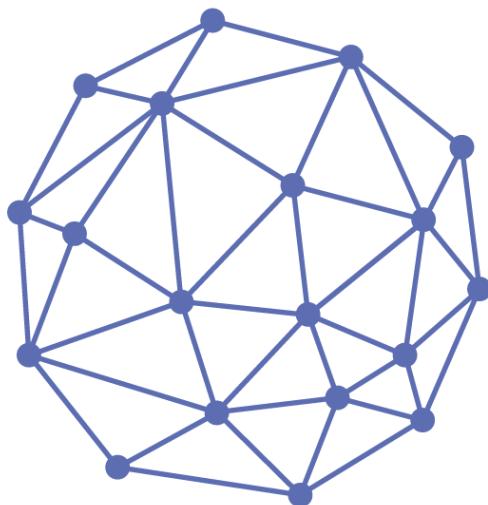


Using IBM API Connect

Create & publish your API in a few clicks



IBM API Connect

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1. API Connect Overview

IBM API Connect is a comprehensive end-to-end API lifecycle solution that enables the automated creation of APIs, simple discovery of systems of records, self-service access for internal and third party developers and built-in security and governance. Using automated, model-driven tools, create new APIs and microservices based on Node.js and Java runtimes—all managed from a single unified console. Ensure secure & controlled access to the APIs using a rich set of enforced policies. Drive innovation and engage with the developer community through the self-service developer portal. IBM API Connect provides streamlined control across the API lifecycle and also enables businesses to gain deep insights around API consumption from its built-in analytics.

Components in API Connect

Find below a list of the main components in API Connect :

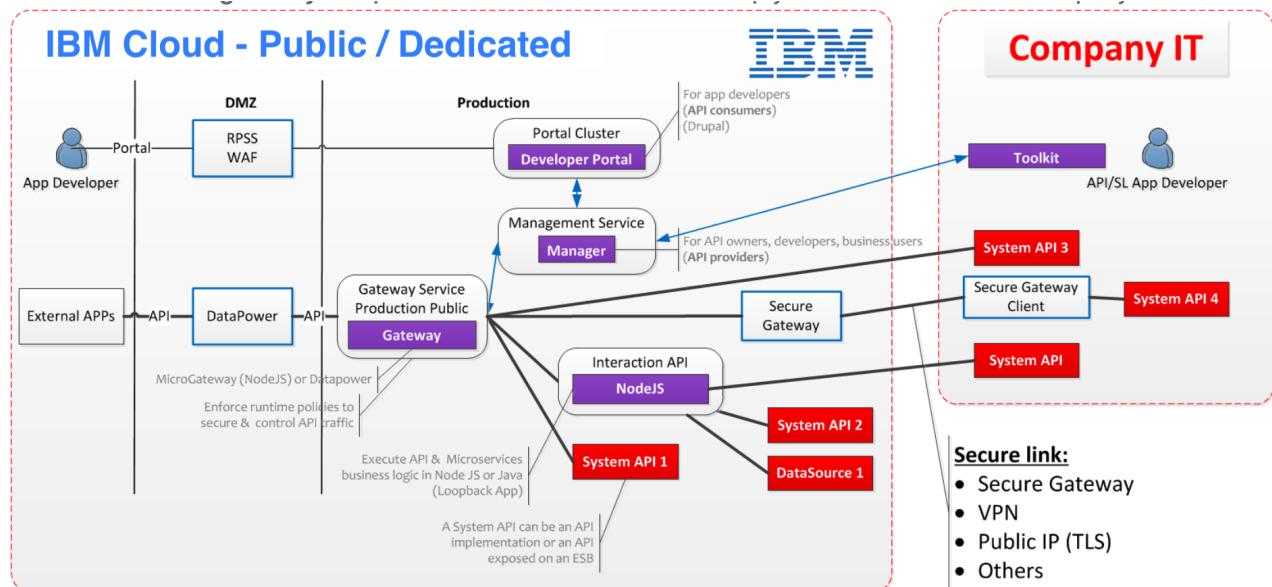
- **Gateway** (either DataPower, either a NodeJS implementation called micro gateway in this case). The requests from apps are going through the gateway, policies are enforced and analytic are gathered.
- **Manager** where the APIs are defined and governed. It also collects the analytics from the gateway. The manager can be used directly or more likely using the toolkit.
- **Portal**, an open source Drupal CMS - Content Management System. For the API consumers (Apps developpers), they create Apps and subscribe to API within the portal. Based on Drupal, it is highly customizable.
- **Loopback runtime** or micro services runtime. This is where the loopback applications are running. This component is originally coming from StrongLoop acquisition. Loopback applications can be created in minutes to expose data from SQL or NoSQL database and also a good place to perform composition of APIs.
- Associated to the Loopback runtime is the **Kubernetes** that monitors the Loopback runtime and can provide advanced feature such as auto-scaling.
- **Developer Toolkit**, running on the API developer, it offers the same web experience as the manager to manage APIs. But this is also the only place where you can define Loopback applications. It also contains CLI to operate directly on the manager whether it is an onPremise version or Bluemix version of API Connect.

Terminology

- **API** : Can be SOAP or Representational State Transfer - REST API defined with an Open API definition (Swagger) as a YAML file. One API = one yaml file though WSDLs and Schema are separated in a zip file for a SOAP API.
- **Plan** : this is where we specify the quotas and if an approval is needed to subscribe to a Product/API.
- **Product** : this is an aggregation of APIs, and one or many plans associated to those APIs. This is what is published to a catalog. One Product = one yaml file.
- **Catalog** : it's relates to a cluster of gateways and a portal. It sounds like an environment but it also contains a business dimension. For example, good names for a catalog are Sandbox, Dev, Production, CRM (for my CRM APIs exposed to a specific population), etc ...
- **API Connect Cloud** : not to be confused with a cloud infrastructure/platform, it is a combination of gateways clusters, managers cluster, portal clusters and loopback applications runtimes. Usually a customer will have one, two, sometime three or more API Connect clouds, based on its organization and needs to separate the infrastructures.
- **Assembly panel** : this is where we specify the policies to be executed in the gateway for each transactions.

Architecture

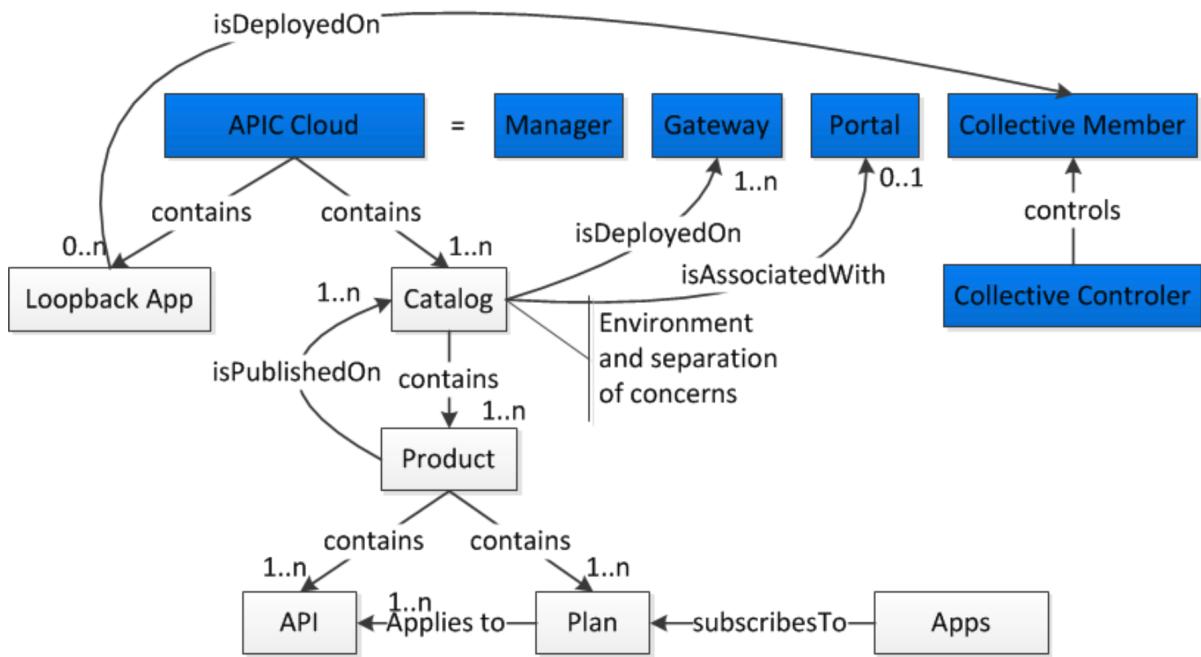
IBM API Connect can work on Premises or in a Cloud. Find below the architecture details of the solution in the IBM Cloud that we are going to use during this labs :



Concept Map

We often speak about an **API Connect Cloud** which represents an instantiation of all the components of API Connect. The following diagram describes all the relationships

between all the components.



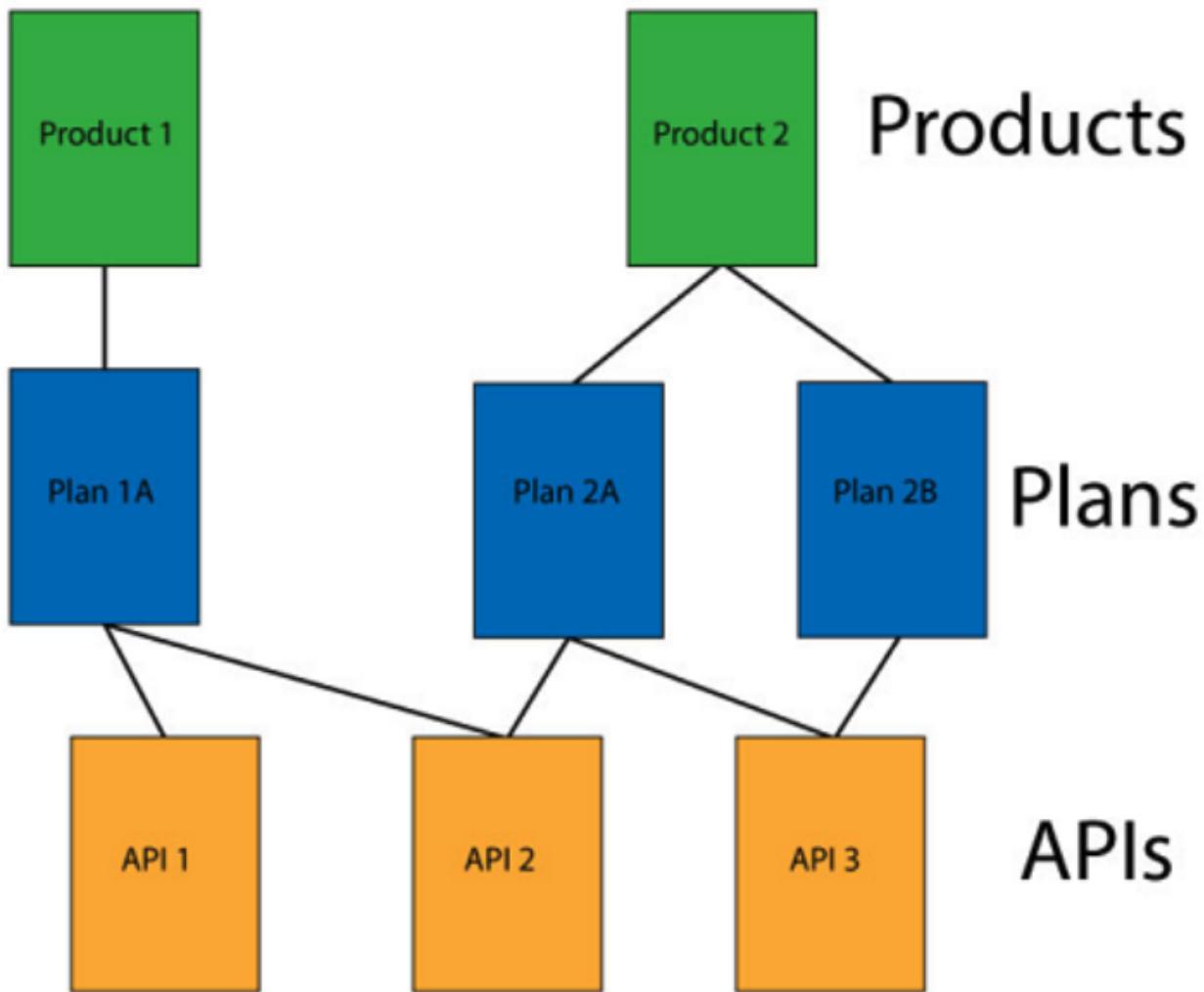
Plans & Products

To make an API available to a customer, it must be included in a **Plan**. Plans are used to differentiate between different offerings. Plans can share APIs, but whether subscription approval is required depends upon the Plan itself. Additionally, you can enforce rate limits through Plans or through operations within a Plan's APIs that override the Plan's rate limit.

Products

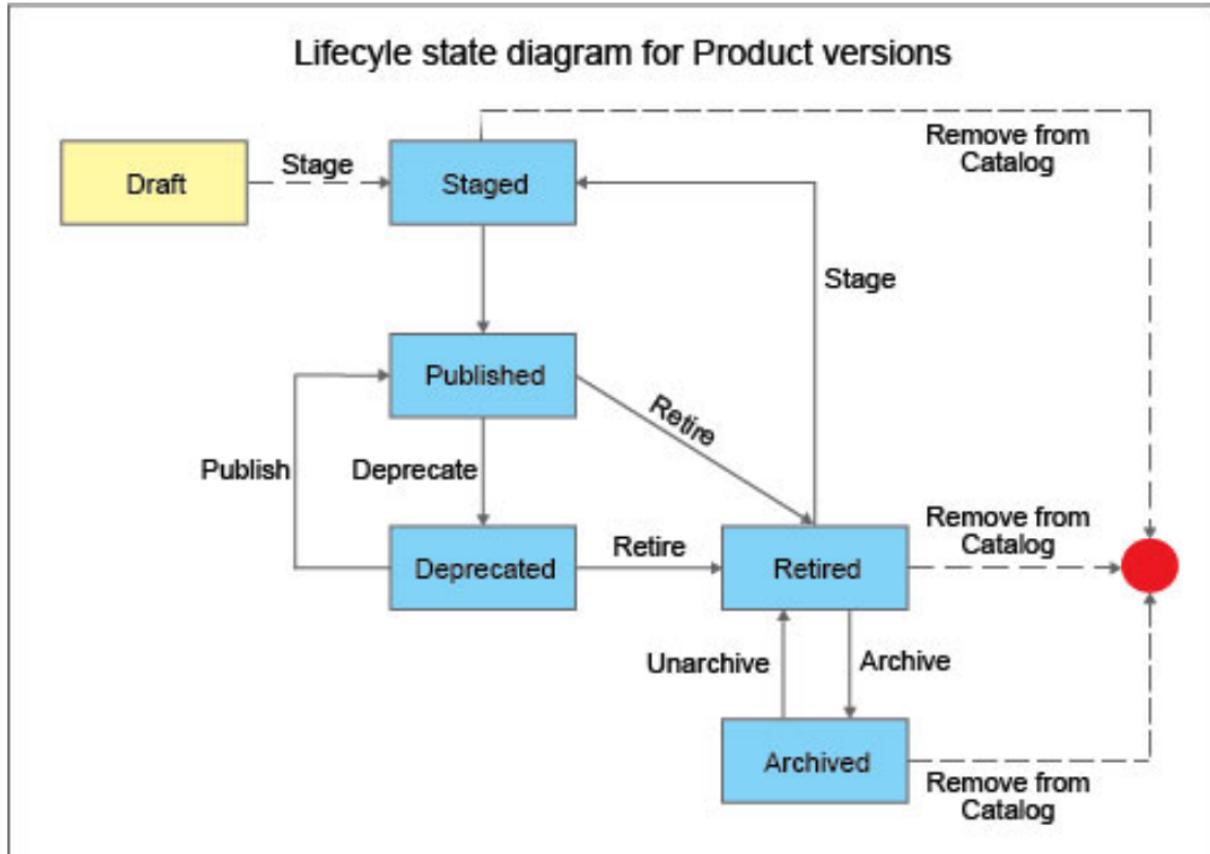
Plans and APIs are grouped in Products. Through Products, you can manage the availability and visibility of APIs and Plans. Use the API Designer to create, edit, and stage your Product. Use the API Manager to manage the lifecycle of your Product.

The following diagram demonstrates how Products, Plans, and APIs relate to one another. Note how Plans belong to only one Product, can possess different APIs to other Plans within the same Product, and can share APIs with Plans from any Product. Figure to show the hierarchy of Products, Plans, and APIs.



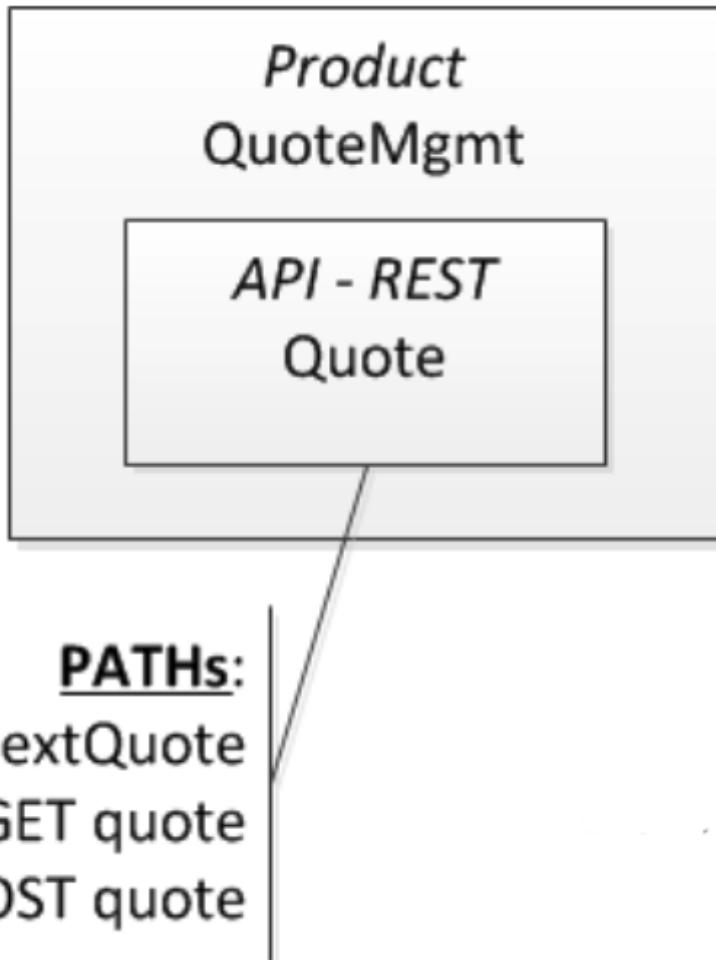
Product LifeCycle

When you manage your Product versions, you move them through a series of lifecycle states, from initially staging a draft Product version to an environment, through to publishing to make the Product version available to your application developers, and to eventual retiring and archiving. The following table and diagram describe the various Product lifecycle states for a Product version.



2. Objectives

In this workshop, you will use **API Connect** to define a simple REST API and an API Product in your private instance of API Connect in the **IBM Cloud**. This API is providing a **quote for a loan request**. The back-end application has already been implemented somewhere in the IBM Cloud thru Java code.



You will learn:

- Goals of API Connect (Presentation)
- Basics on the architecture of the API Connect and terminology useful with API Connect (Presentation)
- How to create and test a REST API definition (Lab)
- How to publish an API to the IBM Cloud (Lab)
- How to subscribe to an API previously published and test in the Developer Portal (Lab)
- How to manage security and analytics about APIs (Lab)

3. Prerequisites

This lab is running on the **IBM Cloud** (ex Bluemix).

So before you start this lab, you should have satisfied the following prerequisites :

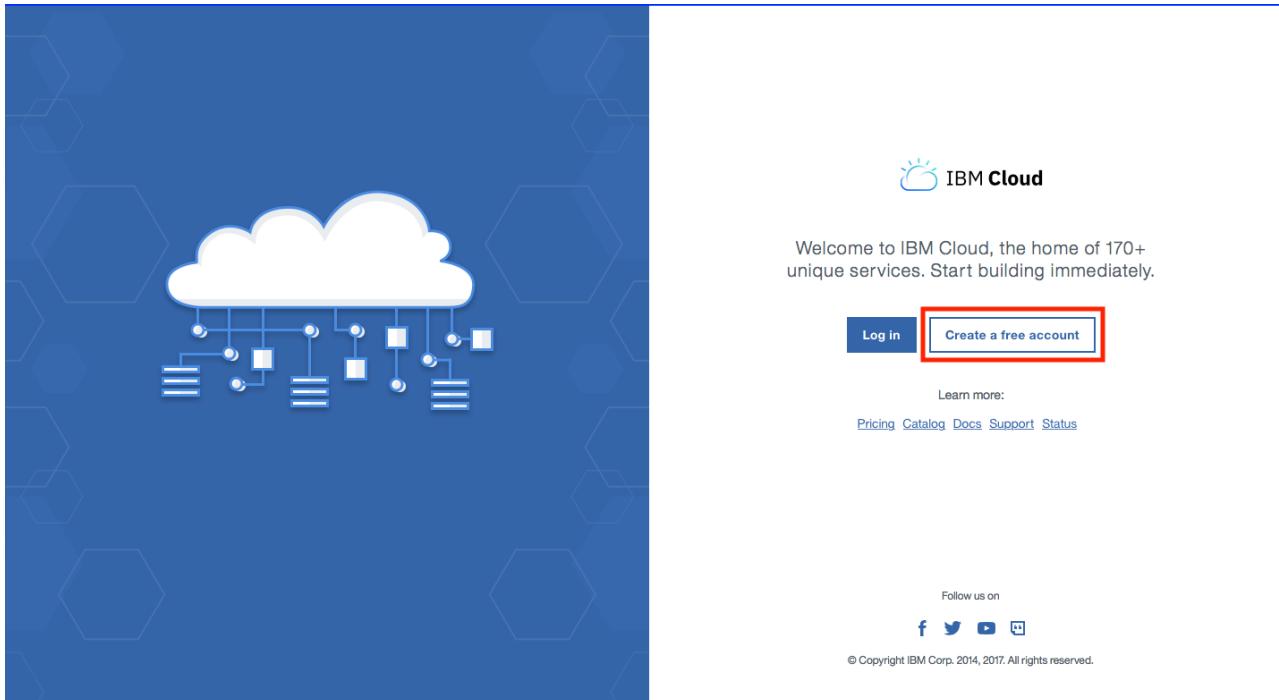
- You should have **2 valid emails** (one will be used to connect to IBM Cloud and the other one will be used to connect to the Developer Portal)
- Sign up to the **IBM Cloud** (ex Bluemix)

Here are some helpful steps :

Task 1 : Sign in to IBM Cloud

If you don't have already registered to **IBM Cloud**,

Open this link [IBM Cloud](#) or type <http://bluemix.net> in your favorite internet browser.



Task 2 : Fill in the form

Specify last name, first name, corp, country, phone number and password.

By default, all new people that register to IBM Cloud will have an **Lite Account** with **no time restriction**. This is not a 30 day trial account.

Click on **Create Account** button.

IBM Cloud

Sign up for an IBMid and create your IBM Cloud account

Build on IBM Cloud for free with no time restrictions

Guaranteed free development with Lite plans
Develop worry-free and at no cost with cap based Lite plan services for as long as you like.

Start on your projects right away
Skip entering your credit card info and get working in just a few short steps.

Get \$200 on us to try paid services
Ease into cloud pricing or try something new with \$200 in credit available for 1 month upon upgrade.

Ready to get started? Sign up today!

Already have an IBM Cloud account? [Log in](#)

Email* ✓
phil.metal@mail.com

First Name* ✓
phil

Last Name* ✓
Metal

Company
myCorp

Country or Region* ✓
France

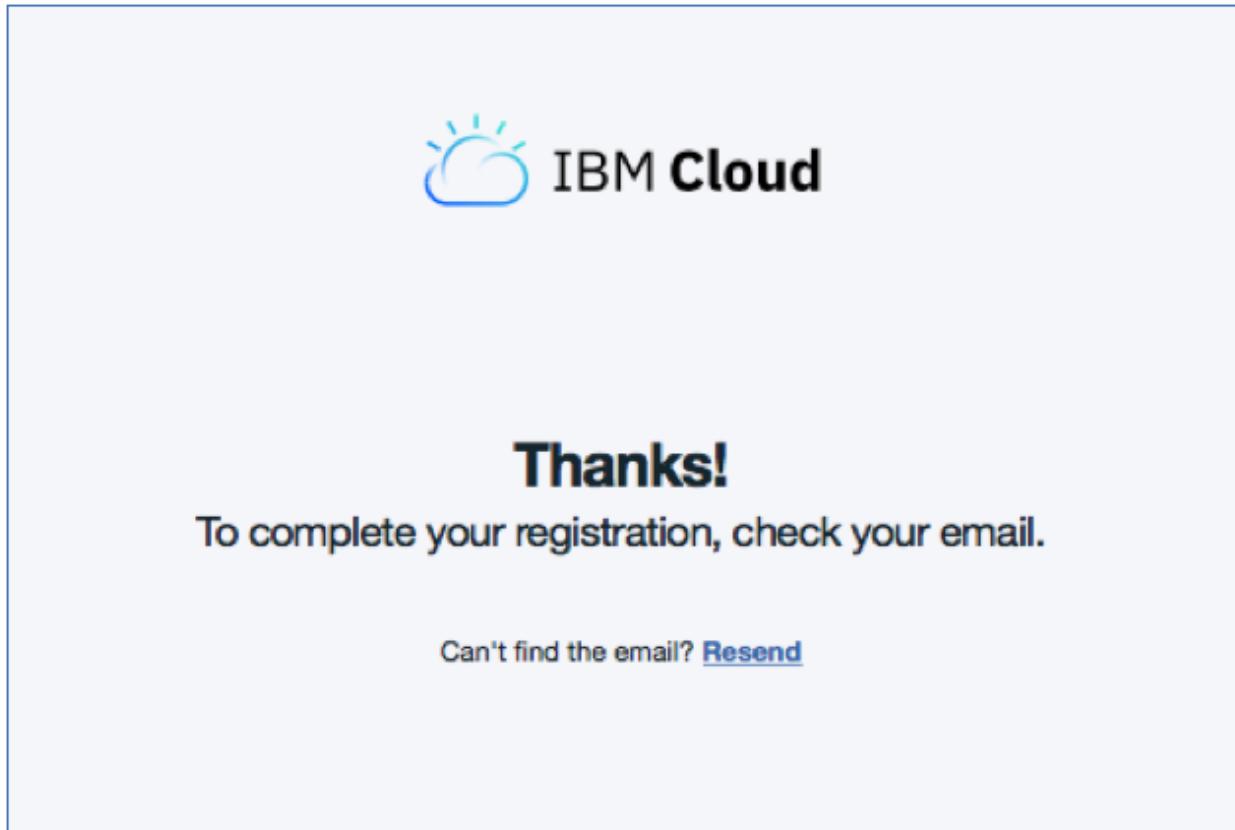
Phone Number* ✓
0675899198

Password* ✓
***** 

Keep me informed of products, services, and offerings from IBM companies worldwide.
 By email By telephone

By clicking Create Account, I accept the [IBM Cloud privacy policy](#) and [IBM Cloud terms](#).

Create Account



Task 3 : Confirm your registration to IBM Cloud from you email application

From your email application, confirm the account creation.

Action required: Confirm your IBM Cloud account

From: The Bluemix Team

Hello phil,

Thank you for signing up for IBM Cloud! Confirm your account to get started.

Confirm Account

By confirming your account, you accept the [Terms of Use](#)

Welcome and happy building!



Log in to IBM Cloud with your credentials :

IBM Cloud

Success!

You successfully signed up for an IBM Cloud account and it is now activated.

Log in

Once connected to IBM Cloud, you will notice that you are directed automatically to the closest region (UK for our case). IBM Cloud also creates an org (your email) and a space (dev) by default.

The screenshot shows the IBM Cloud dashboard. At the top, there's a navigation bar with the IBM Cloud logo and a menu icon. Below it is a header with 'Dashboard' and a 'RESOURCE GROUP' dropdown set to 'None'. To the right are three dropdown menus: 'REGION' (set to 'United Kingdom'), 'CLOUD FOUNDRY ORG' (set to 'philmetal@mail.com'), and 'CLOUD FOUNDRY SPACE' (set to 'dev'). A red box highlights these three dropdowns. On the far right of the header is a search bar with the placeholder 'Filter by resource name...'. The main content area is currently empty.

4. Setup API Connect in IBM Cloud

This exercise will show you how to create and setup an API Connect instance in IBM Cloud.

Task 4 : Login to IBM Cloud

Open this link [IBM Cloud](#) and log in to IBM Cloud.

Task 5 : Access the Catalog

Click on Catalog on the top left bar.

The screenshot shows the IBM Cloud Catalog interface. At the top, there's a dark header with four links: 'Catalog' (which is highlighted with a red box), 'Docs', 'Support', and 'Manage'. To the right of the links is a user profile icon. Below the header is a large blue 'Create resource' button. The main content area is currently empty.

Task 6 : Find API Connect

On the left navigation bar find APIs and click on API Connect.

The screenshot shows the IBM Cloud Catalog interface with the 'Catalog' tab selected. On the left, there's a sidebar with categories like 'All Categories (45)', 'Infrastructure (3)', 'Platform (42)', and 'Boilerplates (5)'. Under 'Boilerplates', 'APIs (1)' is listed. The main content area shows a search bar with 'label:lite' and a 'Filter' button. It displays a list of services under 'APIs published in your org or shared from API Management'. One service, 'API Connect', is highlighted with a red box. Its details are shown: 'Create, manage, enforce, and run APIs.' with 'Lite' and 'IBM' plan options. Below this, there's a section for 'Application Services'.

Task 7 : Review the service instance

For this lab, you'll need the Lite plan (Free Plan).

[View all](#)

API Connect

IBM API Connect is a comprehensive end-to-end API lifecycle solution that enables the automated creation of APIs, simple discovery of systems of records, self-service access for internal and third party developers and built-in security and governance. Using automated, model-driven tools, create new APIs and microservices based on Node.js and Java runtimes—all managed from a single unified console. Ensure secure & controlled access to the APIs using a rich set of enforced policies. Drive innovation and engage with the developer community through the self-service developer portal. IBM API Connect provides streamlined control across the API lifecycle and also enables businesses to gain deep insights around API consumption from its built-in analytics.

[Lib](#) [IBM](#)

[View Docs](#)

Service name: API Connect-wq

Choose a region/location to deploy in: United Kingdom

Choose an organization: philmetal@mail.com

Choose a space: dev

Features

- Securely unlock existing IT assets**
Rapidly generate Swagger compliant APIs from backend datasources. Iteratively design and test APIs thereby shortening development cycles.
- Community & Subscription management**
Create developer communities to publish and share APIs and engage with them through a self-service portal. Also manage the subscriptions of the API to ensure easy consumption.
- Graphical API assembly**
Graphically assemble the API invocation flow and apply policies that need to be enforced for secure controlled access.
- Gain insights about API consumption**
Built-in analytics and customized dashboards empower businesses to make informed decisions.

Task 8 : Create the API Connect instance

Don't change anything. Click on the Create button.

[View all](#)

API Connect

IBM API Connect is a comprehensive end-to-end API lifecycle solution that enables the automated creation of APIs, simple discovery of systems of records, self-service access for internal and third party developers and built-in security and governance. Using automated, model-driven tools, create new APIs and microservices based on Node.js and Java runtimes—all managed from a single unified console. Ensure secure & controlled access to the APIs using a rich set of enforced policies. Drive innovation and engage with the developer community through the self-service developer portal. IBM API Connect provides streamlined control across the API lifecycle and also enables businesses to gain deep insights around API consumption from its built-in analytics.

[Lib](#) [IBM](#)

[View Docs](#)

AUTHOR	IBM
PUBLISHED	12/13/2017
TYPE	Service
LOCATION	Sydney, Germany, United Kingdom, US East, US South

Service name: API Connect-wq

Choose a region/location to deploy in: United Kingdom

Choose an organization: philmetal@mail.com

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Built-in analytics and customized dashboards empower businesses to make informed decisions.

Images

Click an image to enlarge and view screen captures, slides, or videos. Screen caps show the user interface for the service after it has been provisioned.

[Need Help?](#)
[Contact IBM Cloud Sales](#)

[Estimate Monthly Cost](#)
[Cost Calculator](#)

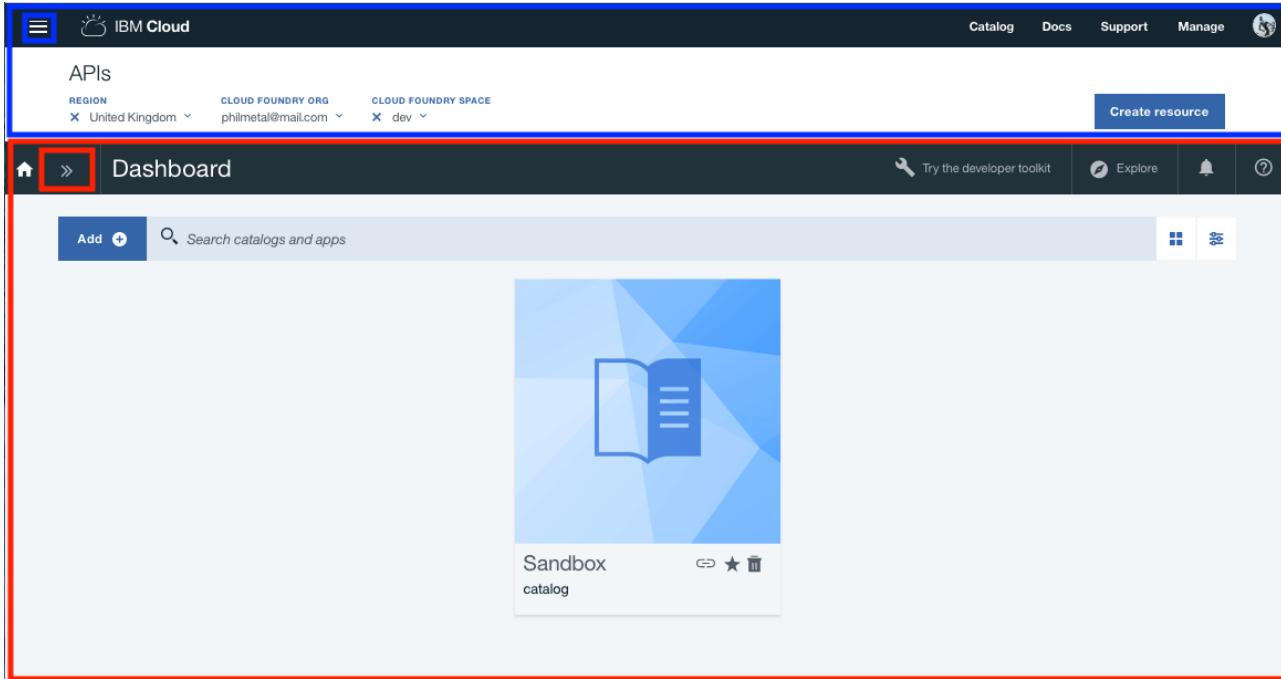
Create

Task 9 : Learn the different parts of the screen

When looking at the screen, there are 2 areas :

- The bold blue box belongs to **IBM Cloud**, the Hamburger (small blue box) give menus specific to IBM Cloud.

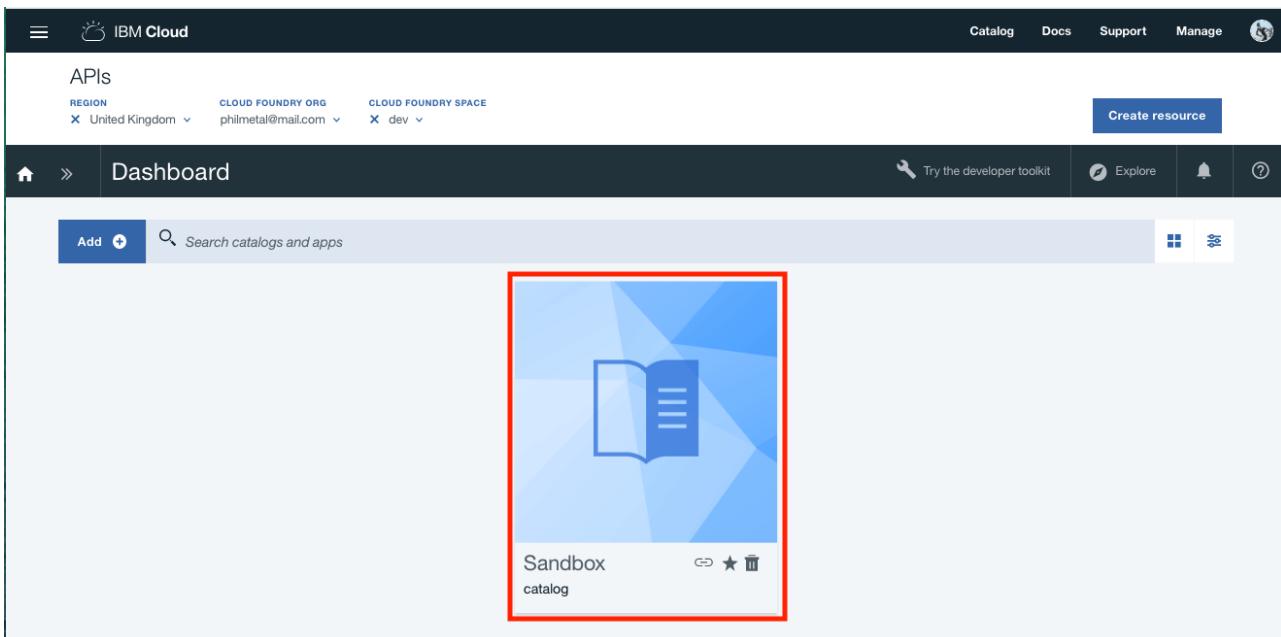
- The bold red box belongs to **API Connect**, the chevrons (small red box) gives menus specific to API connect.



Task 10 : Get access to the Sandbox catalog

API Connect is using a concept of "Catalog of products" to group a set of products and APIs all together. By default, at creation time, we only have one catalog called "Sandbox" that we are using for this lab. To see the catalog, click on the >> and then **Dashboard**. Click on the **Sandbox Tile**.

You can create any number of catalogs depending on your organization.



Task 11 : Instantiate the Developer Portal

Each catalog has its own components and propose a developer portal. Click on **Settings**, then on **Portal** and finally choose **Developer Portal**. Follow the 4 steps (1,2,3 and 4 in red).

Note that a yellow message will appear to indicate that your request is in process. You will normally receive a message later on your email indicating that the Developer Portal is ready to use. We will customize a standard access to the portal later in this lab.

The screenshot shows the IBM Cloud API Portal configuration interface. At the top, there's a navigation bar with 'IBM Cloud' and links for Catalog, Docs, Support, Manage, and a user icon. Below the navigation is a header with 'APIs', 'REGION United Kingdom', 'CLOUD FOUNDRY ORG philmetal@mail.com', 'CLOUD FOUNDRY SPACE dev', and a 'Create resource' button. The main content area is titled 'Sandbox'. It features a sidebar with 'Overview', 'Approvals', 'Gateways', 'Portal' (highlighted with a red border and number 2), 'Roles', and 'Extensions'. The main panel has tabs for 'Portal Configuration', 'Select Portal' (showing 'IBM Developer Portal' with a dropdown menu containing a red number 3), 'User Registration and Invitation' (with a dropdown menu showing 'User Registry Sandbox' and a note that developers can invite collaborators with roles), and 'Analytics' (which is currently selected). A yellow message box at the bottom left says: 'Thank you for enabling the IBM Developer Portal. Please note that due to the time taken for the DNS definition to propagate around the Internet it may take up to 2 hours for your Portal to become accessible.' There are also several red numbers (1, 4) and icons indicating pending actions or notifications.

IMPORTANT

Save the configuration by clicking on the diskette.

We are now ready to create, run and manage APIs in security.

5 - Expose an existing REST API

In this first step, we assume that a developer of an API is providing you the Swagger source associated with that API. The developer is using WAS Liberty as the runtime and he also uses JAX-RS annotations along api discovery feature. This allows him to get a Swagger easily consumed by API Connect.

In this lab, we are going to use the IBM Cloud to implement the API but we can also use the Developer Toolkit (in another lab).

Note: Using the Developer Toolkit (locally) or using API Connect manager directly (remote server) is a pretty important decision. Using the toolkit allows to use a Source Control Management System and perform micro versioning as well as

backup of the various yaml (and wsdl). It also provides a local experience with a very low response time. Using the Manager simplifies sharing the API Drafts. In reality, there are ways to benefit of both approaches.

Task 12 : Download the API swagger source to your laptop

Follow this link to download the source definition of the API.

[Link Here](#)

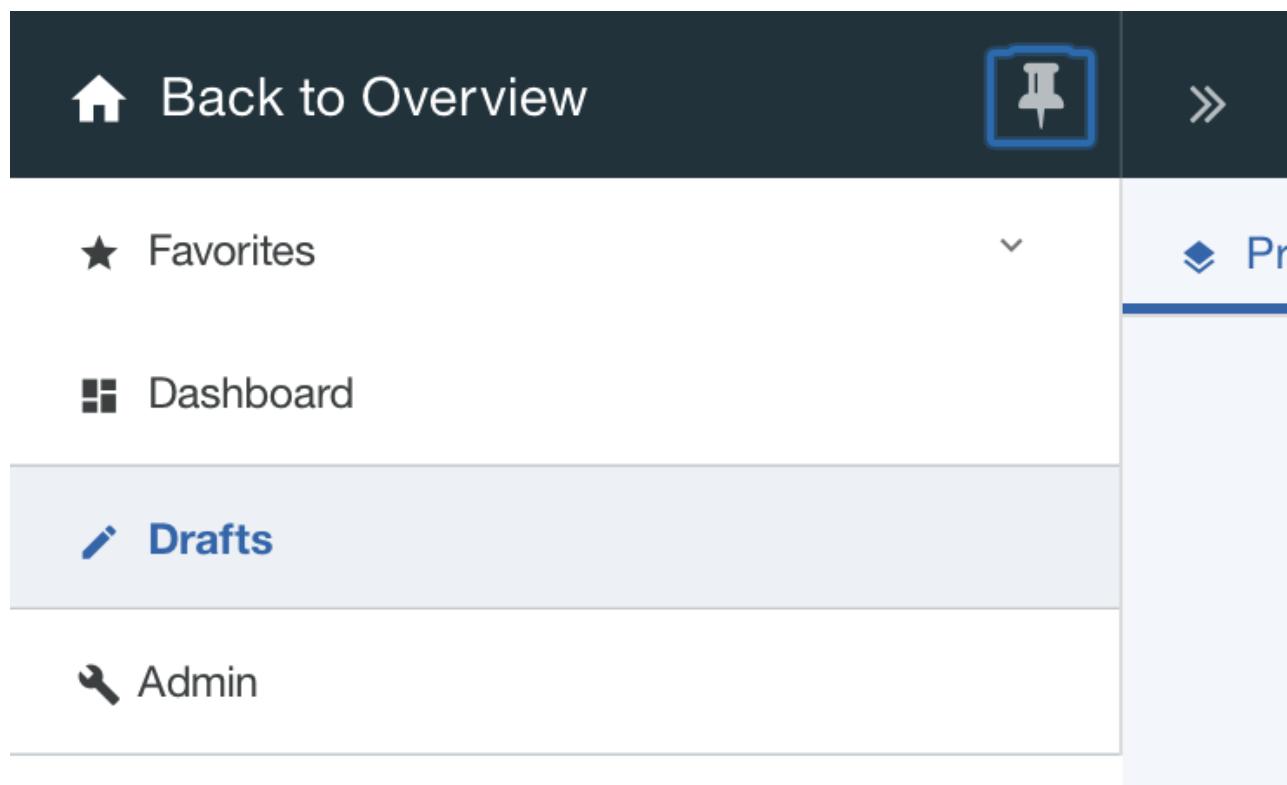
or

https://github.com/phthom/Using-IBM-API-Connect/blob/master/QuoteManagementAPI_AW_S.yaml

Task 13 : Create a Product

Depending where you are in the API Connect console, Click on the chevrons (**>>**) to get access to the navigation menu on the left side.

Choose **Drafts** to implement the product.



The screenshot shows the IBM Cloud API Management interface. At the top, there's a navigation bar with 'Catalog', 'Docs', 'Support', 'Manage', and a user icon. Below the navigation, it says 'APIs' and shows 'REGION United Kingdom', 'CLOUD FOUNDRY ORG philmetal@mail.com', and 'CLOUD FOUNDRY SPACE dev'. There's a 'Create resource' button. The main area is titled 'Drafts' with a back arrow. It has tabs for 'Products' (selected) and 'APIs'. A search bar says 'Search products'. Below it, there's a table header with 'TITLE' and 'LAST MODIFIED'. A message says 'No products found'.

Click the **Add** button, select **New product**.

This screenshot is similar to the previous one, but the 'Add' button in the 'Products' tab is highlighted with a blue box. A dropdown menu is open from the 'Add' button, showing 'New Product' and 'Import an existing product' options. The rest of the interface is identical to the first screenshot.

In the Title section, enter **QuoteMgmt**.

This screenshot shows the 'New Product' creation form. The title 'Info' is visible. Under 'Title *', the value 'QuoteMgmt' is entered. Under 'Name *', the value 'quotemgmt' is entered. Under 'Version *', the value '1.0.0' is entered. At the bottom right, there are 'Cancel' and 'Create product' buttons.

Click **Create product** button.

The screenshot shows the 'Info' tab for a new product named 'QuoteMgmt'. The 'All Products' link in the top left is highlighted with a red box. The product details are as follows:

- Title ***: QuoteMgmt
- Name**: quotemgmt
- Version ***: 1.0.0

Description: Edit Preview ⓘ

Go back to **All Products**.

Task 14 : Create (import) the API

Click on **APIs** in the menu.

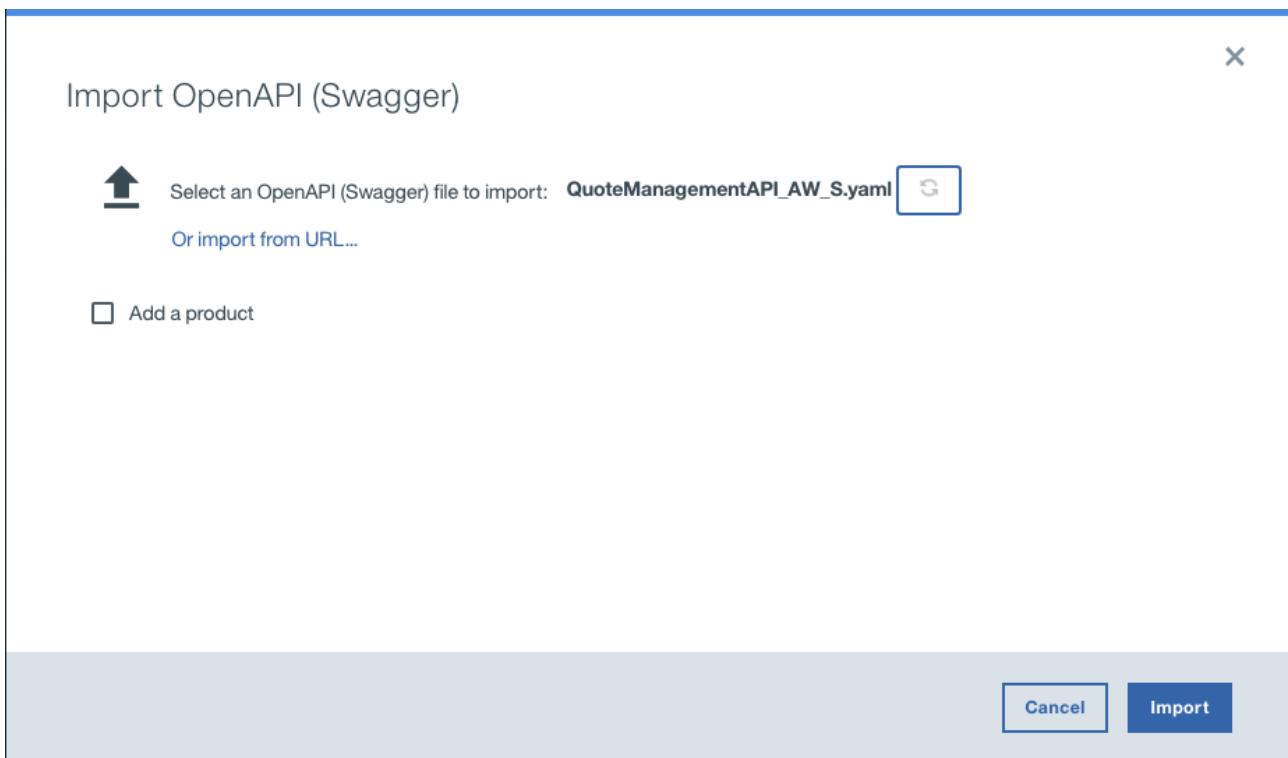
Now we can create the API that will be included later in the Product just created. Click on **Add** and then on **Import API from File or URL**.

The screenshot shows the 'Drafts' page with the 'APIs' tab selected. A dropdown menu is open over the 'Add' button, showing the following options:

- New API
- OAuth 2.0 Provider API
- API from a SOAP service
- Import API from a file or URL** (highlighted)
- Import a sample OpenAPI

A tooltip below the dropdown says: "API, start with a soap service, import an existing OpenAPI or [get started with the Climbing Weather sample API](#)".

Specify the location of the Swagger file you just downloaded. Click **Import**.



Task 15 : Modify the definitions of the API

We need to complete/review a few informations, that were not specified in the generated Swagger. The amount of information that need to be completed will depend greatly on the use of the annotations or the Swagger generator used.

Click on **Design** in the top menu.

Select https for the scheme, in the Schemes section.

A screenshot of the "Quote API 1.0.0" design interface. The top navigation bar shows "Quote API 1.0.0" and has tabs for "All APIs" and "Design". The "Design" tab is highlighted with a red box. The left sidebar has a "Schemes" section with a red box around it. The "Schemes" section lists "Info", "Schemes", "Host", "Base Path", "Consumes", "Produces", "Lifecycle", "Policy Assembly", "Security Definitions", and "Security". Under "Schemes", there is a list of schemes: "http" (unchecked), "https" (checked), "wss" (unchecked), and "ws" (unchecked).

Scheme	Status
http	unchecked
https	checked
wss	unchecked
ws	unchecked

Create the security definition, click on + sign close to the Security Definitions section.

The screenshot shows the 'Design' tab of the Quote API 1.0.0 interface. On the left, a sidebar lists various API metadata sections like Info, Schemes, Host, etc., with 'Security Definitions' highlighted and a red box around it. The main content area is titled 'Security Definitions' and displays the message 'No security definitions defined'. In the top right corner, there is a red circle with a plus sign, indicating where to click to add new security definitions.

Select **API Key**.

This screenshot shows the same 'Design' tab as above, but with a modal or dropdown menu open over the 'Security Definitions' section. The menu has three options: 'API Key' (which is highlighted with a red box), 'Basic', and 'OAuth'. A red circle with a plus sign is also present in the top right corner of the main content area.

Enter **client-id** in the name.

The screenshot shows the 'Design' tab with the 'Security Definitions' section expanded. A new security definition named 'client-id (API Key)' is listed. Under the 'Name *' field, the value 'client-id' is entered and highlighted with a red box. Below it, the 'Parameter name *' field contains 'X-IBM-Client-Id'.

Specify the security of the API, click on the + sign close to the Security section, and check the client-id API Key (3 steps)

Quote API 1.0.0

All APIs Design Source Assemble

Schemes Host Base Path Consumes Produces Lifecycle Policy Assembly Security **1**

Security

Define security requirements for the API. Multiple alternative sets can be defined, any one of which can be satisfied to access the API.

Option 1 client-id (API Key) **3**

Extensions

Create a property to define the target-url of the back end API. This allows us to create a variable that may take different values based on the catalog instance. Click on the + sign close to the Properties section. Set the Property name to **target-url**, and enter <http://SampleJAXRS20-aw.eu-gb.mybluemix.net> in the value, close to Default value.

Quote API 1.0.0

All APIs Design Source Assemble

Schemes Host Base Path Consumes Produces Lifecycle Policy Assembly Security Definitions Extensions **Properties**

Paths /extQuote /quote Analytics Parameters Definitions QuoteRequest

Properties

To replace values with one of these API properties, type \${} with the name of the property inside the parentheses.

target-url

Property Name * **target-url**

Encode

Description

Define catalog specific values for this property below

Add value +

Catalog	Value
Default	http://SampleJAXRS20-aw.eu-gb.mybluemix.net

Click on the Assemble menu, click on the **Invocation** policy, and set the URL property to **(target - url)(request.path)\$(request.search)**

Quote API 1.0.0

All APIs Design Source Assemble **Assemble**

Filter Search Show catches

Micro Gateway policies DataPower Gateway policies

Logic

- If
- Operation Switch
- Switch
- Throw

Invocation

Title **Invocation**

Description Invoking back-end service

URL * **\$(target-url)\$(request.path)\$(request.search)**

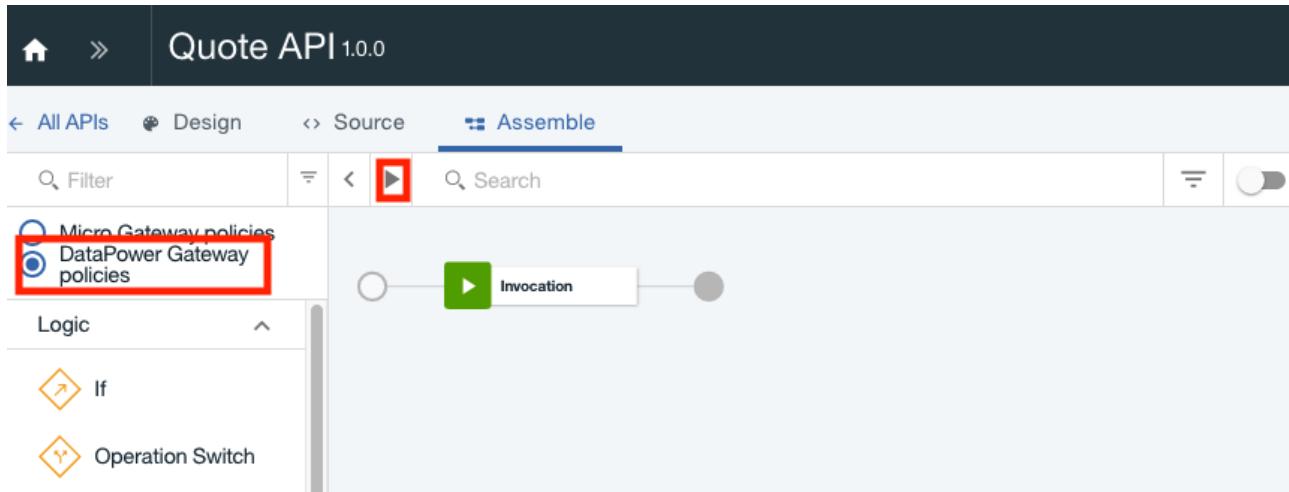
The URL to be invoked.

Access URL through Secure Gateway

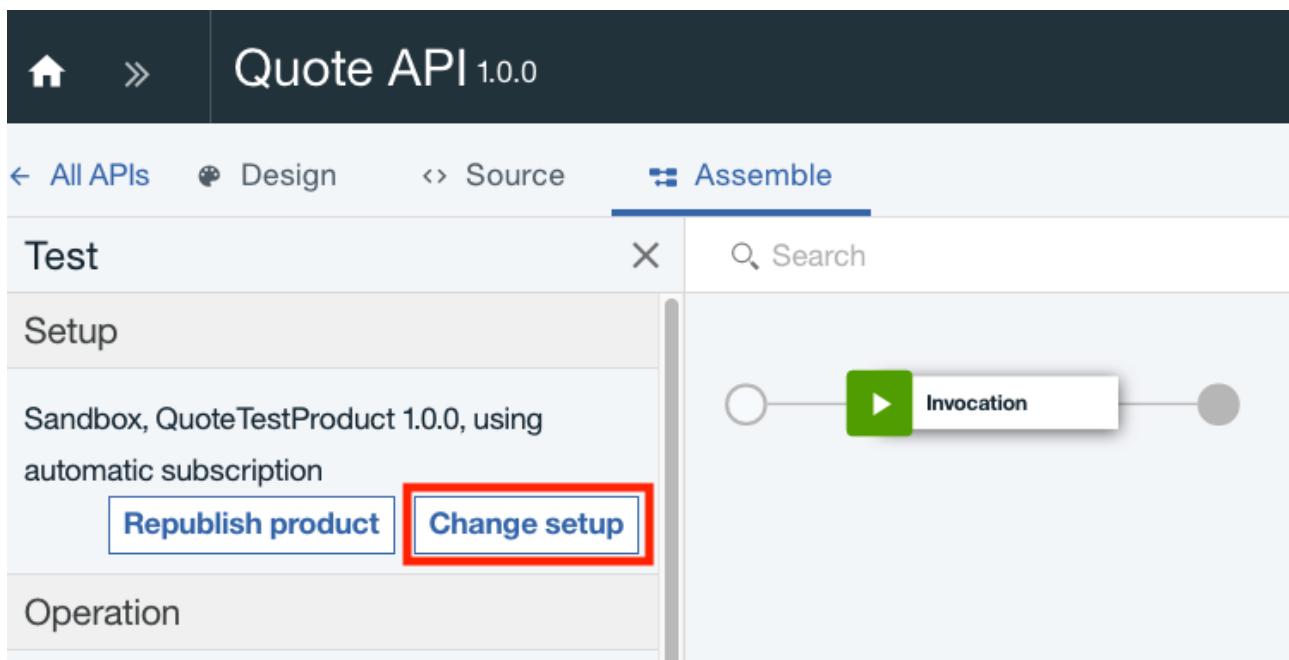
Save the changes, by clicking on the Save diskette icon at the top.

Task 16 : Testing the new created API

To test the API from an API provider perspective, click on Assemble, in the left hand side panel, switch from Micro Gateway policies to **DataPower Gateway** policies if necessary. Save the change. Click on the **read icon**, check the catalog to run the API, select the **QuoteMgmt** product if necessary.



Because we didn't associate this API to any Product, if we want to live test the API, we have to change the setup for the test. Click on **Change Setup**



Specify a testing product name like **QuoteTestingProduct** and click on **Create and publish** :

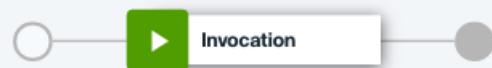
Home » Quote API 1.0.0

All APIs Design Source Assemble

Setup

Choose a catalog to test within:

Catalog Sandbox



Product

Choose a product containing this API, or create a new one:

Choose an existing product

Product QuoteTestProduct 1.0.0

Republish product

Or create a new product and publish it to the selected catalog

Name QuoteTestingProduct

Create and publish

Then Click **Next**

Select the operation : **get /extQuote**

Don't click on the other buttons.

Notice the change at the top : QuoteTestingProduct 1.0.0

Quote API 1.0.0

Assemble

Test

Sandbox, QuoteTestingProduct 1.0.0, using automatic subscription

Republish product Change setup

Setup

Operation

Choose an operation to invoke:

Operation get /extQuote

Identification

Client ID
a83c9891-7285-4898-8e14-07ba8a91d649

Parameters

Content-Type
application/json



Enter the parameters (amount 1000, rate 1.1, duration 36, delay 10, msg length 11) and click invoke.

Don't change the generated Client ID.



»

Quote API 1.0.0

[← All APIs](#)[Design](#)[Source](#)[Assemble](#)

Test



Search

The total amount of the loan

loanAmount *

1000

[Generate](#)

The loan rate

annualInterestRate *

1.1

[Generate](#)

Duration of the loan

termInMonths *

36

[Generate](#)

Delay introduced in generating the response

delay *

10

[Generate](#)

Message length

msgLength *

11

[Generate](#) Repeat

Repeat the API invocation a set number of times, or until the stop button is clicked

Stop after:
10

Stop on error

Here is a example of the answer :

Invoke

Response

Status code:
200 OK

Response time:
372ms

Headers:

content-type: application/json
content-language: en-US
apim-debug-trans-id: 10.113.132.225-d8eaf94-b930-44e2-ada8-a6e50daf5c9d
x-global-transaction-id: 368486225

Body:

```
{  
  "loanAmount": 1000,  
  "annualInterestRate": 1.1,  
  "termInMonths": 36,  
  "monthlyPaymentAmount": 28.25136028  
  1363677,  
  "delay": 10,  
  "message": "Lorem ipsum"  
}
```

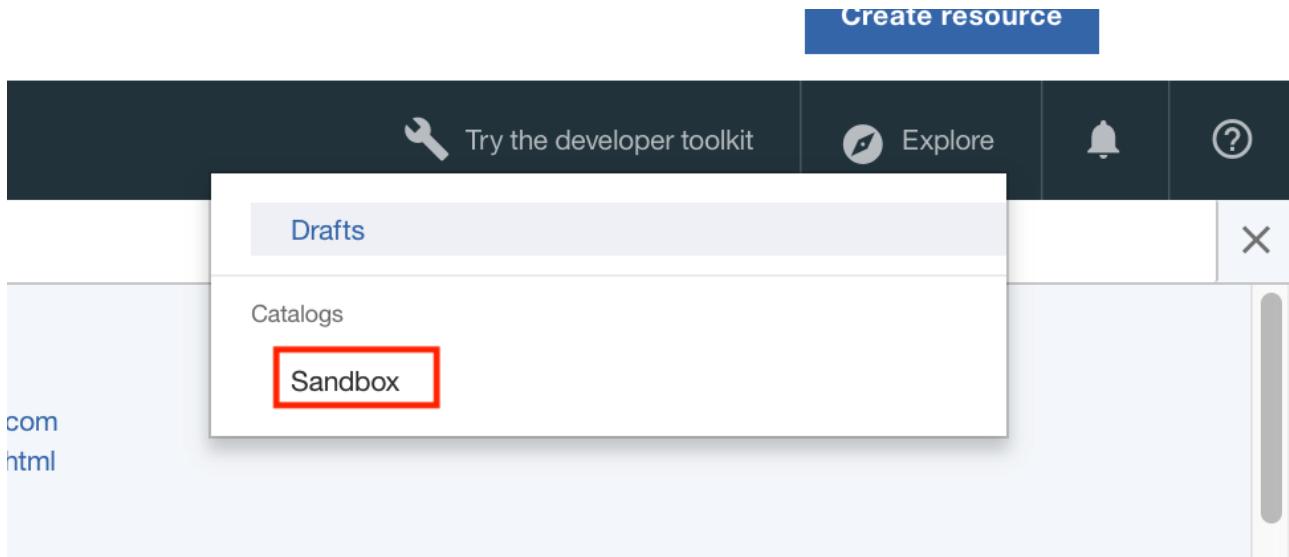
Debug

Task 17 : Exploring the API

You can also test the API using the explore facility. You get a view similar to the API consumer in the portal, but in this case you do not need to create an Apps and

subscribe to the API. Click on the **Explore** link on the top right, you see the documentation and have the possibility to test the various operations.

Click on the **Sandbox** link :



Select the operation : **get /extQuote** then click on **Try it**

A screenshot of the API developer toolkit showing the details for the "get /extQuote" operation. The left panel shows the operation's parameters: "loanAmount" (integer, required in query), "annualInterestRate" (number, required in query), "terminMonths" (integer, required in query), "delay" (integer, required in query), and "msgLength" (integer, required in query). The right panel shows the API endpoint "GET https://apieu.apiconnect.ibmcloud.com/philmemailcom-dev/sb/loanmgt/resources/loans/v1/extQuote" and a "Try it" button, which is highlighted with a red rectangular box. It also shows sections for "Identification", "Client ID" (with value "9a0386b3-5a48-460b-89e6-85ad2145ee63"), "Type Headers" (set to "application/json"), and "Parameters" with values for "loanAmount" (1000), "annualInterestRate" (1), and "terminMonths" (36).

Fill the request for the loan as you did previously and click on **Call Operation**

See the result of the request :

Click the X icon on the top right to close the explore window.

6. Publish your API to the Sandbox catalog

Task 18 : Stage the API in the Sandbox Catalog

Within the Draft area, select the **QuoteMgmt** product :

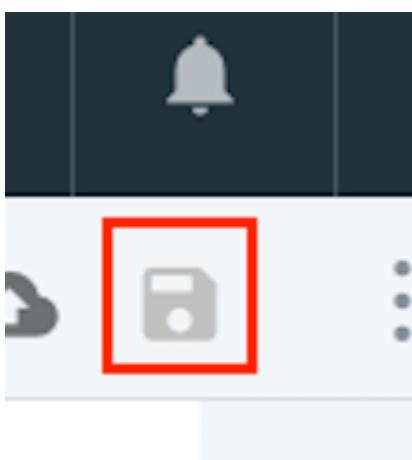
Drafts	
Products	APIs
Add Search products	
TITLE	LAST MODIFIED
QuoteMgmt 1.0.0	an hour ago

In the APIs Section, add the **Quote API**, then **Apply** :

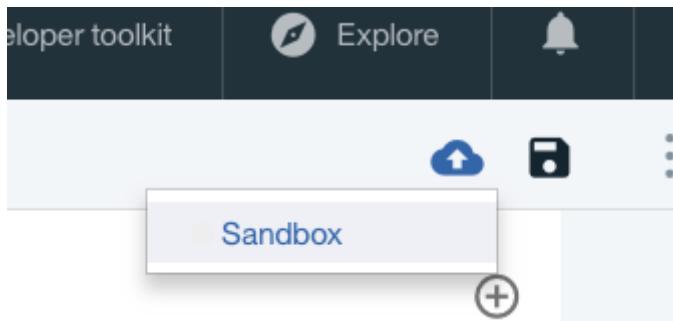
The screenshot shows the 'QuoteMgmt 1.0.0' product page. The left sidebar has tabs for 'Info', 'Contact', 'License', 'Terms of Service', 'Visibility', 'APIs' (which is highlighted with a red box), and 'Plans'. The main content area is titled 'APIs' and contains a message: 'There are currently no APIs included in this product.' A red box highlights the '+' button in the top right corner of this area.

The screenshot shows a 'Select APIs' dialog box. It includes a search bar labeled 'Search APIs' and a list item 'Quote API 1.0.0' with a checked checkbox. A red box highlights the checkbox next to 'Quote API'.

Click on the **Save** icon.

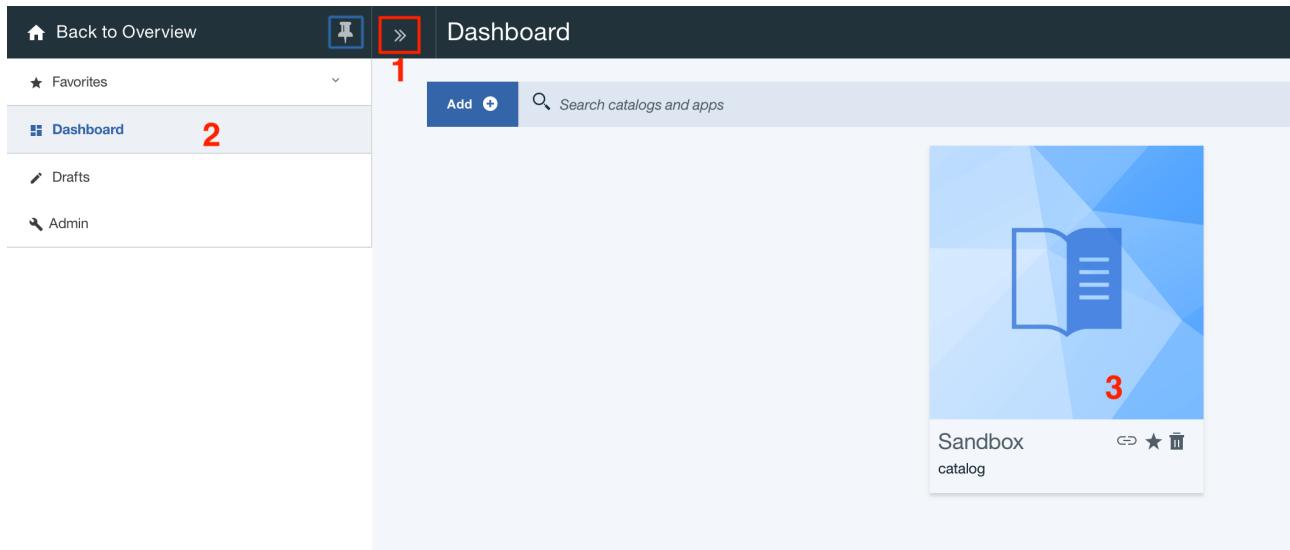


Click on **Publish icon** (cloud shape) in the top right corner, select Sandbox. This does effectively **stage** the product in the **Sandbox** catalog. The product is not yet fully published to the Portal.

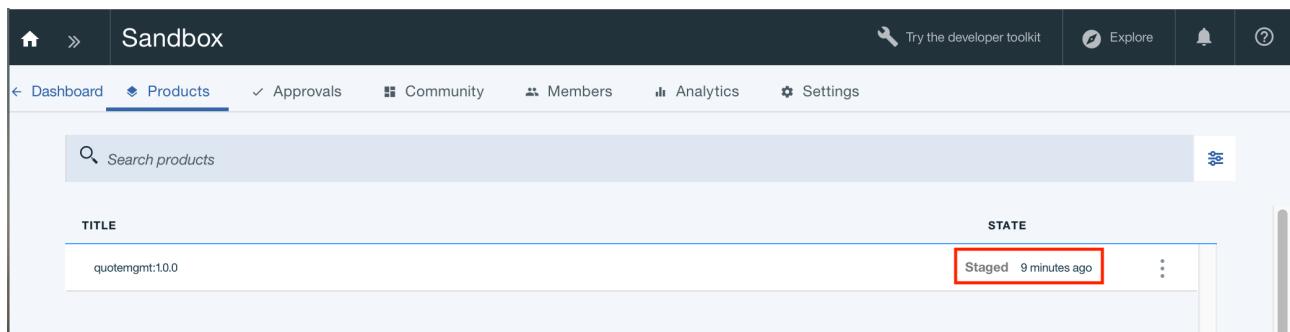


Task 19 : Publish your API

Click on the chevron (>>) and get access to the Dashboard, then click on the Sandbox tile :



You should see the product just staged :



Click on the dots link and select Publish :

The screenshot shows the Oracle Developer Cloud Sandbox interface. In the top navigation bar, there are links for Dashboard, Products (which is the active tab), Approvals, Community, Members, Analytics, and Settings. On the far right, there are icons for the developer toolkit, Explore, a bell, and help. Below the navigation, there's a search bar with placeholder text 'Search products'. The main content area displays a table with two columns: 'TITLE' and 'STATE'. There is one row for a product titled 'quotemgmt:1.0.0', which is currently 'Staged' and was updated '9 minutes ago'. To the right of this row is a vertical context menu with several options: 'Publish' (highlighted in blue), 'Edit visibility', 'Product analytics', and 'Approval history'. The 'Publish' button has a small icon above it.

Check the visibility and click on **Publish** button.

This screenshot shows a modal dialog box titled 'Edit visibility'. Inside the dialog, there is a section labeled 'Visible to:' with a dropdown menu. The option 'Public (Developer Portal)' is selected and highlighted with a red box. Below this, there is another section labeled 'Subscribable by:' with a dropdown menu. The option 'Authenticated (Developer Portal)' is selected. At the bottom of the dialog are two buttons: 'Cancel' on the left and 'Publish' on the right, both in blue.

Your QuoteMgmt Product is now visible in Developer Portal.

7. Consumer Experience

In this step, you will learn about the consumer experience for the APIs that have been exposed to your developer organization. You login as a developer to register your application and then subscribe to the product just published and then test the API included in the product.

Task 20 : Accessing the Developer Portal

Navigate to the Dashboard section and click on the Sandbox catalog tile. Click on Settings, then Portal and finally on the Portal URL :

The screenshot shows the 'Sandbox' interface of the IBM API Connect developer portal. The left sidebar has a 'Portal' section highlighted with a red number '2'. The main content area is titled 'Portal Configuration' and contains a 'Select Portal' dropdown set to 'IBM Developer Portal'. Below it is a 'Portal URL' input field containing the value 'https://sb-philmemailcom-dev.developer.eu.apiconnect.ibmcloud.com', which is also highlighted with a red box and a red number '3'. A red number '1' is positioned above the 'Settings' tab in the top navigation bar.

You are now on the Developer Portal, navigate to the API Products :

The screenshot shows the 'IBM API Connect /dev' page. The top navigation bar includes links for Home, Getting started, API Products (which is highlighted with a red box), Blogs, Forums, and Support. A search bar is also present. The main content features a large blue banner with the text 'Innovate with our APIs' and a subtext 'Welcome to our API portal where you will find a great selection of APIs for your awesome innovative apps'. Below the banner, there's a section titled 'Featured APIs'.

You can now explore the API and Products (without login) :

The screenshot shows the same 'IBM API Connect /dev' page as above, but without being logged in. The 'API Products' link in the top navigation bar is now blue and underlined, indicating it's the active page. Below the 'Featured APIs' section, there's a single product card for 'QuoteMgmt (1.0.0)' which includes a purple icon, the product name, a description '(1 API included)', and a rating section showing five stars and the text 'No votes yet'. At the bottom of the page, there are links for 'Terms of use' and 'Privacy policy'.

Task 21 : Sign in as a Developer

From the Developer Portal, click on **Login**, create an account, then enter **your account information** for the developer account. **This must be a different email address than your IBM Cloud account**. You can create a **email account** on mail.com for example.



Create an account

[Create new account](#)[Log in](#)[Request new password](#)**First name ***

phil

Enter your first name.

Last name *

Metal2

Enter your last name.

Developer organization *

IBM

Enter your developer organization.

E-mail address *

philmetal2@mail.com

A valid e-mail address. All e-mails from the system will be sent to this address. Your e-mail address will also be your username.

Password Requirements

- Password must contain characters of at least 3 different types (lowercase, uppercase, digit or punctuation).
- Password must be at least 8 characters in length.

Password *

Password quality:

Good

Confirm password *

Passwords match: yes

Provide a password for the new account in both fields.

A validation email will be sent out to the email address used at sign up. Click on the validation link and then you will have completed the sign up process and will be authenticated into the page.

Go to your email application, locate the new message and log in thru the link :

Delete Spam Reply ▾ Forward Move ▾

Thank you for signing up for our APIs

From: IBM API Connect +

Hello,

Thank you for signing up for access to APIs from sb.
To activate your account, click the following link:

https://sb-philmemailcom-dev.developer.eu.apiconnect.ibmcloud.com/?q=ibm_apim/activate/x&activationToken=eyJ1cmwiOiJodHRwczovL2RldmVsb3Blci5ldS5hcGlib25uZWN0LmlbWN

Log in into the developer portal as an application developer using your developer credentials.



User login

[Create new account](#)**Log in**[Request new password](#)**Username ***

Enter your sb-philmetalmailcom-dev.developer.eu.apiconnect.ibmcloud.com username.

Password *

Enter the password that accompanies your username.

[Log in](#)

Task 22 : Defining a Mobile Application

Click the **Apps** menu, then click on the **Create new App** button :

The screenshot shows the IBM API Connect /dev interface. At the top, there is a navigation bar with links for Home, Getting started, API Products, Apps (which is highlighted with a red box), Blogs, Forums, and Support. To the right of the navigation bar, there is a user profile section showing '0' notifications, the email 'miketodo@mail.com', and the IBM logo. Below the navigation bar, a message box displays a warning icon and the text 'No applications have been found.' In the bottom right corner of the main content area, there is a blue button with white text that says '+ Create new App', which is also highlighted with a red box.

Enter a **title** and **description** for the application and click the **Submit** button.



Register application

Title *

Mobile App Consumer

Description

This is a new mobile application that I am creating.

OAuth Redirect URI

[Redacted]

The URL authenticated OAuth flows for this application should be redirected to.

Submit

We need to capture the Client Secret and Client ID in a **text editor** for later use by our test application.

Client secret is at the top of the page :

The screenshot shows the IBM API Connect /dev interface. At the top, there's a navigation bar with links for Home, Getting started, API Products, Apps, and Support. On the left, a sidebar lists 'All Apps' and 'Mobile App Consumer'. The main content area displays a success message: 'Application created successfully.' followed by 'Your client secret is:' and a code snippet 'wH3vP1pL8yP5dJ4kH4xY3aM6cK6jQ5pF3fC6nW3lU0wC6xE1xS'. There's also a checked checkbox labeled 'Show Client Secret'.

Client ID is at the bottom of the page :

The screenshot shows the IBM API Connect interface. In the left sidebar, under 'Mobile App Consumer', there is a 'Description' section with the text: 'This is a new mobile application that I am creating.' Below it is a 'Credentials' section with a 'Default' entry. The 'Client ID' field contains the value 'a76f8fa3-423d-4704-954f-1ab30fe28024'. To the right of the input field are two buttons: 'Show' (with a checked checkbox) and 'Reset'. A blue border highlights the 'Client ID' input field.

Copy Client Secret and Client ID in a text editor

Task 23 : Subscribe to a Plan for our Product

In this section, we will subscribe to a plan for the "QuoteMgmt" using the **Mobile App Consumer** application.

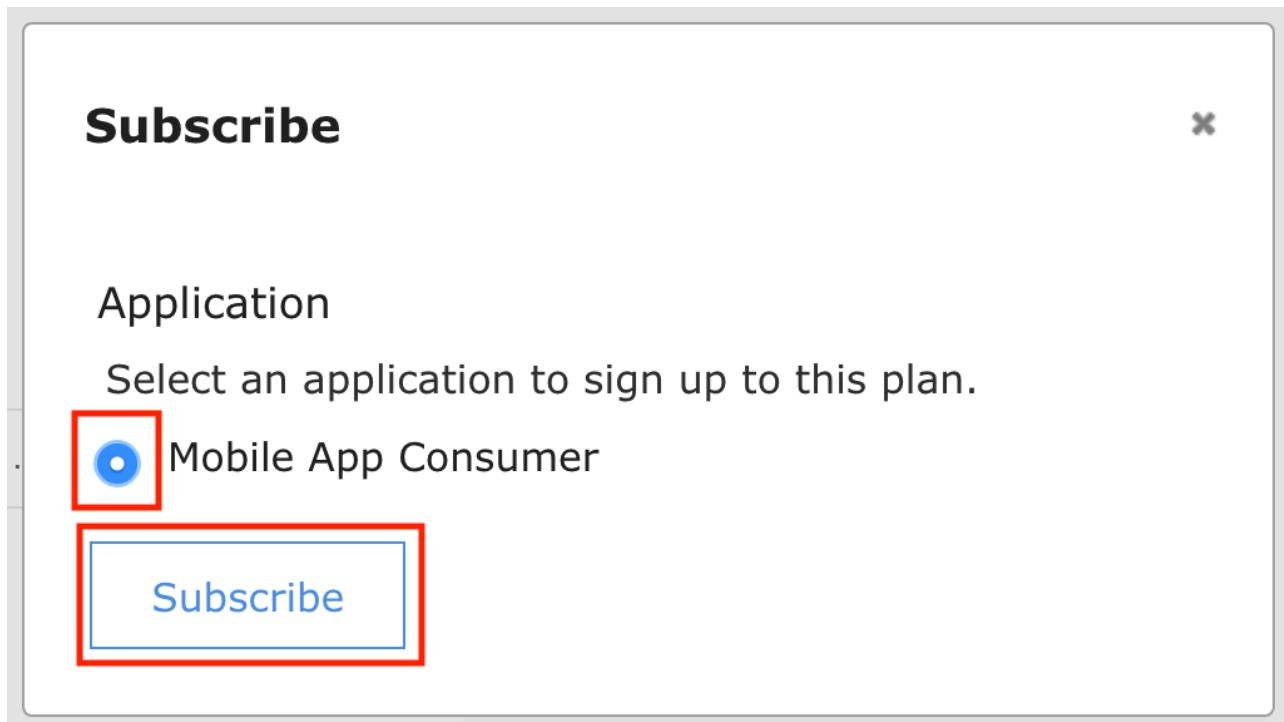
- Click the API Products menu on the top of the page.
- Click the QuoteMgmt (v1.0.0) API product tile.
- Click on the **Subscribe** button under the Default plan.

The screenshot shows the IBM API Connect interface. In the left sidebar, under 'APIs', there is a 'QuoteMgmt 1.0.0' entry. The main content area displays the 'QuoteMgmt 1.0.0' API product details. It includes a purple circular icon with three horizontal bars, a rating of 5 stars, and the text 'No votes yet'. Below this is a 'Plans' section. Under the 'Default Plan' heading, there is a table:

Quote API 1.0.0	100 per hour
	Free

A red box highlights the 'Subscribe' button at the bottom of the table.

Select the Mobile App Consumer toggle and click the **Subscribe** button.



The MobileApp Consumer application is now subscribed to the **Default plan** for the QuoteMgmt product.

Task 24 : Test QuoteMgmt APIs from the Developer Portal

In this section, we will use the developer portal to test Quote Management API REST API. This is useful for application developers to try out the APIs before their application is fully developed or to simply see the expected response based on inputs they provide the API. We will test the Quote Management API REST API from the developer portal.

Click the **Quote** link on the left-hand navigation menu and then expand the **GET /quote** path by clicking on the twisty next to the path.

The screenshot shows the IBM API Connect developer portal interface. On the left, there's a sidebar with "QuoteMgmt 1.0.0" and "APIs" sections. Under "APIs", "Quote API 1.0.0" and "GET /extQuote" are selected (highlighted with red boxes). The main content area shows the "extQuote" endpoint with a "GET /extQuote" button (highlighted with a red box) and a "Subscribe" button. Below the button is a "curl" command for making a request to the API.

```
curl --request GET \
--url 'https://api.eu.apiconnect.ibmcloud.com/philmemail \
com-dev/sb/loanmgmt/resources/loans/v1/extQuote?loanAmount=100 \
00&annualInterestRate=1.1&termInMonths=36&delay=10&msgLength= \
725' \
--header 'accept: application/json' \
--header 'x-ibm-client-id: REPLACE_THIS_KEY'
```

Scroll down to the **Try this** operation section for the GET /quote path. Enter your **Client ID** and your **Client secret** (if necessary - the credentials should be already set) and then click the **Call Operation** button

Scroll down below the Call operation button. You should see a **200 OK** and a **response body** as shown below.

The screenshot shows the IBM API Connect /dev interface. On the left, a sidebar lists APIs under 'QuoteMgmt 1.0.0' including 'APIs', 'Operations', and several specific endpoints like 'GET /extQuote', 'GET /quote', and 'POST /quote'. The 'GET /extQuote' endpoint is currently selected. The main panel displays the API's schema (string), responses (200 OK, 401 Invalid credentials provided, 500 Server error), and a detailed 'Request' section. The 'Request' section shows a cURL command with various headers and parameters. Below it, the 'Response' section shows a JSON object representing the API's output.

```
curl -X GET "https://api.eu.apiconnect.ibmcloud.com/philmetalmailcom-dev/sb/loanmgt/resources/loans/v1/extQuote?loanAmount=10000&annualInterestRate=1.1&termInMonths=36&delay=10&msgLength=725" -H "Accept: application/json" -H "x-ibm-client-id: a76f8fa3-423d-4704-954f-1ab30fe28024"
```

```
{"loanAmount": 10000, "annualInterestRate": 1.1, "termInMonths": 36, "monthlyPaymentAmount": 282.51360281363674, "delay": 10, "message": "Loan application received. Your monthly payment will be $282.51 over 36 months."}
```

Task 25 : Test QuoteMgmt APIs from the Command Line

It is now time to test our API from the command line. From the previous cURL screen, **Copy the cURL example from the left side** into your text editor window replacing REPLACE_WITH_CLIENT_ID and REPLACE_WITH_CLIENT_SECRET with your client id and your client secret saved from the prior step :

```
--header 'x-ibm-client-id: REPLACE_WITH_CLIENT_ID' \
--header 'x-ibm-client-secret: REPLACE_WITH_CLIENT_SECRET'
```

IMPORTANT : You may have to add the client secret parameter.

Copy and try it into your terminal windows. Here is the result in a command line :

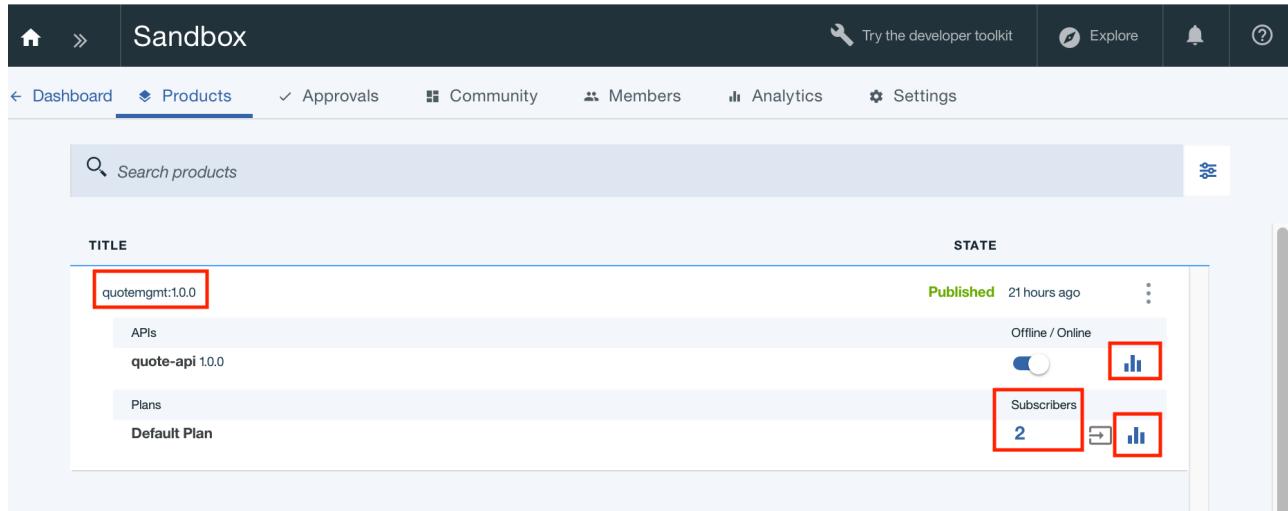
```
phil:[~]: curl --request GET \
>   --url 'https://api.eu.apiconnect.ibmcloud.com/philmetalmailcom-dev/sb/loanmgt/resources/loans/v1/extQuote?loanAmount=10000&annualInterestRate=1.1&termInMonths=36&delay=10&msgLength=725' \
>   --header 'Accept: application/json' \
>   --header 'x-ibm-client-id: a76f8fa3-423d-4704-954f-1ab30fe28024' \
>   --header 'x-ibm-client-secret: wH3vP1pL8yP5dJ4kH4xY3aM6cK6jQ5pF3Fc6nW3LU0wC6xE1xS'
{"loanAmount": 10000, "annualInterestRate": 1.1, "termInMonths": 36, "monthlyPaymentAmount": 282.51360281363674, "delay": 10, "message": "Loan application received. Your monthly payment will be $282.51 over 36 months."}
```

8. APIs Analytics

It is very important to get some analytics from the API Gateway when you want to follow errors, response time and hundreds of metrics from the your APIs, Catalogs, Products ...

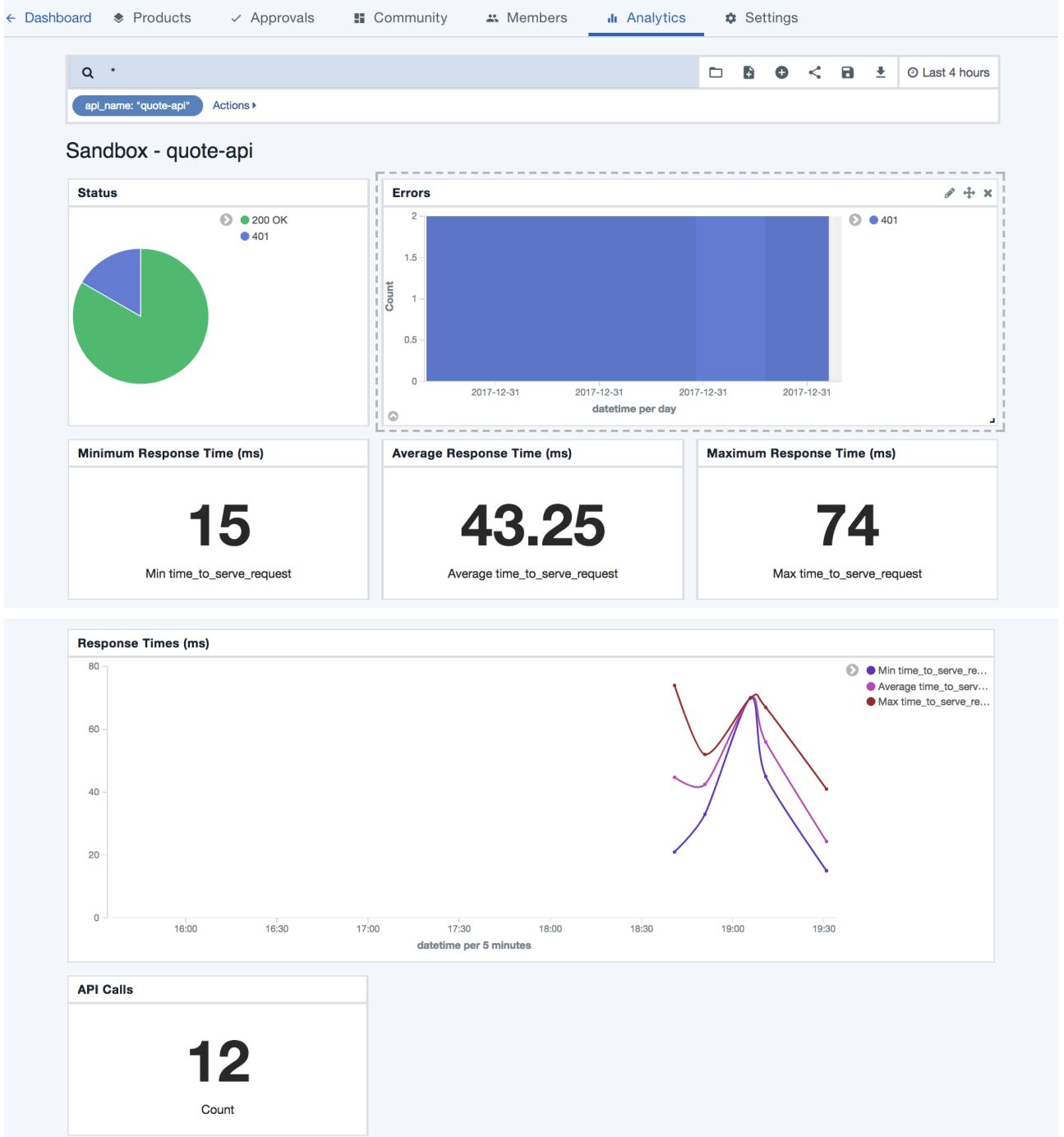
Task 26 : Accessing the Analytics Dashboard

Return to the **IBM Cloud API Connect** screen. Navigate to the **Dashboard** section and click on the **Sandbox** catalog tile. Click on your **QuoteMngnt** Product and you can see number of subscriptions to you API.



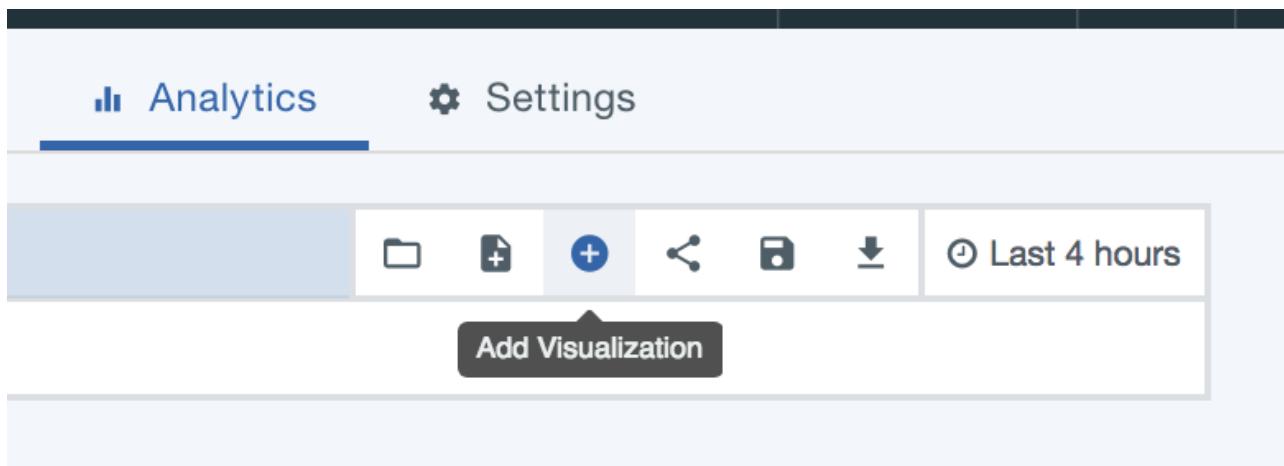
The screenshot shows the IBM Cloud API Connect dashboard. In the top navigation bar, the 'Sandbox' catalog is selected. Below the navigation, there's a search bar labeled 'Search products'. The main content area displays a table with two columns: 'TITLE' and 'STATE'. The first row shows a product titled 'quotemgmt:1.0.0' which is 'Published' 21 hours ago. The second row shows a product titled 'quote-api 1.0.0' which is currently 'Offline / Online'. A third row is partially visible, showing 'Plans' and 'Default Plan'. On the right side of the product rows, there are three small visualizations: a bar chart, a line graph, and another bar chart. The 'Subscribers' count of 2 is highlighted with a red box. The entire screenshot is framed by a red border.

You can scroll down the analytics page. On the top right part of the page, there are some controls that you can use to change the visualizations in the page.



Task 27 : Customizing the Dashboard

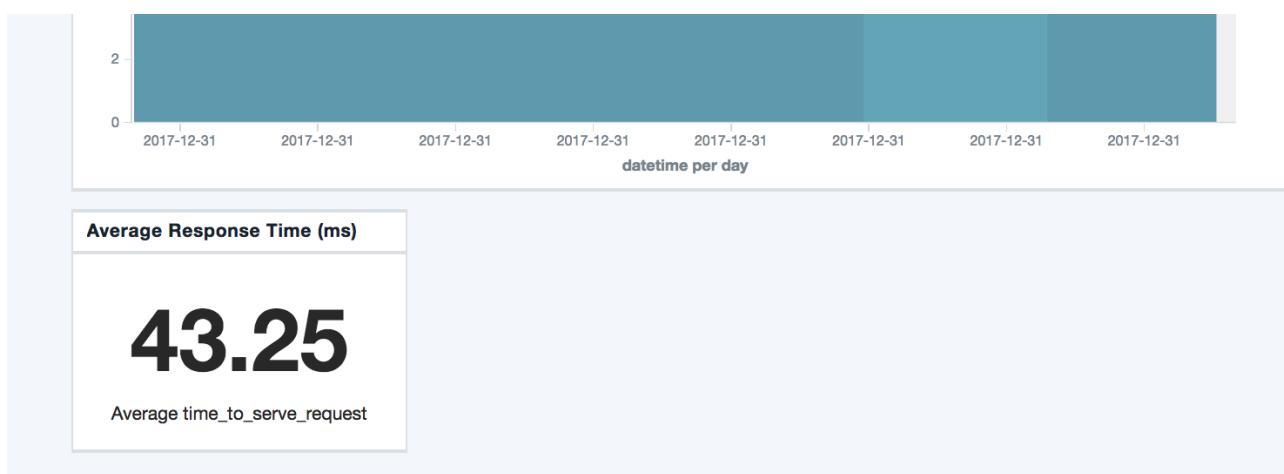
The default dashboard gives some general information like the 5 most active Products and 5 most active APIs. This information is interesting, but we can see much more information by customizing the dashboard. Add a new visualization by clicking on the **+ Add Visualization** icon.



This will bring a list of some of the standard visualizations. You can then type in a string to filter through visualizations or use the arrows to page through the list. Add the **Average Response Time** visualization to the dashboard by simply clicking on it. The new visualization will be added to the bottom of our dashboard.

A screenshot of a list titled 'Visualizations Filter...'. The list contains 17 items, numbered 1 to 17. Item 17 is 'Average Response Time (ms)', which is highlighted with a red rectangular box. Other items include '5 Most Active APIs', '5 Most Active Products', 'API Calls', 'API Calls per Day', 'Apps per Plan', 'Data Usage (bytes)', and 'Developer Organizations'. At the top right of the list, there are buttons for 'Create Visualizations', 'Manage Visualizations', and a 'Last 4 hours' filter.

The new visualization will be added to the bottom of our analytic dashboard.



9. Conclusion

Results

Successful exercise ! You finally went thru the following features :

- You logged in the IBM Cloud
 - You created an instance of API Connect in the Cloud
 - You imported an API to that instance
 - You added API key and some security definitions to that API
 - You tested the API before publishing
 - You created an instance of the developer portal
 - You published your API Product to a catalog
 - You were able to subscribe as a developer to this API
 - You were able to test this API from the internet
 - Finally, you were able to see analytics on the APIs and Products.
-

End of Lab

Using IBM API Connect