

Using IBM API Connect v5

Create & publish your API in a few clicks

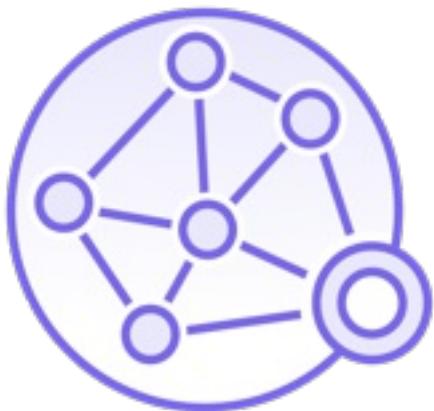


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1. API Connect Overview

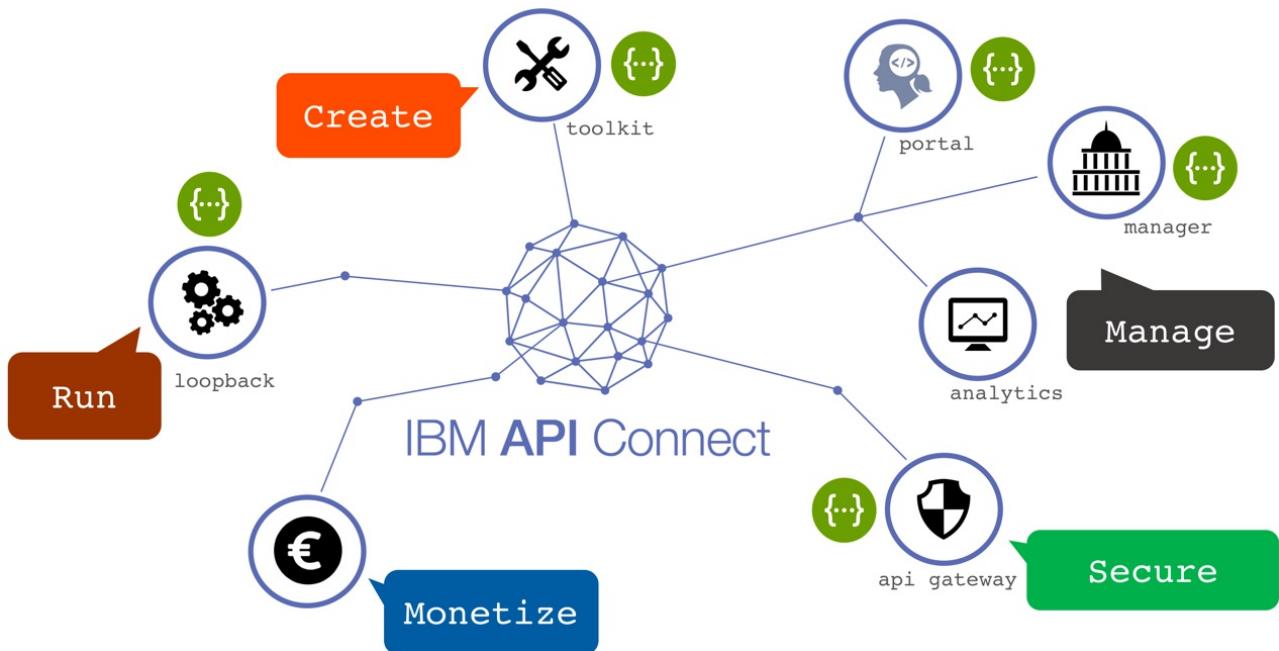
IBM API Connect is a comprehensive end-to-end API lifecycle solution that enables the automated creation of APIs, simple discovery of systems of records, self-service access for internal and third party developers and built-in security and governance. Using automated, model-driven tools, create new APIs 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.

Based on these different components, IBM API Connect is able to deliver all the capabilities of an API Management solution and much more...



Terminology

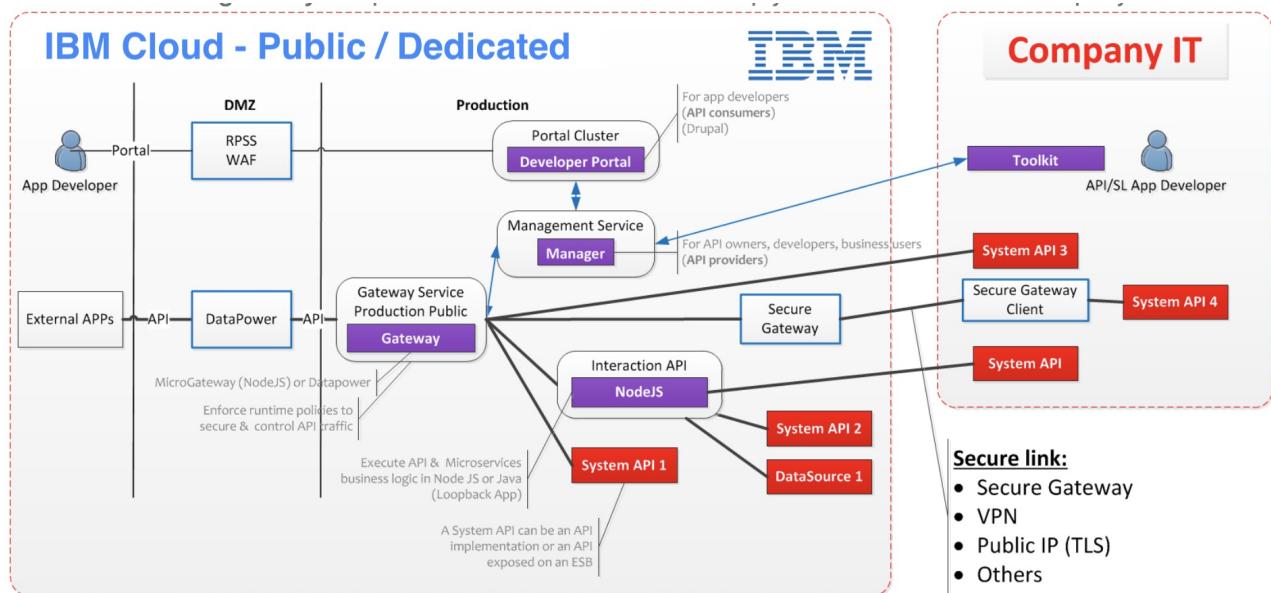
- **API** : Can be SOAP or Representational State Transfer – REST API defined with an Open API definition (Swagger) as a YAML file. One API = one yaml file though WSDLs and Schema are separated in a zip file for a SOAP API.
- **Plan** : this is where we specify the quotas and if an approval is needed 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

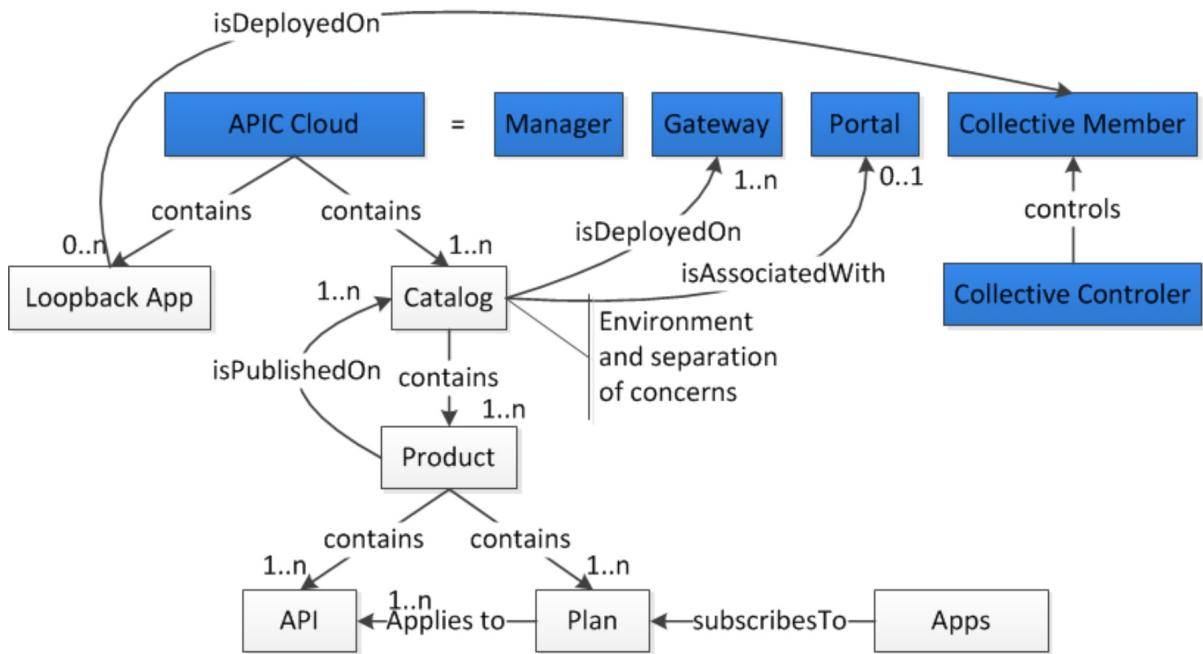
IBM API Connect can work on Premises or in a Cloud.

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.



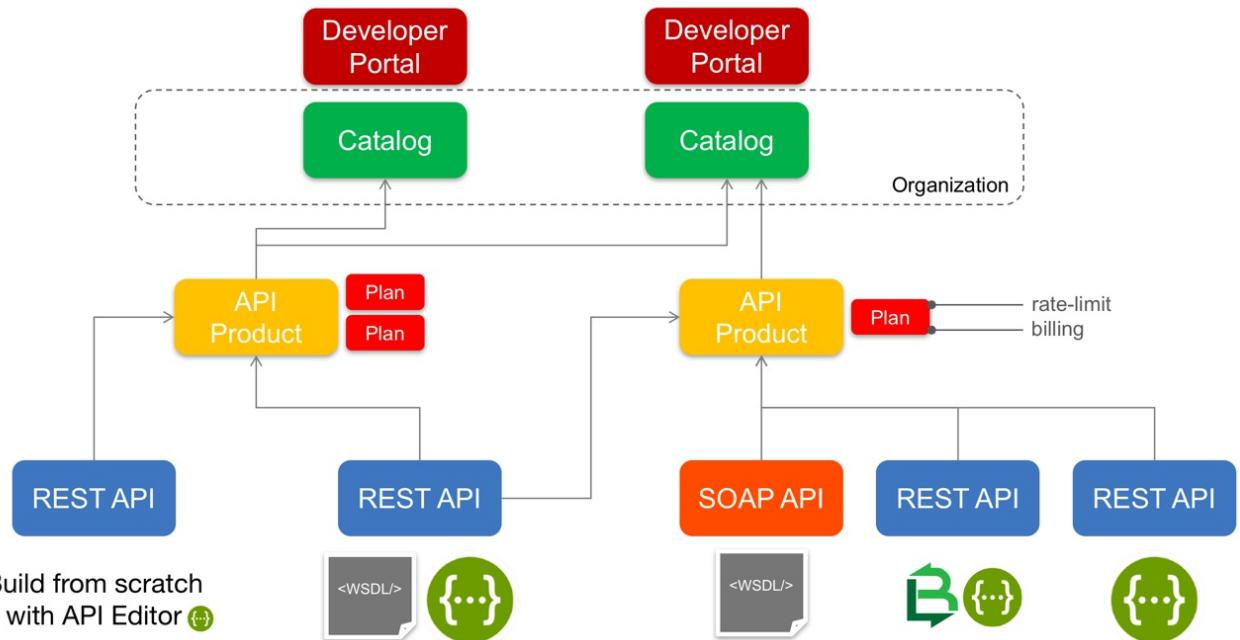
Plans & Products

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

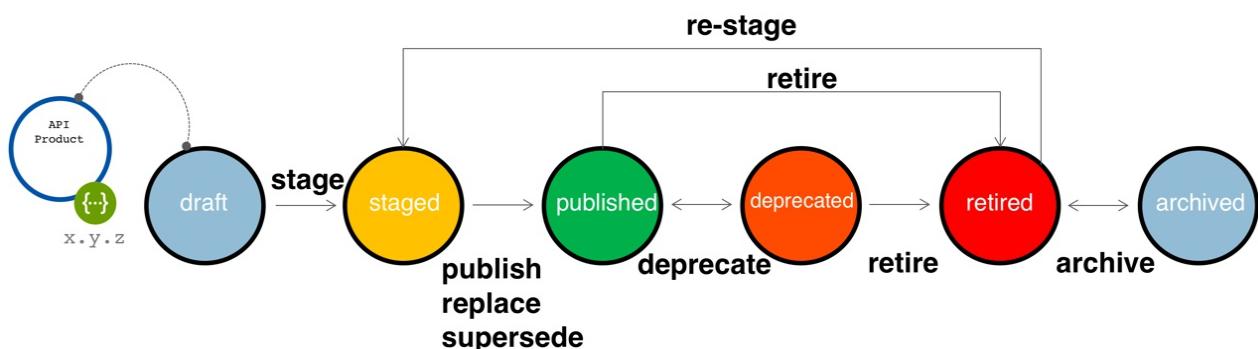
Plans and APIs are grouped in Products. Through Products, you can manage the availability and visibility of APIs and Plans. Use the API Designer to create, edit, and stage your Product. Use the API Manager to manage the lifecycle of your Product.

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

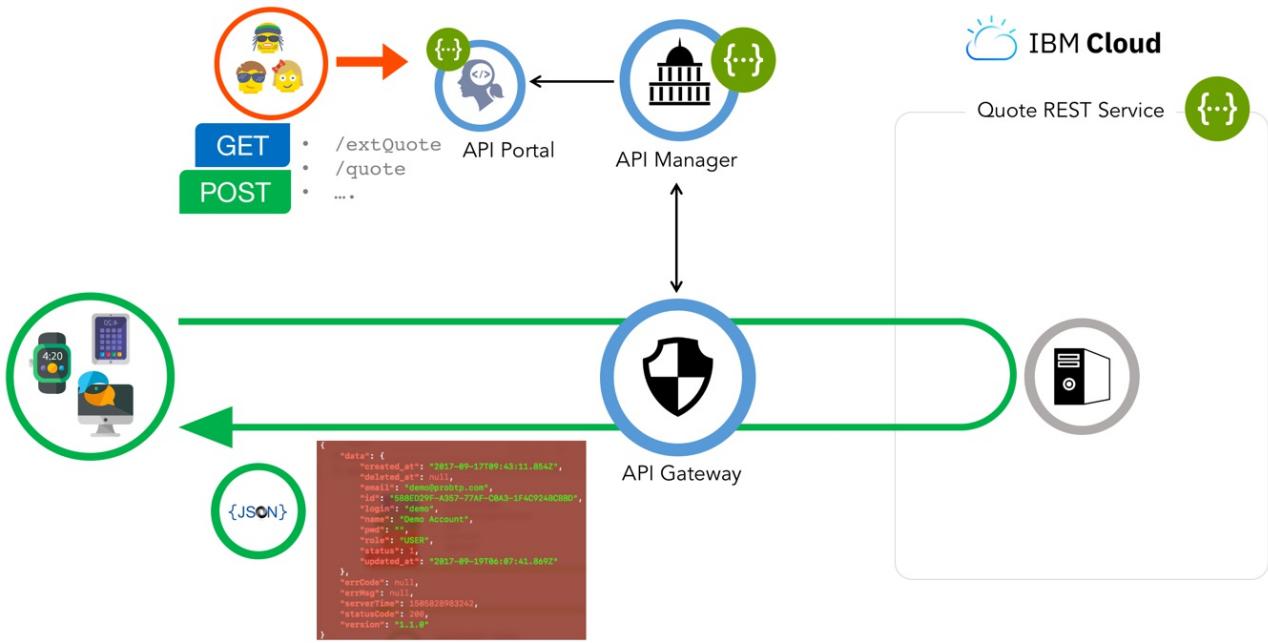
When you manage your Product versions, you move them through a series of lifecycle states, from initially staging a draft Product version to an environment, through to publishing to make the Product version available to your application developers, and to eventual retiring and archiving. The following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



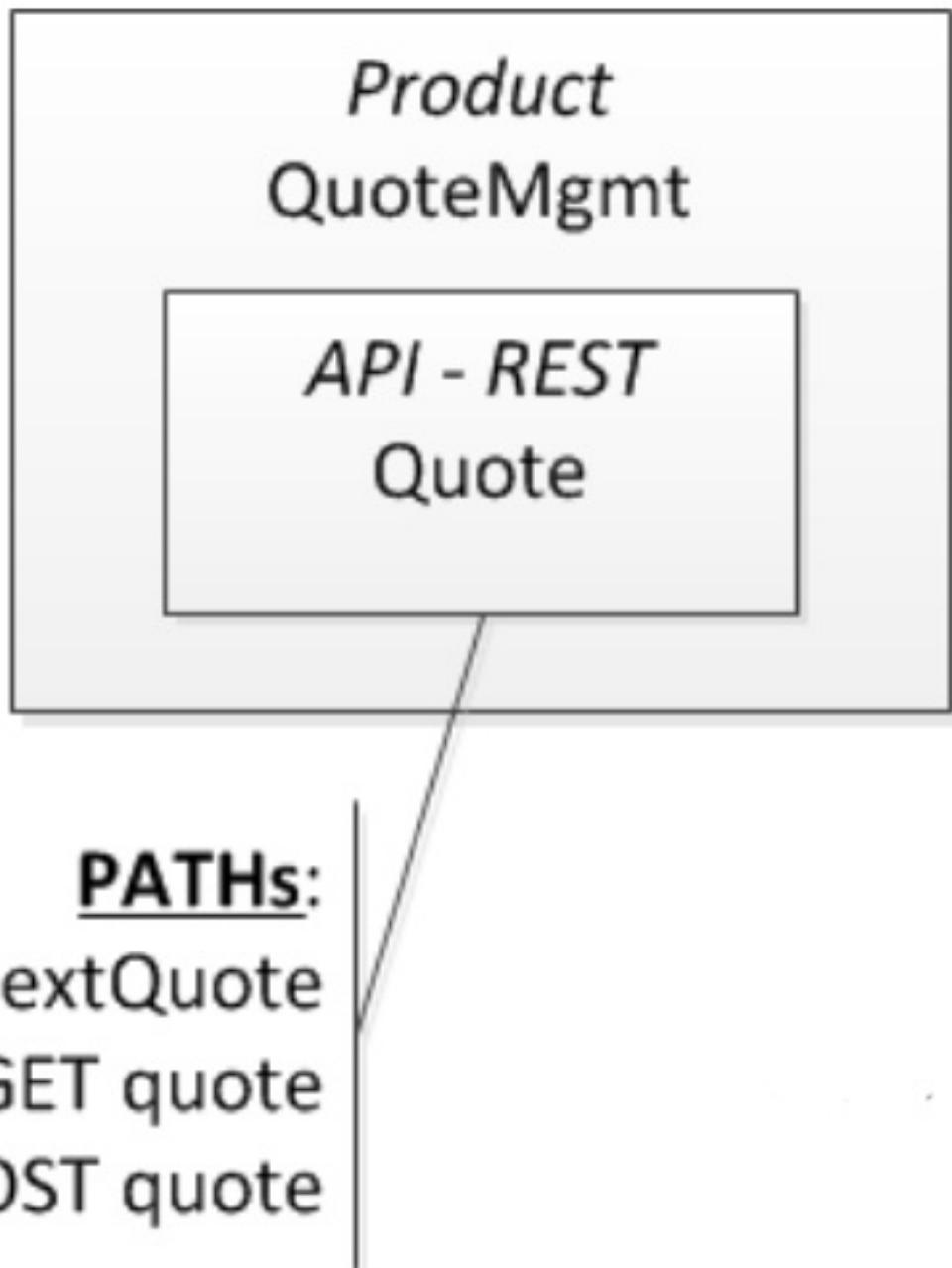
2. Objectives

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.

The following pictures present an overview of the workshop components and their relations. All the components of the workshop are part of **IBM Cloud**.



On the API Manager, you will define an **API Product** (QuoteMgmt) based on the swagger definition of the existing Quote REST service.



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)

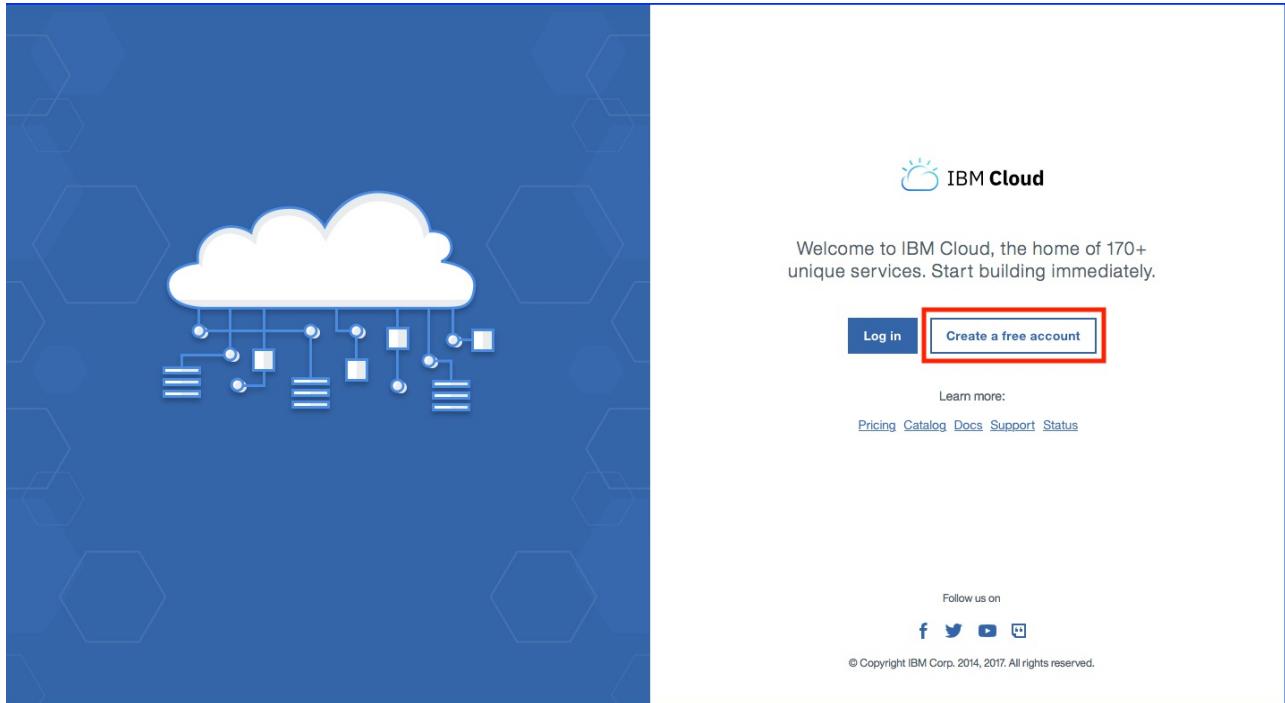
Here are some helpful steps :

Task 1 : Sign in to IBM Cloud

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

Open this link [IBM Cloud Trial \(<https://console.bluemix.net/registration/trial>\)](https://console.bluemix.net/registration/trial) or type <https://console.bluemix.net/registration/trial> in your favorite internet browser.

If you already have an IBM Cloud account, open this link [IBM Cloud \(<https://console.bluemix.net/>\)](https://console.bluemix.net/)

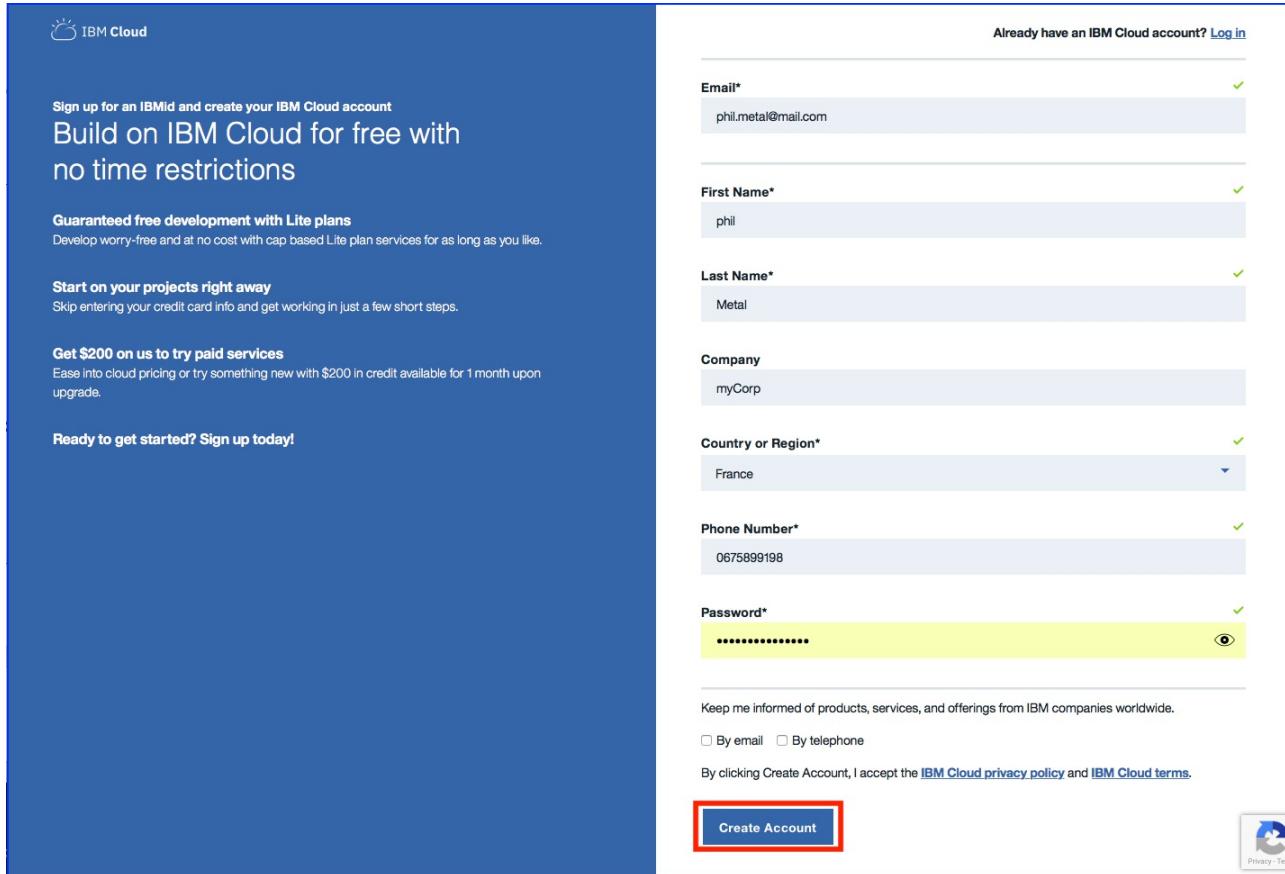


Task 2 : Fill in the form

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.

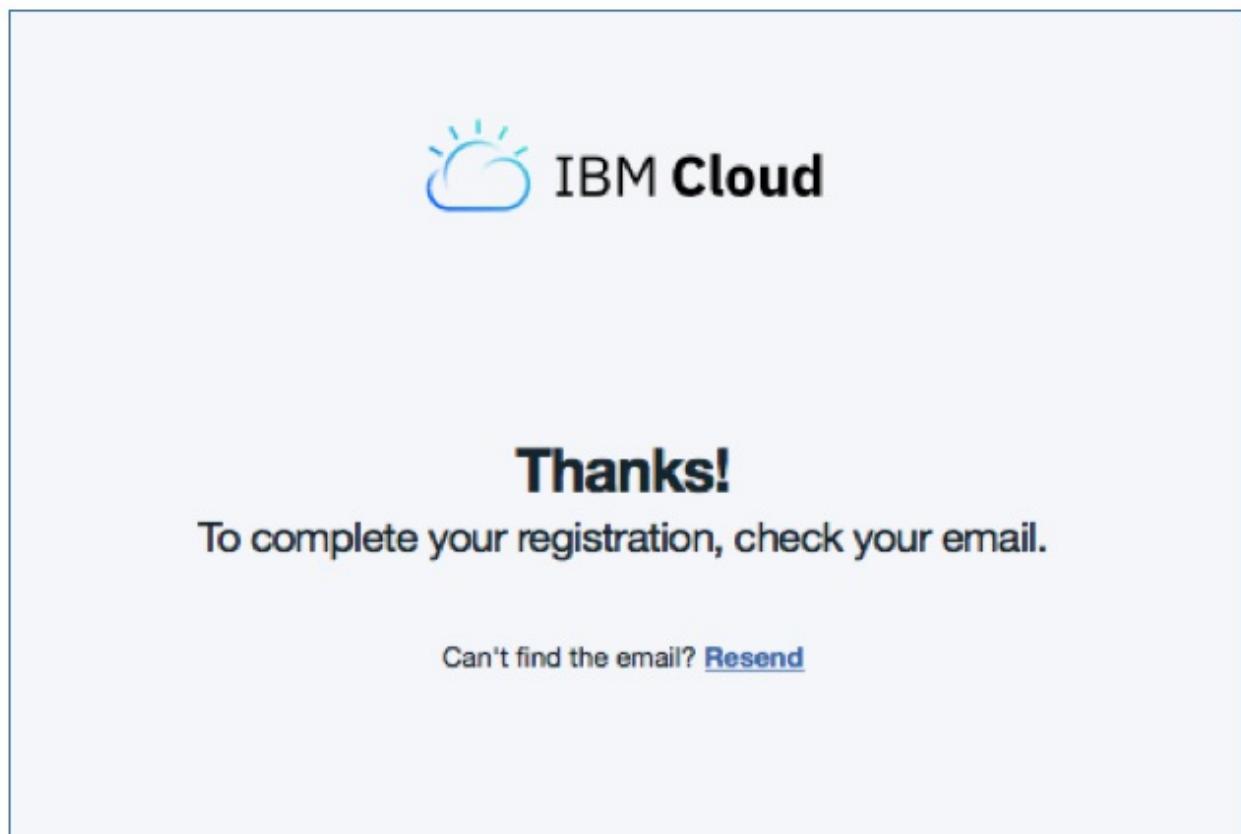


The screenshot shows the IBM Cloud registration form. On the left, there's promotional text about building on IBM Cloud for free and guaranteed free development with Lite plans. On the right, the registration form fields are displayed:

- Email*: phil.metal@mail.com (validated)
- First Name*: phil (validated)
- Last Name*: Metal (validated)
- Company: myCorp
- Country or Region*: France (validated)
- Phone Number*: 0675899198
- Password*: (redacted)

Below the form:
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](#).

A red box highlights the "Create Account" button.



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.

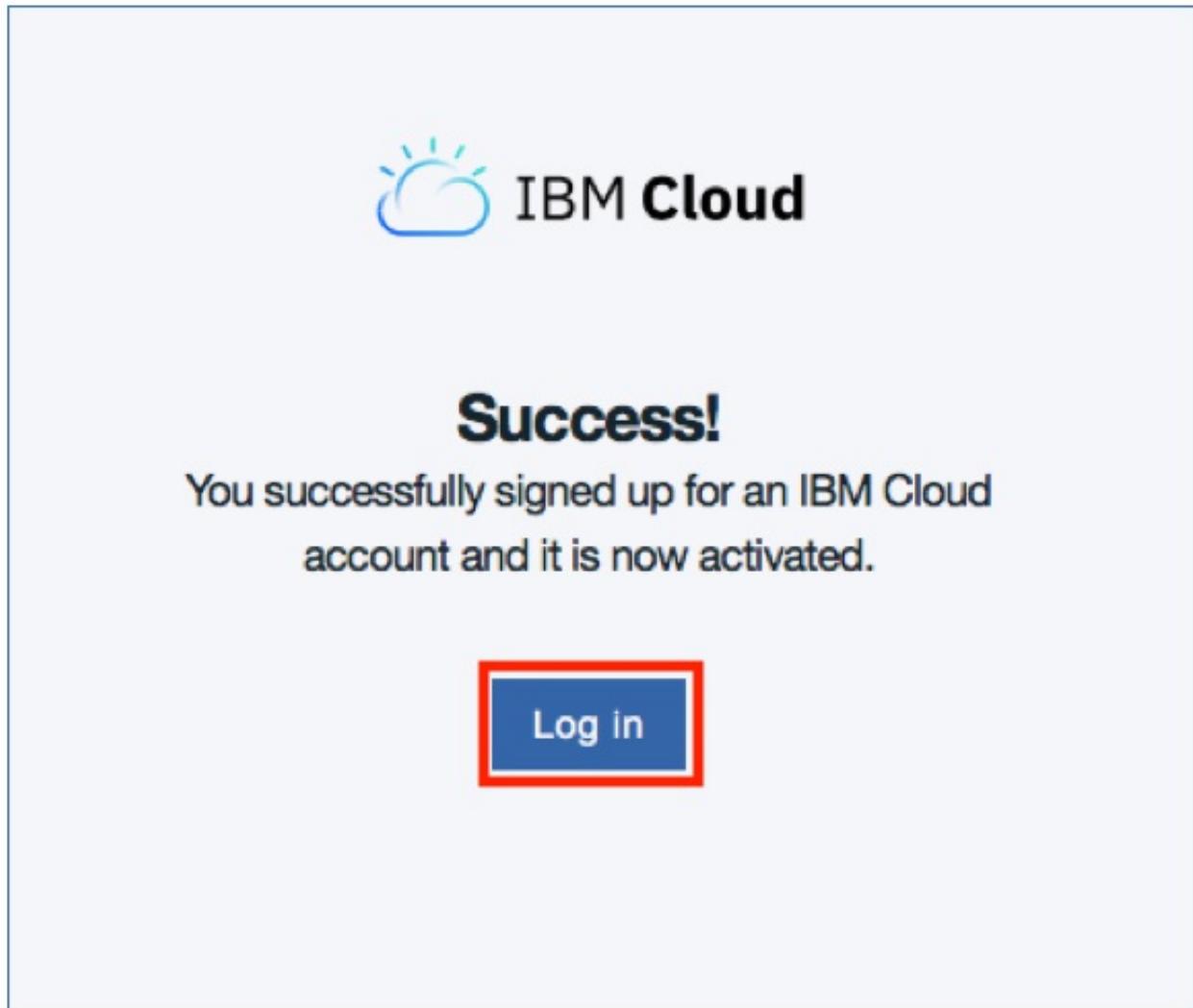
Confirm Account

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

Welcome and happy building!



Log in to IBM Cloud with your credentials :



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 bar with 'Dashboard' on the left and three dropdown menus: 'RESOURCE GROUP' (set to 'None'), 'REGION' (set to 'United Kingdom'), 'CLOUD FOUNDRY ORG' (set to 'philmetal@mail.com'), and 'CLOUD FOUNDRY SPACE' (set to 'dev'). A search bar on the right says 'Filter by resource name...'. A red box highlights the region, org, and space dropdowns.

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 \(http://bluemix.net\)](http://bluemix.net) 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 navigation bar with 'Catalog' (highlighted with a red box), 'Docs', 'Support', 'Manage', and a user profile icon. Below the navigation bar, there's a large blue button with the text 'Create resource'. To the right of the button, there's a sidebar with a dark background and white text.

Task 6 : Find API Connect

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

The screenshot shows the IBM Cloud catalog search results for 'label:lite'. On the left, there's a navigation bar with 'All Categories (45)', 'Infrastructure (3)', 'Compute', 'Storage (1)', 'Network', 'Security', 'Containers (2)', 'VMware', 'Platform (42)', 'Boilerplates (5)', 'APIs (1)' (highlighted with a blue box), and 'Application Services'. In the center, there's a search bar with the text 'label:lite' and a 'Filter' button. Below the search bar, there's a message: 'APIs published in your org or shared from API Management.' followed by a list of APIs. One API, 'API Connect', is highlighted with a red box. It has a circular icon, the name 'API Connect', the description 'Create, manage, enforce, and run APIs.', and two status indicators: 'Lite' and 'IBM'.

Task 7 : Review the service instance

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

The screenshot shows the IBM Cloud interface for creating a new API Connect instance. At the top, there's a navigation bar with 'IBM Cloud' and links for 'Catalog', 'Docs', 'Support', and 'Manage'. Below the navigation, a section titled 'API Connect' is shown. On the left, there's a detailed description of the service and two buttons: 'Lite' (highlighted) and 'IBM'. In the center, there are input fields for 'Service name' (set to 'API Connect-wq'), 'Choose a region/location to deploy in' (set to 'United Kingdom'), 'Choose an organization' (set to 'philmetal@mail.com'), and 'Choose a space' (set to 'dev'). To the right, a 'Features' section lists several benefits with bullet points. At the bottom, there's a 'View Docs' link and a large blue 'Create' button.

Task 8 : Create the API Connect instance

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

This screenshot is identical to the one above, showing the API Connect creation page. The 'Create' button at the bottom right is now highlighted with a red box, indicating where the user should click to proceed.

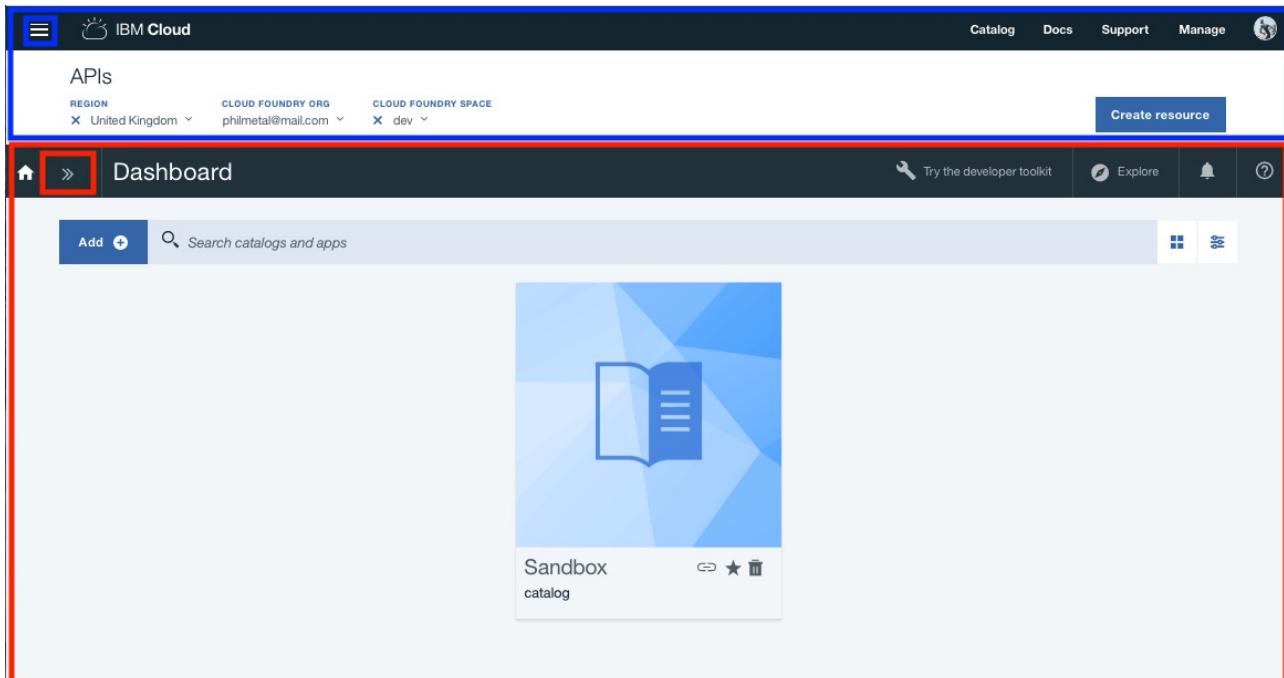
Task 9 : Learn the different parts of the screen

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.

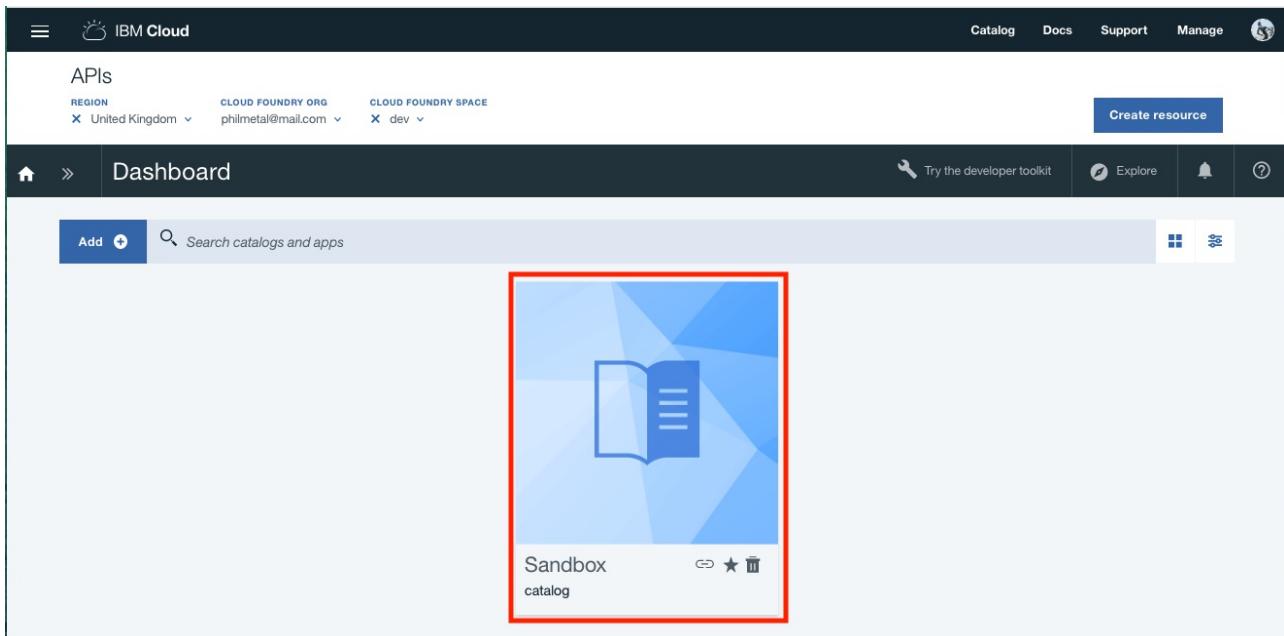
- The bold red box belongs to **API Connect**, the chevrons (small red box) gives menus specific to API connect.



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.

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



Task 11 : Instanciate 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 interface. At the top, there's a navigation bar with 'IBM Cloud' and links for Catalog, Docs, Support, Manage, and a user icon. Below that is a header for 'APIs' with sections for REGION (United Kingdom), CLOUD FOUNDRY ORG (philmetal@mail.com), and CLOUD FOUNDRY SPACE (dev). A 'Create resource' button is also present. The main content area has tabs for Dashboard, Products, Approvals, Community, Members, Analytics, Settings (which is selected and has a red '1' notification), and a 'Try the developer toolkit' link. On the left, a sidebar lists Overview, Approvals, Gateways, **Portal** (selected and has a red '2'), Roles, and Extensions. The 'Portal Configuration' section contains a 'Select Portal' dropdown set to 'IBM Developer Portal' (with a red '3' notification) and a 'Portal URL' field with the value 'https://sb-philmetalmailcom-dev.developer.eu.apiconnect.ibmcloud.com'. A yellow info box 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.' Below that is a 'User Registration and Invitation' section with a 'User Registry' dropdown set to 'Sandbox' and a note about inviting collaborators with roles assigned.

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](#)

https://raw.githubusercontent.com/joelGauci/apicLabs/master/QuoteManagementAPI_AW_S.yaml

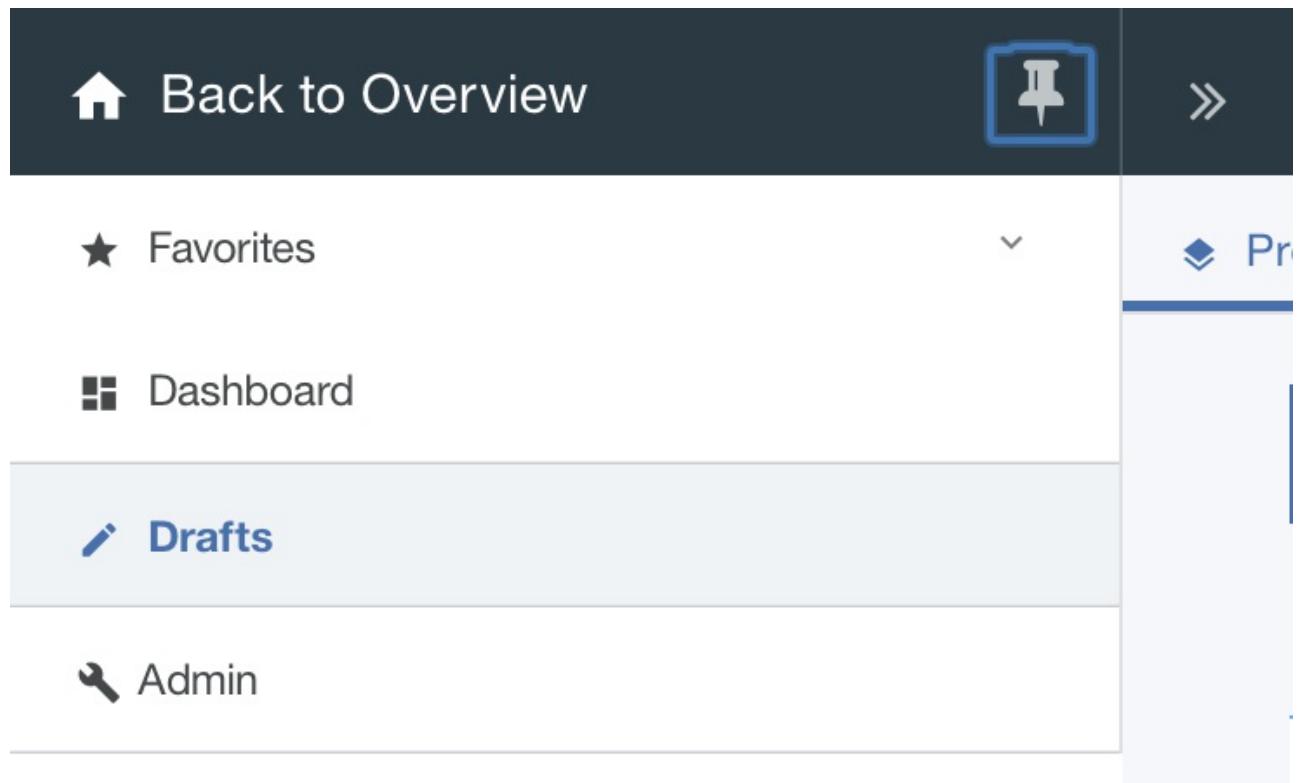
or

https://raw.githubusercontent.com/joelGauci/apicLabs/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 interface. At the top, there's a navigation bar with 'IBM Cloud' and links for 'Catalog', 'Docs', 'Support', 'Manage', and a user profile 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 search bar and navigation icons. Under 'Products', there's an 'Add' button with a plus sign, a search bar, and a link to 'Search products'. A table below shows columns for 'TITLE' and 'LAST MODIFIED', with a message 'No products found'.

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

This screenshot shows the 'New Product' creation dialog. The 'Add' button is highlighted with a blue box. A dropdown menu is open, showing 'New Product' and 'Import an existing product'. The main area has a 'Search products' bar and a table with a 'LAST MODIFIED' column. A message 'No products found' is displayed.

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

This screenshot shows the 'Info' tab of the 'New Product' dialog. It contains fields for 'Title *' (filled with 'QuoteMgmt'), 'Name *' (filled with 'quotemgmt'), and 'Version *' (filled with '1.0.0'). At the bottom right are 'Cancel' and 'Create product' buttons.

Click **Create product** button.

The screenshot shows the 'Info' tab for a product named 'QuoteMgmt' version '1.0.0'. The 'All Products' button in the top left corner is highlighted with a red box. The page includes fields for Title, Name, Version, and Description.

Info

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' interface with the 'APIs' tab selected. The 'Add' button is highlighted with a blue box, and the 'Import API from a file or URL' option is also highlighted with a blue box. A tooltip provides instructions for importing a SOAP service.

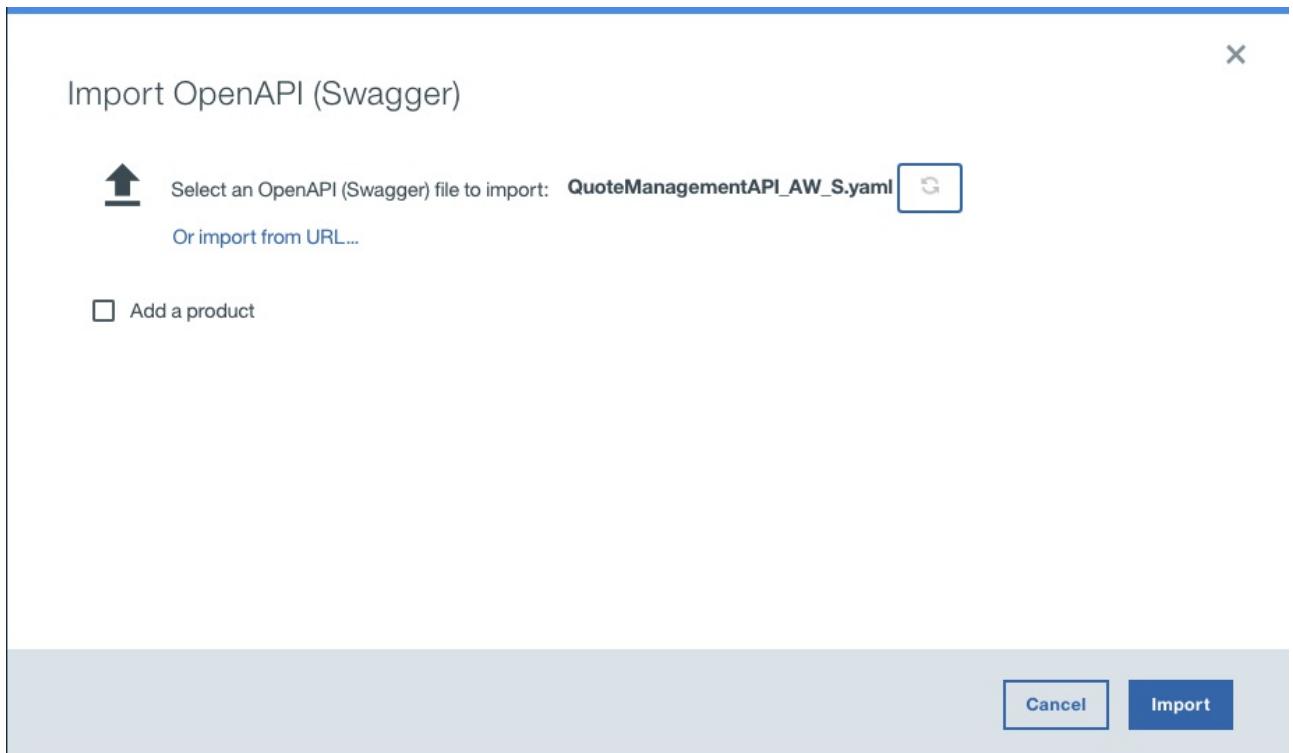
Drafts

Add + **Search APIs**

New API
OAuth 2.0 Provider API
API from a SOAP service
Import API from a file or URL
Import a sample OpenAPI

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.

All APIs **Design** Source Assemble

Info **Schemes**

Host
Base Path
Consumes
Produces
Lifecycle
Policy Assembly
Security Definitions
Security

Schemes

http
 https
 wss
 ws

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 components: Info, Schemes, Host, Base Path, Consumes, Produces, Lifecycle, Policy Assembly, **Security Definitions** (which is selected and highlighted with a red box), Security, and Extensions. The main content area is titled 'Security Definitions' and displays the message 'No security definitions defined'. A red circle highlights the '+' button in the top right corner of this section.

Select API Key.

The screenshot shows the 'Design' tab of the Quote API 1.0.0 interface. The sidebar shows the 'Security Definitions' section selected. In the main content area, the 'Security Definitions' section still says 'No security definitions defined'. To the right, a modal or dropdown menu is open under the '+ API Key' button, listing 'API Key', 'Basic', and 'OAuth', with 'API Key' selected and highlighted with a red box.

Enter client-id in the name.

The screenshot shows the 'Design' tab of the Quote API 1.0.0 interface. The sidebar shows the 'Security Definitions' section selected. In the main content area, the 'Security Definitions' section now displays a configuration for a new API key named 'client-id'. The 'Name *' field contains 'client-id', which is 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 Definitions 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 Security 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

Filter Search Show catches Logic

Micro Gateway policies DataPower Gateway policies

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.

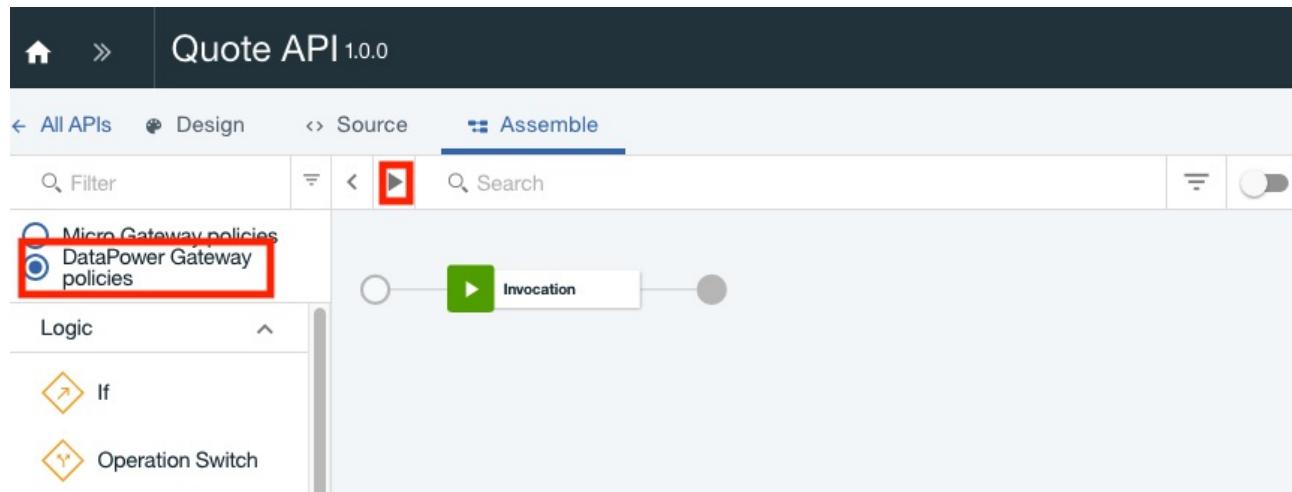
Access URL through Secure Gateway

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

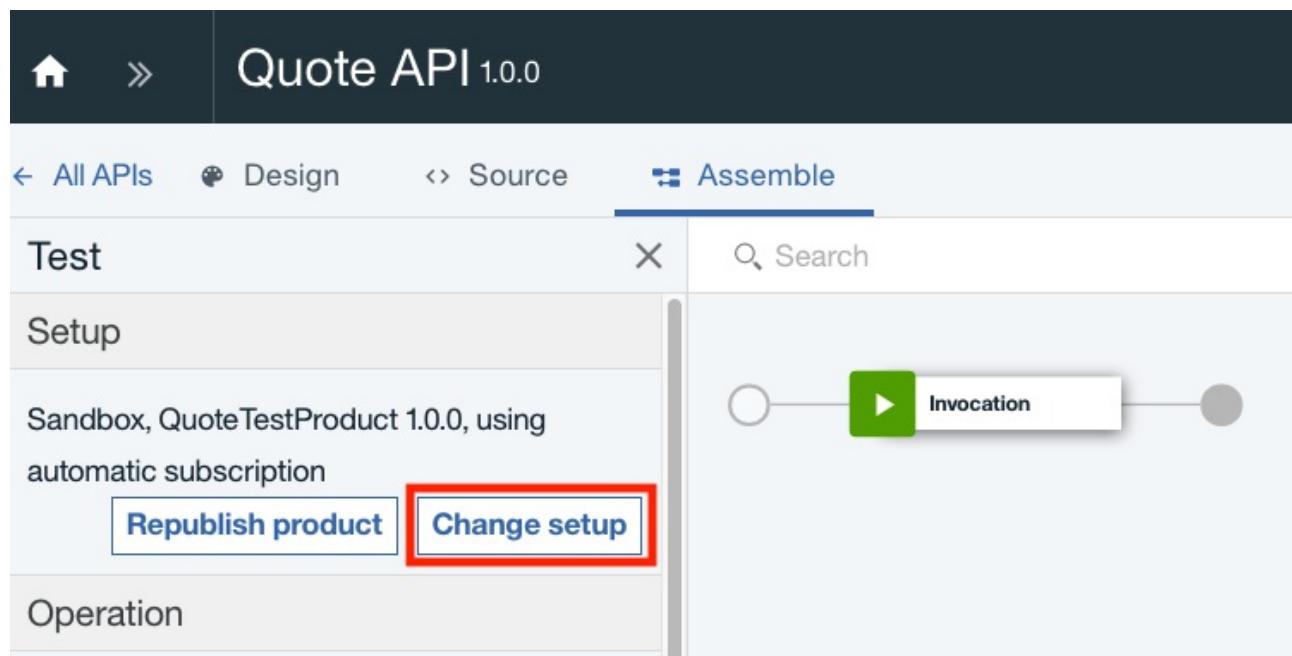
Task 16 : Testing the new created API

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** :

Quote API 1.0.0

All APIs Design Source Assemble

Setup X Search

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

Home > Quote API 1.0.0

All APIs Design Source Assemble

Test

Setup

Sandbox, QuoteTestingProduct 1.0.0, using automatic subscription

[Republish product](#) [Change setup](#)

Operation

Choose an operation to invoke:

Operation get /extQuote

Identification

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

Parameters

Content-Type
application/json



Search

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****X****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**Invoke**

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:

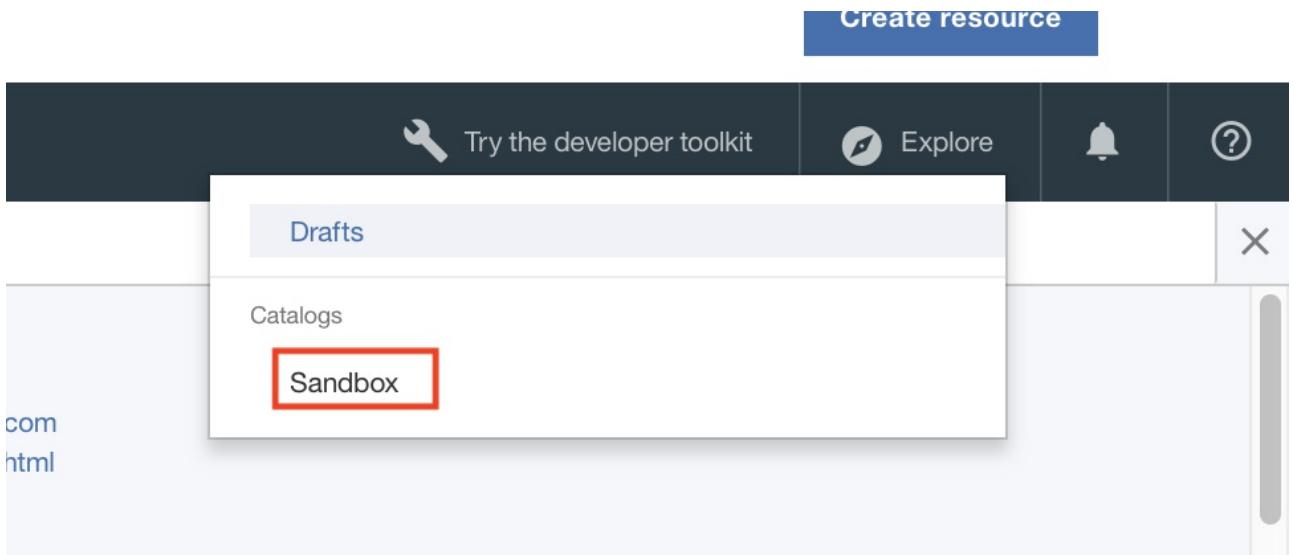
```
{  
  "loanAmount": 1000,  
  "annualInterestRate": 1.1,  
  "termInMonths": 36,  
  "monthlyPaymentAmount": 28.25136028  
  1363677,  
  "delay": 10,  
  "message": "Lorem ipsum"  
}
```

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 "get /extQuote" operation details. On the left, a sidebar lists operations like "getExtQuote", "getQuote", "postQuote", etc. The "getExtQuote" button is highlighted with a red rectangle. The main panel shows the operation details: "Description" (Get a loan quotation with GET verb, with variable response time and variable message length), "Security" (X-IBM-Client-Id), "Parameters" (loanAmount, annualInterestRate, terminMonths, delay, msgLength), and "Responses" (HTTP 200 OK with JSON schema). On the right, the "Try it" button is highlighted with a red rectangle. The URL is https://api.eu.apiconnect.ibmcloud.com/philmemailcom-dev/sb/loanmgmt/resources/loans/v1/extQuote.

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

The screenshot shows the 'Explore' interface for a POST operation named 'extQuote'. The 'Parameters' section contains five fields: 'loanAmount' (1000), 'annualInterestRate' (11), 'termInMonths' (36), 'delay' (10), and 'msgLength' (11). The 'Call operation' button at the bottom right is highlighted with a red box.

See the result of the request :

The screenshot shows the 'Explore' interface after calling the 'extQuote' operation. The 'Response' section displays the JSON response body, which includes the input parameters and calculated values:

```
{
  "loanAmount": 1000,
  "annualInterestRate": 11,
  "termInMonths": 36,
  "monthlyPaymentAmount": 28.251360281363677,
  "delay": 10,
  "message": "Lorem ipsum"
}
```

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

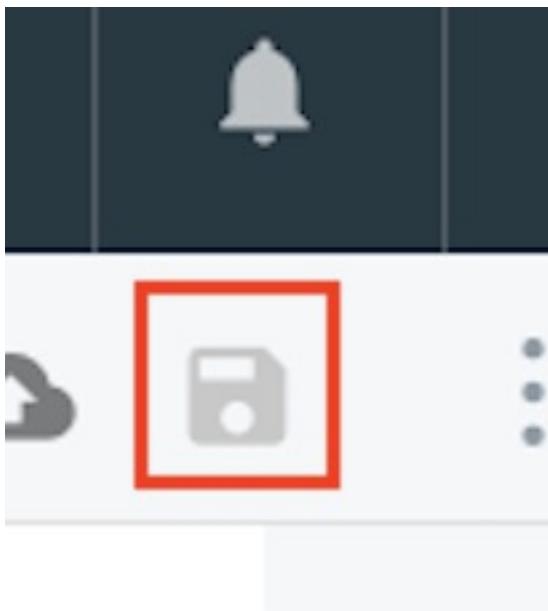
Within the Draft area, select the **QuoteMgmt** product :

The screenshot shows the 'Drafts' section of a software interface. At the top, there are navigation icons for Home, Back, and Drafts. Below the navigation is a header with 'Products' (highlighted with a red box) and 'APIs'. A search bar labeled 'Search products' is present. Underneath, there is a table with two columns: 'TITLE' and 'LAST MODIFIED'. A single row is shown for 'QuoteMgmt 1.0.0', which was last modified 'an hour ago'. The 'TITLE' column contains a link that is also highlighted with a red box.

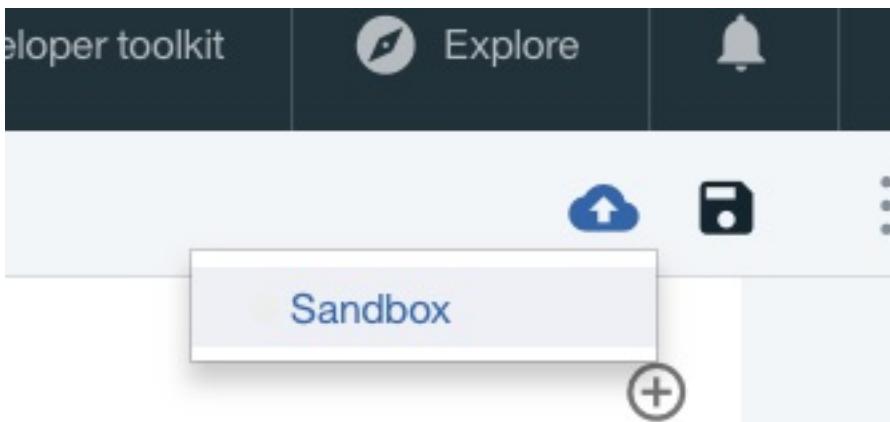
In the APIs Section, add the **Quote API**, then **Apply** :

The screenshot shows the 'QuoteMgmt 1.0.0' product page. The top navigation includes 'All Products', 'Design' (highlighted with a red box), 'Source', and developer tools like 'Try the developer toolkit', 'Explore', and 'Bell'. On the left, a sidebar has sections for 'Info', 'Contact', 'License', 'Terms of Service', 'Visibility', 'APIs' (highlighted with a red box), and 'Plans'. The main area is titled 'APIs' and contains a message: 'There are currently no APIs included in this product.' A plus sign icon is in the top right corner of this area. A modal window titled 'Select APIs' is open, containing a search bar and a list with one item: 'Quote API' (with a checked checkbox) and '1.0.0'. The 'X' button in the top right corner of the modal is also highlighted with a red box.

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 :

The screenshot shows the SAP Fiori interface. At the top, there's a dark header with a 'Back to Overview' button, a bell icon, and a chevron icon labeled '»'. To the right of the chevron is the word 'Dashboard'. A red number '1' is placed near the chevron icon. Below the header is a sidebar menu with items: 'Favorites' (with a star icon), 'Dashboard' (which is highlighted with a blue background and has a red number '2' next to it), 'Drafts', and 'Admin'. To the right of the sidebar is a search bar with the placeholder 'Search catalogs and apps' and an 'Add' button. A red number '3' is placed near the 'Sandbox catalog' tile. The main area features a large tile titled 'Sandbox catalog' with a blue geometric background and a white book icon. At the bottom right of the tile are three small icons: a gear, a star, and a trash can.

You should see the product just staged :

Sandbox

Try the developer toolkit Explore ?

Dashboard Products Approvals Community Members Analytics Settings

Search products

TITLE	STATE
quotemgmt:1.0.0	Staged 9 minutes ago

Click on the dots link and select Publish :

Sandbox

Try the developer toolkit Explore ?

Dashboard Products Approvals Community Members Analytics Settings

Search products

TITLE	STATE
quotemgmt:1.0.0	Staged 9 minutes ago

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

Edit visibility

QuoteMgmt

Visible to: ⓘ

Public (Developer Portal)

All developers will be able to see this product

Subscribable by: ⓘ

Authenticated (Developer Portal)

All authenticated developers in consumer organizations who have signed up for this developer portal can see this product

Cancel Publish

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' dashboard with the 'Settings' tab selected (marked with a red '1'). On the left sidebar, 'Portal' is highlighted (marked with a red '2'). The main content area displays 'Portal Configuration' with a 'Select Portal' dropdown showing 'IBM Developer Portal'. Below it, the 'Portal URL' is listed as <https://sb-philmemailcom-dev.developer.eu.apiconnect.ibmcloud.com> (marked with a red '3').

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

The screenshot shows the 'IBM API Connect /dev' page with the 'API Products' tab selected (marked with a red box). The main heading is 'Innovate with our APIs' with the subtext 'Welcome to our API portal where you will find a great selection of APIs for your awesome innovative apps'. Below this is a 'Featured APIs' section.

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' tab is still selected. A single product card for 'QuoteMgmt (1.0.0)' is visible, 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'.

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.

The screenshot shows the 'Create an account' form on the IBM API Connect /dev website. The form fields are as follows:

- Create new account** (button)
- Log in** (link)
- Request new password** (link)
- First name ***: phil (highlighted with a red box)
- Enter your first name.
- Last name ***: Metal2 (highlighted with a red box)
- Enter your last name.
- Developer organization ***: IBM (highlighted with a red box)
- 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 ***: (highlighted with a red box)
- Confirm password ***: (highlighted with a red box)
- Password quality:** Good (green bar)
- 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=eyJ1cmwiOiJodHRwczovL2RldmVsb3Bici5ldS5hcGlib25uZWN0LmlibWN

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

IBM API Connect /dev

Home Getting started API

User login

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

Username *
 Enter your sb-philmemailcom-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 :

IBM API Connect /dev

0 miketodo@mail.com IBM

Home Getting started API Products **Apps** Blogs Forums Support

No applications have been found.

+ Create new App

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

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, and Apps. Below this, a large section titled "Register application" contains fields for "Title *" (with "Mobile App Consumer" entered) and "Description" (with "This is a new mobile application that I am creating."). A "OAuth Redirect URI" field is present but empty. A "Submit" button is located at the bottom left of the form area, highlighted with a red box.

Title *

Mobile App Consumer

Description

This is a new mobile application that I am creating.

OAuth Redirect URI

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 after the application has been created. The navigation bar remains the same. On the left, there's a sidebar with "All Apps" and "Mobile App Consumer". The main content area displays a success message: "Application created successfully." and "Your client secret is: wH3vP1pL8yP5dJ4kH4xY3aM6cK6jQ5pF3fC6nW3lU0wC6xE1xS". There's also a checked checkbox labeled "Show Client Secret".

Application created successfully.

Your client secret is:

wH3vP1pL8yP5dJ4kH4xY3aM6cK6jQ5pF3fC6nW3lU0wC6xE1xS

Show Client Secret

Client ID is at the bottom of the page :

The screenshot shows the IBM API Connect interface. In the top navigation bar, there is a user icon with '1' and the email 'miketodo@mail.com'. The main menu includes Home, Getting started, API Products, Apps, Blogs, Forums, and Support. A search bar is on the right. On the left, a sidebar has 'All Apps' and 'Mobile App Consumer' selected. The main content area shows a 'Description' section with a note about creating a mobile application. Under 'Credentials', there is a 'Default' section with a 'Client ID' field containing the value 'a76f8fa3-423d-4704-954f-1ab30fe28024'. There is also a 'Show' checkbox and a 'Reset' button. A callout box highlights the 'Client ID' field.

Copy Client Secret and Client ID in a text editor

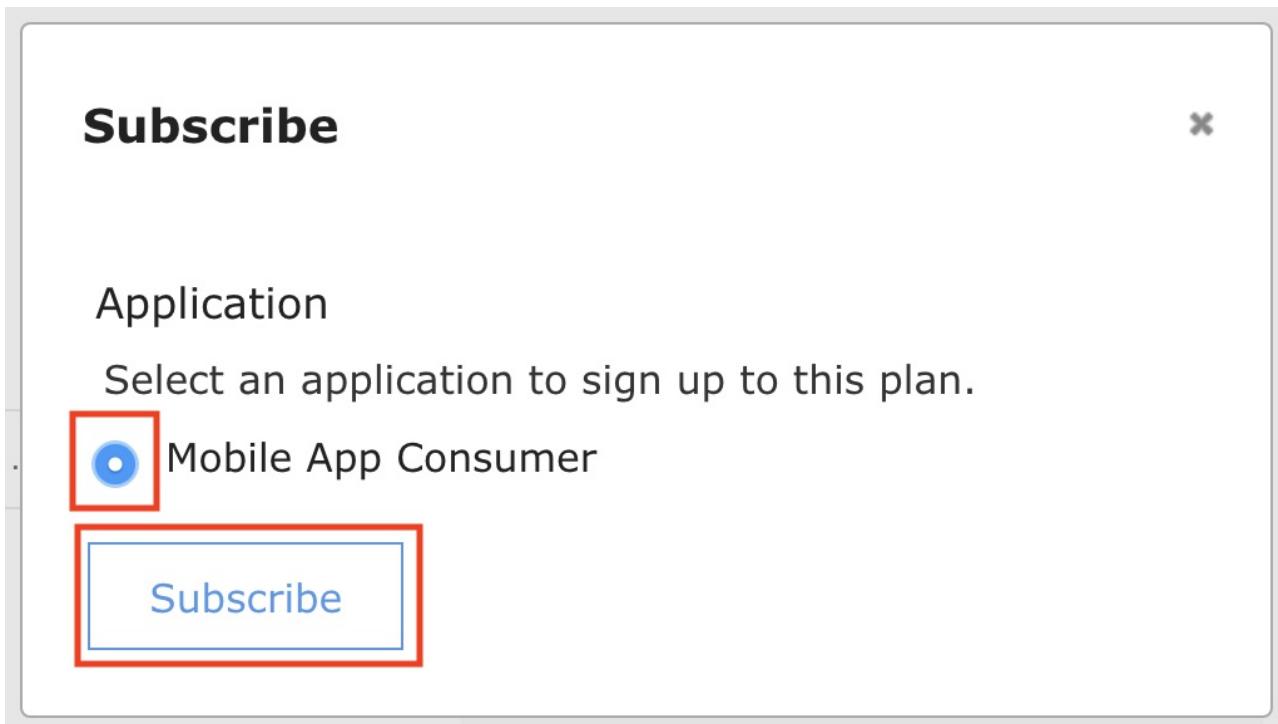
Task 23 : Subscribe to a Plan for our Product

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. The top navigation bar and sidebar are identical to the previous screenshot. The main content area shows the 'QuoteMgmt 1.0.0' API product details. It features a purple circular icon with a document symbol, the text 'QuoteMgmt 1.0.0', a 5-star rating icon with 'No votes yet' below it, and a 'Plans' section. The 'Plans' section lists the 'Default Plan' (100 per hour, Free) and a 'Subscribe' button, which is highlighted with a red box. A small note at the bottom states '* = Mouseover for more information'.

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, a sidebar lists "QuoteMgmt 1.0.0", "APIs", "Quote API 1.0.0" (which is selected and highlighted with a red border), "Operations", "GET /extQuote" (which is also highlighted with a red border), "GET /quote", and "POST /quote". The main content area shows the "extQuote" endpoint with a "GET /extQuote" operation. A "Quote" button is present. Below it, "Summary" and "Description" sections are visible. To the right, a "curl" example request is provided:

```
curl --request GET \
--url 'https://api.eu.apiconnect.ibmcloud.com/philmemail
com-dev/sb/loamgt/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 interface. On the left, there's a sidebar with navigation links like Home, Getting started, API Products, Apps, Blogs, Forums, Support, and a search bar. The main content area is focused on the 'QuoteMgmt 1.0.0' API. Under the 'Operations' section, the 'GET /extQuote' endpoint is selected. The right side shows the API details for this endpoint, including responses for 200, 401, and 500 status codes. Below that, there's a 'Request' section with a cURL command and a 'Response' section showing a JSON object.

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/philmemailcom-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: wH3vP1pL8yP5dj4kh4xY3aM6cK6jQ5pF3fc6nW3lU0wC6xEIxS'
{"loanAmount":10000,"annualInterestRate":1.1,"termInMonths":36,"monthlyPaymentAmount":282.51360281363674,"delay":10,"message": "Lo
adipiscing elit. Nam eu semper elit. Nunc vitae posuere dolor, eu porta nunc. Aenean vulputate finibus gravida. Curabitur eget au
ec quis quam. Vestibulum nulla nulla, interdum quis est vel, dictum interdum lectus. Sed augue diam, laoreet eu fermentum non, la
morbi tristique senectus et netus et malesuada fames ac turpis egestas. Aliquam vehicula ligula sit amet libero ultricies lobort
itor. Mauris non erat lectus. Sed interdum elit id enim scelerisque vulputate. Curabitur sed ornare nulla, et bibendum felis. Nu
ltricies eu quam."}phil:[~]:
```

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.

Sandbox

Try the developer toolkit Explore Settings

Dashboard Products Approvals Community Members Analytics

Search products

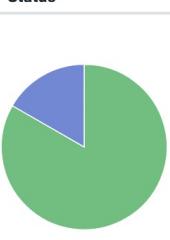
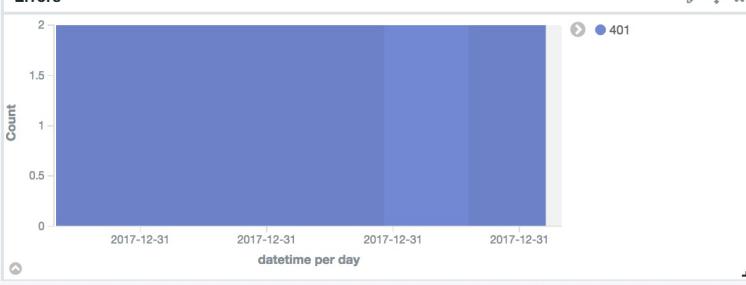
TITLE	STATE
quotemgmt:1.0.0	Published 21 hours ago
APIs	Offline / Online
quote-api 1.0.0	Subscribers 2
Plans	Default Plan

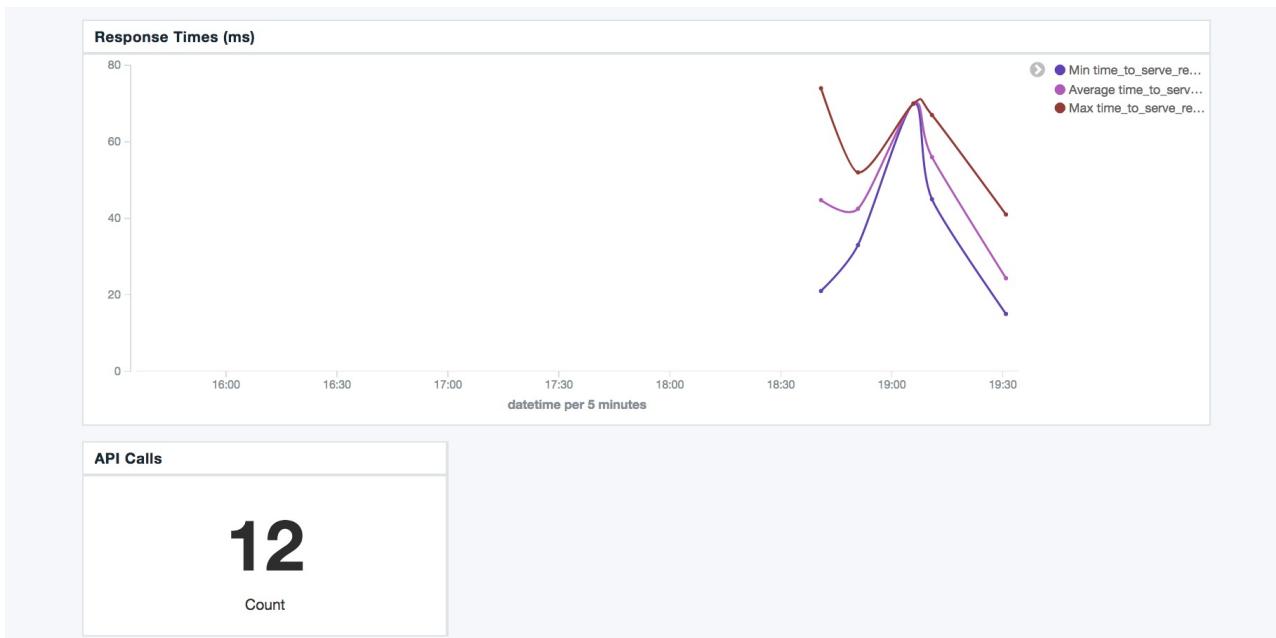
You can scroll down the analytics page. On the top right part of the page, there are some controls that you can use to change the visualizations in the page.

Dashboard Products Approvals Community Members Analytics Settings

api_name: "quote-api" Actions Last 4 hours

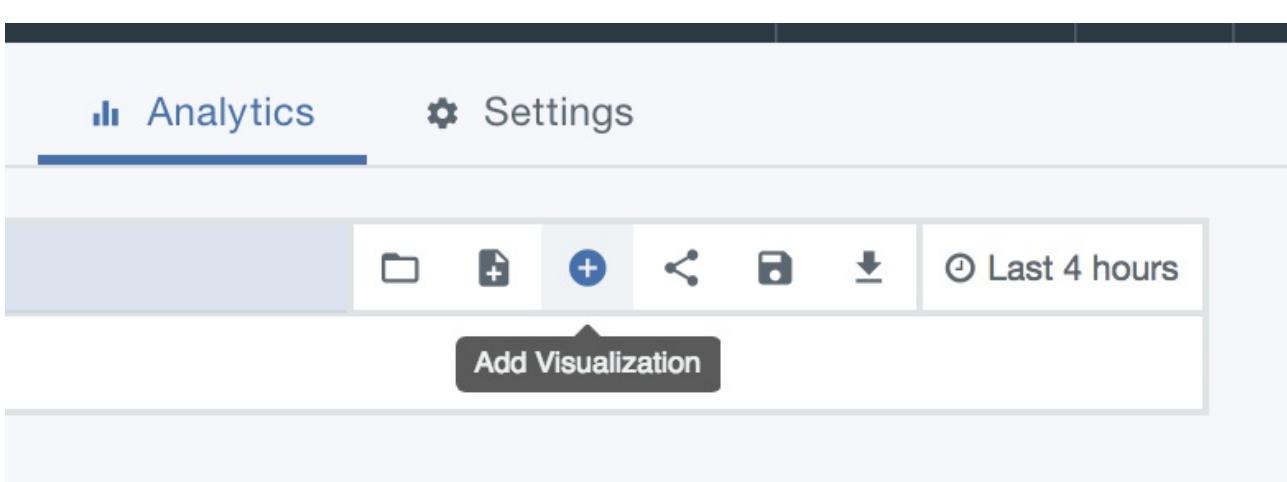
Sandbox - quote-api

Status	Errors	Minimum Response Time (ms)	Average Response Time (ms)	Maximum Response Time (ms)										
	 <table border="1"><thead><tr><th>datetime per day</th><th>Count</th></tr></thead><tbody><tr><td>2017-12-31</td><td>2</td></tr><tr><td>2017-12-31</td><td>1</td></tr><tr><td>2017-12-31</td><td>1</td></tr><tr><td>2017-12-31</td><td>2</td></tr></tbody></table>	datetime per day	Count	2017-12-31	2	2017-12-31	1	2017-12-31	1	2017-12-31	2	15 Min time_to_serve_request	43.25 Average time_to_serve_request	74 Max time_to_serve_request
datetime per day	Count													
2017-12-31	2													
2017-12-31	1													
2017-12-31	1													
2017-12-31	2													



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.

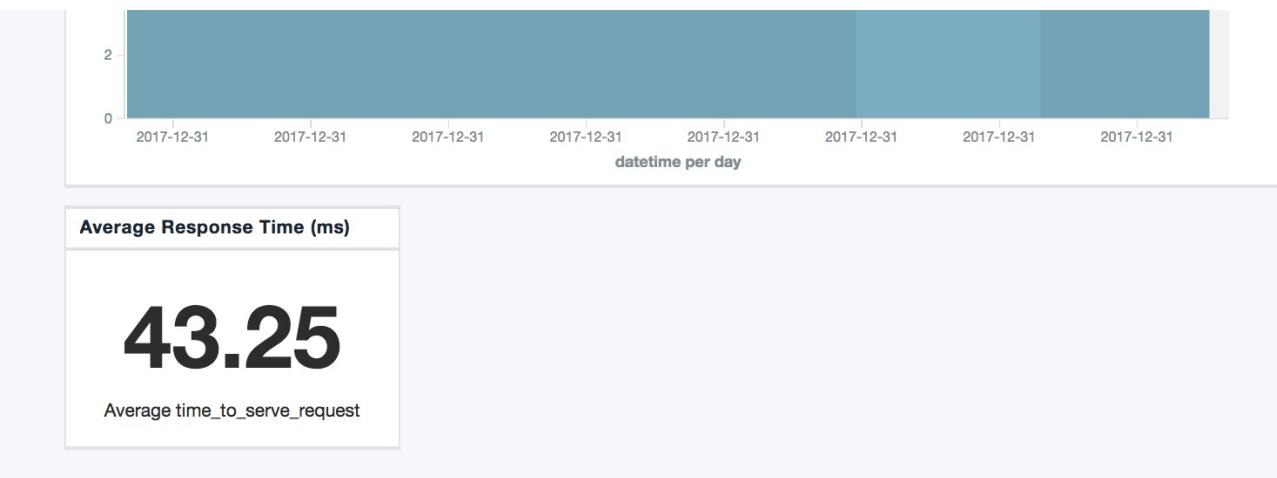


This will bring a list of some of the standard visualizations. You can then type in a string to filter through visualizations or use the arrows to page through the list.

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.

The screenshot shows a list of visualizations in the IBM Cloud Analytics interface. The visualizations include: 5 Most Active APIs, 5 Most Active Products, API Calls, API Calls per Day, Apps per Plan, Average Response Time (ms) (which is highlighted with a red box), Data Usage (bytes), and Developer Organizations. At the top right, there are buttons for 'Create Visualizations' and 'Manage Visualizations'. The status bar at the bottom indicates 'Last 4 hours'.

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 :

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

End of Lab

Using IBM API Connect v5