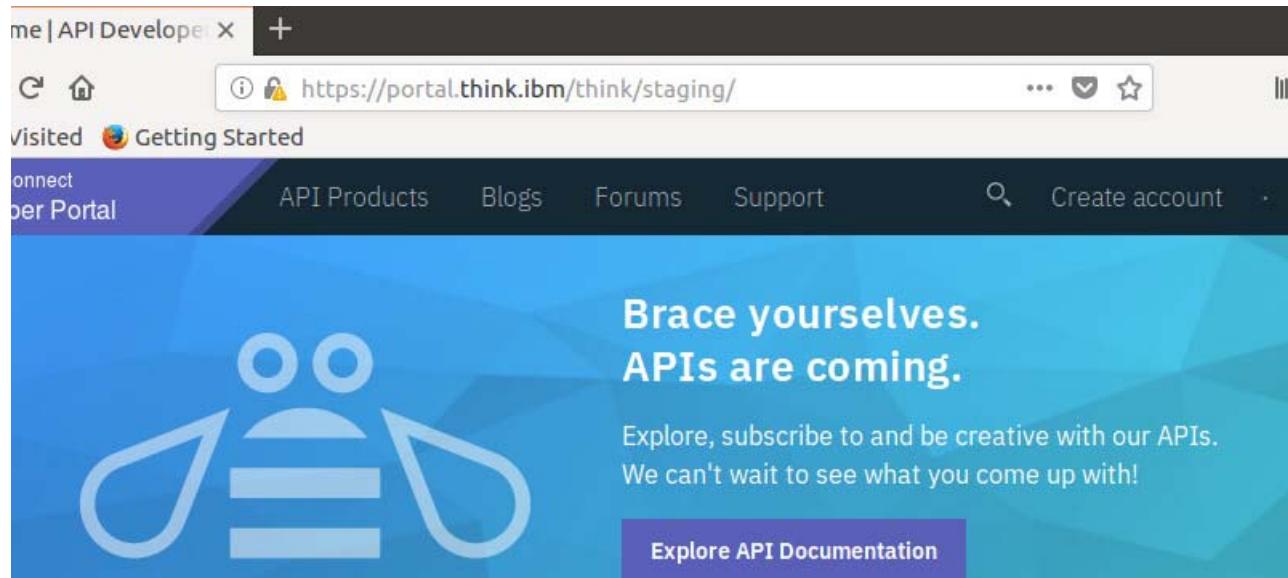
Exercise instructions

Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

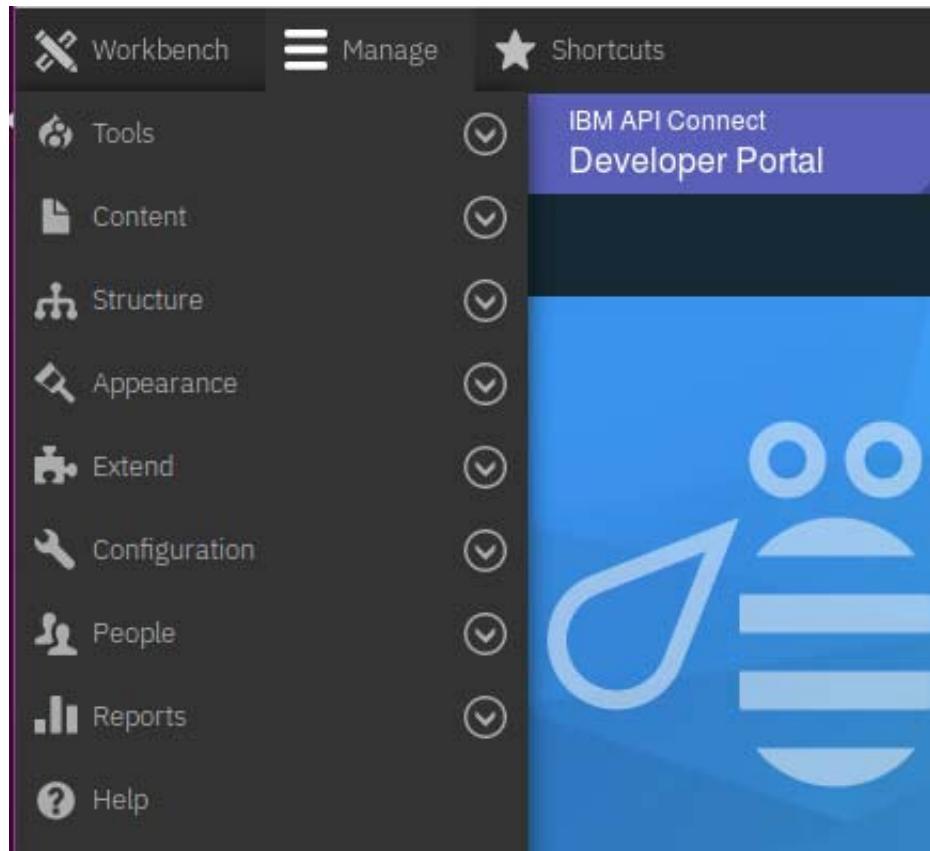
5.1. Sign on to the Developer Portal and review the administration menu

- ___ 1. Sign on to the Staging Developer Portal with the admin user.
 - ___ a. In a browser tab, type: <https://portal.think.ibm/think/staging/>

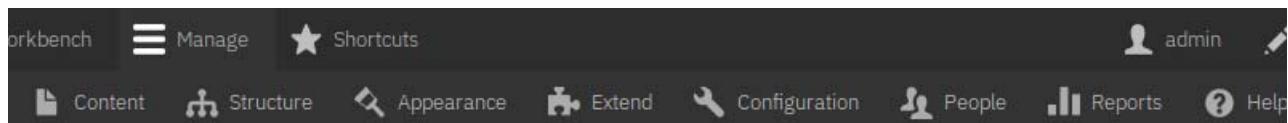


- You see the public page for the Developer Portal of the Staging catalog.
- ___ b. Click **Sign in** at the top of the page in the browser.
 - ___ c. Sign in to the Developer Portal with the credentials:
 - User name: admin
 - Password: Passw0rd!
 - ___ d. Click **Sign in**.

- ___ e. You are signed in to the Developer Portal with the admin user. The Developer Portal uses a responsive layout, so the administration might be displayed on the left side when the browser page width is smaller, or might be displayed along the top of the page when the browser is maximized. Here you see the administration menu when the browser width is reduced.



- ___ f. You can choose to resize or maximize the browser page so that the administration menu is displayed along the top of the page, or you can work with the vertically displayed administration menu.



- ___ g. The top of the administration menu contains the icons that are named Workbench, Manage, and Shortcuts. Click each of these icons in sequence to display their associated sub-menus.

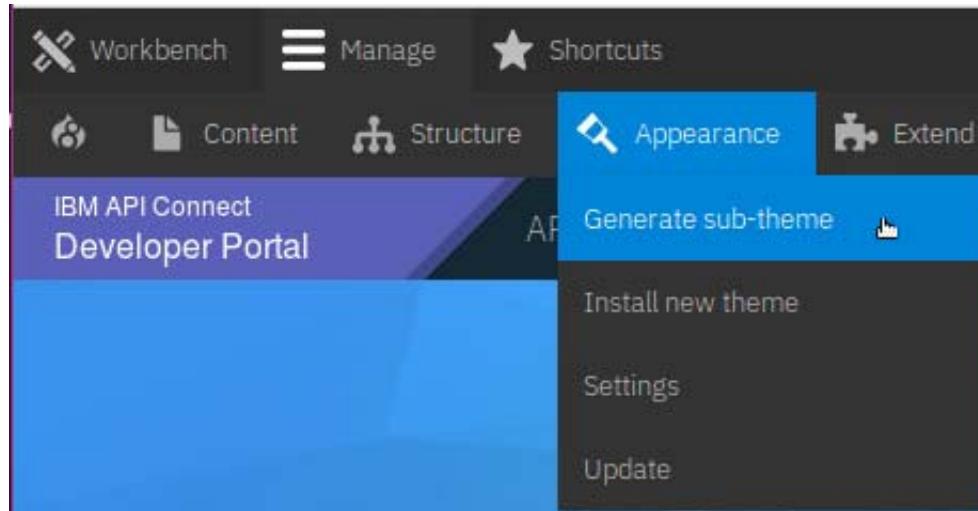
In the exercise, you use the Manage sub-menu items to create a sub-theme for the Developer Portal.

5.2. Create a sub-theme

You can create a custom theme for your Developer Portal site by generating and configuring a sub-theme. A sub-theme is a theme that inherits all the resources of a specified parent theme. You can then override specific resources to configure your required customizations.

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. Templates for different color schemes are provided on which the sub-theme can be based.

- 1. Generate a sub-theme.
 - a. From the administration menu, ensure that the Manage sub-menu is visible. Click **Appearance** and then select **Generate sub-theme**.



The Generate sub-theme page is displayed.

- ___ b. In the Generate sub-theme page, enter the following values:

- Sub-theme name: custom_think_theme
- Sub-theme type: CSS
- Template: Business Mono

Click **Generate**.

- ___ c. The sub-theme can be downloaded from the link on the page.

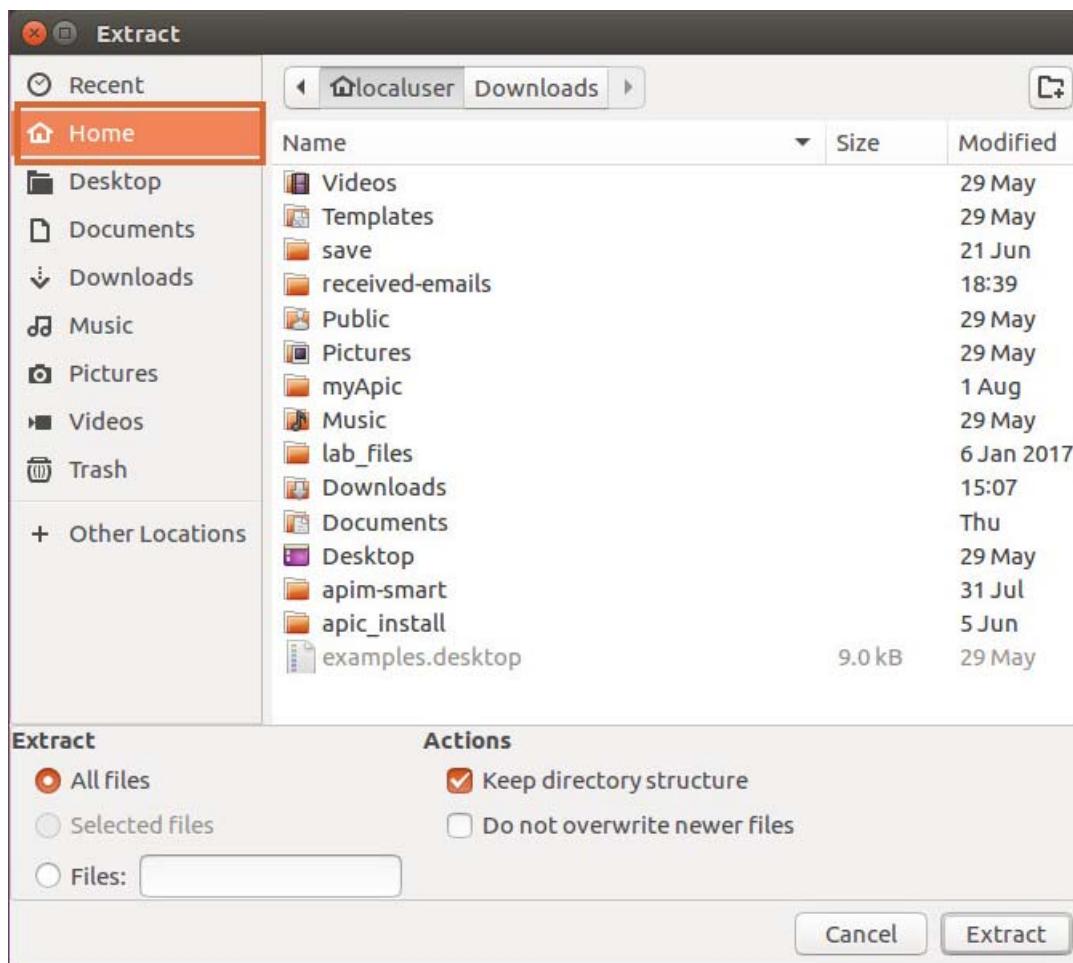
Click **custom_think_theme.zip**.

- ___ d. In the Opening custom_think_theme.zip dialog, select **Save File**. Then, click **OK**.
- ___ e. The file is saved to the /home/localuser/Downloads folder.
- ___ 2. Extract the resources from the sub-theme file to the Home directory.
- ___ a. Click the Files icon from the application list on the Ubuntu desktop.

- __ b. Go to the Downloads directory. Then, right-click **custom_think_theme.zip** and select **Open with Archive Manager**.



- __ c. With the Archive Manager open, click **Extract**.
__ d. In the Extract dialog, select the Home directory in the left column.



Then, select **Extract**.

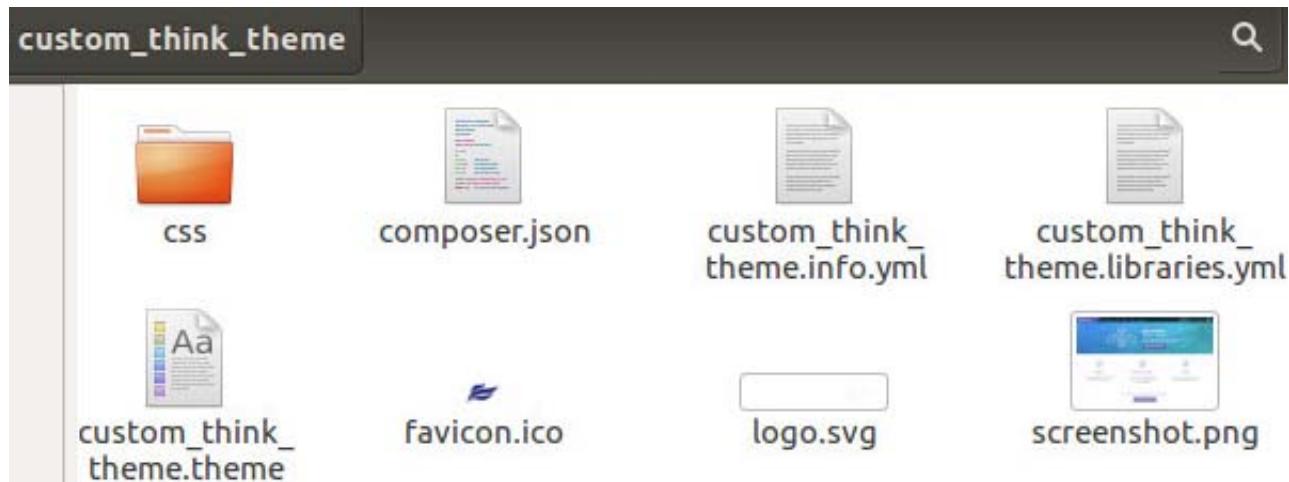
- e. The extraction completes successfully. In the dialog that is displayed, click **Show the Files**.
- f. A folder that is named `custom_think_theme` is displayed in the Home directory.



5.3. Review and customize the sub-theme

In this part, you review the resources that were extracted from the generated sub-theme file. In the exercise, you work through the method of customizing a sub-theme by making minor modifications to the sub-theme that is generated.

- 1. Review the contents of the sub-theme folder.
 - a. With the File Manager open in the Home directory, double-click the `custom_think_theme` folder.



The folder opens to display sub-folders and files. These are the components that you can configure with your own customizations.

Table 1. Sub-theme file properties

File name	Description
<code>overrides.css</code>	This file is located in the <code>css</code> folder in the sub-theme. This stylesheet overrides the fonts, colors, and other defaults from the inherited base IBM API Connect theme that is named <code>connect_theme</code> .
<code>screenshot.png</code>	The file contains a screen capture of the home page for the custom theme. It is used in the appearance settings so that you can easily find the theme that you want to enable and set as the default theme. When you are finishing completing the edits to the <code>overrides.css</code> file and the welcome banner is set up to your satisfaction, you should take a screen capture of the developer portal home page. Capture it with some screen capture tool and place the file in the top-level directory of the theme file. The name of this screen capture file is specified in the <code>theme.info</code> file.
<code>composer.json</code>	The <code>composer.json</code> file contains information about the API Connect Developer Portal repository on GitHub.

Table 1. Sub-theme file properties

File name	Description
<sub-theme-name>.info.yml	The info file is a static text file for defining and configuring a sub-theme. The file is in YAML format and contains the name of the base theme, the sub-theme name, and the regions and libraries that are defined in the sub-theme.
<sub-theme-name>.theme	Drupal themes get a number of configurable settings options for free. For example, most provide toggle switches for the search box, site slogans, and user pictures. Similarly, most provide widgets to upload files and add a custom logo or favicon. These settings are easy: Drupal adds them to the theme's configuration page by default, so it takes no extra work. However, you want to create your own custom setting: one that adds a hidden field that contains the current release information to the Theme configuration form. To do that, you need to add a file to the theme: <code>theme-settings.php</code> . The function name that is specified within this file needs to be prefixed with the theme name.
<sub-theme-name>.libraries.yml	This file contains a global-styling group. Include the names of the css and js that are used for customizing the sub-theme.
favicon.ico	In web development, you can provide a small logo for your site that appears near the address bar and in the bookmarks folder in a visitor's browser. This logo is called the favicon. Drupal provides a default one, which is the recognizable water drop logo. Using the Drupal logo as the favicon is fine but if you really want to make your site stand out, you should provide your own. Favicon files are in the <code>.ico</code> format and are small in dimensions. The default Drupal favicon is 32 pixels high by 32 pixels wide, many browsers use a 16 x 16 pixel version that can be included in the same file. This standard is used because the favicon is only an icon that shows up in the address bar and favorites (bookmarks) list and typically storage is limited there. Any favicon that you create should be as small.
logo.svg	The default logo that appears at the upper-left side of the developer portal page. In the generated theme, this logo includes the name Acme Bank.

— 2. Customize the cascading stylesheet.

- a. From the File Manager, double-click the **css** folder.
- b. Double-click the **overrides.css** file to open it with the default Gedit editor.

- ___ c. Search the file to locate the **footer.footer** element (a little over halfway down). Then, change the color from hex #fff to hex #df722e. Next, locate the **footer.footer ul.nav > li > a** element. Change the color from hex #777677 to hex #fff.

```
footer.footer
{
  color: #464646;
  background-color: #df722e; ←
  border-top: 2px solid #777677;
}

footer.footer ul.nav > li > a, footer.footer ul.nav > li > a:visit
{
  color: #fff; ←
}
```

- ___ d. **Save** the changes to the overrides.css file.
 ___ e. Close the editor.
-



Information

These changes should change the background color of the footer area of the Staging Developer Portal from white to a rust color, and the text from gray to white.

Original:

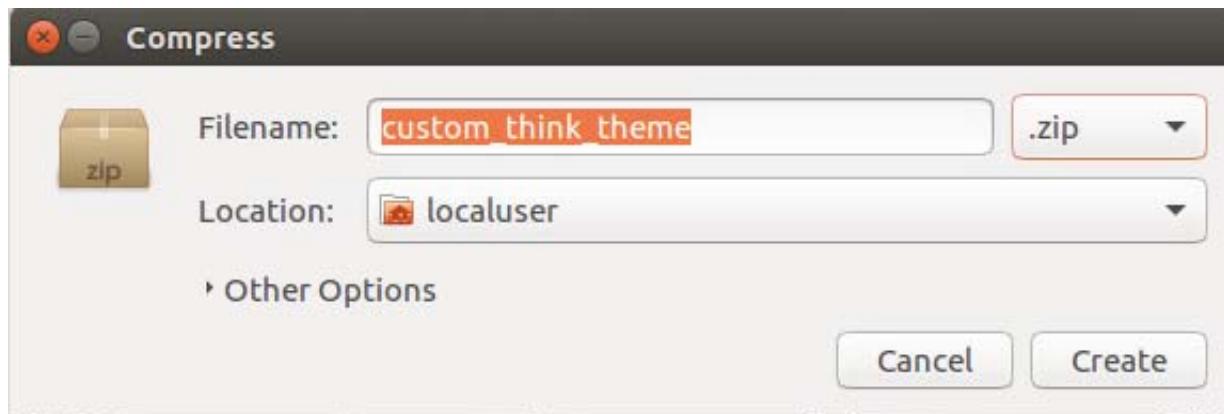
Contact · Terms and Conditions · Privacy Policy

Modified:

Contact · Terms and Conditions · Privacy Policy

-
- ___ 3. Compress all the sub-theme files back into a compressed file.
 ___ a. Go up one level in the File Manager to the Home directory.

- ___ b. Right-click the **custom_think_theme** folder. Then, select **Compress** from the pop-up menu. Select .zip as the output file type.

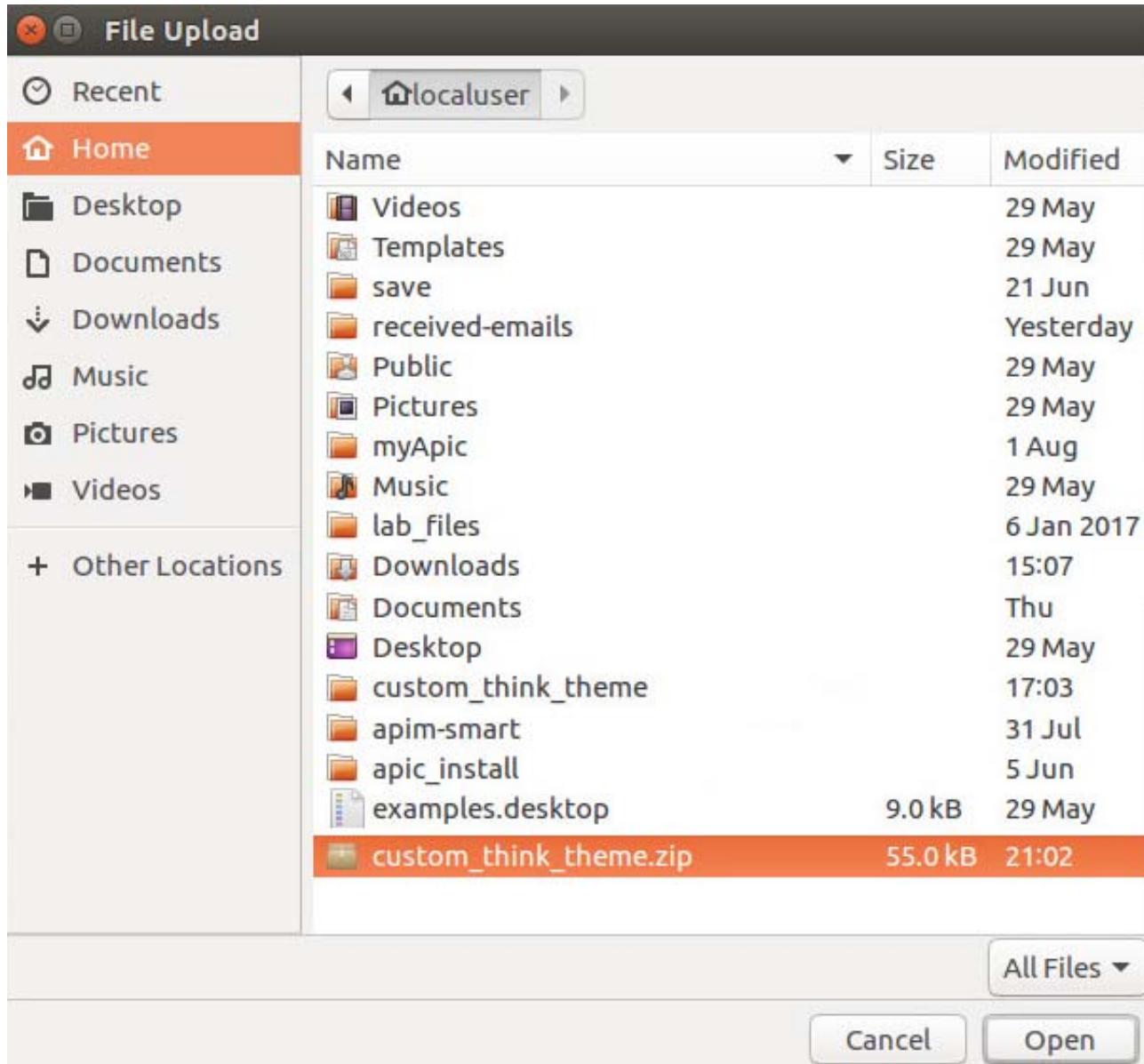


Click **Create**.

- ___ c. The file is created successfully in the Home directory.

5.4. Install the sub-theme on the Developer Portal

- __ 1. Install the sub-theme onto the Developer Portal.
 - __ a. From the administration menu, ensure that the Manage menu is selected. Click **Appearance** and then select **Install new theme**.
 - __ b. Click **Browse**. Then, go to the directory /home/localuser and select the `custom_think_theme.zip` file.



Click **Open**.

- ___ c. Click **Install** to install the theme.

Install new theme

Home » Administration

You can find **modules** and **themes** on drupal.org. The following file extensions a

Install from a URL

For example: <https://ftp.drupal.org/files/projects/name.tar.gz>

Or

Upload a module or theme archive to install

custom_think_theme.zip

For example: *name.tar.gz* from your local computer

The theme is installed.

- ___ d. Click **Enable newly added themes**.

API Developer Portal

Update manager

 Installation was completed successfully.

custom_think_theme

- Installed *custom_think_theme* successfully

Next steps

- [Enable newly added themes](#)
- [Administration pages](#)

- ___ e. Scroll down the list of disabled themes to find the `custom_think_theme` theme.

Disabled themes



`custom_think_theme`
Sub-theme of `connect_theme`.

[Enable](#) | [Enable and set as default](#) |
[Uninstall](#)

Click **Enable and set default**.

- ___ f. The custom theme is now set as the default theme and is listed in the Enabled themes section.

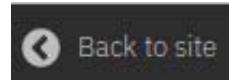
Appearance ☆

List	Generate	Update	Settings
----------------------	--------------------------	------------------------	--------------------------

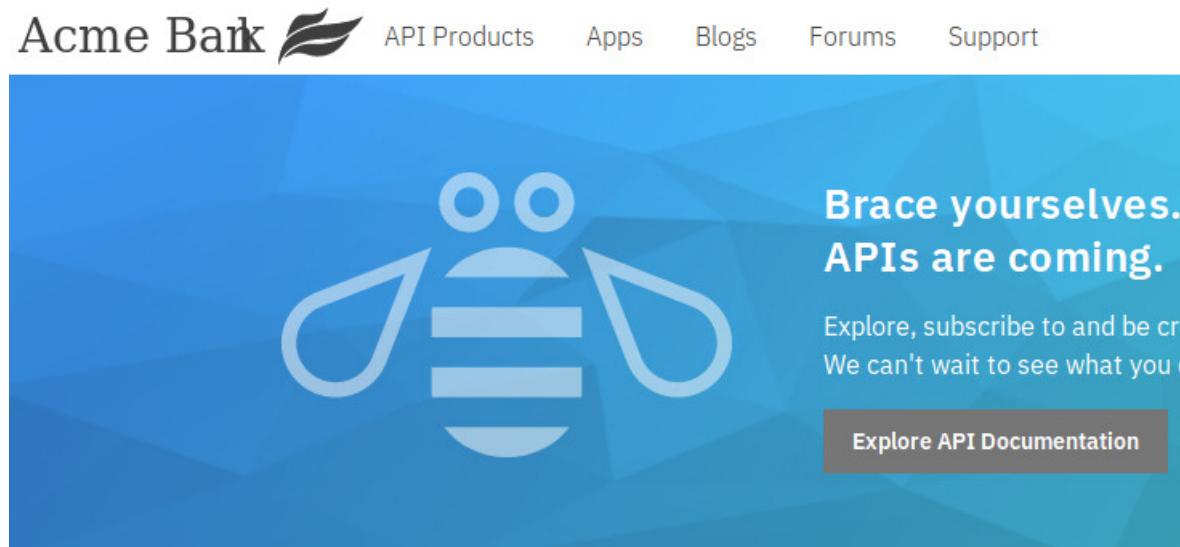
[Home](#) » [Administration](#)

✓ `custom_think_theme` is now the default theme.

- ___ 2. Click the Back to site icon in the upper left corner of the menu to return to the home page.



- 3. The custom theme is displayed in the Developer Portal.



5.5. Review the role of the forum moderator

In this part, you review the role of the forum moderator that was assigned to one of the Developer Portal developers in an earlier exercise.



Questions

Do you recall the members of the Staging Developer Portal that you created in earlier exercises? You can see the list of users and their roles from the **Manage > People** administration menu.

- ___ 1. **Sign out** of the admin user in the Developer Portal.
- ___ 2. Sign in to the Staging Developer Portal with the user in the forum moderator role.
 - ___ a. Click **Sign in** at the top of the page in the browser.
 - ___ b. Sign in to the Developer Portal with the credentials:
 - User name: AppDeveloper
 - Password: Passw0rd!
 - ___ c. Click **Sign in**.



Troubleshooting

If you receive the error:



Unauthorized
Unable to sign in. This may be because the the credentials provided for authentication are invalid or the user has not been activated. Please check that the user is active, then repeat the request with valid credentials. Please note that repeated attempts with incorrect credentials can lock the user account.
[Forgot your password? Click here to reset it.](#)



ensure you have the correct URL address pointing to staging and not sandbox:

<https://portal.think.ibm/think/staging/>

- ___ d. You are signed in to the Developer Portal as the AppDeveloper who is also assigned the role of forum moderator.

Notice that the Smart Product 1.0.0 is visible in the list of API Products. The Product was published earlier.

The screenshot shows the Acme Bank developer portal. At the top, there's a navigation bar with links for API Products, Apps, Blogs, Forums, Support, and a search icon. To the right of the search icon is a dropdown menu labeled 'Organizational Ordinal'. The main content area has a large blue background with a white bee logo. To the right of the logo, the text 'Brace yourselves. APIs are coming.' is displayed. Below this, there's a button labeled 'Explore API Documentation'. Underneath the banner, there's a section titled 'API Products' with a card for 'Smart Product 1.0.0', which includes a purple icon of three stacked squares.

API Products



**Smart
Product
1.0.0**

- ___ 3. From the menu, click **Forums**.
- ___ 4. You see that two forums are created already. A forum is created for each published API and a general discussion forum is created by default in the Developer Portal.

Forums

[Add new Forum topic](#)

FORUM	TOPICS	POSTS
APIs Get help and advice on the use of our APIs.		
IBM APIM SMart API resources related to the retail industry. Download the swagger.json definition to use in your API Manager.	0	0
General discussion	0	0

- ___ 5. You see that no topics or posts are in either of these two forums.

5.6. Create a topic for the IBM APIM SMart forum (optional)

In this part, you create a topic in the IBM APIM SMart forum. You should already be signed on to the AppDeveloper and select Forums from the menu.

- 1. Click **IBM APIM SMart** to open the forum.
- 2. Add a topic to the forum.
 - a. Click **Add new Forum topic**.
 - b. Type some information. For example:
 - Subject: Troubleshooting
 - Body: This forum is created to discuss help and tips for troubleshooting issues with APIs in the APIM SMart Product.

Create Forum topic

Subject *

Troubleshooting

Forums *

-IBM APIM SMart

Body

A horizontal toolbar with various icons for text formatting, including bold, italic, underline, and alignment options.

This forum is created to discuss help and tips for troubleshooting issues with APIs in the APIM SMart Product.

- c. Scroll to the bottom of the page in the portal. Then, click **Save**.

- ___ d. The forum topic is created.



Forum topic *Troubleshooting* has been created.

Troubleshooting

[View](#)

[Edit](#)

[Delete](#)



Submitted by
AppDeveloper on Thu,
09/13/2018 - 23:07

Forums

IBM APIM SMart

This forum is created to discuss help and tips for troubleshooting issues with APIs

Add new comment

Subject

- ___ 3. Click the **Forums** link. You see the IBM APIM SMart forum now contains one topic and one post.

FORUM	TOPICS	POSTS	LAST POST
APIs Get help and advice on the use of our APIs.			
IBM APIM SMart API resources related to the retail industry. Download the swagger.json definition to use in your API Manager.	1	1	By AppDeveloper seconds ago

End of exercise

Exercise review and wrap-up

In this exercise, you examined the customization options in the Developer Portal. You signed in to the Developer Portal with a Portal administrator account. You generated and customized a Drupal sub-theme. Finally, you reviewed some of the Developer Portal forum options that are available to members of the Developer Portal.

Exercise 6. Creating an application and subscribing to a plan

Estimated time

00:45

Overview

In this exercise, you learn how to create an application and subscribe to a plan in the Developer Portal. You see how an application is migrated from one version to another when the publisher supersedes the published Product on the Staging catalog. You also review the retire and archive actions in API Manager.

Objectives

After completing this exercise, you should be able to:

- Sign on to the Developer Portal as a developer of the consumer organization
- 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

Introduction

You assume the role of the application developer of the consumer organization when you register an application and subscribe to a plan in the first part of the exercise. In the latter part, you assume the role of the owner of the provider organization to make lifecycle changes in API Manager. These lifecycle changes affect the Product subscription that is created in the first part.

Requirements

You can complete this exercise by using the Ubuntu Linux course image that is supplied with the course.

Before doing this exercise, you must complete exercises 1 - 4.

If you do not complete [Exercise 5, "Customizing the Developer Portal,"](#) on page 5-1, then some of the screen captures in this exercise and the following exercise might look slightly different. You can still do the exercise.

Exercise instructions

Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

6.1. Register an application and subscribe to a plan

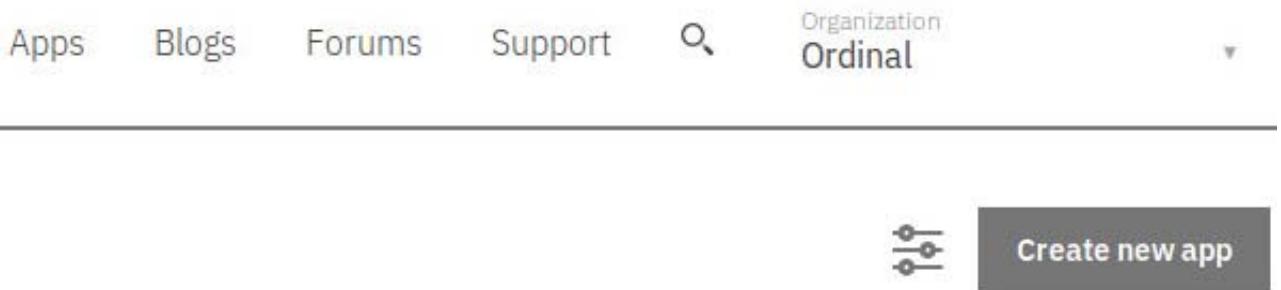
In this part, you sign on to the Developer Portal as a user in the application developer role, then you register an application that calls the APIs.

- ___ 1. Sign on to the Staging Developer Portal with the application developer role, if you are not already signed on.
 - ___ a. In a browser tab, type `https://portal.think.ibm/think/staging`.
 - ___ b. Click **Sign in** at the top of the page in the browser.
 - ___ c. Sign in to the Developer Portal with the credentials:
 - User name: AppDeveloper
 - Password: Passw0rd!
 - ___ d. Click **Sign in**.
You are signed in to the Developer Portal as an application developer.
- ___ 2. Create an application.
 - ___ a. Click the **Apps** link on the menu of the Developer Portal.



No applications are displayed.

- ___ b. Click **Create new App**.



__ c. Type the information.

- Title: SMart Application
- Description: API resources for retail

Create a new application

Title *

Description

Application OAuth Redirect URL(s)

	Remove
--	---------------------

Add another item

Submit

Click **Submit**.

- ___ d. The application is created successfully. Select the Show option alongside the Key to display the Client ID.

The screenshot shows a success message: "Application created successfully." Below it, the "Key" section displays the value "a48eb57cef6ddfadece4e721cc06d871" with a checked "Show" checkbox. The "Secret" section shows a redacted value with an unchecked "Show" checkbox. A note below 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.



Information

In some cases, you might need to capture the Client ID and Client Secret in a text editor for later use in a client or web application. Select the **Show** check box next to Key and the **Show** check box next to Client Secret. In the case of the SMart application, only the Client ID (Key) is required to identify the application.

- ___ e. Highlight the Key value and select Copy. Then, open the File Manager in the Home directory. Right-click in the open area and select **New Document >Empty Document**.
- ___ f. Double-click the Untitled Document to open it in the editor. Then, type `Client ID:` on the first line and paste the copied Key value onto the second line in the editor.
- ___ g. Save the Untitled Document as **SmartAppClientID**. Click Save. Then, close the editor.
- ___ h. You see the file in the Home directory. Move the Untitled Document to trash.

- ___ i. Click **Continue**, in the browser for the Developer Portal.
The SMart application is added.

Applications

SMart Application DEVELOPMENT

[Dashboard](#) [Subscriptions](#)

Description

API resources for retail

- ___ j. From the application, click the **Subscriptions** tab.
___ k. Scroll down on the page to the Subscriptions area.
Click the link to browse the **available APIs**.

Client Secret

Verify

Subscriptions

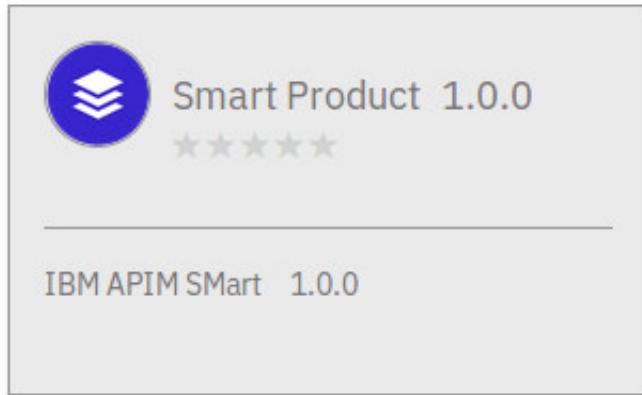
PRODUCT

PLAN

No subscriptions found. [Why not browse the available APIs?](#)

- __ I. The Smart Product (V1.0.0) is displayed.

API Products



- __ 3. Subscribe to a Product plan.
- __ a. With the API Products menu option selected, click the **Smart Product (v1.0.0)** link.
The details of the Smart Product 1.0.0 is displayed on the page.
- __ b. Go to the Plans area on the page. Then, click the **Subscribe** icon under the Default Plan.

A screenshot of a product details page for "Smart Product 1.0.0". The page includes a green circular icon with a white cube, the product name and version, and a row of five gray stars.

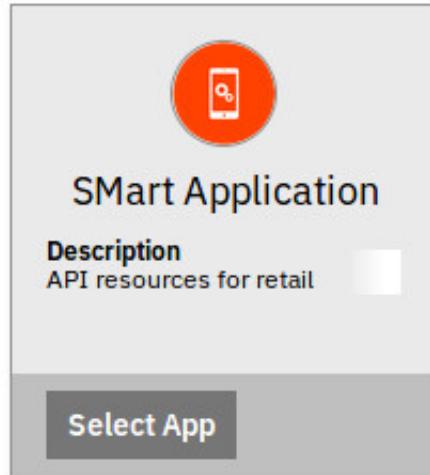
APIs



Plans

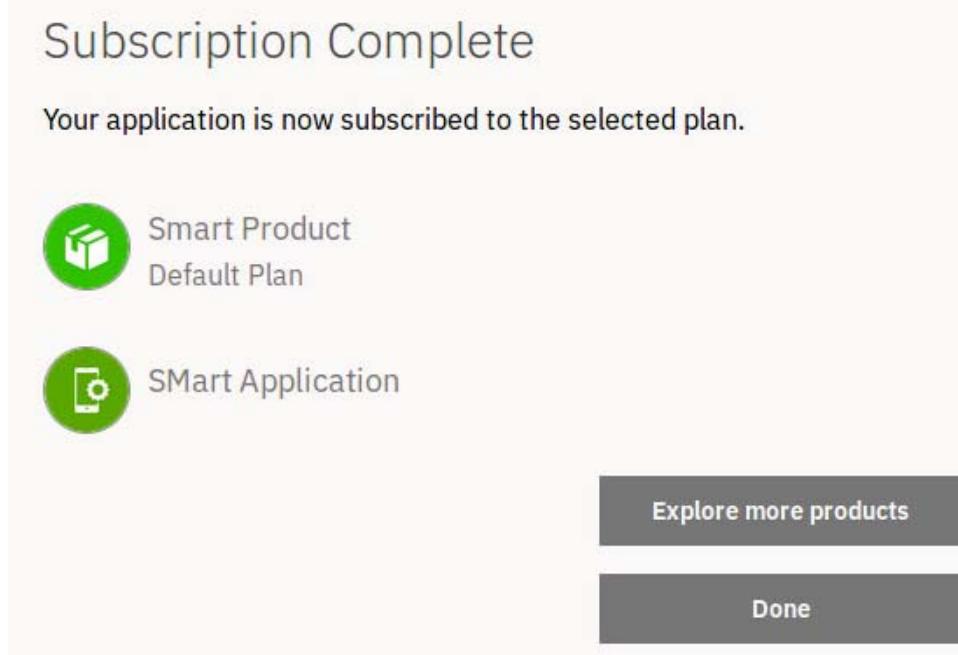
A screenshot of the "Plans" section. It displays two cards: "Default Plan" and "Gold Plan". Each card has a "Subscribe" button and a "View details" link below it.

- ___ c. In the Subscribe dialog box, select the **SMart Application** to subscribe the application to the plan.



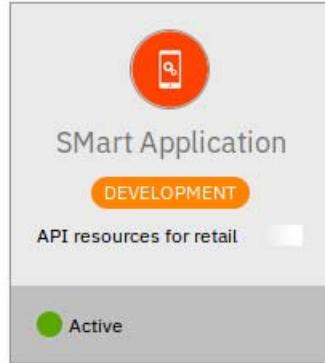
Click **Select App**.

- ___ d. Accept the defaults in the Confirm Subscription dialog. Then, click **Next**.
The application is successfully subscribed to the Default plan.



- ___ e. Click **Done**.
- ___ 4. Validate that all the APIs in the Product are subscribed to the Default plan.
- ___ a. On the Developer Portal menu, click the **Apps** link.

- __ b. Click the **SMart Application** link.



The application details are displayed.

- __ c. Click the **Subscriptions** tab. Then, navigate to the Subscriptions area on the page. Notice that the smart-product (v1.0.0) is subscribed to the default plan.

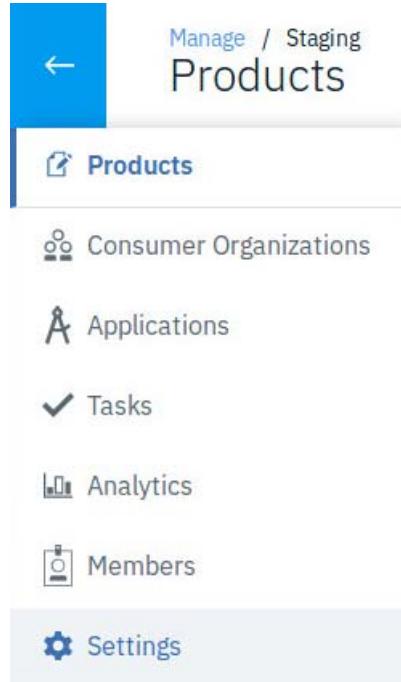
Subscriptions		
PRODUCT	PLAN	
Smart Product (1.0.0)	Default Plan	⋮

- __ d. Sign out of the AppDeveloper on the Developer Portal.

6.2. Configure lifecycle actions for task self-approval

In this part, you sign on to API Manager as the owner of the provider organization. Recall that in an earlier exercise, the owner of the provider organization created versions of the APIs and Product. Also, recall that the owner in API Manager in this case study is granted permissions to perform all lifecycle changes and needs approval only when publishing a Product. You change the lifecycle approval settings for the Staging catalog so that the owner can self-approve the publishing action.

- 1. Open the API Manager web user interface.
 - a. In the Firefox browser, open API Manager with the URL:
`https://manager.think.ibm/`
 - b. Sign on to API Manager with the credentials of the owner of the Think organization:
 - User: ThinkOwner
 - Password: Passw0rd!
 - c. Click **Sign In**.
 You are signed in to API Manager.
- 2. Configure the lifecycle settings for the Staging catalog.
 - a. Click the **Home** icon from the navigation menu.
 - b. Click the **Manage Catalogs** tile. Then, click the **Staging** tile.
 - c. With the Staging option selected, click the icon to open the **Settings** option.



- ___ d. Click **Lifecycle approvals**.

Lifecycle Approvals

The following lifecycle actions require approval

✓ Publish

Task self approval Off — On

Notice that the publish action requires approval.

- ___ 3. Enable task self-approval by sliding the toggle to the On position.
- ___ 4. Click **Confirm** to enable task self-approval.
Task self-approval is enabled.

Lifecycle Approvals

The following lifecycle actions require approval

✓ Publish

Task self approval Off — On

The provider organization owner can now self-approve the publishing action.

- ___ 5. Click the return icon from the Settings page.



Manage / Staging
Settings

6.3. Stage the recent version of the Product

In this part, you stage the recent version of the Product (smart-product 2.0.0) that was created in an earlier exercise. A staged Product becomes visible on a catalog where the Product lifecycle can be managed from the Manage option in API Manager. When the Product version is in the staged state, additional actions can be performed on the Product version, such as superseding or publishing the Product. Recall that smart-product 1.0.0 is already published.

- __ 1. Click the Develop option from the Navigation menu.
- __ 2. The list of APIs and Products is displayed.
- __ 3. Expand **smart-product**.

APIs and Products		Add ▾
TITLE	TYPE	
>  ibm-apim-smart	API (REST)	
 IBM APIM SMart auto product-1.0.0	Product	
▼  smart-product	Product	
Smart Product-1.0.0	Product	3 hours ago
Smart Product-2.0.0	Product	2 hours ago

Smart Product 1.0.0 is already published.
Smart Product 2.0.0 exists as a draft version.

__ 4. Stage the Smart Product 2.0.0.

__ a. Click the list of options ellipsis in the **Smart Product 2.0.0** row. Then, click **Stage**.

smart-product		Product	
Smart Product-1.0.0	Product	3 hours ago	...
Smart Product-2.0.0	Product	2 hours ago	...

Items per page: 50 | 1-5 of 5 items

__ b. In the Stage To page, select **Staging** from the catalog drop-down list. Leave the Publish to specific gateway services cleared.

Stage To

Catalog

Staging

Publish to specific gateway services

Cancel Stage

Then, click **Stage**.

The Product is staged.

__ 5. Verify that the Product is staged.

__ a. Click **Manage** from the navigation menu.

__ b. Click the **Staging** tile.

- ___ c. You see that the Smart Product version 2.0.0 is successfully staged to the Staging catalog.

TITLE	NAME	STATE	
> Smart Product	smart-product 1.0.0	Published	⋮
> Smart Product	smart-product 2.0.0	Staged	⋮

6.4. Start the email server

When you supersede a product, email notifications are sent to members who are subscribed to the Product.

- ___ 1. Open the email server.

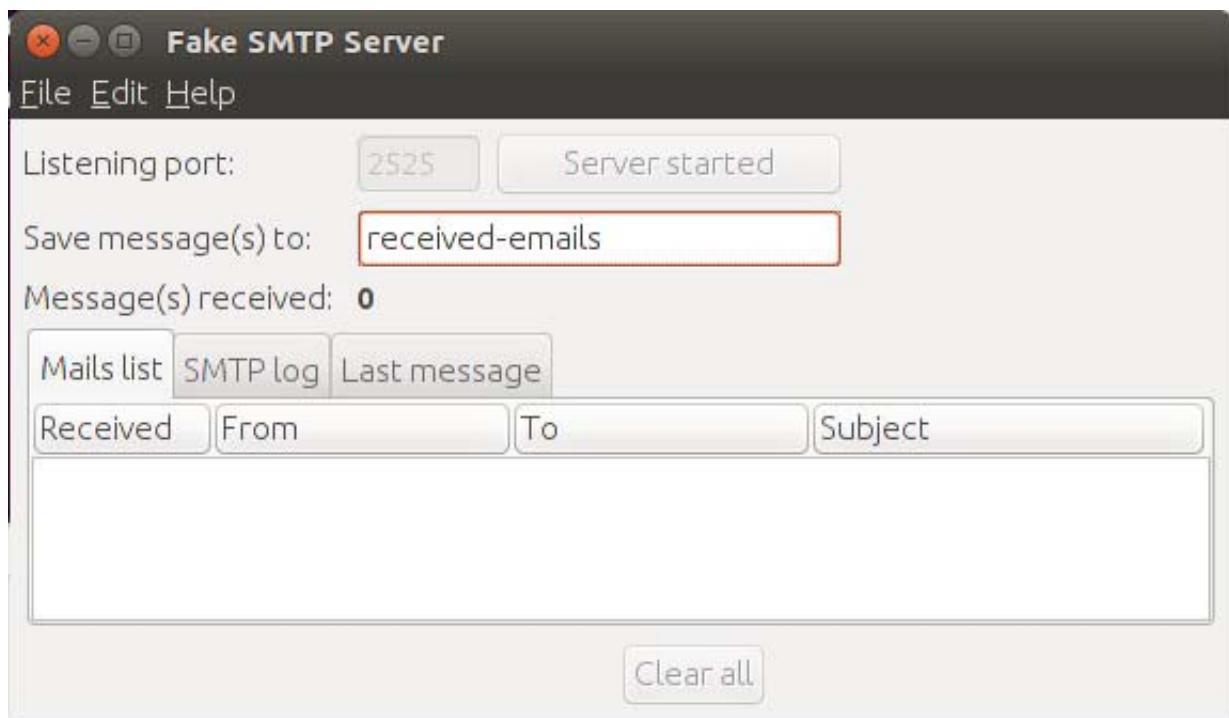
The email server runs as a Java application on the course image.

- ___ a. Open a terminal from the application list on the Ubuntu desktop.
Ensure that you are in the /home/localuser directory.

In the terminal type:

```
java -jar /usr/local/bin/fakeSMTP-2.0.jar -s -p 2525
```

- ___ b. The fakeSMTP application is displayed and the server is automatically started.



Clear any existing emails.

6.5. Supersede the published Product with the new version

Assume that Smart Product version 2.0.0 contains some fixes and new features that are not in Smart Product version 1.0.0. As the owner of the provider organization, you want to automatically migrate all applications that are subscribed to the Product to the later version.

You can choose to replace or supersede the currently published Product version with the new version of the Product. There are subtle differences as to what happens to the original Product version when one or the other of these actions are taken.

In this exercise, you choose to supersede the published Product version with the new version. The superseding Product must be in the staged or deprecated state, and the Product to be superseded must be in the published state.

- 1. You are signed In to API Manager as the owner of the provider organization and you are in the Manage Staging page with the list of Products displayed.
- 2. Supersede the published Product with the new version of the Product.
 - a. Click the list of options ellipsis alongside the Product that you want to supersede.

TITLE	NAME	STATE	
Smart Product	smart-product 1.0.0	Published	
Smart Product	smart-product 2.0.0	Staged	 Deprecate Retire Replace Supersede

- __ b. Select the Smart Product to supersede smart-product 1.0.0. You must click the smart-product 2.0.0 to highlight the row. The selected icon is displayed.

The screenshot shows a 'Select Product' dialog box. At the top, it says 'Select a product to supersede smart-product 1.0.0:'. Below is a table with three columns: 'Title', 'Name', and 'State'. A single row is present in the table. The 'Title' column contains 'Smart Product', the 'Name' column contains 'smart-product 2.0.0', and the 'State' column contains 'Staged'. To the left of 'Smart Product' is a blue square containing a white checkmark. At the bottom right of the dialog are two buttons: 'Cancel' in a white box and 'Next' in a blue box.

Title	Name	State
Smart Product	smart-product 2.0.0	Staged

Cancel **Next**

Then, click **Next**.

- ___ c. In the second page of the dialog box, review the options. Then, select both the default plan and the Gold Plan from their corresponding drop-down lists.

Supersede

Smart Product (smart-product:1.0.0)

with

Smart Product (smart-product:2.0.0)

SOURCE	TARGET
default-plan	default-plan
gold-plan	gold-plan

Cancel **Supersede**

Click Supersede.

- ___ d. Smart Product version 1.0.0 is superseded by Smart Product version 2.0.0 on the Staging catalog.
- ___ 3. You see that the smart-product 2.0.0 is published and smart-product 1.0.0 is deprecated.

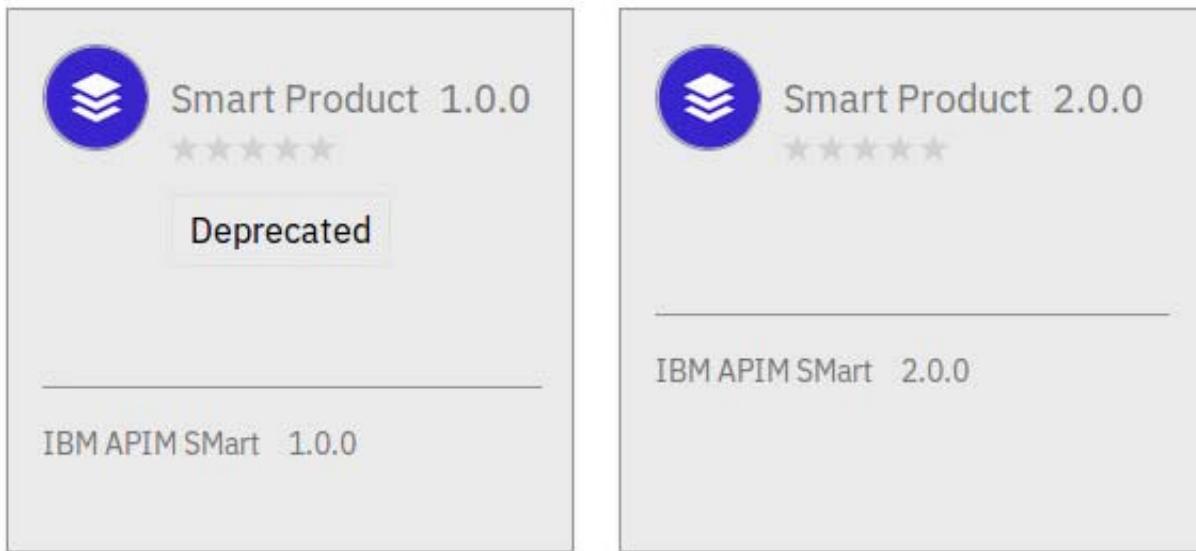
TITLE	NAME	STATE	⋮
> Smart Product	smart-product 1.0.0	Deprecated	⋮
> Smart Product	smart-product 2.0.0	Published	⋮

- ___ 4. Sign out of API Manager.

6.6. Review the status of the application on the Developer Portal

In this part, you sign on to the Developer Portal as the member `AppDeveloper` in the application developer role. You review how the lifecycle updates that were made in API Manager affects the application in the Developer Portal.

- 1. Sign on to the Staging Developer Portal with the application developer role.
 - a. In a browser tab, type `https://portal.think.ibm/think/staging`.
 - b. Click **Sign in** at the top of the page in the browser.
 - c. Sign in to the Developer Portal with the credentials:
 - User name: `AppDeveloper`
 - Password: `Passw0rd!`
 - d. Click **Sign in**.
You are signed in to the Developer Portal.
- 2. Review the status of the API Products.
 - a. Click **API Products** from the menu of the Developer Portal.
 - b. The two Smart Product versions are displayed.



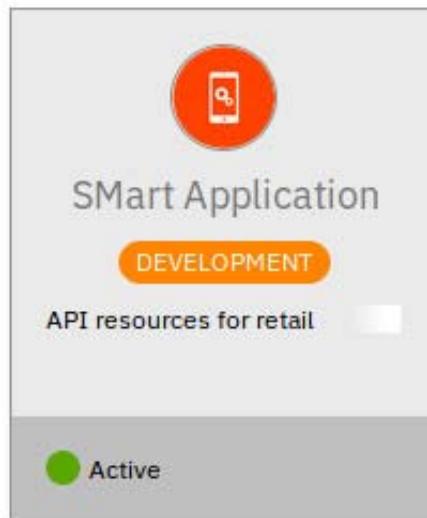
Smart Product (v1.0.0) is marked as Deprecated.



Information

It might take some time before you see the Deprecated message under Smart Product (v1.0.0) while the Management server updates the information on the Developer Portal. You do not need to wait to see this status change and you can verify it later.

- ___ 3. Review the status of the registered applications.
- ___ a. Click **Apps** from the menu of the Developer Portal.
- ___ b. Click the **SMart Application** link.



- ___ c. Click the Subscriptions tab on the page. Then, scroll down to the subscriptions area.

Subscriptions

PRODUCT	PLAN	
Smart Product (1.0.0)	Default Plan	Migrate this subscription to plan 'default-plan' in product 'Smart Product' at version '2.0.0'

You see that the smart-product (v1.0.0) is still subscribed to the Default plan. However, a message link prompts that a new version of this plan is published.
Click the message link.

- ___ d. You are prompted with another dialog box that asks whether you really want to migrate the application to the new version of the plan.

Migrate the subscription for SMart Application?

Are you sure you want to migrate this subscription? This action cannot be undone.

<input type="button" value="Cancel"/>	<input checked="" type="button" value="Migrate subscription"/>
---------------------------------------	--

Click **Migrate subscription**.

- ___ e. You see a message that the application subscription migrated successfully.



Application subscription migrated successfully.

- ___ 4. Confirm that the SMart application is now subscribed to smart-product 2.0.0.
- ___ a. Scroll down to the Subscriptions area on the page.
You see that the application is subscribed to the smart-product (2.0.0) with the default plan.

Subscriptions

PRODUCT	PLAN	
Smart Product (2.0.0)	Default Plan	:

- ___ 5. The application developer successfully subscribed the application to the new version of the Product plan.
- ___ 6. Sign out member AppDeveloper from the Developer Portal.
- ___ 7. Close the email server.

End of exercise

Exercise review and wrap-up

In this exercise, you registered an application and subscribed to a plan in the Developer Portal. In the last part, you saw how an application is migrated from one version to another when the publisher supersedes the published Product on the Staging catalog.

Exercise 7. Calling an API on the gateway and monitoring API usage

Estimated time

01:00

Overview

In this exercise, you test the operations for the APIs in Smart Product 2.0.0. The APIs that you are going to test are the APIs for which you created an assembly in an earlier exercise. You use the test feature in the Developer Portal. The operations call to the API endpoint on the gateway and then forwards the request to the back-end service. You run a script to generate API calls and review the API analytics capabilities for both the consumer and provider organizations.

Objectives

After completing this exercise, you should be able to:

- 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 analytical elements in the Visualize dashboard for a catalog
- Change the time period filter for a visualization
- View API event data
- Export the API event data for a specified time range

Introduction

Analytical data is captured in real time on the gateway in API Connect based on the calls that are made to the API endpoints that are published to the gateway. In the first part of the exercise, you use the Developer Portal test feature to determine the API endpoint request URI on the gateway. You run a script that simulates a number of calls to APIs on the gateway. Then, you review the analytics in the Developer Portal and API Manager.

Requirements

You can complete this exercise by using the Ubuntu Linux course image that is supplied with the course.

Before doing this exercise, you must complete all previous exercises. The only exercise that is optional is [Exercise 5, "Customizing the Developer Portal,"](#) on page 5-1.

Exercise instructions

Preface

Follow the instructions that are provided under the heading "Before you begin" in the Exercises description at the start of this guide.

7.1. Start the back-end application

The back-end application that you call from the API assembly runs as a local Loopback application.

- __ 1. Open a terminal interface from the Ubuntu list of applications.
- __ 2. Run the apim-smart Node application.
 - __ a. Change to the apim-smart directory in the terminal.
cd ~/apim-smart
 - __ b. Issue the command:
node .

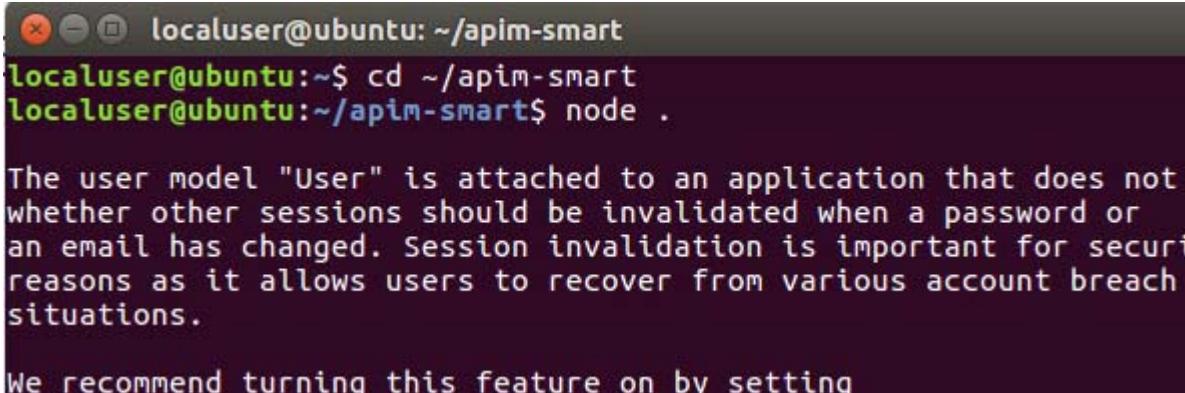


Information

The command is **node** followed by a period.

Alternatively, you can type the command **npm start**.

- __ c. The application starts in the terminal.



A screenshot of a terminal window on an Ubuntu system. The window title is "localuser@ubuntu: ~/apim-smart". The terminal shows the following commands and output:

```
localuser@ubuntu:~$ cd ~/apim-smart
localuser@ubuntu:~/apim-smart$ node .
The user model "User" is attached to an application that does not
whether other sessions should be invalidated when a password or
an email has changed. Session invalidation is important for security
reasons as it allows users to recover from various account breach
situations.

We recommend turning this feature on by setting
```

- __ d. Leave the terminal running.

7.2. Review the API endpoint calls in the Developer Portal

In this part, you test the APIs in the Developer Portal. When you test the published API operations in the Developer Portal, you call the API on the gateway server. The gateway server routes the call to the back-end application.

- ___ 1. Sign on to the Staging Developer Portal with the application developer role.
 - ___ a. In a browser tab, type `https://portal.think.ibm/think/staging/`.
You see the public page for the Developer Portal of the Staging catalog.
 - ___ b. Sign in to the Developer Portal with the credentials:
 - User name: AppDeveloper
 - Password: Passw0rd!
 - ___ c. Click **Sign in**.
You are signed in to the Developer Portal as an application developer.
- ___ 2. Click **API Products**.
Then, select Smart Product (2.0.0)
- ___ 3. Click **IBM APIM SMart 2.0.0** in the list of APIs to open the API.
- ___ 4. Test the GET /products API operation in the Developer Portal.
 - ___ a. In the list of API operations, select **GET /products**.

The screenshot shows the API details page for the **GET /products** operation. The left sidebar lists various API operations, and the main panel displays the following details:

Find all instances of the model matched by filter from the data source.

Details **Try it**

GET **Production, Development:** `https://gw.think.ibm/think/staging/smart/v1/products`

Security

clientIdHeader
X-IBM-Client-Id apiKey located in header

- __ b. Scroll down with the Details tab selected until the cURL request for the GET /products operation is displayed.

Example
request

curl

```
curl --request GET \
    --url 'https://apigw.think.ibm/think/staging/smart
/v1/products?filter=REPLACE_THIS_VALUE' \
--header 'accept: application/json' \
--header 'x-ibm-client-id: Client ID'
```

Notice the URL for the operation indicates that the call is made to the gateway.

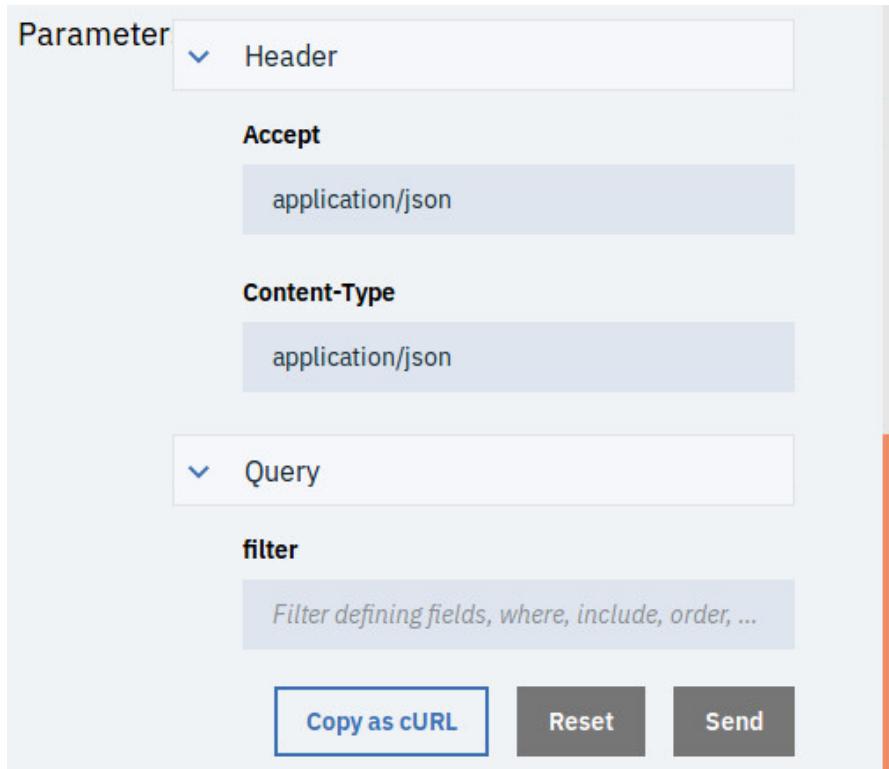
- __ c. Scroll back up in the page. Then, click the **Try it** tab.

Details **Try it**

GET	Production, Development:	https://apigw.think.ibm/think/staging/smart/v1/products
Security	Identification	
	Client ID	
	SMart Application	

Notice that the Client ID is automatically retrieved from the SMart Application.

__ d. Scroll down. Then, click **Send**.



__ e. The request is sent and the result is displayed.

The screenshot displays a request and response interface. On the left, under "Request", there's a "Headers" section with "Accept: application/json" and "X-IBM-Client-Id: 3476318d1cdc20d232dde0c06fecad62". On the right, under "Response", the "Code" is listed as "200 OK". The "Headers" section includes "content-type: application/json; charset=utf-8". The main response body is a JSON object representing a product:

```
Code: 200 OK
Headers:
content-type: application/json; charset=utf-8
[
  {
    "product_id": "apples",
    "name": "apples",
    "description": "A waxy fruit grown in Europe and Central Asia.",
    "image": "/images/apples.png",
    "price": 1.49,
    "rating": 3
  }
]
```



Troubleshooting

If you get a CORS error,

Request

```
GET https://apigw.think.ibm/think/staging/smart/v1/products
Headers:
Accept: application/json
X-IBM-Client-Id: 034ef4dc5c24e7d164c30fe94d77144b
```

Response

```
Code: 0
No response received. Causes include a lack of CORS support on the target server, the server being unavailable, an untrusted certificate being encountered, or Mutual SSL authentication is required.
Clicking the link below will open the server in a new tab. If the browser displays a certificate issue, you may choose to accept it and return here to test again.
https://apigw.think.ibm/think/staging/smart/v1/products
```

- a. Retire the Smart Product 2.0.0 in API Manager.
- b. Republish the Smart Product 1.0.0. product.
- c. Approve the publishing as ThinkOwner.
- d. Verify only the Smart Product 1.0.0 is available in the portal.
- e. Resubscribe the product to the Default plan so the App is pointing to Smart Product 1.0.0.

Subscriptions

PRODUCT

PLAN

Smart Product (1.0.0)	Default Plan	⋮
-----------------------	--------------	---

- f. Retry the test.

- __ g. Click one of the other operations. Then, return to the GET /products operation. Refresh the page. Then, from the Try it tab click **Copy as cURL**.

The screenshot shows the 'Parameter' section of an API try-it interface. It includes sections for 'Header' and 'Query'. Under 'Header', there are fields for 'Accept' (set to 'application/json') and 'Content-Type' (set to 'application/json'). Under 'Query', there is a field for 'filter' with the placeholder text 'Filter defining fields, where, include, order, ...'. At the bottom right are buttons for 'Copy as cURL', 'Reset', and 'Send'.

- __ h. Open a new terminal window. Leave the other terminal window that is running the back-end NodeJS application.
 __ i. In the new terminal, use the Edit > Paste option to paste the curl command.

```
localuser@ubuntu:~/apim-smart
localuser@ubuntu:~/apim-smart$ curl --request GET \
> --url 'https://apigw.think.ibm/think/staging/smart/v1/products?filter=REPLACE_\
THIS_VALUE' \
> --header 'accept: application/json'
```

- __ j. Change the command to turn off certificate validation, remove the '\' characters, and include the X-IBM-Client-Id header. Replace the value of the X-IBM-Client-Id with the Key that was generated when you created the application.

```
curl -k --request GET --url
'https://apigw.think.ibm/think/staging/smart/v1/products' --header
'accept: application/json' --header 'X-IBM-Client-Id:
a48eb57cef6ddfadece4e721cc06d871'
```

__ k. Run the command in the terminal and view the result.



Information

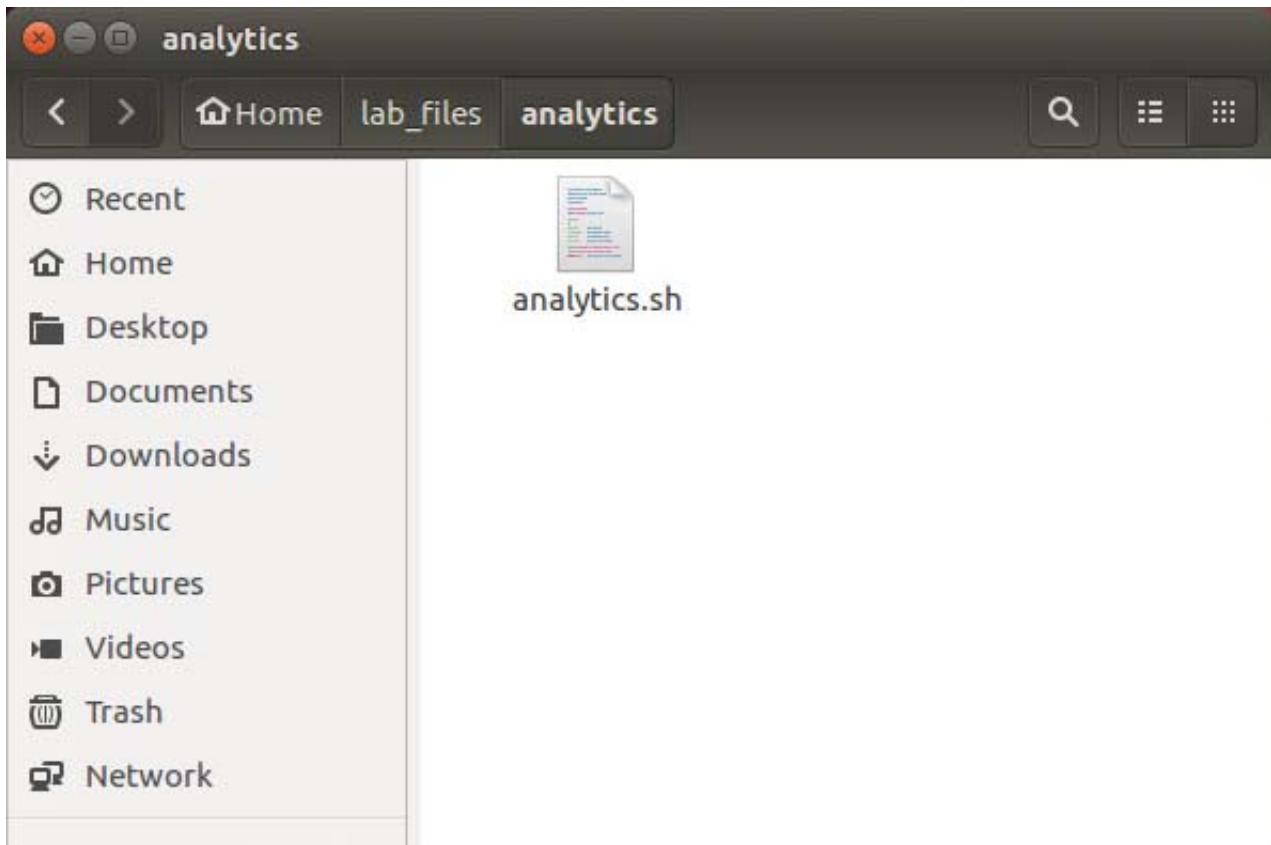
You will use the same cURL request that is used in the Developer Portal in the scripts to generate calls in the next part.

5. Sign out of the Developer Portal.

7.3. Run the script that makes calls to the APIs

In this part of the exercise, you run a script that simulates a number of calls to APIs on the gateway.

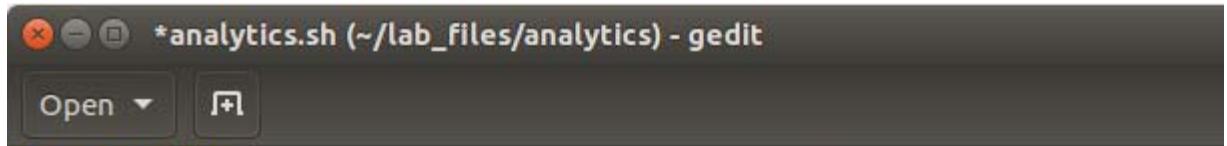
- ___ 1. Review the script file for generating the analytics.
 - ___ a. Open File Manager. Then, navigate to /home/lab_files/analytics.



You see the `analytics.sh` file.

- ___ b. Double-click the `analytics.sh` file to open it with the editor.

- c. The file opens in the editor.



```

#!/bin/bash
# load data for analytics
# API Connect Education
USAGE="Usage analytics GET products"

#option processing
if [ $# == 0 ]; then
echo $USAGE
else
echo $#
exit 1;
fi

#main curl statement in loop
i="0"
while [ $i -le 50 ]
do
curl -k --request GET \
--url 'https://apigw.think.ibm/think/staging/smart/v1/products' \
--header 'accept: application/json' \
--header 'content-type: application/json' \
--header 'X-IBM-Client-Id: 3476318d1cdc20d232dde0c06fecad62'
i=$[ $i+1 ]
done

```

You see the same cURL statement that is used when testing the API in the Developer Portal.

- d. Change the value in for the X-IBM-Client-Id to match the generated key value of your application.
- e. Save and close the editor and the File Manager.
2. Run the script from a terminal.
- a. Open another terminal. Leave the other terminal window that is running the back-end NodeJS application. Then, change to the ~/lab_files/analytics directory.

```
cd ~/lab_files/analytics
```

- __ b. Type ./analytics.sh in the terminal.

```
localuser@ubuntu:~/lab_files/analytics$ ./analytics.sh
analytics GET products
{"product_id": "apples", "name": "apples", "description": "A waxy fruit grown in Central Asia.", "image": "/images/apples.png", "price": 1.49, "rating": 4.5}
{"product_id": "asparagus", "name": "asparagus", "description": "A spring vegetable from Europe and Africa.", "image": "/images/asparagus.png", "price": 4.99, "rating": 4.5}
{"product_id": "bananas", "name": "bananas", "description": "A source of potassium and vitamins.", "image": "/images/bananas.png", "price": 0.69, "rating": 4.5}
{"product_id": "carrots", "name": "carrots", "description": "A root vegetable found in many cultures.", "image": "/images/carrots.png", "price": 0.99, "rating": 4.5}
{"product_id": "chicken", "name": "chicken", "description": "A meat product from chickens.", "image": "/images/chicken.png", "price": 3.99, "rating": 4.5}
{"product_id": "eggs", "name": "eggs", "description": "A food product made from chicken eggs.", "image": "/images/eggs.png", "price": 1.99, "rating": 4.5}
{"product_id": "flour", "name": "flour", "description": "A grain product used in baking.", "image": "/images/flour.png", "price": 2.49, "rating": 4.5}
{"product_id": "garlic", "name": "garlic", "description": "A pungent vegetable used in cooking.", "image": "/images/garlic.png", "price": 1.29, "rating": 4.5}
{"product_id": "ham", "name": "ham", "description": "A meat product from pigs.", "image": "/images/ham.png", "price": 4.49, "rating": 4.5}
{"product_id": "lettuce", "name": "lettuce", "description": "A leafy green vegetable used in salads.", "image": "/images/lettuce.png", "price": 1.79, "rating": 4.5}
{"product_id": "milk", "name": "milk", "description": "A dairy product from cows.", "image": "/images/milk.png", "price": 2.99, "rating": 4.5}
{"product_id": "onions", "name": "onions", "description": "A vegetable used in cooking.", "image": "/images/onions.png", "price": 1.49, "rating": 4.5}
{"product_id": "pepper", "name": "pepper", "description": "A vegetable used in cooking.", "image": "/images/pepper.png", "price": 1.99, "rating": 4.5}
{"product_id": "potatoes", "name": "potatoes", "description": "A root vegetable used in cooking.", "image": "/images/potatoes.png", "price": 1.99, "rating": 4.5}
{"product_id": "salt", "name": "salt", "description": "A seasoning used in cooking.", "image": "/images/salt.png", "price": 0.99, "rating": 4.5}
{"product_id": "sugar", "name": "sugar", "description": "A sweetener used in cooking.", "image": "/images/sugar.png", "price": 1.49, "rating": 4.5}
{"product_id": "tomatoes", "name": "tomatoes", "description": "A fruit used in cooking.", "image": "/images/tomatoes.png", "price": 1.99, "rating": 4.5}
{"product_id": "turkey", "name": "turkey", "description": "A meat product from turkeys.", "image": "/images/turkey.png", "price": 3.99, "rating": 4.5}
{"product_id": "water", "name": "water", "description": "A liquid used for drinking and cooking.", "image": "/images/water.png", "price": 0.99, "rating": 4.5}
```

The script calls the GET /products API operation 50 times. You see the responses in the terminal.

- __ c. Run the script again.



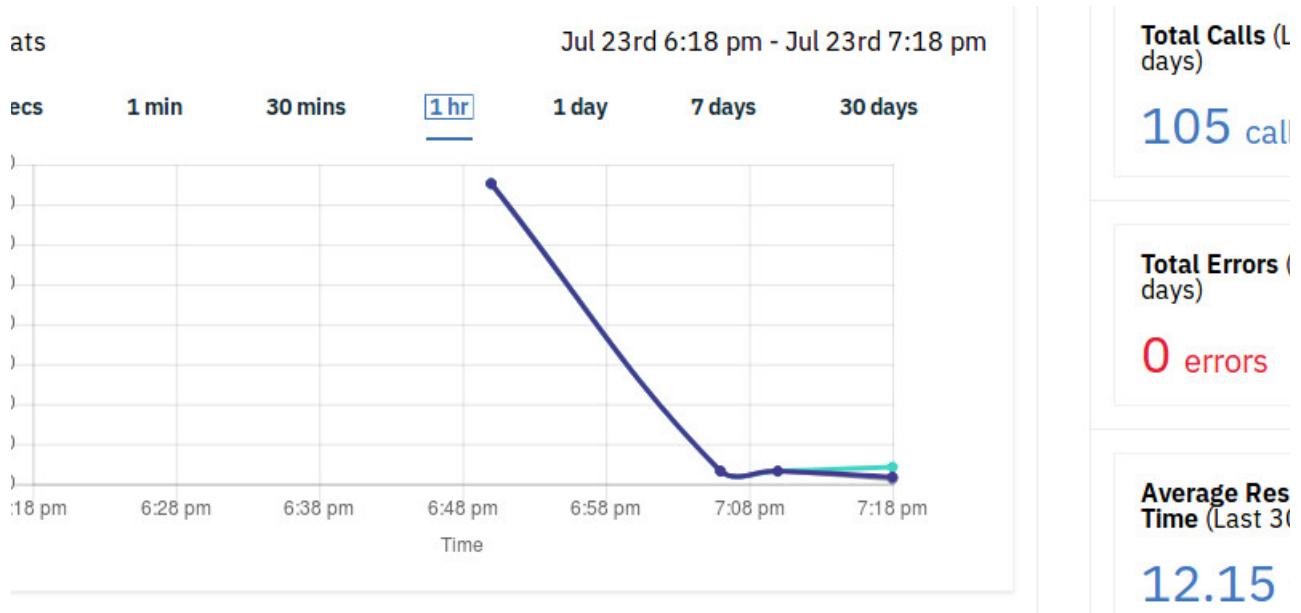
Attention

Due to the system date of the VM being hard-coded, visualizations within the API Developer Portal do not display. This is because you can only go back 30 days in the Developer Portal. You can reference the steps in the next section as a guide to display statistics in other environments. Although the data does not display in the API Developer Portal, it does display in the API Manager Analytics. Within the API Manager Analytics portal, you can configure a date range to include the system date (December 1, 2019). For this reason, you can skip section 7.4 and continue with section 7.5.

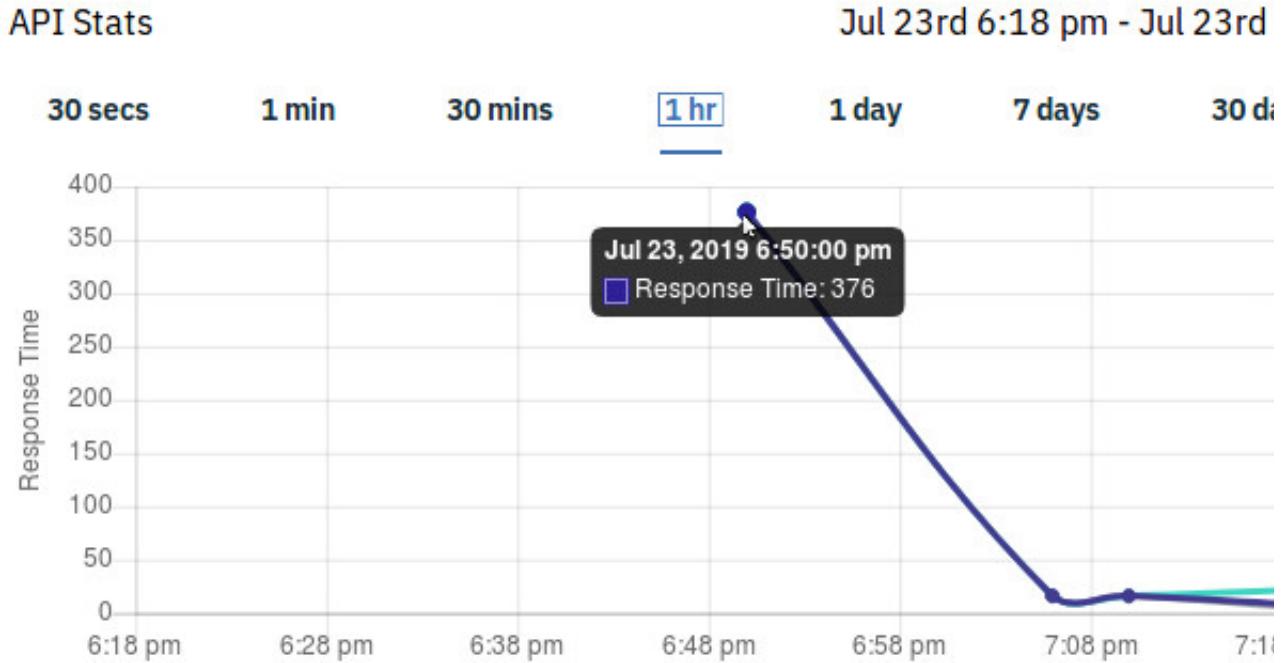
7.4. View the analytics data in the Developer Portal

You first review the Analytics as the AppDeveloper to see the usage of the application. Later, you sign on to the owner of the consumer organization to review the analytics for the organization.

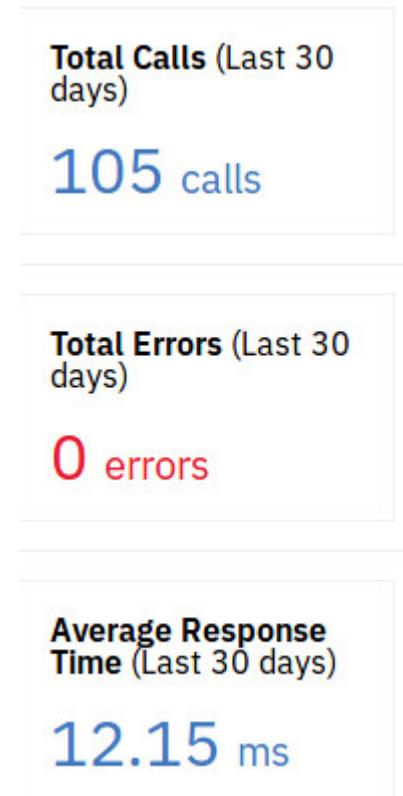
- 1. Sign on to the Staging Developer Portal with the application developer role.
 - a. In a browser tab, type `https://portal.think.ibm/think/staging/`.
You see the public page for the Developer Portal of the Staging catalog.
 - b. Sign in to the Developer Portal with the credentials:
 - User name: AppDeveloper
 - Password: Passw0rd!
 - c. Click **Sign in**.
You are signed in to the Developer Portal as an application developer.
- 2. Click **Apps**.
Then, select **Smart Application**.
- 3. Review the analytics for the application.
 - a. The Smart Application dashboard is displayed that shows the statistics. In this case, for the previous 1 hour.



- __ b. When you hover over the endpoints, the response time is displayed.



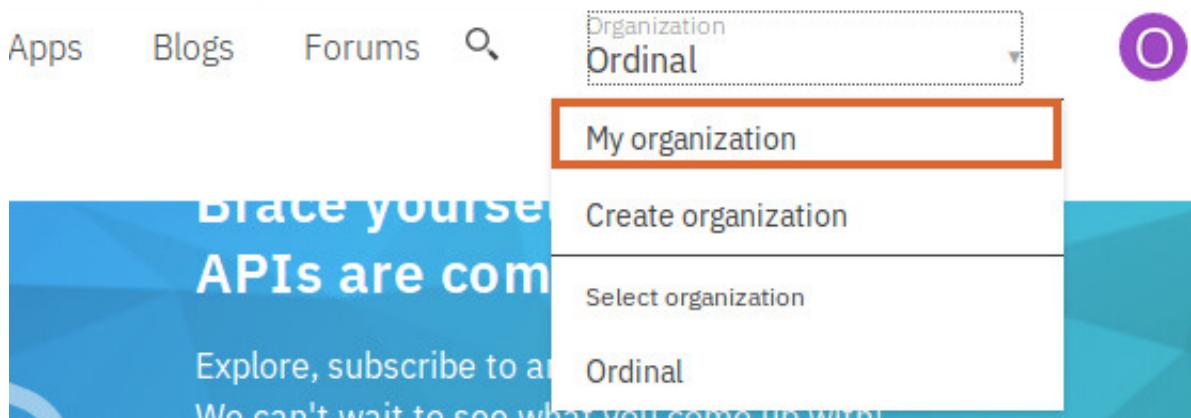
- __ c. The application dashboard also contains a block with the total calls, total errors, and average response time.



- ___ d. Other blocks in the dashboard display the last 100 API calls and last 100 errors.

The screenshot shows a dashboard with two main sections: 'API Calls (Last 100)' and 'Errors (Last 100)'. The 'API Calls' section displays three recent GET requests to '/think/staging/smart/v1/products', each taking approximately 7-9 ms and occurring at 07:19 pm on July 23, 2019. The 'Errors' section is currently empty.

- ___ 4. Sign out of the AppDeveloper.
- ___ 5. Sign on to the Staging Developer Portal as the organization owner.
 - ___ a. Sign in to the Developer Portal with the credentials:
 - User name: OrdinalOwner
 - Password: Passw0rd!
 - ___ b. Click **Sign in**.
You are signed in to the Developer Portal as the organization owner
- ___ 6. Review the analytics for the organization.
 - ___ a. From the Organization drop-down, select My organization.



- ___ b. The analytics for the Ordinal organization are displayed.

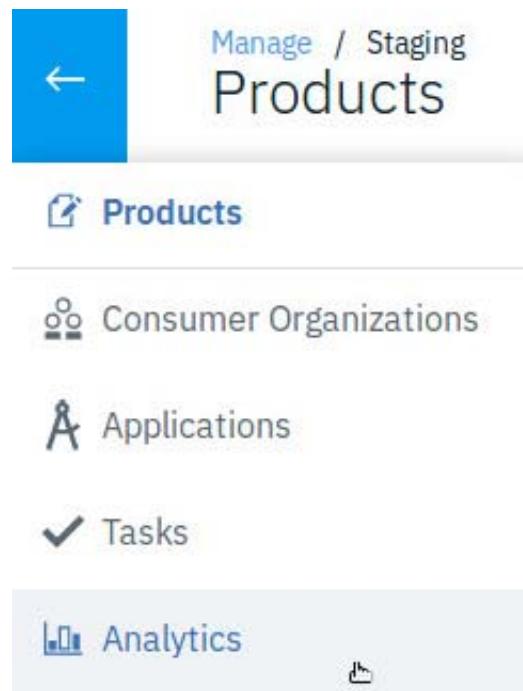


The statistics are identical to what you saw in the AppDeveloper.

- ___ 7. Sign out of the Developer Portal.

7.5. Browse the analytics data in API Manager

- ___ 1. Open the API Manager web user interface.
 - ___ a. In the Firefox browser, open API Manager with the URL:
`https://manager.think.ibm/`
 - ___ b. Sign in to API Manager with the credentials of the owner of the Think organization:
 - User: ThinkOwner
 - Password: Passw0rd!
 - ___ c. Click **Sign In**.
You are signed in to API Manager.
- ___ 2. Click Manage in the navigation menu. Then, click the Staging tile.
- ___ 3. Select **Analytics** from the Manage Staging navigation menu.



- __ 4. The Analytics Service dashboard is displayed.

The screenshot shows the Analytics Service dashboard interface. At the top, there are tabs for 'Discover', 'Visualize', and 'Dashboard', with 'Dashboard' being the active tab. Below the tabs is a search bar labeled 'Search...' and three buttons: '+', 'Export', and 'Import'. The main area displays a table of dashboards:

<input type="checkbox"/> Name ▾	Description	Tags
<input type="checkbox"/> API Default	replication of api_default from APIC v5	ADMIN
<input type="checkbox"/> Catalog Default	replication of catalog_default from APIC v5	ADMIN
<input type="checkbox"/> Monitoring Latency	easy dashboard for monitoring the latency of your apis	ADMIN
<input type="checkbox"/> Monitoring Status	easy dashboard for monitoring the status of your apis	ADMIN

Click the **Visualize** tab.

- ___ 5. The list of standard analytics is displayed.

The screenshot shows the 'Analytics Service' interface with the 'Visualize' tab selected. At the top, there are buttons for 'Discover', 'Visualize' (which is underlined), and 'Dashboard'. Below this is a search bar with the placeholder 'Search...', and buttons for '+', 'Export', and 'Import'. A status message indicates '1–19 of 19'. The main area displays a table of analytics entries:

<input type="checkbox"/> Name ▲	Type	Tags
<input type="checkbox"/> API Calls	42 Metric	ADMIN
<input type="checkbox"/> API Calls per Day	Vertical Bar	ADMIN
<input type="checkbox"/> Apps Per Plan	Pie	ADMIN
<input type="checkbox"/> Average Response Time (ms)	42 Metric	ADMIN
<input type="checkbox"/> Data Usage (bytes received)	Area	ADMIN
<input type="checkbox"/> Data Usage (bytes sent)	Area	ADMIN
<input type="checkbox"/> Developer Organizations	42 Metric	ADMIN

- ___ 6. Review the captured analytics for the Staging catalog.

- ___ a. Click the **API Calls** option from the list. You might not see any results without changing the time filter. Click the time filter on the page.

The screenshot shows the 'Visualize / API Calls' page. At the top, there are buttons for 'Refresh', 'Clone', and a date range selector set to 'Today'. Below this is a search bar with a placeholder 'Uses lucene query syntax' and a magnifying glass icon. A link 'Add a filter +' is also present. In the center, there is a large emoji face with a neutral expression, and below it, the text 'No results found'.

**Attention**

Due to the system date of the VM being hard-coded, visualizations within the API Manager portal must use the Absolute Time Range configuration to retrieve data. The Quick and Relative configurations do not work.

- __ b. On the subsequent page, click the **Absolute** option for the time range.
- __ c. Select December 1, 2019 as the **From** date and set the current date as the **To** date.
- __ d. Click **Go**.

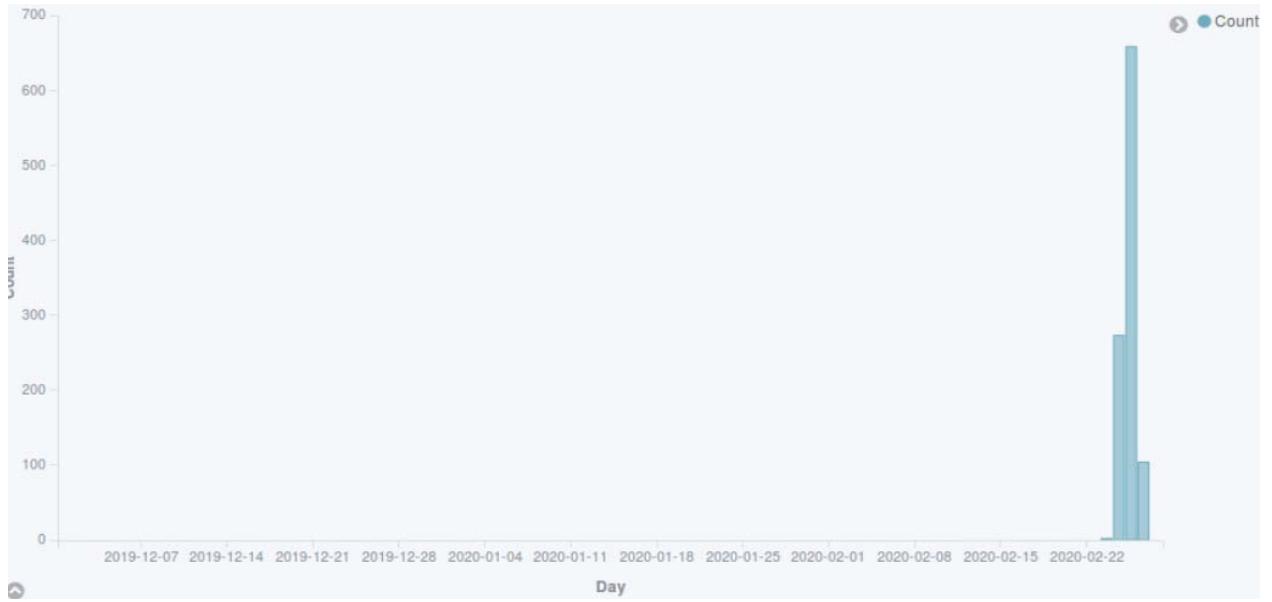
The screenshot shows the IBM API Manager Analytics Service interface. At the top, there are tabs for 'Discover', 'Visualize' (which is selected), and 'Dashboard'. Below the tabs, there are buttons for 'Visualize / API Calls', 'Refresh', 'Clone', and 'Auto-refresh'. To the right, a time range selector shows 'December 1st 2019, 00:00:00.000 to February 28th 2020, 23:59:59.999'. The 'Time Range' section has three options: 'Quick', 'Relative', and 'Absolute' (which is highlighted with a blue background). Below this, there are two date input fields: 'From: Set To Now' (containing '2019-12-01 00:00:00.000') and 'To: Set To Now' (containing '2020-02-28 23:59:59.999'). A 'Go' button is located to the right of the 'To' field. Below the date inputs is a calendar grid for December 2019 and February 2020. The calendar shows days from Sunday to Saturday, with December 1st and February 28th highlighted in blue.

- ___ e. Verify results are displayed. Your results will vary based on the number of API calls you have made and how many times you ran the analytics shell script.

The screenshot shows the IBM Watson Analytics interface. At the top, there's a navigation bar with 'Manage / Staging' and 'Analytics'. Below it, a dropdown menu is set to 'Analytics Service'. The main area has tabs for 'Discover', 'Visualize' (which is selected), and 'Dashboard'. Under 'Visualize / API Calls', there are buttons for 'Refresh', 'Clone', and a date range from 'December 1st 2019, 00:00:00.000' to 'February 28th 2020, 23:59:59.999'. A search bar contains the placeholder '*'. Below the search bar is a button 'Add a filter +'. In the center, a large bold number '1,037' is displayed above the text 'Total API Calls'. The background of the visualization area is light grey.

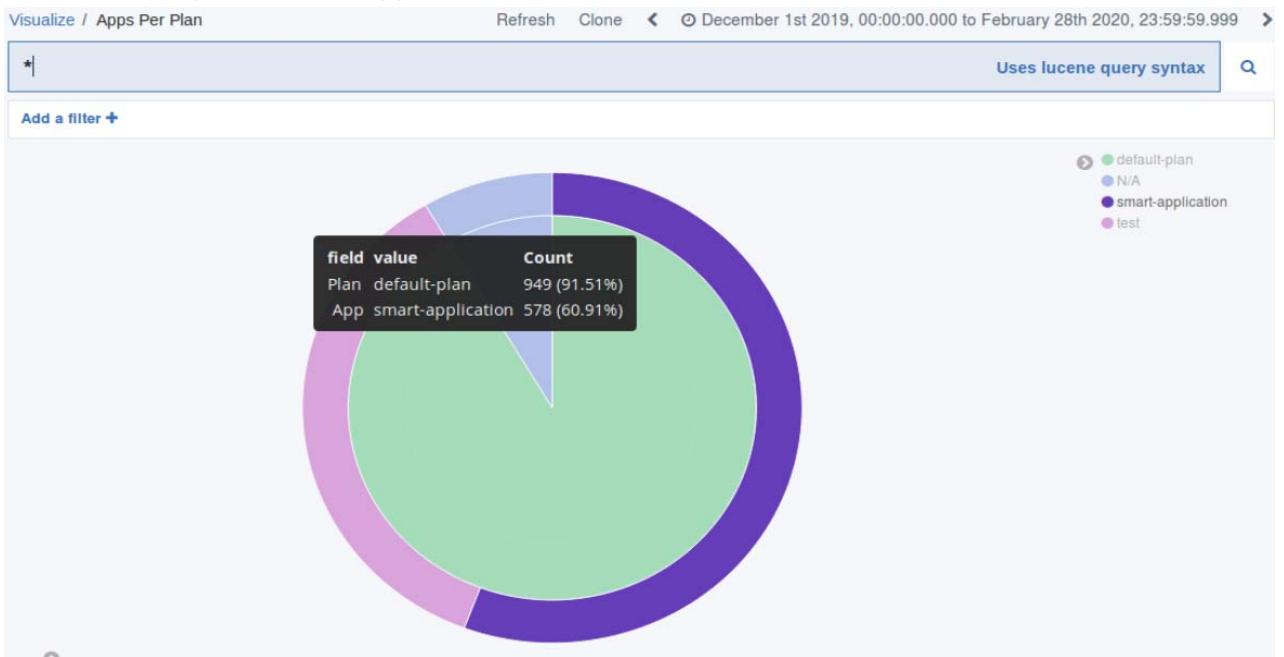
- ___ f. Click the **Visualize** link to return to the list of analytics options.

- ___ g. Click **API Calls per Day**. Leave the date range the same.

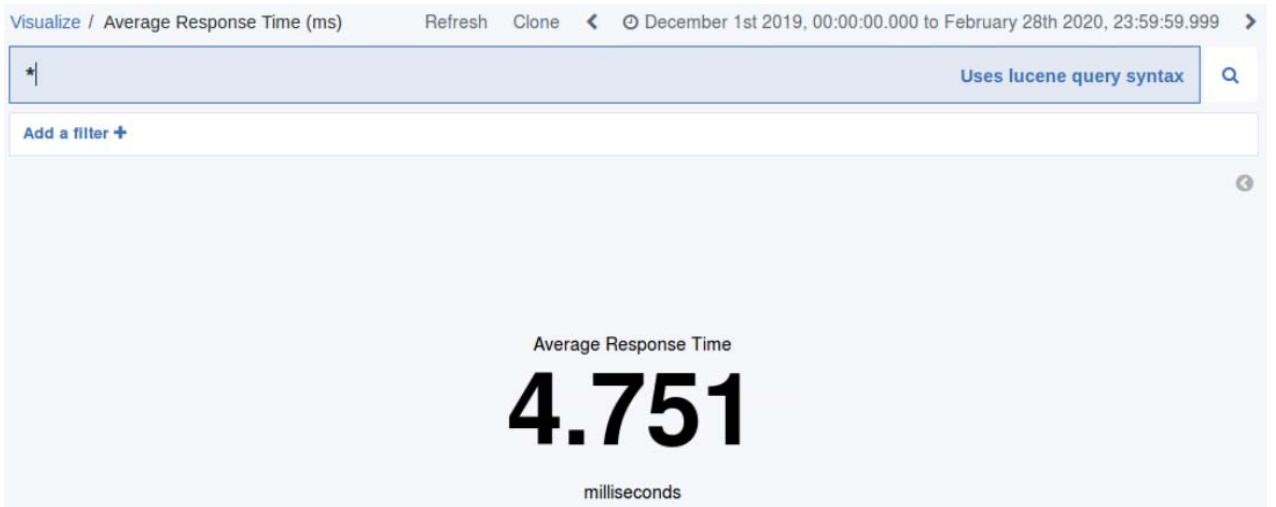


- ___ h. Click the **Visualize** link to return to the list of analytics options.

- ___ i. Click the **Apps Per Plan** option from the list. Hover over the graph to see the counts for the plan and the application.

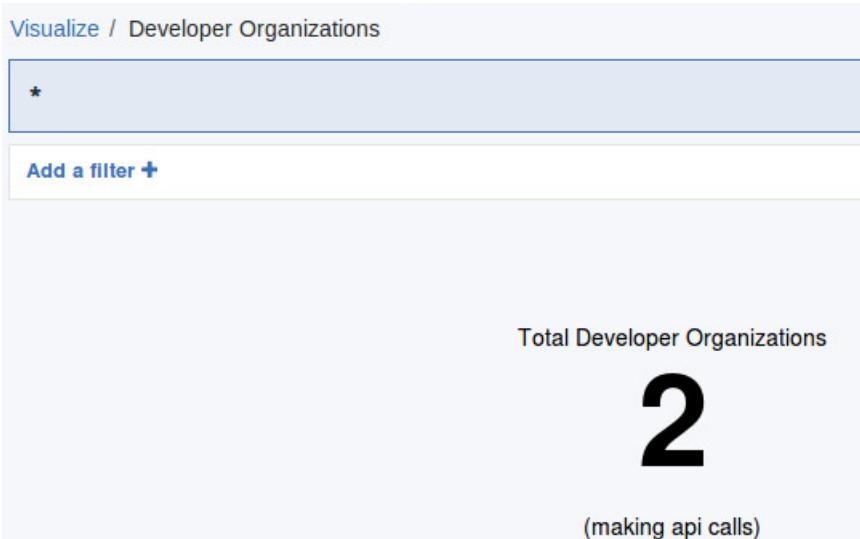


- ___ j. Click the **Visualize** link to return to the list of analytics options.
 ___ k. Click the **Average Response Time (ms)** option from the list. The metric is shown.

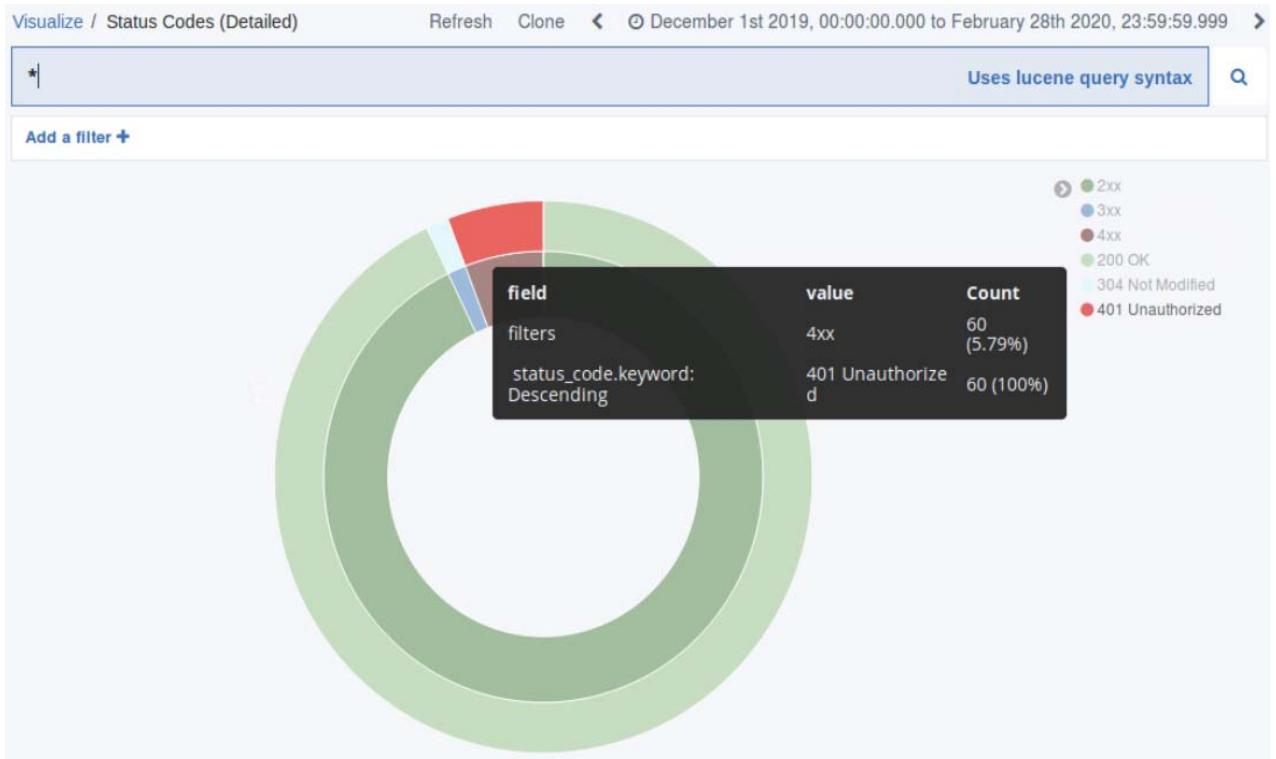


- ___ l. Click the **Visualize** link to return to the list of analytics options.

- ___ m. Click the **Developer Organizations** option from the list. The number of organizations that made API calls in the last day is displayed.



- ___ n. Click the **Visualize** link to return to the list of analytics options.
 ___ o. Click the **Status Codes (Detailed)** from the list. Then, hover over the pie chart. The result is displayed.

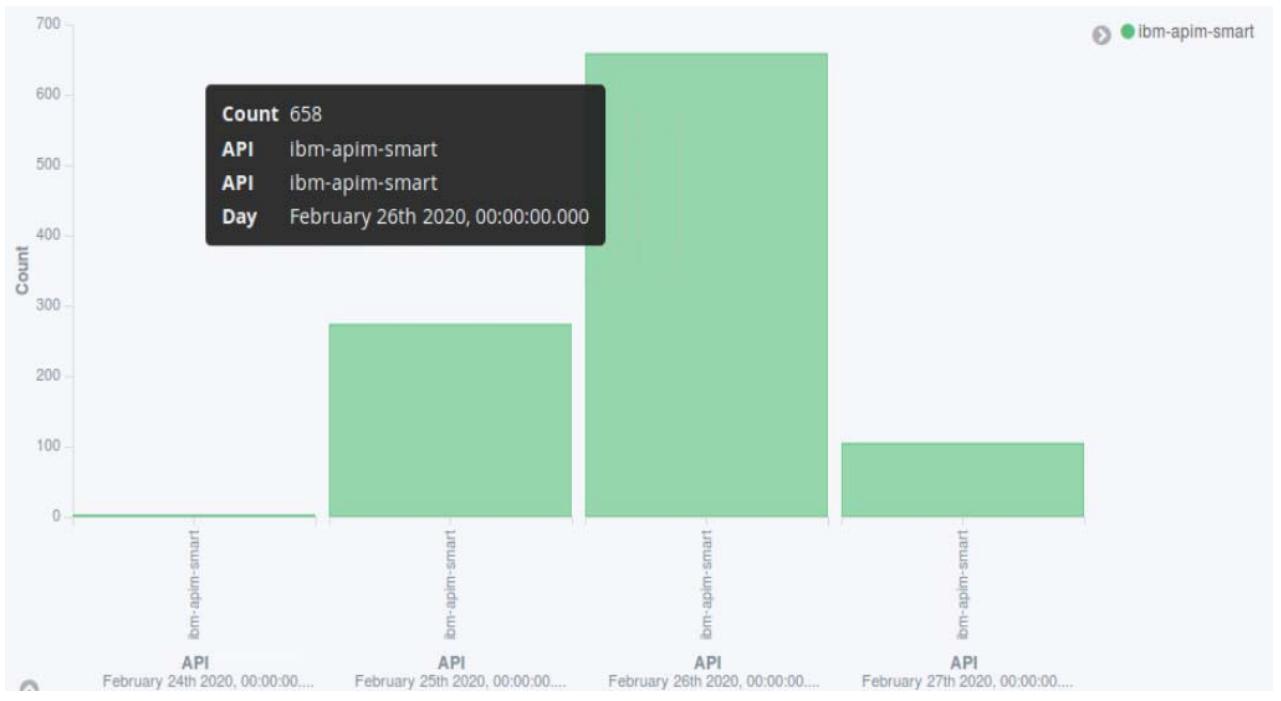


- ___ p. Click the **Visualize** link to return to the list of analytics options.

- ___ q. Click the **Top 5 Products Overall (Daily Usage)** option from the list. Hover over the graph to display the results.



- ___ r. Click the **Top 5 APIs Overall (Daily Usage)** option from the list. Then, hover over the graph to display the results.



7.6. Export the analytics data in API Manager

You can export the API event data for all events in a dashboard across the defined time frame. Analytical events and visualizations are exported as JSON data.

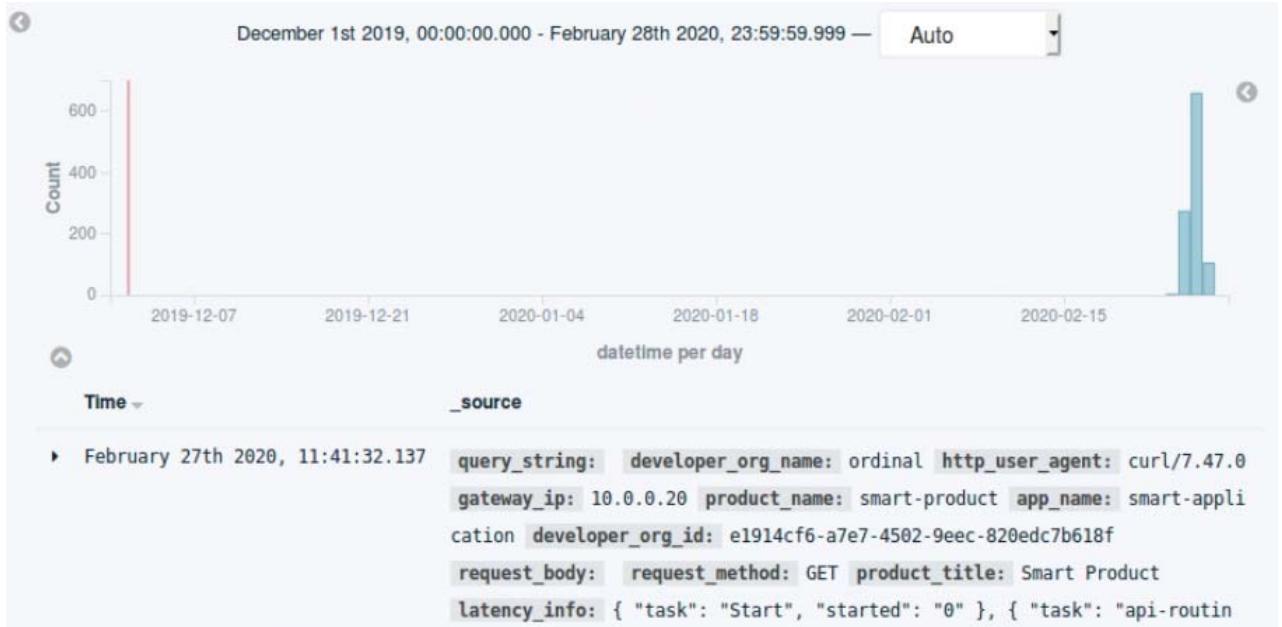
- ___ 1. Review the data for all events.
 - ___ a. From the Analytics page, select the **Discover** tab.
A list is displayed.

The screenshot shows the 'Analytics' service interface under the 'Discover' tab. At the top, there's a search bar with a magnifying glass icon and placeholder text 'Search...', followed by three buttons: a blue '+' button, a blue 'Export' button with a downward arrow, and a blue 'Import' button with an upward arrow. Below the search bar is a table with five rows. Each row has a checkbox on the left, a category name in the center, and a 'Tags' button on the right. The categories listed are 'Name', 'All Events', 'Errors', 'Response Times (>1s)', and 'Successes'. All five categories have the 'ADMIN' tag assigned to them.

<input type="checkbox"/>	Name	Tags
<input type="checkbox"/>	All Events	ADMIN
<input type="checkbox"/>	Errors	ADMIN
<input type="checkbox"/>	Response Times (>1s)	ADMIN
<input type="checkbox"/>	Successes	ADMIN

- ___ b. Click **All Events**.

- ___ c. It may take a moment for the graph to show render. The page shows the graph for all the events for the selected time filter.



- ___ d. Scroll down in All Events to see the data.

Time	_source
▶ February 27th 2020, 11:41:32.137	<code>query_string: developer_org_name: ordinal http_user_agent: curl/7.47.0 gateway_ip: 10.0.0.20 product_name: smart-product app_name: smart-application developer_org_id: e1914cf6-a7e7-4502-9eec-820edc7b618f request_body: request_method: GET product_title: Smart Product latency_info: { "task": "Start", "started": "0" }, { "task": "api-routin</code>
▶ February 27th 2020, 11:41:32.025	<code>query_string: developer_org_name: ordinal http_user_agent: curl/7.47.0 gateway_ip: 10.0.0.20 product_name: smart-product app_name: smart-application developer_org_id: e1914cf6-a7e7-4502-9eec-820edc7b618f request_body: request_method: GET product_title: Smart Product latency_info: { "task": "Start", "started": "0" }, { "task": "api-routin</code>
▶ February 27th 2020, 11:41:31.900	<code>query_string: developer_org_name: ordinal http_user_agent: curl/7.47.0 gateway_ip: 10.0.0.20 product_name: smart-product app_name: smart-application developer_org_id: e1914cf6-a7e7-4502-9eec-820edc7b618f request_body: request_method: GET product_title: Smart Product latency_info: { "task": "Start", "started": "0" }, { "task": "api-routin</code>

___ 2. Export the data for all events.

___ a. From the All Events page, click **Export**.

The screenshot shows the 'Discover' tab selected in the top navigation bar. Below it, the URL 'Discover /' and the title 'All Events 108 hits' are visible. On the right side, there are 'Clone' and 'Export' buttons, with 'Export' being highlighted in blue. A search bar contains the query 'Search... (e.g. status:200 AND extension:PHP)'. Below the search bar is a link 'Uses lucene query'. A 'Add a filter +' button is also present. At the bottom of the page, the search term 'apic-api-r' is displayed.

___ b. Verify the time period and file type. Then, select **Export**.

The screenshot shows a modal dialog titled 'Export Hits'. It displays a summary: 'All Events 1,037 hits' and the date range 'December 1st 2019, 00:00:00.000 to February 28th 2020, 23:59:59.999'. Below this, a text area explains the export operation: 'This operation exports all the hits that fall under the current search, to the chosen file format. This is not a lightweight operation, so it may take some time to complete. It is recommended to narrow down the search to as far as your use case supports.' Another text area below states: 'The file may be downloaded at any point after the export process has been started. Depending on the speed of download this data set may be incomplete. The file will download automatically when the export has finished. This will open a new window/tab to initiate the download, you may need to disable popup blockers to successfully download the file.' At the bottom, a 'Filetype' dropdown is set to 'JSON Lines (.txt)' and an 'Export' button is visible.

If the browser is configured to block pop-up windows, the file download might be blocked. You might then see a message that the browser is preventing the site from opening pop-up windows.

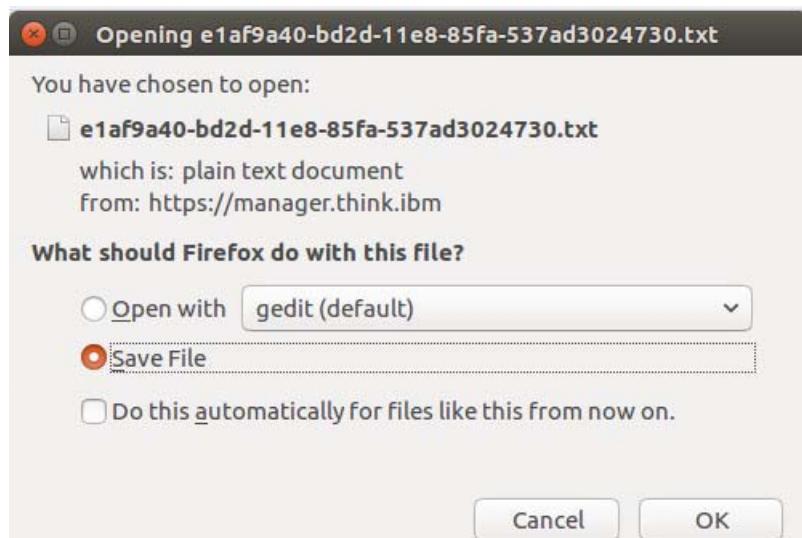
___ c. Allow browser pop-ups for the API Manager host address in the Firefox browser from the preferences for the Firefox browser.

The screenshot shows a Firefox browser window with a yellow warning bar at the top stating 'Firefox prevented this site from opening a pop-up window.' In the bottom right corner of the browser, a context menu is open with three options: 'Allow pop-ups for manager.think.ibm' (which is highlighted in orange), 'Edit Pop-up Blocker Preferences...', and 'Don't show this message when pop-ups are blocked.'

- __ d. The page displays that the export has completed successfully.

The screenshot shows a 'Discover /' interface with 'All Events 1,037 hits'. The 'Export' button was clicked, and the results are displayed under 'Export Hits'. Two green checkmarks indicate success: 'The export has successfully started. Found 1037 hits.' and 'The export has completed successfully. Collected 1037 of 1037 hits.' Below these messages are 'Download' and 'Another?' buttons.

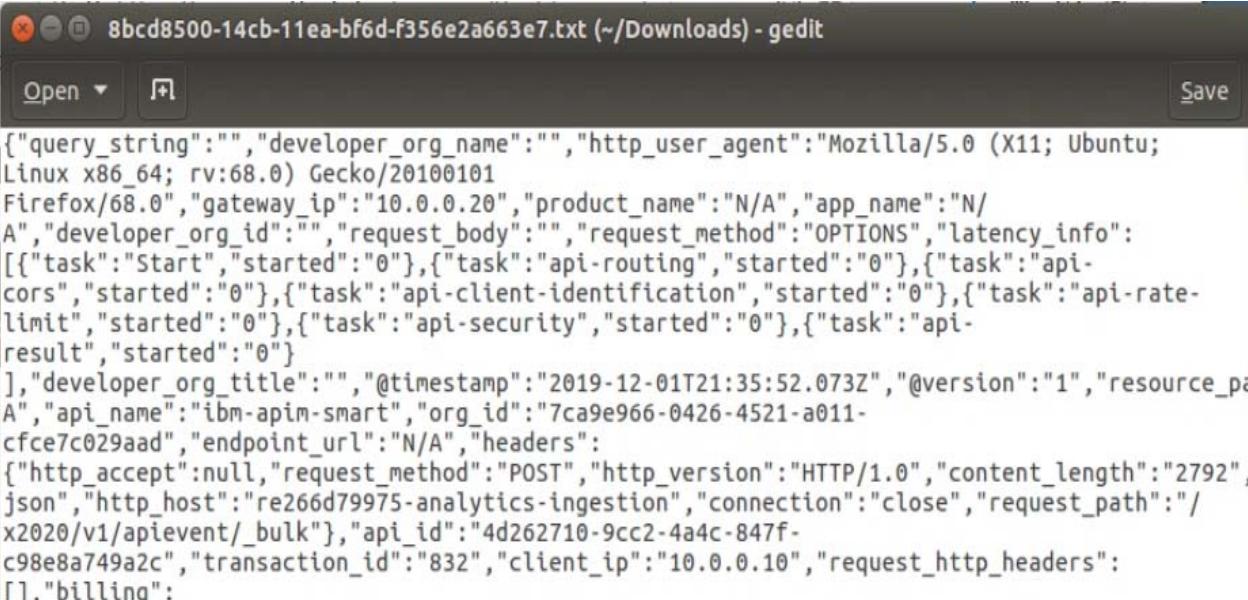
- __ e. The dialog box with the txt file is displayed. Select **Save File**.



Then click **OK**.

- __ f. The file is downloaded to the Downloads directory on the course image.

- __ 3. Open the downloaded text file.



The screenshot shows a Gedit text editor window with the title bar "8bcd8500-14cb-11ea-bf6d-f356e2a663e7.txt (~/Downloads) - gedit". The window contains a large amount of JSON-formatted data representing API event logs. The data includes fields like "query_string", "developer_org_name", "http_user_agent", "gateway_ip", "product_name", "app_name", "developer_org_id", "request_body", "request_method", "latency_info", "task names", "started times", "headers", and "request_http_headers". The JSON structure is complex, showing the flow of requests through various API components like routing, client identification, security, and rate limiting.

```
{"query_string": "", "developer_org_name": "", "http_user_agent": "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:68.0) Gecko/20100101 Firefox/68.0", "gateway_ip": "10.0.0.20", "product_name": "N/A", "app_name": "N/A", "developer_org_id": "", "request_body": "", "request_method": "OPTIONS", "latency_info": [{"task": "Start", "started": "0"}, {"task": "api-routing", "started": "0"}, {"task": "api-cors", "started": "0"}, {"task": "api-client-identification", "started": "0"}, {"task": "api-rate-limit", "started": "0"}, {"task": "api-security", "started": "0"}, {"task": "api-result", "started": "0"}], "developer_org_title": "", "@timestamp": "2019-12-01T21:35:52.073Z", "@version": "1", "resource_pa A", "api_name": "ibm-apim-smart", "org_id": "7ca9e966-0426-4521-a011- cfce7c029aad", "endpoint_url": "N/A", "headers": {"http_accept": null, "request_method": "POST", "http_version": "HTTP/1.0", "content_length": "2792", "json", "http_host": "re266d79975-analytics-ingestion", "connection": "close", "request_path": "/x2020/v1/apievent/_bulk"}, "api_id": "4d262710-9cc2-4a4c-847f- c98e8a749a2c", "transaction_id": "832", "client_ip": "10.0.0.10", "request_http_headers": [], "billing": :}
```

The file contains data in JSON format for the API events for the selected time period. You can extract and then import this JSON file into other IBM API Connect catalogs or other software tools to further analyze your API Connect usage.

End of exercise

Exercise review and wrap-up

Analytical information is captured in real time on the gateway in API Connect based on the calls that are made to the API endpoints that are published to the gateway. In the first part of the exercise, you used the Developer Portal test feature to determine the API endpoint request URI on the gateway. You ran a script that simulates a number of calls to APIs on the gateway. You reviewed the analytics in API Manager.

Finally, you exported the API event data from the Discover dashboard to a file that contains JSON event data.

Appendix A. Troubleshooting Issues

This Appendix describes some issues that you might encounter when working through the exercises and troubleshooting tips for how to deal with them.

IBM Remote Lab Platform - suspension of images

If the IRLP Skytap environment suspends the virtual machines, the DataPower and API Connect virtual machines might get out of synch. This can cause issues when testing the APIs in the Test client. Various error codes may be received as a result. This section provides troubleshooting tips in case this happens. The following status codes are covered:

- *401 Unauthorized API Request*
- *401 Unauthorized: no API Connect Gateway Service*
- *401 Unauthorized: client id not registered*
- *404 Not found*
- *500 URL Open error*
- *500 Internal Server Error*
- *503 API Error*

401 Unauthorized API Request

Issue: If you leave the user signed on to the user interface for a significant amount of time, you may encounter the following error:



Solution: Close the browser and sign on again.

401 Unauthorized: no API Connect Gateway Service

Issue: When invoking an API, you get the following error:

Response
Status code: 401 Unauthorized
Response time: 39ms
Headers: apim-debug-trans-id: 426530149-Landlord-apiconnect-4f5bf661-f803-4735-97af-65556c190ef6 content-type: application/json
Body: <pre>{ "httpCode": "401", "httpMessage": "Unauthorized", "moreInformation": "The API request is rejected because of no API Connect Gateway Service." }</pre>

This error is due to the two virtual machines being out of synch.

Solution: Reset the environment following the [Reset Environment Procedures](#).

401 Unauthorized: Client id not registered

Issue: When invoking an API, you get the following error:

Response
Status code: 401 Unauthorized
Response time: 36ms
Headers: apim-debug-trans-id: 426530149-Landlord-apiconnect-5ef29733-b9b1-4b8e-b767-65556c19f9ba content-type: application/json
Body: <pre>{ "httpCode": "401", "httpMessage": "Unauthorized", "moreInformation": "Client id not registered." }</pre>

This occurs when an API with a client id has been published but the two virtual machines got out of sync.

Solution: To resolve this issue, republish the API to re-register the client id. It may take several minutes before the client id is successfully registered. If you get a **404 error**, try again

404 - Not Found

Issue: When invoking an API, you get the following error:

The screenshot shows a "Response" panel with the following details:

- Status code: 404 Not Found
- Response time: 46ms
- Headers:


```
apim-debug-trans-id: 426530149-Landlord-
apiconnect-0f4fcae4-dfe2-47ff-bba2-65556c19d71f
content-type: application/json
x-ratelimit-limit: name=default,100;
x-ratelimit-remaining: name=default,95;
```

or you encounter a CORS error when attempting to invoke an API

The screenshot shows a "Response" panel with the following details:

- Status code: -1
- No response received. Causes include a lack of CORS support on the target server, the server being unavailable, or an untrusted certificate being encountered.
- Clicking the link below will open the server in a new tab. If the browser displays a certificate issue, you may choose to accept it and return here to test again.

<https://apigw.think.ibm/think/sandbox/v2/pet/1>

When you click the link in the CORS error, you receive a 404 error.

The screenshot shows a Mozilla Firefox browser window with the following details:

- Title bar: Not Found! - Mozilla Firefox
- Address bar: https://apigw.think.ibm/think/sandbox/v2/pet/1
- Toolbar buttons: Back, Forward, Stop, Home, Refresh, Stop, (unknown)
- Navigation menu: Most Visited, Getting Started, Cloud Manager, API Manager, API Developer Porta
- Main content area: **404 - Not Found!**
The requested URL was not found on this server

This might occur for a few different reasons.

1. The endpoint was not located.

Solution: You should first retry the invocation. At times, although the endpoint is not located on the first try, it is found on subsequent tries.

2. The app-server value or target-url value in the API is incorrect.

Solution: Verify the app-server and target-url values are correctly configured. If they are, you may need to verify the Sandbox is attached (see below).

3. The Sandbox is not attached and the environments are out of sync.

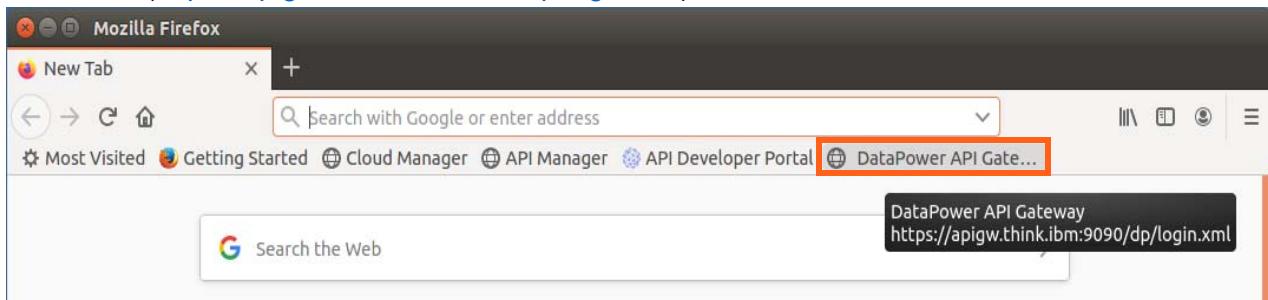
Solution: Follow these instructions:

- __ 1. Log into the IBM DataPower API Gateway.

- __ a. Click the **Firefox Web Browser** icon in the navigation bar on the left.



- __ b. From the Firefox browser, click the **DataPower API Gateway** link (<https://apigw.think.ibm:9090/dp/login.xml>)



- __ c. Enter the following credentials:

User: admin

Password: passw0rd

Domain: apiconnect

IBM DataPower Gateway IDG.2018.4.1.1

IDG console at 10.0.0.20:9090

User name:

admin

Password:

.....

Domain:

apiconnect

Graphical Interface:

Blueprint Console

Login

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- __ d. Click **Login**.

— 2. Attach the Sandbox.

— a. Under the API collection section, click Add.

The screenshot shows the 'API Gateway: apiconnect' configuration page. On the left is a tree view of gateway components, with 'API Gateway apiconnect' selected. The main panel has a 'Status: up' indicator. In the 'Main' section, there are fields for 'Name' (set to 'apiconnect'), 'Enable administrative state' (checked), 'Comments' (empty), and 'Source protocol handler' (set to 'apiconnect_https_44'). Below these are sections for 'Crypto Identifiers' and 'SSL Server Profiles'. The 'API collection' section contains a dropdown menu with 'No items' and an 'Add' button, which is highlighted with a red box. At the bottom right are 'Apply' and 'Cancel' buttons. The entire window has a light gray border.

__ b. Verify the **think_sandbox_collection** is selected and click **Apply**.

API Gateway: apiconnect

Status: **up**

Name: apiconnect

Main

Enable administrative state:

Comments:

Source protocol handler: apiconnect_https_44

API collection: think_sandbox_collection

Share Rate Limit Count: yes

Apply Cancel

__ c. Click **Save changes** to save changes to the configuration.

IBM DataPower Gateways | IDG console at 10.0.0.20:9090

apiconnect admin ? IBM

Services

All Services

Service	Status	Service Type	Front side URL	Actions
apiconnect	Up	API Gateway	https://10.0.0.20:443	

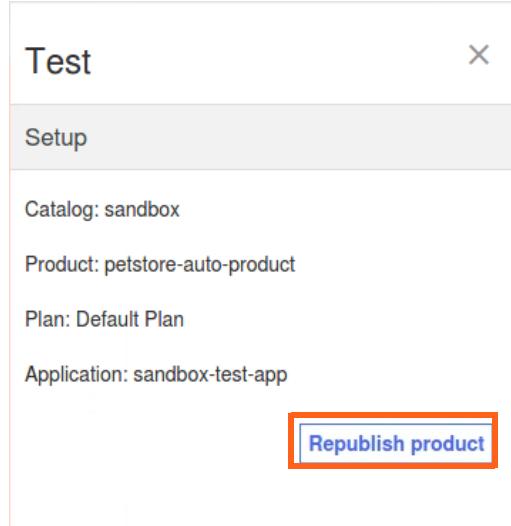
Total: 1

Save changes



Troubleshooting

At times after a restart, the Sandbox does not appear. If this happens, republish an existing API to rebuild the Sandbox. When you return to the DataPower API Gateway console, you will see the option to save changes. Follow the procedures above to save the changes to the configuration.



500 URL Open error

Issue: When invoking an API, you get the following error:

Response
<p>Status code: 500 URL Open error</p> <p>Response time: 41ms</p> <p>Headers: apim-debug-trans-id: 426530149-Landlord-apiconnect-52da6b73-a5b9-4bf5-b456-65556c193ad2 content-type: application/json x-ratelim-limt: name=default,100; x-ratelim-remaining: name=default,95;</p> <p>Body:</p> <pre>{ "httpCode": "500", "httpMessage": "URL Open error", "moreInformation": "Could not connect to endpoint" }</pre>

This occurs when the API endpoint cannot be reached.

Solution: Make sure whichever application the API is attempting to connect to is running. Verify the target-url is correctly configured.

500 Internal Server Error

Issue: When invoking an API, you get the following error:

Response
<p>Status code: 500 Internal Server Error</p> <p>Response time: 543ms</p> <p>Headers:</p> <pre>apim-debug-trans-id: 426530149-Landlord- apiconnect-bdcaab0f-e81e-456d- 9908-65556c1960b9 content-type: application/json x-global-transaction-id: 196c55655e2b1fb200000ec0 x-ratelimit-limit: name=default,100; x-ratelimit-remaining: name=default,97;</pre> <p>Body:</p> <pre>{ "httpCode": "500", "httpMessage": "Internal Server Error", "moreInformation": "Internal Error" }</pre>

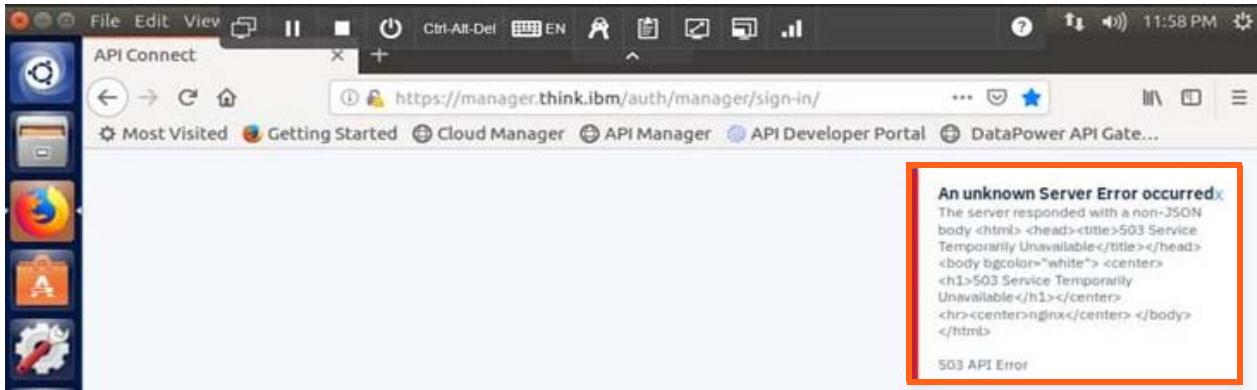
This occurs when a general error occurs when invoking the API. The most common causes are

- No value entered for required parameter.
- Incorrectly configured target-url.

Solution: Make sure the target-url is correctly configured and that values for all required parameters are provided.

503 API Error

Issue: When attempting to log into API Manager, you get the following error:



This error is due to the two virtual machines being out of sync or the environment not being completely started.

Solution: Reset the environment following the [Reset Environment Procedures](#).

IBM Remote Lab Platform - cut and paste

The IRLP Skytap environment uses the Clipboard as go-between for the cut and paste operations.

Copy from your local machine to a VM:

Paste content from your local machine into the copy/paste area above. You can then paste that content within the VM. [Learn more](#).

Copy from a VM to your local machine:

Selecting content within the VM populates the copy/paste area. Select and copy the contents of this field to paste locally. [Learn more](#).

Copy the code that you want to the clipboard and verify that it is indeed visible in the Clipboard. Then, from the Clipboard select Copy.

Paste the contents into the target.

A.1.Useful Kubernetes information and commands

This part describes some resources for learning about Kubernetes and some basic Kubernetes commands that can be used on the student image.

API Connect V2018 and later runs on the Kubernetes environment. The video describes some kubectl commands that can be run on the student image to see the available resources.

Useful Kubernetes commands.

https://www.youtube.com/watch?v=W5xHec3_Tts

Extracting the API Manager logs



Note

You can review the API Connect logs from the appropriate pod that is running in Kubernetes.

Open a terminal window. Then, type:

```
kubectl get pods -n apiconnect
```

The list of running pods is displayed. Locate the pod with apim in the name and copy the associated pod name.

localuser@ubuntu: ~/inventory				
0	4d6h			
r674f0bc86d-apiconnect-cc-repair-1549328400-dbs8z		0/1	Completed	
0	3d2h			
r674f0bc86d-apiconnect-cc-repair-1549328400-llww4		0/1	Error	
0	3d2h			
r674f0bc86d-apiconnect-cc-repair-1549328400-n9277		0/1	Error	
0	3d2h			
r674f0bc86d-apiconnect-cc-repair-1549328400-pzk9t		0/1	Error	
0	3d2h			
r674f0bc86d-apiconnect-cc-repair-1549501200-v2phs		0/1	Completed	
0	31h			
r674f0bc86d-apiconnect-cc-repair-1549501200-zx7xw		0/1	Error	
0	31h			
r674f0bc86d-apim-schema-init-job-ltcpz		0/1	Completed	
0	9d			
r674f0bc86d-apim-v2-88674dd9f-g8r95		1/1	Running	
12	9d			
r674f0bc86d-client-dl-srv-b7fdf9767-6g4qz		1/1	Running	
11	9d			

Then, from the terminal, type:

```
kubectl logs -n apiconnect [pod-name] > apim.logs
```

The log file is written to the current directory.

In the terminal, type:

```
tail -1000 apim.logs
```

The log file is displayed.

```
localuser@ubuntu: ~/inventory
6e35177] =====
=====
Sat, 09 Feb 2019 00:19:05 GMT apim:routesc:rBACHelper [28f7682efc8a7c04d2ab2cbd5
6e35177] \/ Entering: rBACHelper::checkIfUserIsOwnerBasedOnRegistrationType
Sat, 09 Feb 2019 00:19:05 GMT apim:routesc:rBACHelper [28f7682efc8a7c04d2ab2cbd5
6e35177] - internal invoker call, exiting...
Sat, 09 Feb 2019 00:19:05 GMT apim:routesc:rBACHelper [28f7682efc8a7c04d2ab2cbd5
6e35177] \/ Exiting: rBACHelper::checkIfUserIsOwnerBasedOnRegistrationType
Sat, 09 Feb 2019 00:19:05 GMT apim:routesc:rBACHelper [28f7682efc8a7c04d2ab2cbd5
6e35177] -----
Sat, 09 Feb 2019 00:19:05 GMT apim:routes:webhook [28f7682efc8a7c04d2ab2cbd56e35
177] \/ Exiting: webhook::getPreHook
Sat, 09 Feb 2019 00:19:05 GMT apim:routes:webhook [28f7682efc8a7c04d2ab2cbd56e35
177] -----
Sat, 09 Feb 2019 00:19:05 GMT audit [28f7682efc8a7c04d2ab2cbd56e35177] =====
=====
=====
Sat, 09 Feb 2019 00:19:05 GMT audit [28f7682efc8a7c04d2ab2cbd56e35177] Successfu
l 200 response (GET /api/catalogs/7ca9e966-0426-4521-a011-cfce7c029aad/bf54761e-
8440-4bb3-9b24-aab616bb7aa0/webhooks/950d2d29-dd3c-4bfa-ac45-4f78a182f62b)
Sat, 09 Feb 2019 00:19:05 GMT audit [28f7682efc8a7c04d2ab2cbd56e35177] =====
=====
```

A.1. Errors that occur when working in one of the user interfaces

In this section, you see an example of an error that might occur when you try to enable the gateway service for a catalog in API Manager.

In some cases, you might see a 500 API error in one of the API Connect user interfaces when the user interface has timed out.

The solution is to sign out of the user interface and sign in again.



Troubleshooting

You try to enable the gateway for the catalog and you get a 500 API error when you try to select the gateway and save the changes.

The screenshot shows a user interface for managing gateway services. On the left, there's a sidebar with 'Manage / Staging' and a 'Gateway Services' section. Below it is a table with two rows:

	TITLE	TYPE
<input type="checkbox"/>	DP API Gateway	DataPower API Gateway

To the right of the table, a red vertical bar highlights an error message box. The message reads:

A Server Error occurred
An error occurred communicating with the gateways subsystem at 'https://apigwd.think.ibm:3000' (status: 550, response: "Unable to create configuration for API Management. Error: Unable to add catalog configuration. The API Connect Gateway Service is not registered with an API Manager instance.").
500 API Error

At the bottom right of the error box are 'Cancel' and 'Save' buttons.

If you get this error, then you should delete and re-register the gateway in the Cloud Manager user interface.

The procedure to fix this issue is described here:

- 1. Sign on to the API Manager with the ThinkOwner user.
- 2. Remove the gateway service from the Sandbox catalog.
 - a. Select the Manage option. Then, click the Sandbox catalog.

- ___ b. Click **Settings**. Then, select **Gateway Services**.

[Manage](#) / Sandbox

Settings

	TITLE	TYPE	URL
	DP API Gateway	DataPower API Gateway	https://apigw.think.ibm/think/sandbox

- ___ c. Click **Edit**.

- ___ d. Clear the option to select the gateway.

[Manage](#) / Sandbox

Enable Gateway Services

	TITLE	TYPE
<input type="checkbox"/>	DP API Gateway	DataPower API Gateway

Cancel **Save**

Then, click **Save**.

No items are displayed for the Sandbox gateway services.

- ___ 3. Sign on to Cloud Manager as described in the first exercise.
- ___ 4. Unassociate the analytics service.
- ___ a. Navigate to the Topology page.
- ___ b. Click the ellipsis in the DP API Gateway row. Then, select the option to **Unassociate the Analytics Service**.
- The Analytics services is unassociated from the gateway.

- ___ 5. Delete the existing API Gateway in the topology.
- ___ a. Click the ellipsis in the DP API Gateway row. Then, select the **Delete** option from the list.

SERVICE	TYPE	ASSOCIATED ANALYTICS SERVICE	VISIBLE TO
DP API Gateway	DataPower API Gateway	Associate Analytics Service	Public
Portal Service	Portal Service		
Analytics Service	Analytics Service		

A context menu is open over the 'DP API Gateway' row, containing the following options: 'Edit', 'Edit visibility', and 'Delete'. The 'Delete' button is highlighted with a red background.

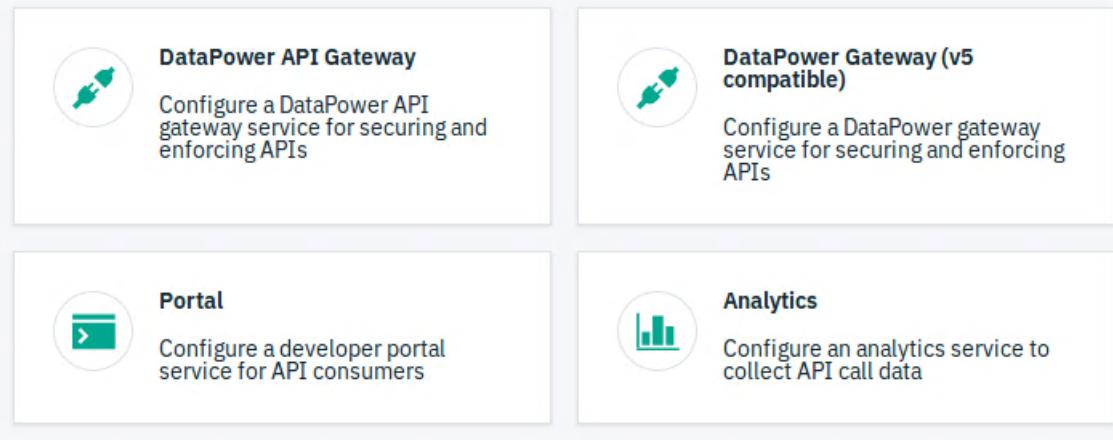
The interface shows a message: "Gateway Service dp-api-gateway has been removed." with a timestamp "Monday, July 29, 2019 1:27 PM".

SERVICE	TYPE	ASSOCIATED ANALYTICS SERVICE	VISIBLE TO
Portal Service	Portal Service		Public
Analytics Service	Analytics Service		

- ___ 6. Add the gateway service in Cloud Manager.
- ___ a. Click **Register Service**.

__ b. Select the **DataPower API Gateway**,

Select Service Type



__ c. Type the details for the gateway:

- Domain name: apiconnect
- Title: DP API Gateway
- Name: dp-api-gateway
- Management Endpoint: <https://apigwd.think.ibm:3000>
- TLS Client Profile: DP Management TLS Client profile
- API Invocation Endpoint: <https://apigw.think.ibm>
- Domain name: apiconnect
- SNI Host Name: *
- TLS Server Profile: DP Gateway TLS Server profile

Management Endpoint

Endpoint

<https://apigwd.think.ibm:3000>

TLS Client Profile

DP Management TLS Client profile

API Invocation Endpoint

API Endpoint Base

<https://apigw.think.ibm>

__ d. Click **Save**.

- ___ e. The gateway is registered.

SERVICE	TYPE	ASSOCIATED ANALYTICS SERVICE	VISIBLE TO
DP API Gateway	DataPower API Gateway	Associate Analytics Service	Public
Portal Service	Portal Service		Public
Analytics Service	Analytics Service		

- ___ 7. Add the Analytics Service to the gateway.
- Click **Associate Analytics Service** in the gateway row.
 - Select the check mark for the Analytics Service.

ANALYTICS	AVAILABILITY ZONE
<input checked="" type="checkbox"/> Analytics Service	availability-zone-default

Then, click **Associate**.

- ___ c. The Analytics Service is associated with the gateway.

Return to API Manager and enable the gateway for both the Sandbox and Staging catalogs.

- ___ 8. Enable the gateway services for the Sandbox catalog.
 - ___ a. From the Manage navigation menu, select the **Sandbox** tile.
 - ___ b. Click **Settings**. Then, select **Gateway Services**.

Manage / Sandbox

Settings

TITLE	TYPE	URL

No items found

- ___ c. Click **Edit**.

- __ d. Select the DP API Gateway.

Manage / Sandbox
Enable Gateway Services

	TITLE	TYPE
<input checked="" type="checkbox"/>	DP API Gateway	DataPower API Gateway

[Cancel](#) [Save](#)

Then, click **Save**.

The DP API Gateway is set for the Sandbox catalog.

Manage / Sandbox

Settings

Overview	Gateway Services	Edit						
Gateway Services								
Lifecycle Approvals	<table border="1"> <thead> <tr> <th>TITLE</th> <th>TYPE</th> <th>URL</th> </tr> </thead> <tbody> <tr> <td>DP API Gateway</td> <td>DataPower API Gateway</td> <td>https://apigw.think.ibm/think/sandbox</td> </tr> </tbody> </table>	TITLE	TYPE	URL	DP API Gateway	DataPower API Gateway	https://apigw.think.ibm/think/sandbox	
TITLE	TYPE	URL						
DP API Gateway	DataPower API Gateway	https://apigw.think.ibm/think/sandbox						

- __ 9. Enable the gateway services for the Staging catalog.

- __ a. From the Manage navigation menu, select the **Staging** tile.
- __ b. Click **Settings**. Then, select **Gateway Services**.
- __ c. Repeat the actions of the previous step to set the Gateway Service for the Staging catalog.



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