
Exercise 3. IBM Cloud with IBM Cloudant

Estimated time

00:45

Overview

NoSQL databases are built from the ground up to scale globally, run non-stop, and handle a wide variety of data types, such as JavaScript Object Notation (JSON), full-text, and geospatial. Cloudant is a NoSQL database that is optimized for handling heavy workloads of concurrent reads and writes in the cloud. These workloads are typical of large, fast-growing web, and mobile applications (apps).

This exercise shows you how to create an instance of a Cloudant service on IBM Cloud. You use your Cloudant service instance to discover various features of the Cloudant service and understand the different methods that are available to use the HTTP APIs by using IBM Cloud Identity and Access Management. You also learn how to use Cloudant HTTP APIs to apply create, read, update, and delete operations by creating indexes and by using Cloudant Query on Cloudant documents.

Objectives

After completing this exercise, you should be able to perform the following tasks:

- Create an instance of the Cloudant service on IBM Cloud.
- Create service credentials by using IBM Cloud Identity and Access Management (IAM).
- Access the Cloudant documentation.
- Explore the features of the Cloudant dashboard.
- Create, read, update, and delete Cloudant documents by using HTTP APIs.
- Verify the data that is stored in the database by using the Cloudant dashboard.
- Create indexes and query Cloudant documents by using HTTP APIs.

Introduction

Cloudant is built on Apache CouchDB and contributes to the open source project.

IBM Cloudant is a NoSQL database as a service (DBaaS) that frees developers from worrying about managing the database and enables them to focus on the application.

Cloudant is designed to ensure that the flow of data between an application and its database remains uninterrupted and performs to users' satisfaction. Cloudant can run across many servers in

a database cluster, resulting in high availability (HA) and fault tolerance. The data replication technology also enables developers to put data closer to where their applications need it most.

Your app's data persistence layer can be durable and highly available with IBM Cloudant. Your data is securely hosted and globally managed by big data experts 24x7.

This exercise demonstrates how you can create a Cloudant database service on IBM Cloud without installing or configuring the database instance on your workstation. You use an HTTP API client such as Postman to create, read, update, and delete Cloudant documents. You learn how to create indexes and query data by using Cloudant API endpoints.

Requirements

This exercise requires:

- Access to the internet and the IBM Cloud console from your workstation by using one of the modern web browsers with the current version (such as Chrome, Firefox, or Safari).
- An IBM Cloud account (Lite, Pay-As-You-Go, or Subscription).
- Postman.
- IBM Cloud CLI that is installed in your workstation (optional).
- Any text editor, such as Notepad, Notepad++, VS code, or Sublime (optional).

Exercise instructions

In this exercise you will complete the following tasks:

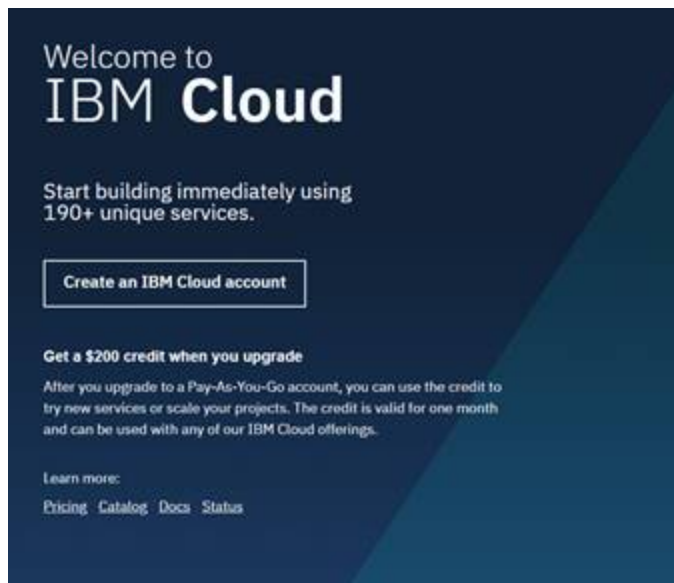
- ___ 1. Log in to IBM Cloud.
- ___ 2. Create an instance of the Cloudant service.
- ___ 3. Explore the Cloudant service on IBM Cloud.
- ___ 4. Create credentials for a Cloudant service instance.
- ___ 5. Explore the features of the Cloudant dashboard.
- ___ 6. Use an HTTP API client to access Cloudant.
- ___ 7. Delete your Cloudant service instance.

Part 1: Logging in to IBM Cloud

In this section, you log in to your IBM Cloud account by providing your own credentials.

Complete the following steps:

- ___ 1. Log in to your IBM Cloud account:
 - ___ a. From your web browser, go to <https://cloud.ibm.com/login>.
 - ___ b. Enter your IBMid, which is the email that you used to register to IBM Cloud, and click **Continue**.
 - ___ c. Enter your password and then click **Log in**, as shown in the following figure.

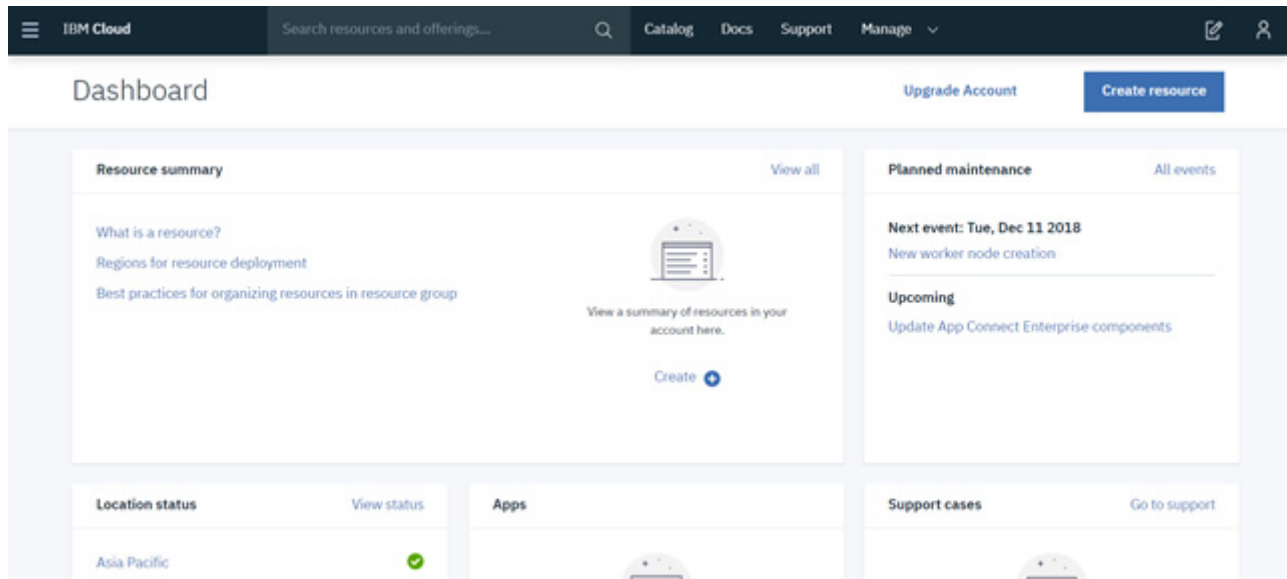


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**Note**

If your company uses the single sign-on service, you provide only your IBMid, and then you are redirected to the single sign-on page to log in by using your company credentials.

___ 2. You are redirected to the IBM Cloud dashboard page, as shown in the following figure.

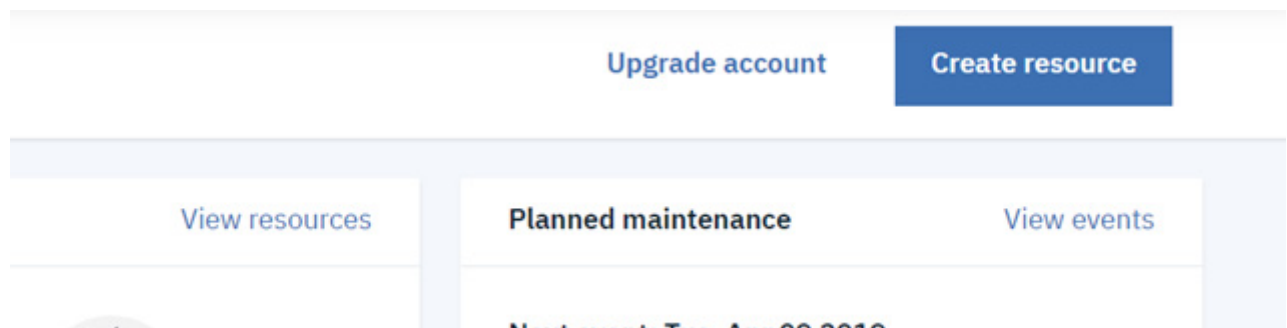


Part 2: Creating an instance of the Cloudant service

Cloudant is a document-oriented DBaaS. Cloudant is available as a service with different plans over IBM Cloud: Lite, Standard, and Dedicated Hardware. This section shows you how to create an instance of the Cloudant service on IBM Cloud. You use this database service in the next part to create, read, update, and delete data.

Complete the following steps:

___ 1. On the IBM Cloud dashboard, click **Create resource** at the upper right, as shown in the following figure.



___ 2. You can now see the entire catalog. In the search field, type **Cloudant**.

___ 3. Select the **Cloudant** service, as shown in the following figure.

Catalog

x

Filter

All Categories (1) >

Compute

Containers

Networking

Storage

AI

Analytics

Databases (1)

Developer Tools

Databases



Cloudant

Lite • IBM • IAM-enabled

A scalable JSON document database for web, mobile, IoT, and serverless applications.

FEEDBACK

___ 4. To complete the creation of the Cloudant service instance:

___ a. Accept the default value for region and keep the **Lite** price plan as the selected plan as shown in the following figure.

Cloudant
Lite
IBM
Service
IAM-enabled

Author: IBM • Date of last update: 10/29/2019
 Need Help?
Contact Support
View docs

Create
About

Select a region

London

Select a pricing plan

Displayed prices do not include tax. Monthly prices shown are for country or region: United States

PLAN	FEATURES	PRICING
✓ Lite	Limited throughput & storage Capped at 1GB of data storage Provisioned throughput capacity fixed at: 20 reads/sec, 10 writes/sec, 5 global queries/sec Max JSON document size of 1MB	Free

The Lite plan provides access to the full functionality of Cloudant for development and evaluation. The plan has a set amount of provisioned throughput capacity as shown and includes a max of 1GB of encrypted data storage. Users exceeding data storage limit will have instances disabled for writes until total storage is below 1GB or instance is upgraded to Standard plan. Users are limited to one Lite plan instance per service.

Lite plan services are deleted after 30 days of inactivity.

___ b. Accept the default values for service name and resource group.

___ c. In **Available authentication methods**, select **Use only IAM**, as shown in the following figure.

Configure your resource

Service name: Select a resource group:

Tags:

Available authentication methods:

Legacy credentials enable login to Cloudant using HTTP Basic authentication

Use only IAM

Use both legacy credentials and IAM

Use only IAM



Note

The Cloudant service has two authentication methods that are available: **Use both legacy credentials and IAM**, which means that both IAM and Legacy credentials can be used to access the account, and **Use only IAM**, which means that only IAM credentials are provided through service binding and credential generation.

- Legacy credentials enable login to Cloudant by using HTTP Basic authentication by providing a user name and password that is used for authentication.
- Identity and Access Management (IAM) provides a unified approach to managing user identities, services, and access control. IAM authentication requires that an IAM API key is exchanged for a time-limited access token before you can make a request to Cloudant. When the access token expires, the client must obtain a new one from the IAM token service.

In this exercise, you use the IAM method as the authentication method for the Cloudant service.

__ d. Click **Create**, as shown in the following figure.

Summary

Cloudant *Free*

Region: London

Plan: Lite

Service name: Cloudant-fs

Resource group: Default

Create

Add to estimate

FEEDBACK

[View terms](#)

5. After the service is created, you are redirected to the Resource list window, as shown in the following figure. Open the Cloudant service instance overview by clicking the newly created service in the Resource list window.

Resource list

Create resource

Collapse all | Expand all

Name ▲	Group	Location	Status	Tags
Filter by name or IP address...	Filter by group or org...	Filter...	Filter...	Filter...
Devices (0)				
VPC Infrastructure (0)				
Kubernetes Clusters (0)				
Cloud Foundry Apps (0)				
Cloud Foundry Services (0)				
Services (1)				
Cloudant-fs	Default	London	Provisioned	--
Storage (0)				
Cloud Foundry Enterprise Environments (0)				



Note

After you create the service, it takes a few minutes to be provisioned, as shown in the following figure. The status is “Provision in progress” for a while. If it takes too long for the status to change to “Provisioned”, refresh the browser.

Resource list Create resource

[Collapse all](#) | [Expand all](#)

Name ▲	Group	Location	Status	Tags
Filter by name or IP address...	Filter by group or org...	Filter...	Filter...	Filter...
▼ Devices (0)				
▼ Kubernetes Clusters (0)				
▼ Cloud Foundry Apps (0)				
▼ Cloud Foundry Services (0)				
▼ Services (1)				
Cloudant-Is	Default	London	Provision in progress	...
▼ Storage (0)				
▼ Cloud Foundry Enterprise Environments (0)				

Part 3: Exploring the Cloudant service on IBM Cloud

The Cloudant service instance has an overview page on IBM Cloud where you can perform the following actions:

- Access the Cloudant dashboard.
- Create credentials to connect manually to an external consumer.
- Connect automatically with an internal IBM Cloud application.
- Upgrade the plan.
- Manage a Cloudant instance and perform many other actions that are related to the Cloudant service on IBM Cloud.
- In this section, you discover these capabilities.
- Complete the following steps:

___ 1. In the **Resource list** under **Services**, click the newly created Cloudant service instance.

Resource list

[Create resource](#)

[Collapse all](#) | [Expand all](#)

Name ▲	Group	Location	Status	Tags
<input type="text" value="Filter by name or IP address..."/>	<input type="text" value="Filter by group or org..."/>	<input type="text" value="Filter..."/>	<input type="text" value="Filter..."/>	<input type="text" value="Filter..."/>
▼ Devices (0)				
▼ VPC Infrastructure (0)				
▼ Kubernetes Clusters (0)				
▼ Cloud Foundry Apps (0)				
▼ Cloud Foundry Services (0)				
▼ Services (1)				
Cloudant-fs	Default	London	Provisioned	-- ***
▼ Storage (0)				
▼ Cloud Foundry Enterprise Environments (0)				

- ___ 2. After you open the Cloudant service instance, you are redirected to the overview page of the service. In the left pane are the **Manage**, **Service credentials**, **Plan**, and **Connections** menu options, as shown in the following figure.

[Manage](#)
[Service credentials](#)
[Plan](#)
[Connections](#)

Resource list /

Cloudant-fs

⋮

Resource group: Default Location: London [Add Tags](#)

[Overview](#) [Dashboard](#) [Capacity](#) [Docs](#) [Launch Cloudant Dashboard](#)

Deployment details

CRN

crn:v1:bluemix:public:cloudantnosqldb:eu-gb:a/253673fed66746c2a4e47e3e6bbbeddf:ecf4f9ec-46cf-449f-8d59-4a63a72e3274::

Location

London

External Endpoint

<https://e6331570-ede2-4e07-87e6-0fbeb4ec5d3-bluemix.cloudant.com>

- ___ 3. The Manage section has four tabs: Overview, Dashboard, Capacity, and Docs, which are in the right pane. The Manage section also includes the **Launch Cloudant Dashboard** button, which opens the Cloudant dashboard.
- ___ a. The Overview tab (shown in the following figure) shows data about the current service, such as the deployment details, which include the location, endpoint, and authentication method that is used. It also shows capacity details, which include the current plan and the available storage. It also includes a section for important announcements that are related to Cloudant, such as showing new features and updates.

Resource list / **Cloudant-fs**

Resource group: Default Location: London [Add Tags](#)

[Overview](#) [Dashboard](#) [Capacity](#) [Docs](#) [Launch Cloudant Dashboard](#)

Deployment details

CRN	crn:v1:bluemixpublic:cloudantnosqldb:eu-gb:a/253673fed66746c2a4e47e3e6bbbeddf:39667b9b-17ec-451a-8ad9-e32713658603::		
Location	London		
External Endpoint	https://33915899-7504-454f-8690-19a1403c0adf-bluemix.cloudant.com		
External Endpoint (preferred)	https://33915899-7504-454f-8690-19a1403c0adf-bluemix.cloudantnosqldb.appdomain.cloud		
Authentication methods	IBM Cloud IAM		
Activity Tracker event types	Management	Save	
Disk encryption	Yes		

Capacity details

You are currently subscribed to the Lite plan. [Upgrade](#)

Reads	20 per second
Writes	10 per second
Global queries	5 per second
Storage	0.00GB of 1GB



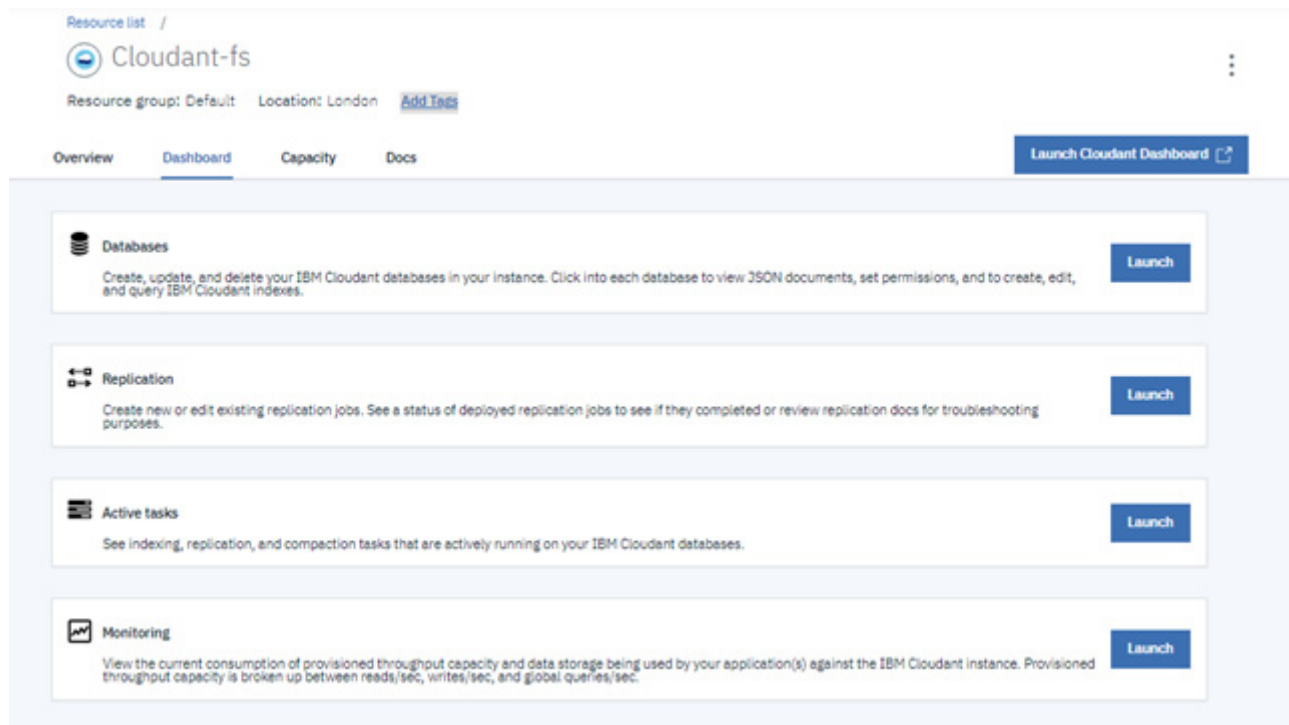
- ___ b. The Dashboard tab (shown in the following figure) includes quick access to specific sections in the Cloudant dashboard:

Databases, where you can create, update, and delete databases.

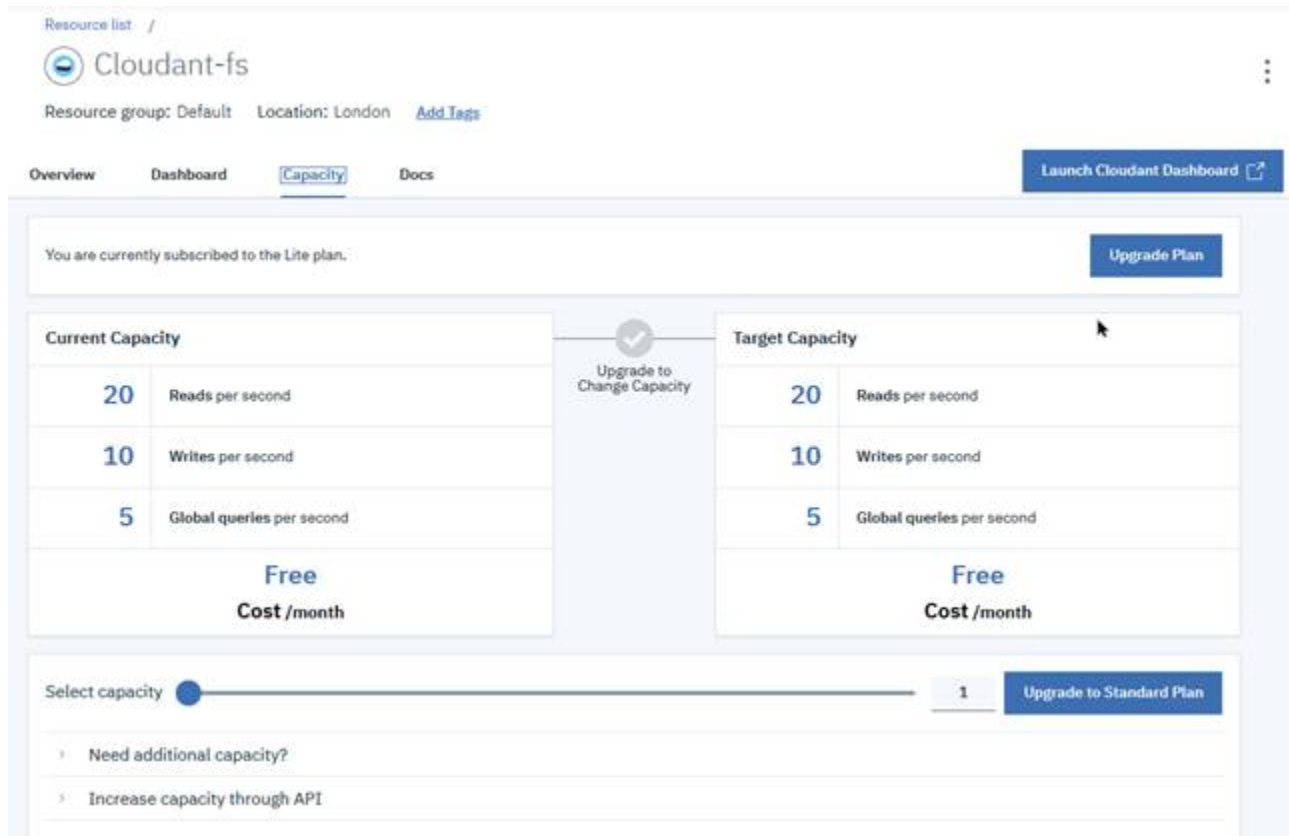
Replication, where you can create or edit existing replication jobs.

Active tasks, where you can see indexing, replication, and compaction tasks that are actively running on your Cloudant instance.

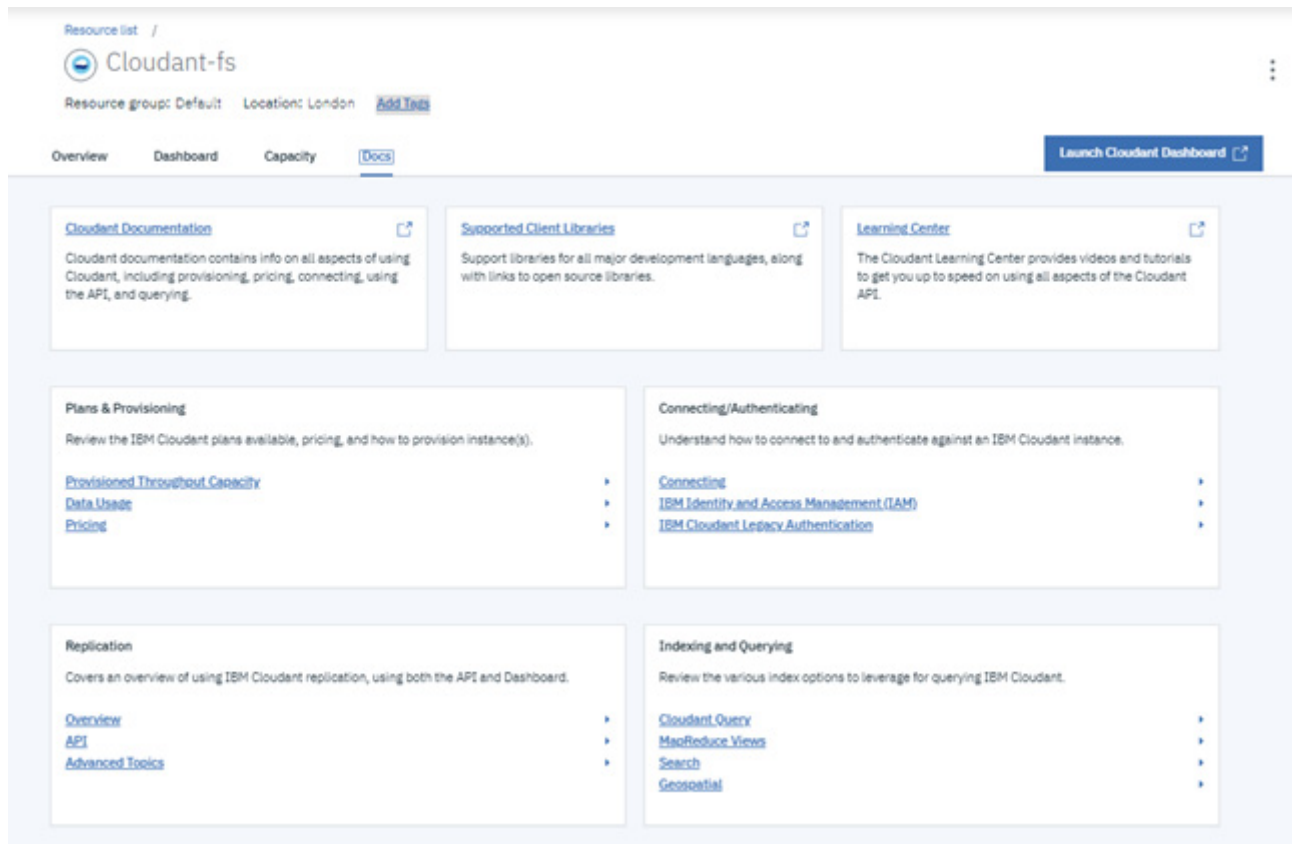
Monitoring, where you can see the current consumption of provisioned throughput capacity and data storage that is being used by your applications.



- ___ c. The Capacity tab shows the current capacity that is available for your application and the current plan that is used, as shown in the following figure.



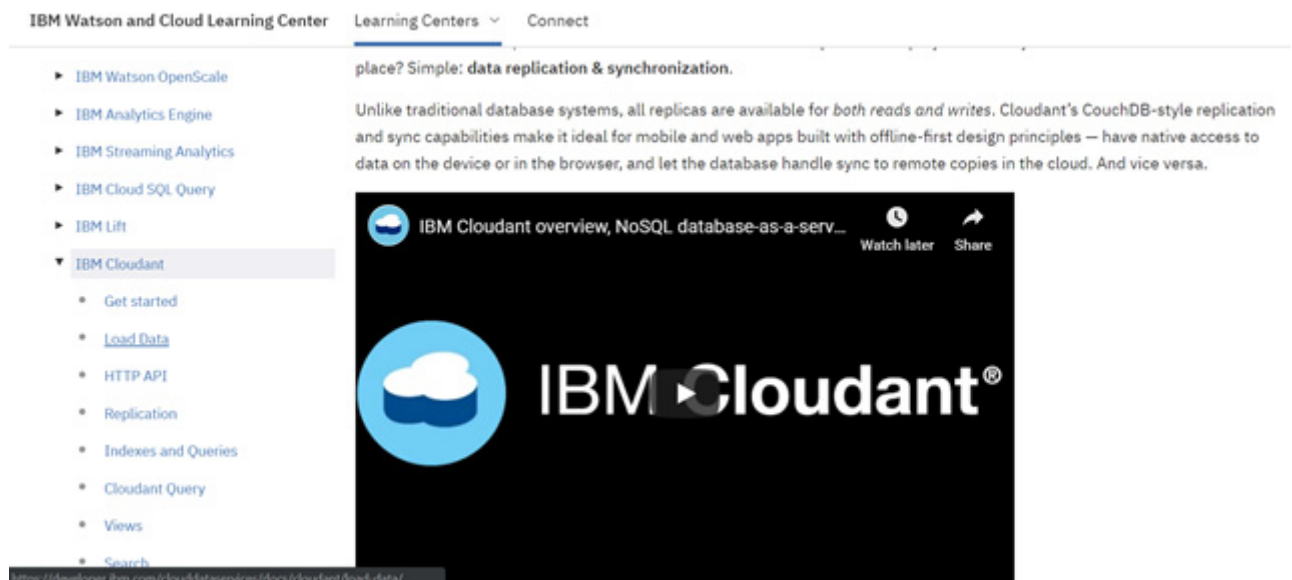
- ___ d. The Docs tab includes a direct link for Cloudant documentation, some tutorials about Cloudant, and open source libraries for connecting with Cloudant for all major development languages, as shown in the following figure.



- ___ e. In the Docs tab, select **Learning Center** or alternatively, from another browser tab, go to the following address:

<https://developer.ibm.com/clouddataservices/docs/cloudant/>

- ___ f. In the IBM Cloudant Learning Center window, click **Load Data**, as shown in the following figure.

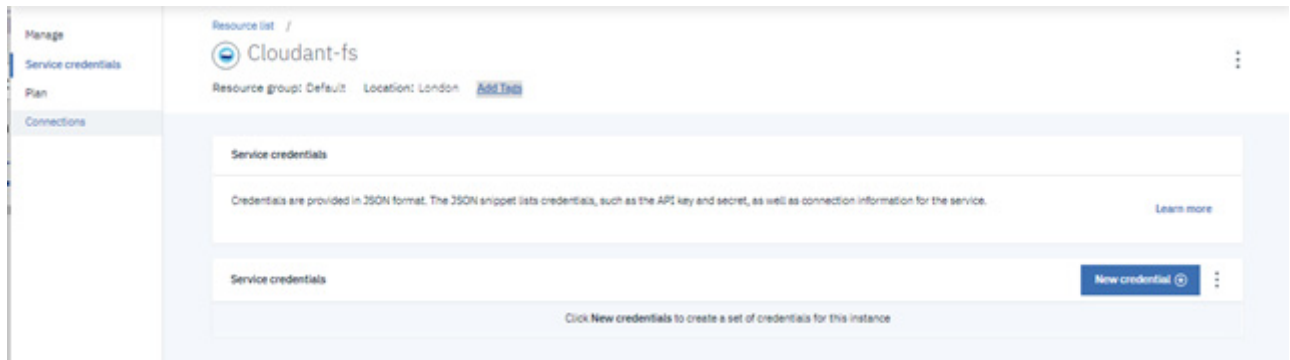


You can also get to this page by going to the following address:

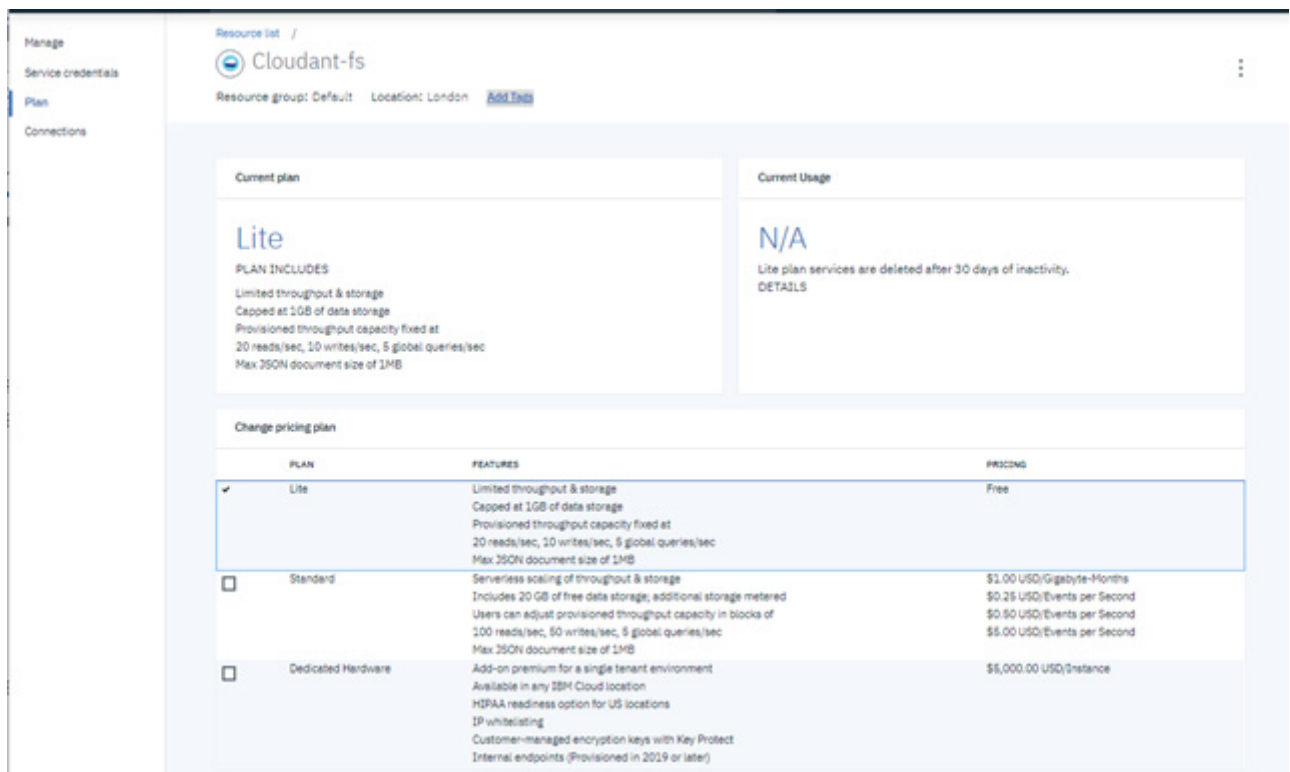
<https://developer.ibm.com/clouddataservices/docs/cloudant/load-data/>

- ___ g. Read the entire document, including the tutorials, and watch all the videos in this page. You do not need to do the tutorials. When you finish reading this document, close the browser tab for IBM Cloudant dashboard.
- ___ 4. In the left pane of the Cloudant service overview page in IBM Cloud, explore the other sections:

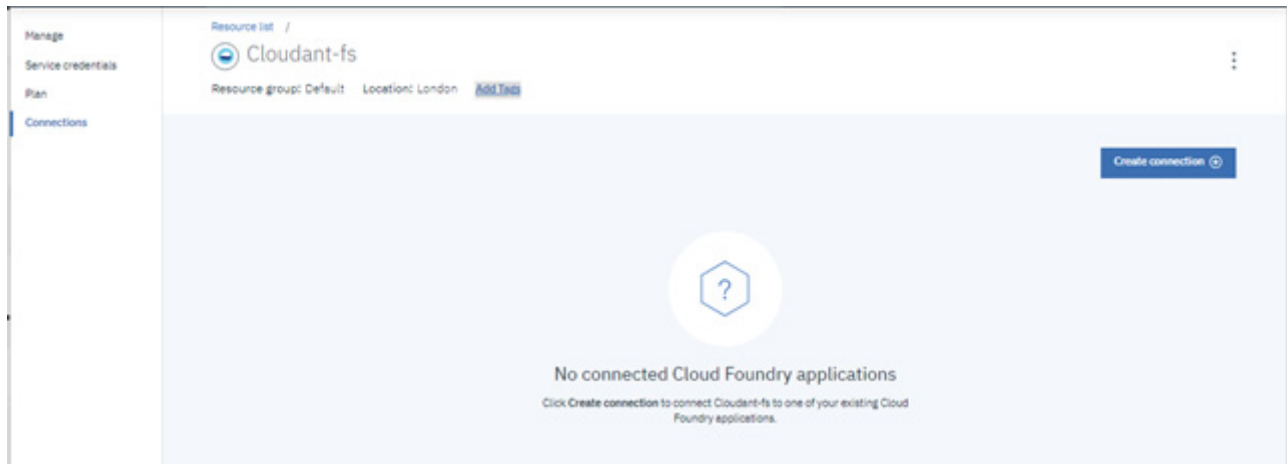
Service credentials, where you can create a set of credentials so that an external consumer can use the Cloudant Rest APIs, as shown in the following figure.



Plan, where you can upgrade your current plan, as shown in the following figure.



Connections, where you can connect the service with any existing Cloud Foundry applications on the same organization.

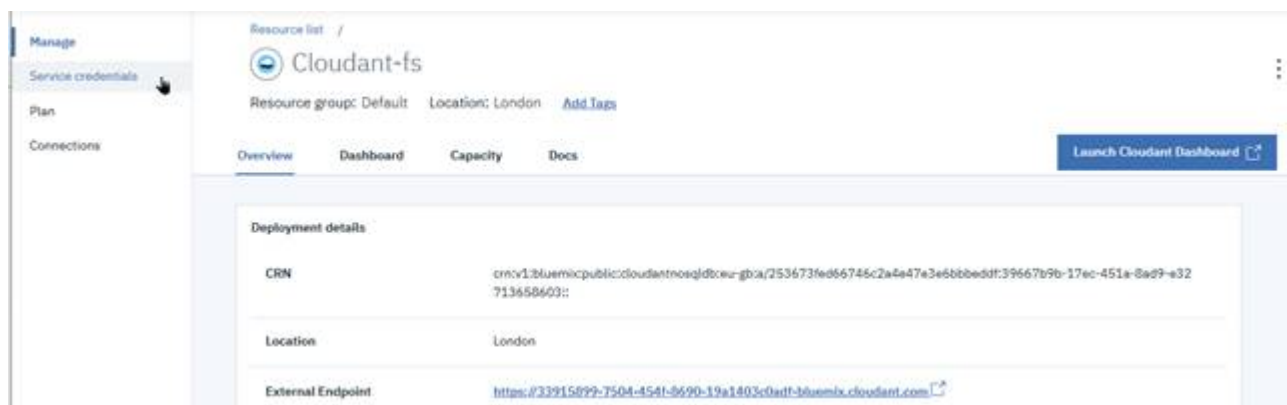


Part 4: Creating credentials for a Cloudant service instance

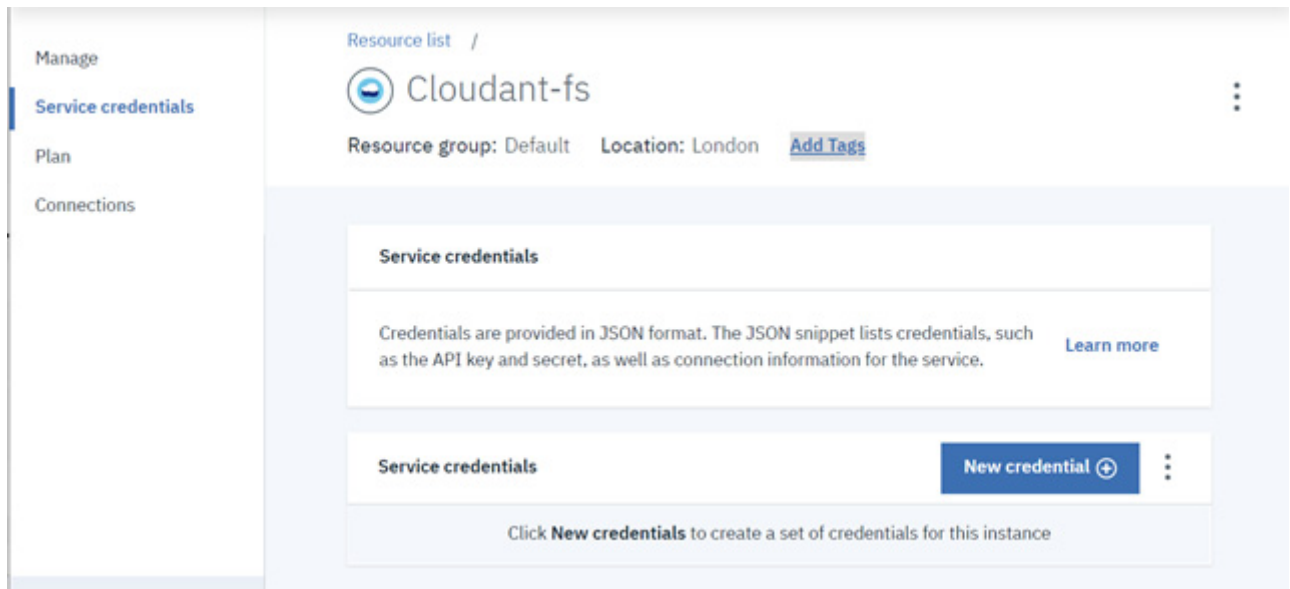
To connect your Cloudant service with external consumers such as external applications or REST API clients, you must create credentials. In this section, you create a set of credentials for the Cloudant service that will be used in the next sections to submit HTTP API calls from an HTTP API client.

Complete the following steps:

- ___ 1. From the Cloudant service Overview page, select **Service credentials** from the left pane, as shown in the following figure.



- ___ 2. In the Service credentials page, click **New credential +** as shown in the following figure.



- ___ 3. Keep the default values that are shown in the window and click **Add**, as shown in the following figure.

The 'Add new credential' dialog box is shown. It has a close button (X) in the top right corner. The form contains the following fields:

- Name:** A text input field with the value 'Service credentials-1'.
- Role:** A dropdown menu with an information icon (i) and the selected value 'Manager'.
- Select Service ID (Optional):** A dropdown menu with an information icon (i) and the selected value 'Select Service ID...'.
- Add Inline Configuration Parameters (Optional):** A text area with an information icon (i) and no text entered.

 At the bottom right of the dialog are two buttons: 'Cancel' and 'Add'.

**Note**

The Add new credential window includes the following fields:

- Role defines the actions that are permitted when the service is accessed. This field currently allows the Manager role only.
- Service ID identifies a service or application similar to how a user ID identifies a user. There are two options for creating service ID: Auto generating one or by creating a customized one.
- Add Inline Configuration Parameters (Optional) provides service-specific configuration parameters in a valid JSON object.

- ___ 4. After the set of credentials is created successfully, open the new service credentials by clicking **View credentials**, as shown in the following figure.

Resource list /

Cloudant-fs

Resource group: Default Location: London [Add Tags](#)

Service credentials

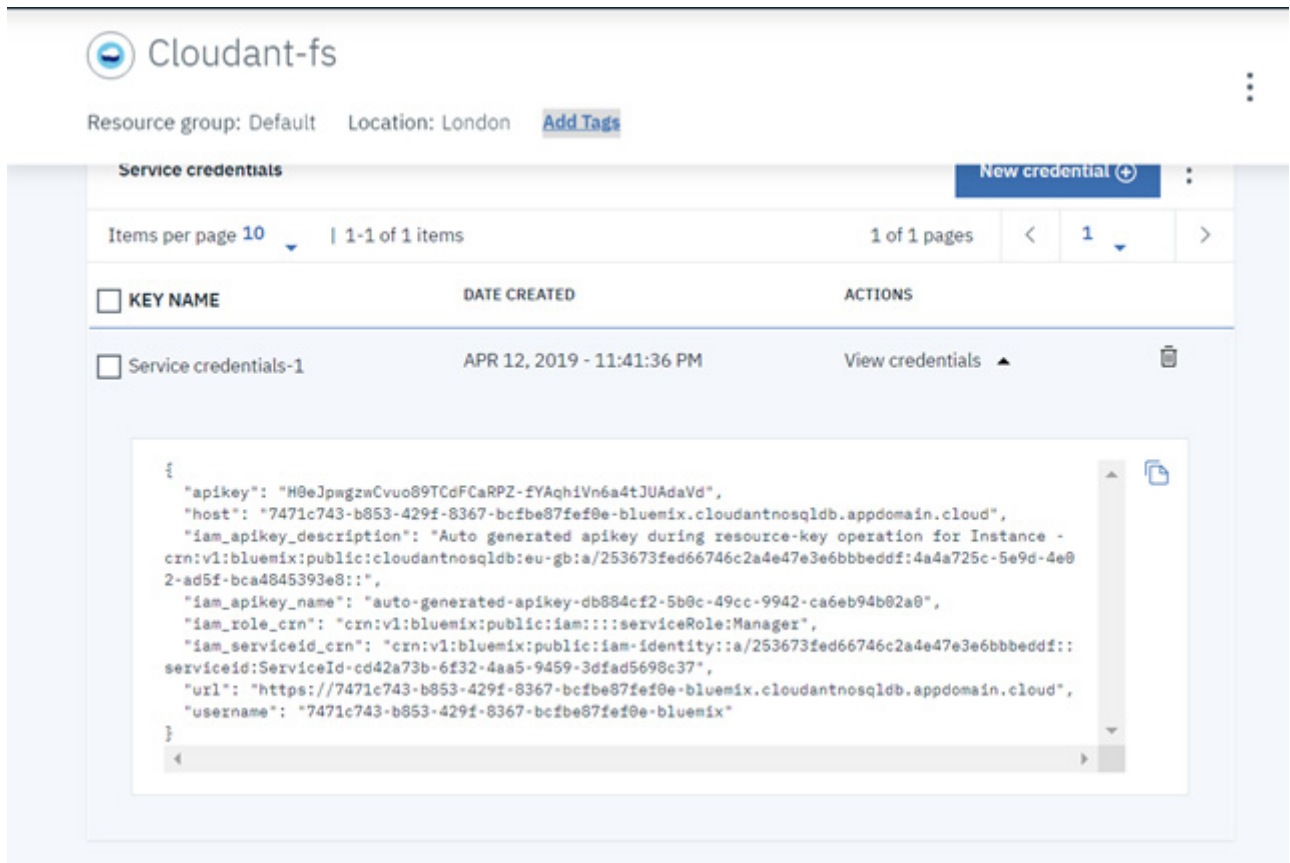
Credentials are provided in JSON format. The JSON snippet lists credentials, such as the API key and secret, as well as connection information for the service. [Learn more](#)

Service credentials [New credential](#)

Items per page 10 | 1-1 of 1 items 1 of 1 pages < 1 >

<input type="checkbox"/> KEY NAME	DATE CREATED	ACTIONS
<input type="checkbox"/> Service credentials-1	APR 12, 2019 - 11:41:36 PM	View credentials

- ___ 5. Click the **Copy to clipboard** icon on the right to copy the credentials data that is kept in JSON format, as shown in the following figure. Then, create a file on your favorite text editor, paste the credentials into the newly created file, save it in your local workstation, and name it `cloudant_credentials.json`.



Part 5: Exploring the features of the Cloudant dashboard

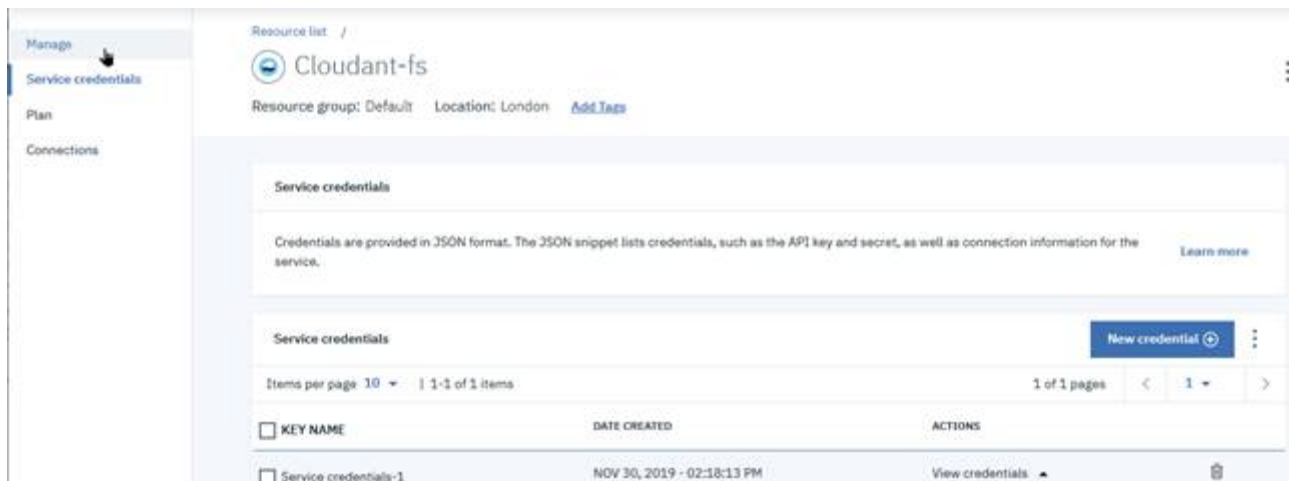
The Cloudant dashboard has a simple structure that you can use to discover and use Cloudant features. These features include the following ones:

- Database management, including database creation and deletions.
- Documents management: create, read, update, and delete (CRUD) operations, indexes, and Cloudant queries.
- Monitoring, including the operations activity and storage.
- Replication of both remote and local databases.

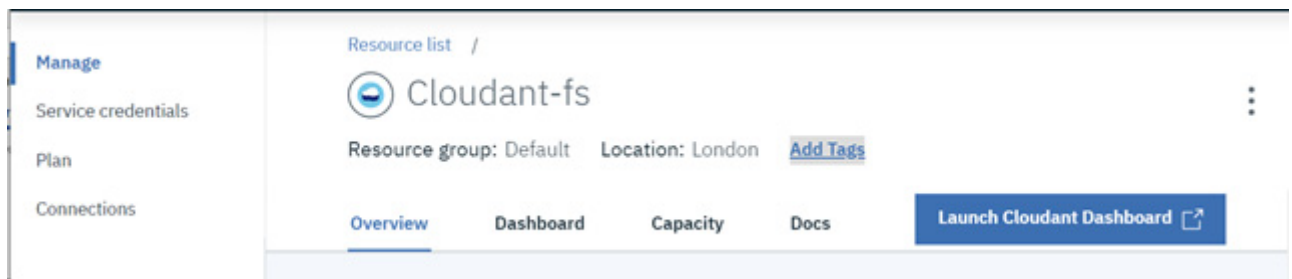
In this section, you explore and apply some of these features. You create a database, and then you apply CRUD operations to Cloudant documents. You also use Cloudant query to view Cloudant documents based on some specified conditions.

Complete the following steps:

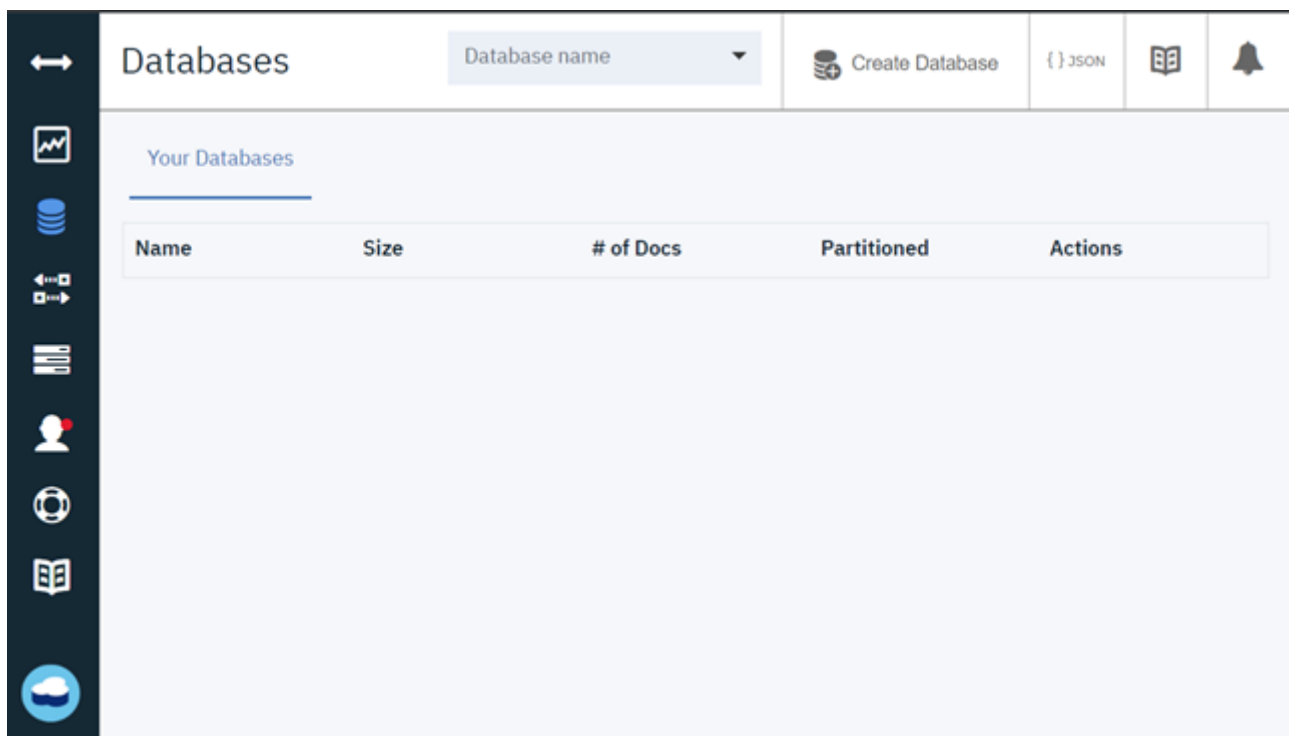
1. From the left pane of the Cloudant instance service, select **Manage**, as shown in the following figure.



__ 2. Click **Launch Cloudant Dashboard**, as shown in the following figure.



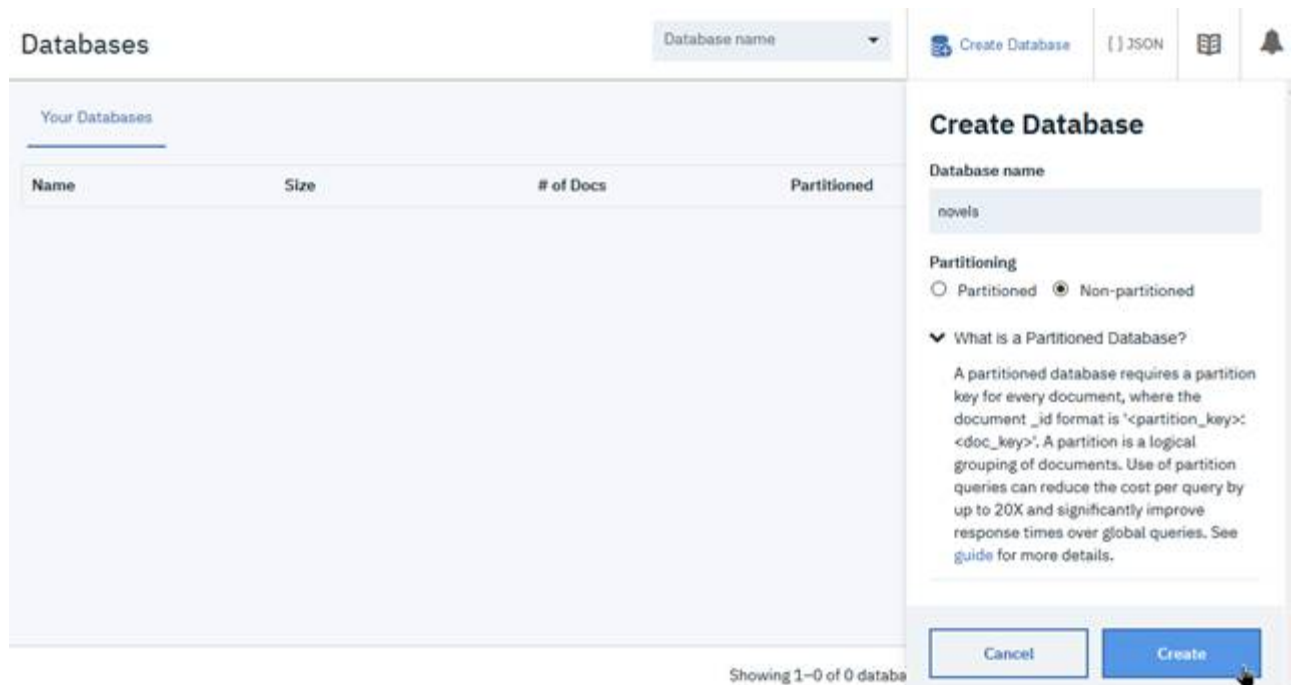
__ 3. The Cloudant dashboard opens in a new browser tab, as shown in the following figure.



- ___ 4. Create a database and name it **novels** by completing the following steps:
- ___ a. Click **Create Database** on the top bar, as shown in the following figure.



- ___ b. Name the database **novels**, select **Non-partitioned**, and then click **Create**, as shown in the following figure.

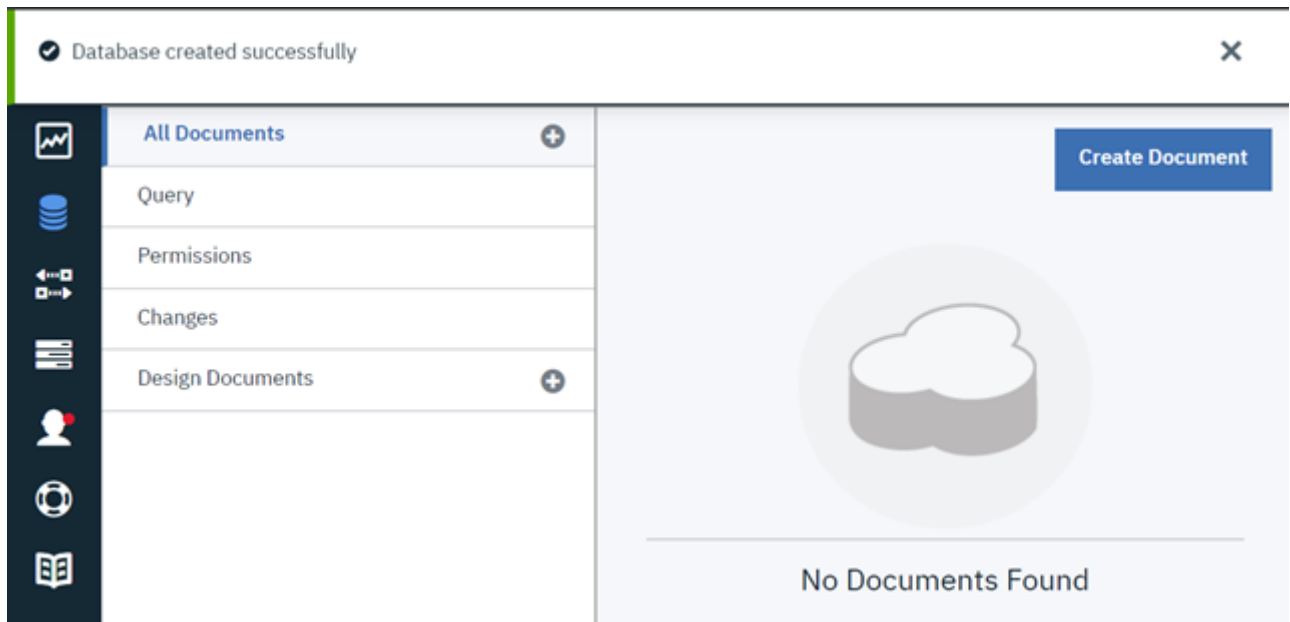


Note

While you are creating a database, there is the option to make the database partitioned. A partitioned database is a newer type of IBM Cloudant database. This option is an advanced feature, so it is out of the scope of this exercise. For more information about this topic, see the following link:

<https://cloud.ibm.com/docs/services/Cloudant/guides?topic=cloudant-database-partitioning#database-partitioning>

- ___ c. After you create the database, you are redirected to the new database overview, as shown in the following figure.



- ___ 5. Create a document for the “Oliver Twist” novel by completing the following steps:
- ___ a. Click **Create Document**, as shown in the following figure.

Create Document

- ___ b. You are redirected to the document editor page, which contains by default a JSON object with an auto-generated `_id`, as shown in the following figure.

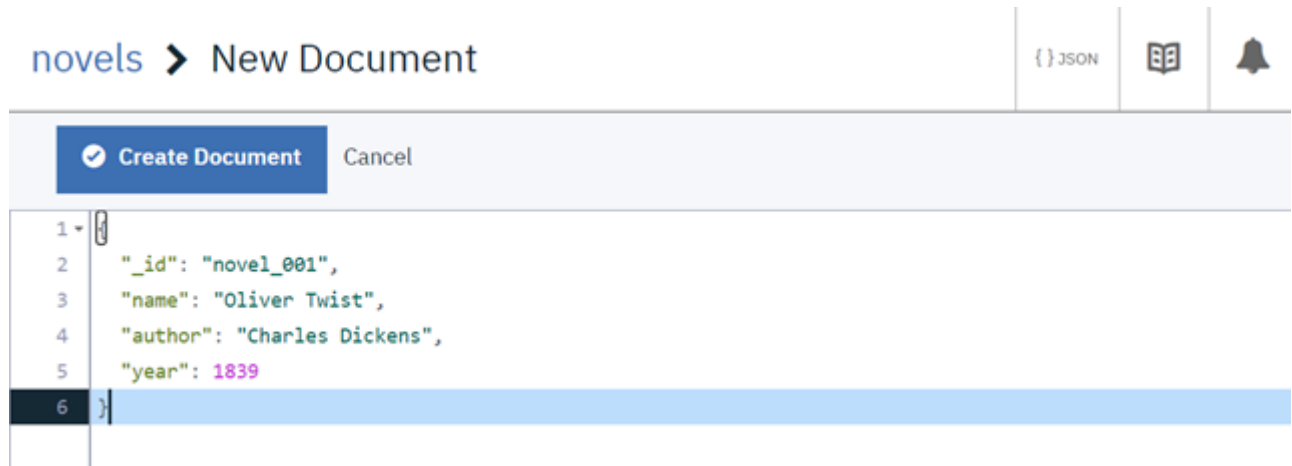


Note

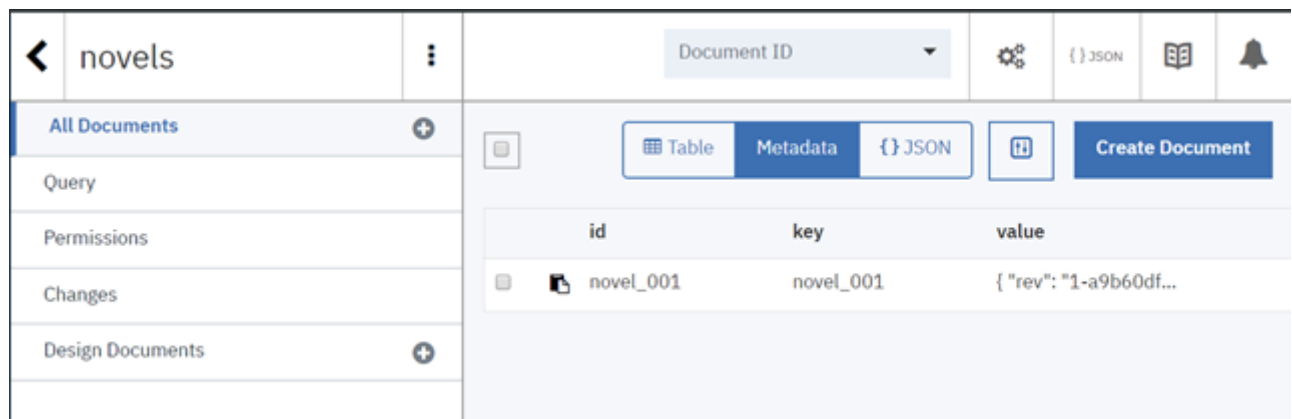
The `_id` field is automatically generated by Cloudant because it is considered the unique key identifier for the document. You can override this key by providing a `_id` with a unique value across the other documents.

- ___ c. Replace the JSON object in the document editor with the following JSON object:

```
{
  "_id": "novel_001",
  "name": "Oliver Twist",
  "author": "Charles Dickens",
  "year": 1839
}
```



- ___ d. Click **Create Document**.
- ___ e. After you create the document, you are redirected back to the database overview page, which contains the newly created document, as shown in the following figure.



- ___ f. To show the full data of the newly created document in JSON format, select **{ } JSON** from the top tabs, as shown in the following figure.

The screenshot shows the IBM Cloudant web interface. On the left is a sidebar with navigation links: 'novels' (selected), 'All Documents', 'Query', 'Permissions', 'Changes', and 'Design Documents'. The main area displays a document with ID 'novel_001'. Above the document content are tabs for 'Table', 'Metadata', and 'JSON' (selected), along with a 'Create Document' button. The JSON content is as follows:

```
{
  "id": "novel_001",
  "key": "novel_001",
  "value": {
    "rev": "1-a9b60df0448b15a0cd6ded38cbb91154"
  },
  "doc": {
    "_id": "novel_001",
    "_rev": "1-a9b60df0448b15a0cd6ded38cbb91154",
    "name": "Oliver Twist",
    "author": "Charles Dickens",
    "year": 1839
  }
}
```

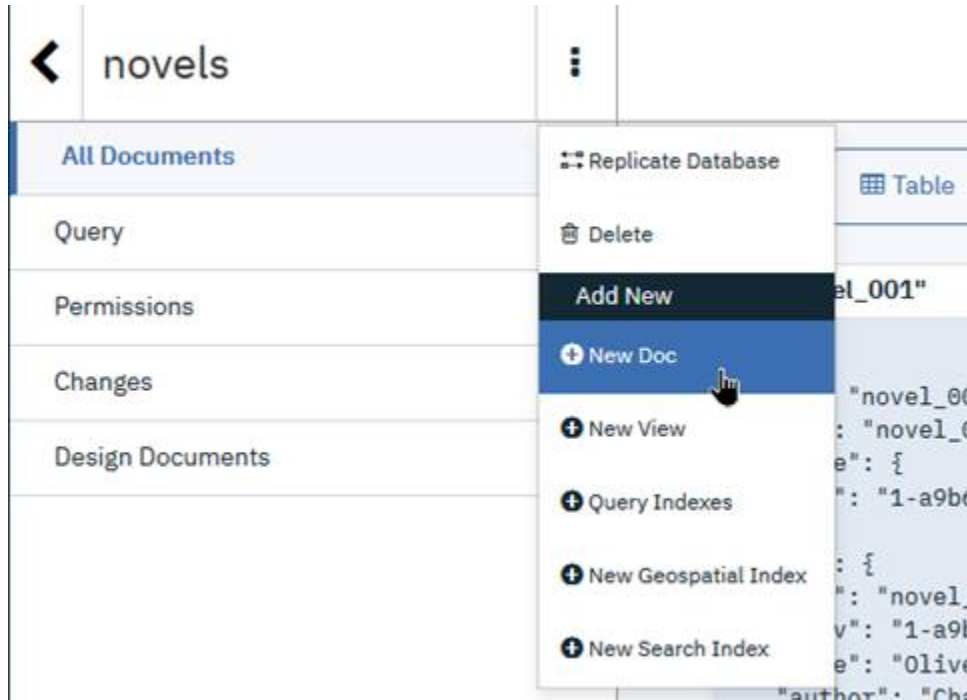


Information

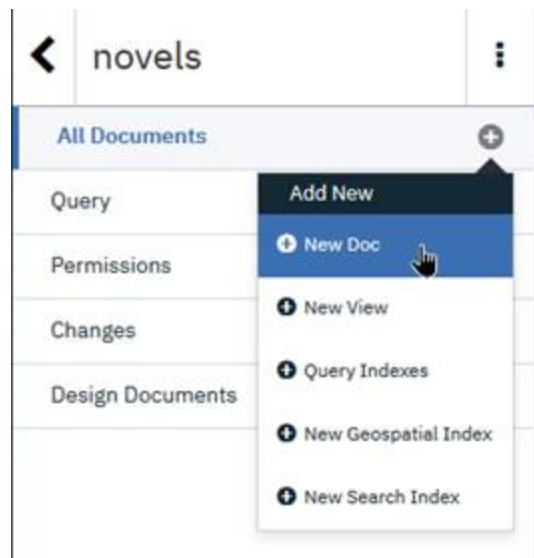
After you create the document, you find a field that is called `_rev` that is automatically generated by Cloudant. The `_rev` field is used internally by the Cloudant database as a revision number. A revision number is added to your documents by the server when you insert or modify documents. You must specify the latest `_rev` when you update a document or your request fails and returns a 409 error. This field helps you avoid conflicting data states. The revision number is also used to confirm that a client is trying to modify the current version of a document.

**Note**

You can also create a document by clicking the three dots vertical menu icon and selecting **+ New Doc**, as shown in the following figure.



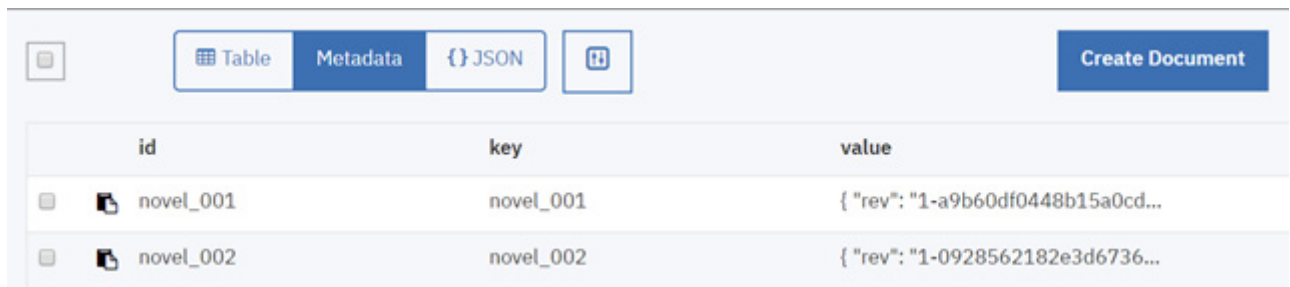
Another option to create a document is to click the **+** icon next to **All Documents** in the left pane then select **New Doc +** as shown in the following figure.



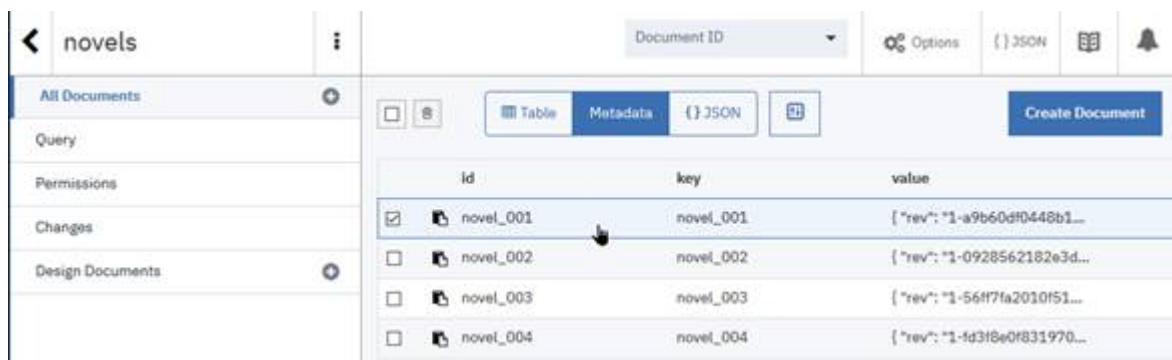
6. Repeat the steps to create a new document three times by using the following JSON objects to add documents for “King Solomon's Mines”, “Treasure Island”, and “The Merry Adventures of Robin Hood” novels:

```
{
  "_id": "novel_002",
  "name": "King Solomon's Mines",
  "author": "H. Rider Haggard",
  "year": 1885
}
{
  "_id": "novel_003",
  "name": "Treasure Island",
  "author": "Robert Louis Stevenson",
  "year": 1883
}
{
  "_id": "novel_004",
  "name": "The Merry Adventures of Robin Hood",
  "author": "Howard Pyle",
  "year": 1883
}
```

7. Update the document of “Oliver Twist” novel by completing the following steps:
- Return to the metadata view by selecting the **Metadata** tab from the top tabs, as shown in the following figure.



- Select the document where `_id` corresponds to `novel_001` from the list of documents, as shown in the following figure.



- ___ c. The document editor opens. Change the name field to `David Copperfield` and the year to `1850`, as shown in the following figure.

novels > novel_001

```

1 {
2   "_id": "novel_001",
3   "_rev": "1-a9b60df0448b15a0cd6ded38cbb91154",
4   "name": "David Copperfield ",
5   "author": "Charles Dickens",
6   "year": 1850
7 }

```

- ___ d. Click **Save Changes**.



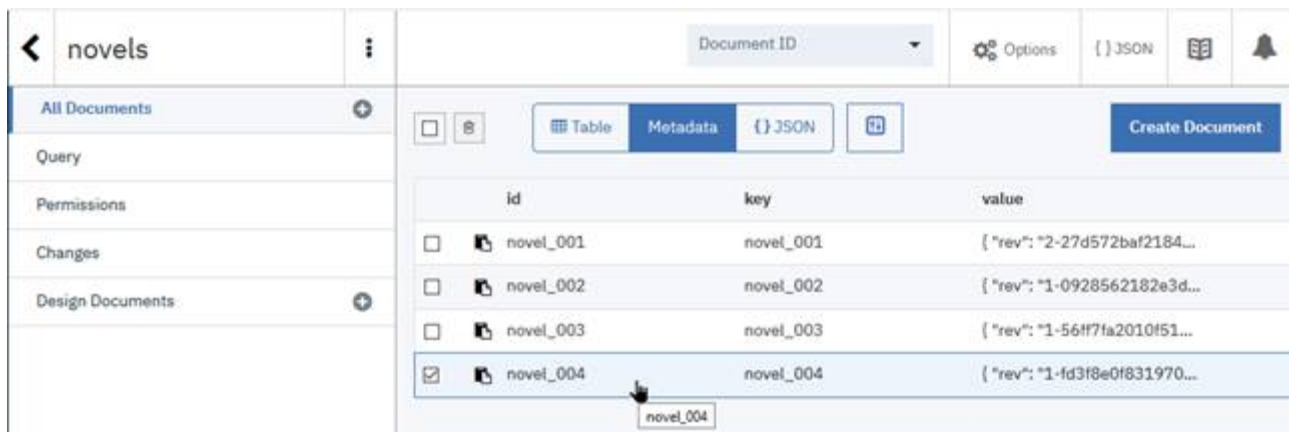
Important

When you create a document, the `_rev` field that is generated by Cloudant always starts with `1-`, which indicates that this is the first version of this document. This number increments by 1 with each document update to highlight the document version number. The first digit in the revision number increments after the document update, as shown in the following figure.

< novels		Document ID	Options	{ } JSON		
All Documents		Table	Metadata	{ } JSON		Create Document
Query						
Permissions						
Changes						
Design Documents						

	id	key	value
<input type="checkbox"/>	novel_001	novel_001	{ "_rev": "2-27d572baf2184...
<input type="checkbox"/>	novel_002	novel_002	{ "_rev": "1-0928562182e3d...
<input type="checkbox"/>	novel_003	novel_003	{ "_rev": "1-56ff7fa2010f51...
<input type="checkbox"/>	novel_004	novel_004	{ "_rev": "1-fd3f8e0f831970...

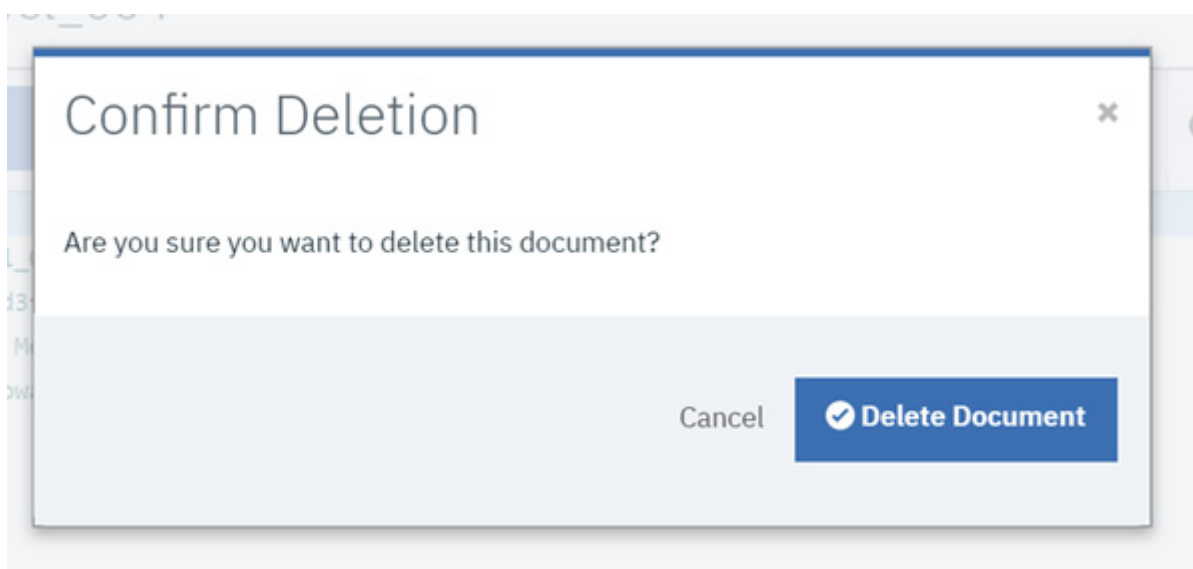
- ___ 8. Delete the document for the “The Merry Adventures of Robin Hood” novel by completing the following steps:
- ___ a. From the **novels** database overview page, select the document where `_id` corresponds to `novel_004` from the list of documents, as shown in the following figure.



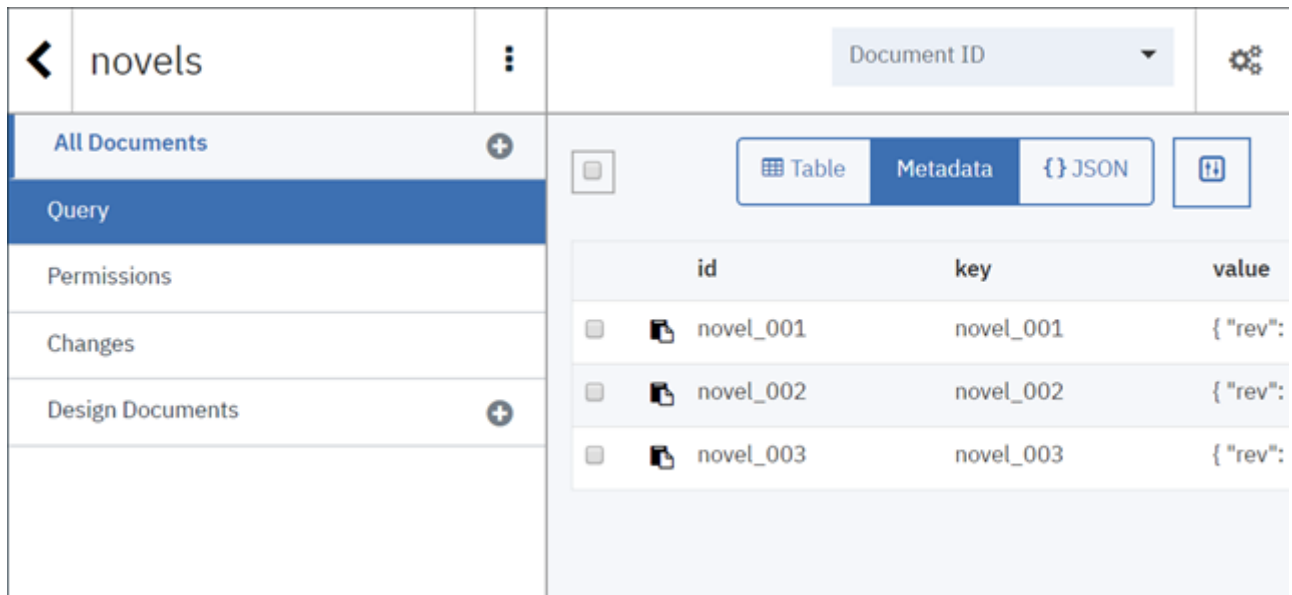
___ b. Click **Delete** from the top bar, as shown in the following figure.



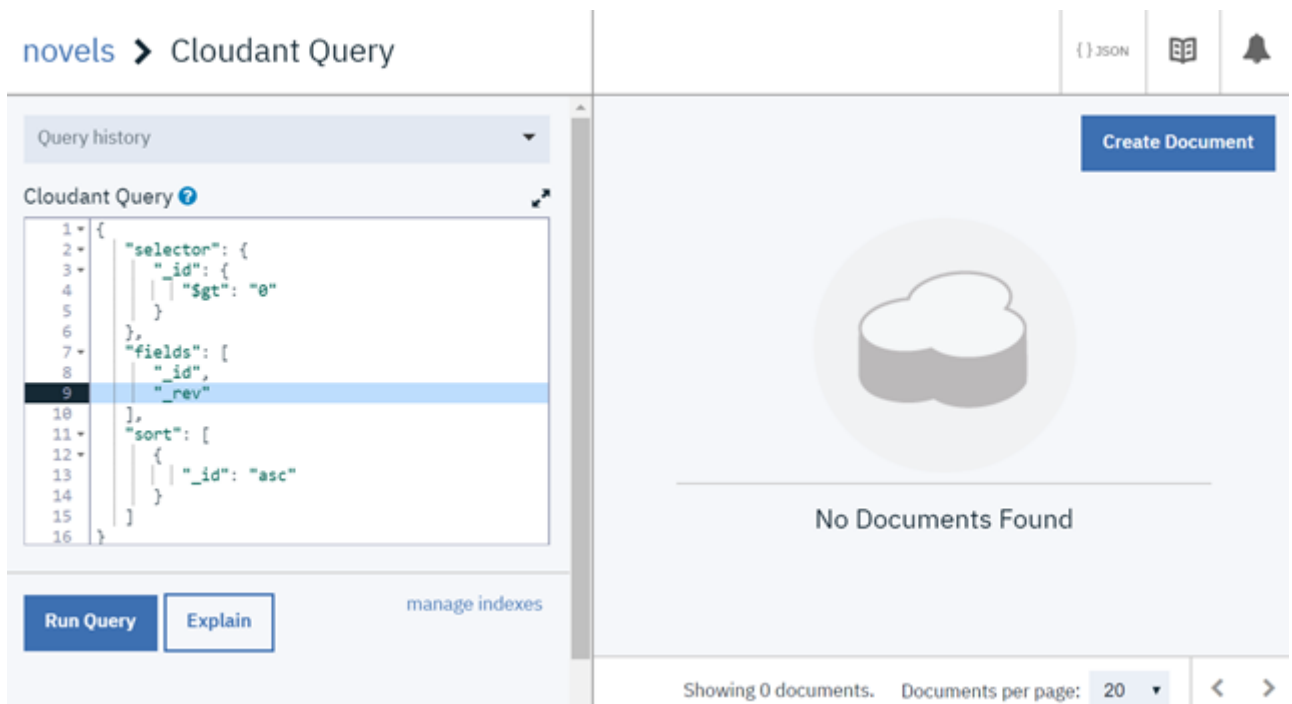
___ c. Click **Delete Document**, as shown in the following figure.



- ___ 9. Create a query to get the documents of the novels that are published after 1870 by completing the following steps:
- ___ a. Select **Query** from left pane, as shown in the following figure.



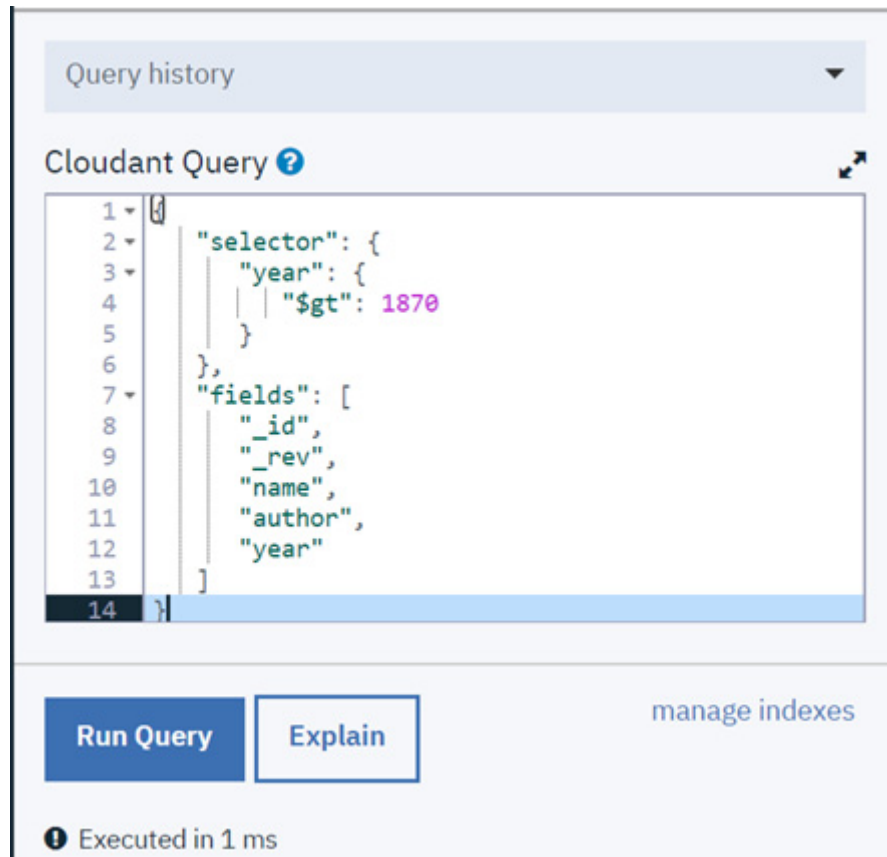
- ___ b. You are redirected to the query editor page, as shown in the following figure.



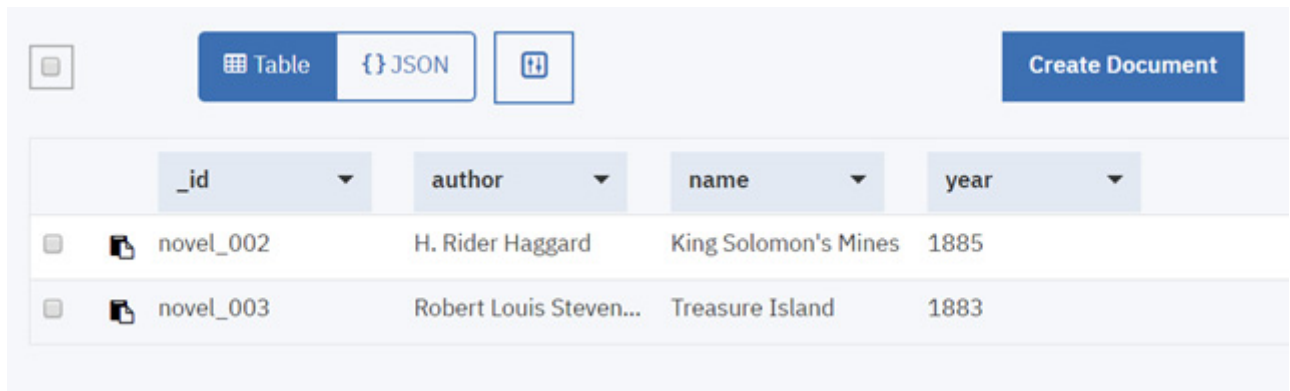
- ___ c. Replace the JSON object in the editor with the following code:

```
{
  "selector": {
    "year": {
      "$gt": 1870
    }
  },
  "fields": [
    "_id",
    "_rev",
    "name",
    "author",
    "year"
  ]
}
```

- ___ d. Click **Run Query**, as shown in the following figure.



- ___ e. The results are populated in the right pane, as shown in the following figure.



The screenshot shows the IBM Cloudant web interface. At the top, there are tabs for 'Table', 'JSON', and a document icon, along with a 'Create Document' button. Below the tabs is a table with four columns: '_id', 'author', 'name', and 'year'. The table contains two rows of data.

_id	author	name	year
novel_002	H. Rider Haggard	King Solomon's Mines	1885
novel_003	Robert Louis Steven...	Treasure Island	1883

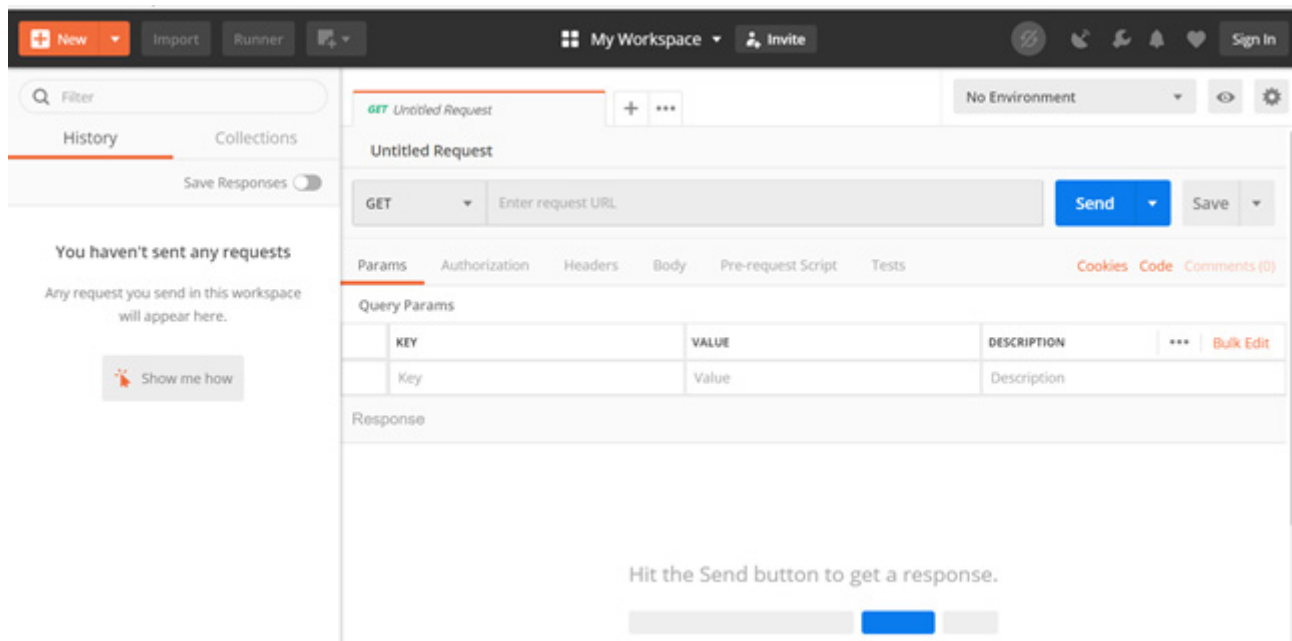
Part 6: Using an HTTP API client to access Cloudant

Cloudant uses HTTP for all external communication to provide simple, web-based access to data in the Cloudant data store. The HTTP API is a programmatic way of accessing the data from any HTTP client consumer. It provides a set of HTTP access methods for create, read, update, and delete operations on Cloudant documents, and for using Cloudant query and many other features that are related to Cloudant.

In this part, you use an HTTP API client (Postman) to interact with Cloudant. You can use another HTTP API client, such as cURL or SOAP-UI, if you prefer.

Complete the following steps:

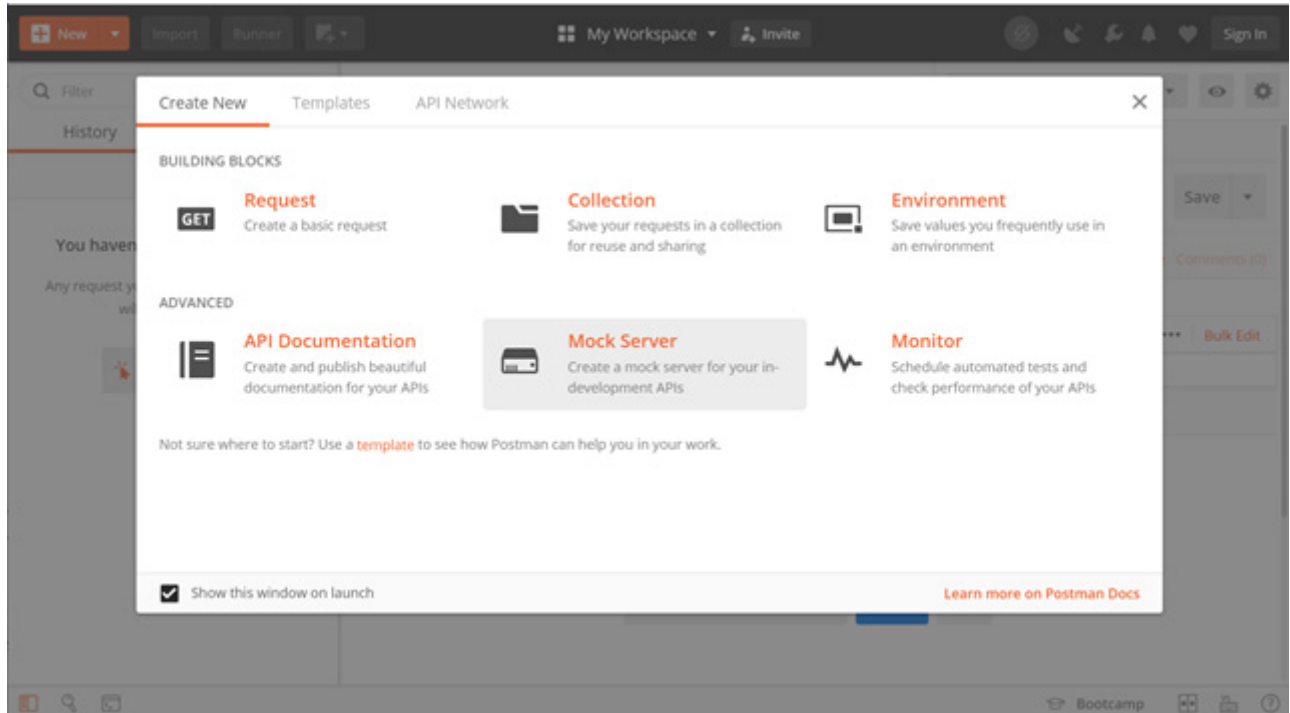
1. From the Start menu, find and open Postman. The window that is shown in the following figure opens.



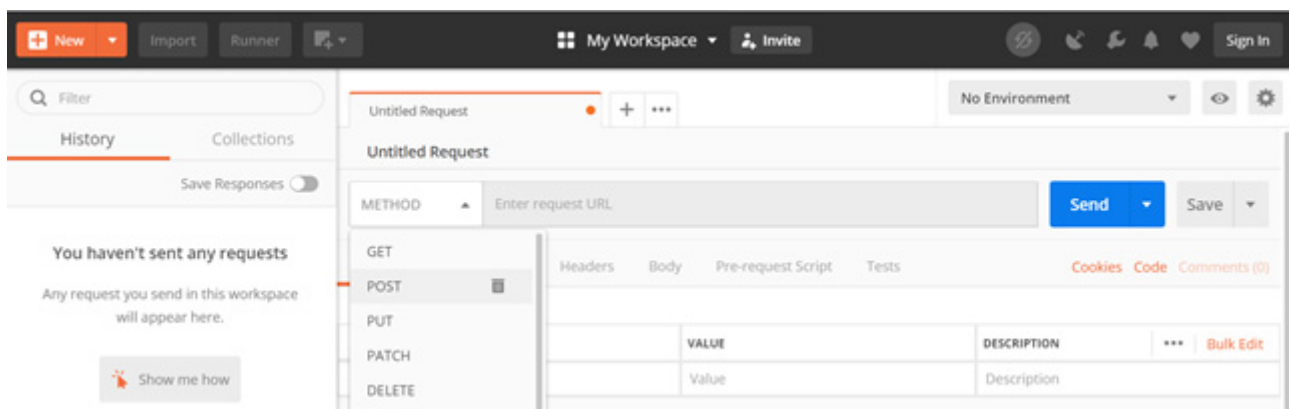


Note

If a pop-up window opens when you open Postman, as shown in the following figure, close it and proceed with the steps normally.



- ___ 2. You use the Cloudant API key to get a time-limited access token that is used in all the upcoming requests to authenticate and authorize your access to Cloudant. After this token expires, you cannot use it anymore. To retrieve this access token, complete the following steps.
 - ___ a. Select the **POST** method from the **METHOD** menu, as shown in the following figure.



- ___ b. Enter the following request URL into the POST field, as shown in the following figure:
<https://iam.cloud.ibm.com/identity/token>

POST `https://iam.cloud.ibm.com/identity/token`

Send Save

Params Authorization Headers Body Pre-request Script Tests Cookies Code Comments (0)

Query Params

KEY	VALUE	DESCRIPTION
Key	Value	Description

- ___ c. Select the **Body** tab from the bar below the Post menu URL field, as shown in the following figure.

POST `https://iam.cloud.ibm.com/identity/token`

Send Save

Params Authorization Headers Body Pre-request Script Tests Cookies Code Comments (0)

☒ none
 ☐ form-data
 ☐ x-www-form-urlencoded
 ☐ raw
 ☐ binary

This request does not have a body

Response

- ___ d. Select `x-www-form-urlencoded` and then add the following keys and values, as shown in the following figure:
- Key: `grant_type` and value: `urn:ibm:params:oauth:grant-type:apikey`
 - Key: `response_type` and value: `cloud_iam`
 - Key: `apikey`, and the value for this field must include your Cloudant instance API key, which you can retrieve from the `cloudant_credentials.json` file. This file includes the Cloudant credentials, and you already saved it in your workstation in a previous step.

[illegible]

3-33



Important

If the `access_token` expires while you make any of the upcoming requests, repeat step 2 to retrieve a new access token and use it instead of the old one.



Troubleshooting

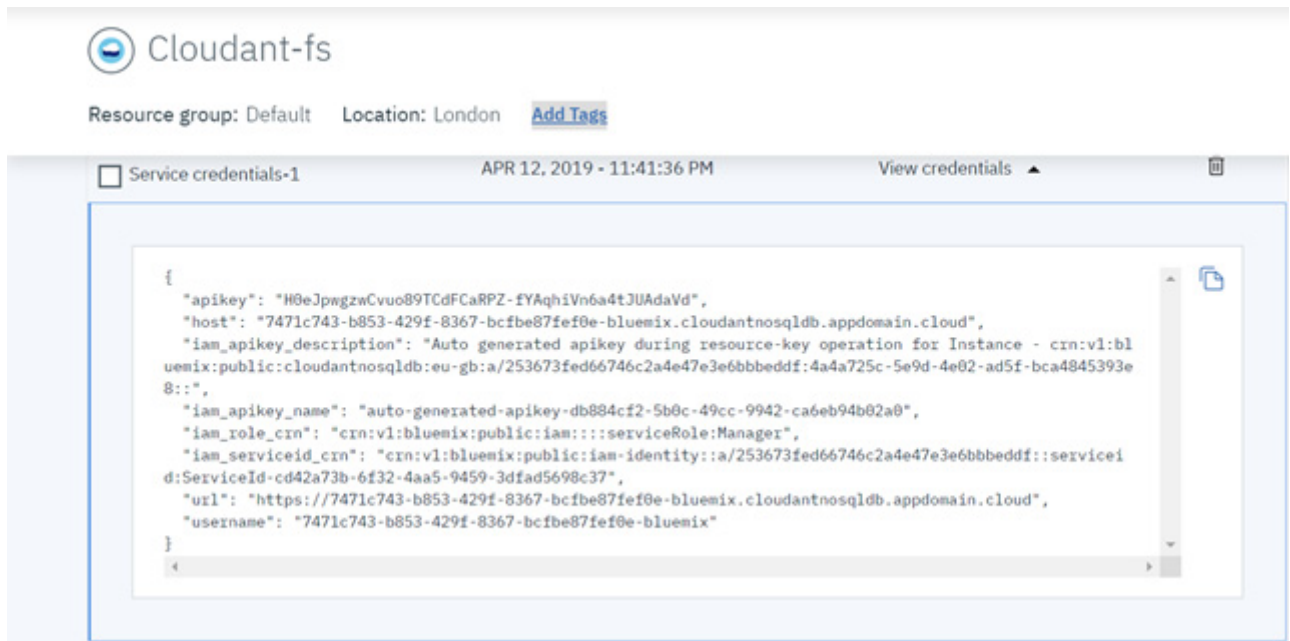
If you receive the error in the response that is shown in the following figure, verify that you provided the correct `apikey`.

```

1 {
2   "context": {
3     "requestId": "e0b6ffb554204b279c16d2789c717a8e",
4     "requestType": "incoming.Identity_Token",
5     "userAgent": "PostmanRuntime/7.6.1",
6     "clientIp": "156.204.159.136",
7     "url": "https://iam.cloud.ibm.com",
8     "instanceId": "iamid-3.8-5353-9ad23d9-64d874b89d-7fqqq",
9     "threadId": "3b87fa",
10    "host": "iamid-3.8-5353-9ad23d9-64d874b89d-7fqqq",
11    "startTime": "18.04.2019 13:50:53:423 UTC",
12    "endTime": "18.04.2019 13:50:53:481 UTC",
13    "elapsedTime": "58",
14    "locale": "en_US",
15    "clusterName": "iam-id-prelon02-xij1"
16  },
17  "errorCode": "BXNIM0415E",
18  "errorMessage": "Provided API key could not be found"
19 }

```

You can check the credentials of the service again from the service overview page on IBM Cloud, as shown in the following figure.



Information

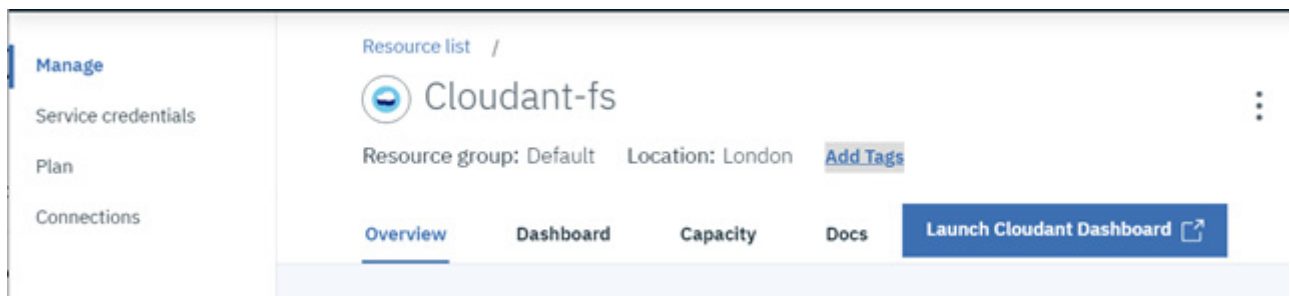
There is another way to retrieve an access token by using the IBM Cloud CLI as follows:

1. Open the Command Prompt and log in to the IBM Cloud with the CLI where **username** is the IBM ID (email) that you use to log in to IBM Cloud), **password** is your password and **region** is the region that corresponds to your location.

```
ibmcloud login -u username -p password -r region
```

The following list shows the list of regions and locations

- o Sydney: au-syd
 - o Frankfurt: eu-de
 - o London: eu-gb
 - o Dallas: us-south
 - o Washington DC: us-east
- To verify your Cloudant service region, you can check the location from the overview page on the IBM Cloud page, as shown in the following figure.



2. Run the following command to get the access token that you can use in the Cloudfant HTTP requests:

ibmcloud iam oauth-tokens

[illegible]

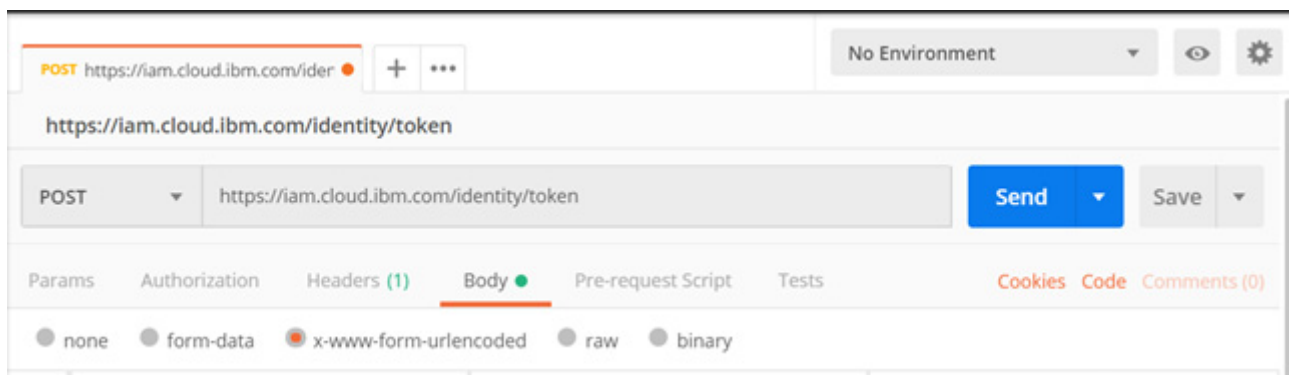
- __ 3. Copy the access token; you use it in the HTTP requests.

4. To view all the documents in a database, issue a **GET** request to the following URL:

```
$URL/$DATABASE/ all docs?include docs=true
```

To show all the documents in the novels database, complete the following steps:

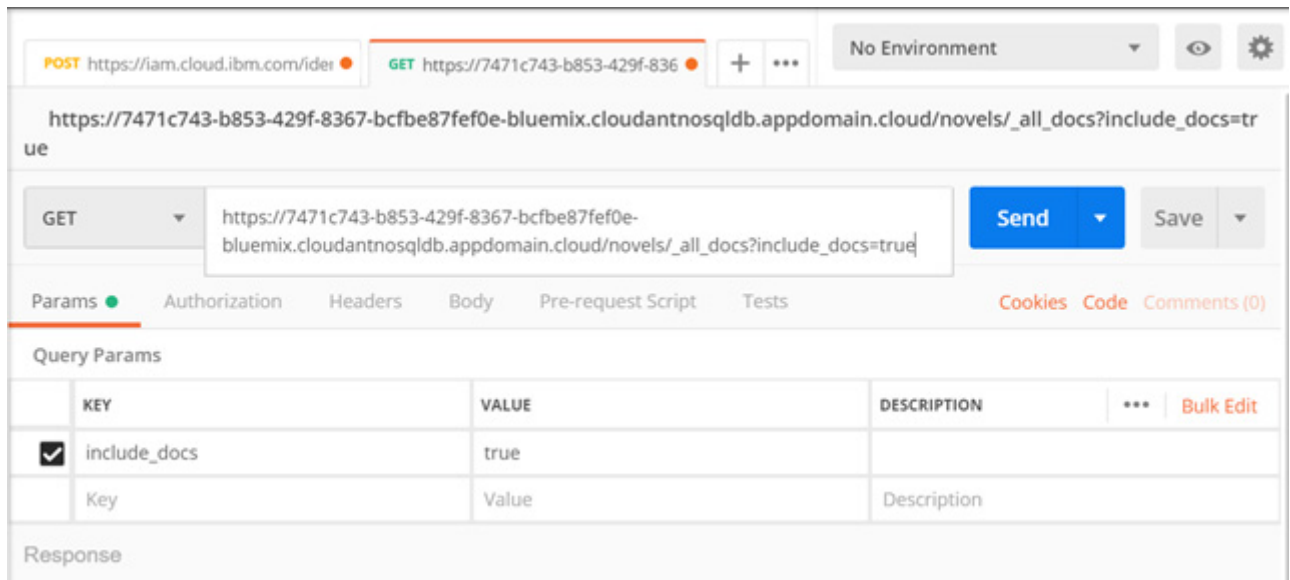
- ___ a. Open a new tab in Postman by clicking **+** in the top bar, as shown in the following figure.



- __ b. Set the request method to the **GET** method.
- __ c. Set the request URL to `$URL/$DATABASE/_all_docs?include_docs=true`, as shown in the following figure:

Replace `$URL` with the value of the `URL` key in the `cloudant_credentials.json` file.

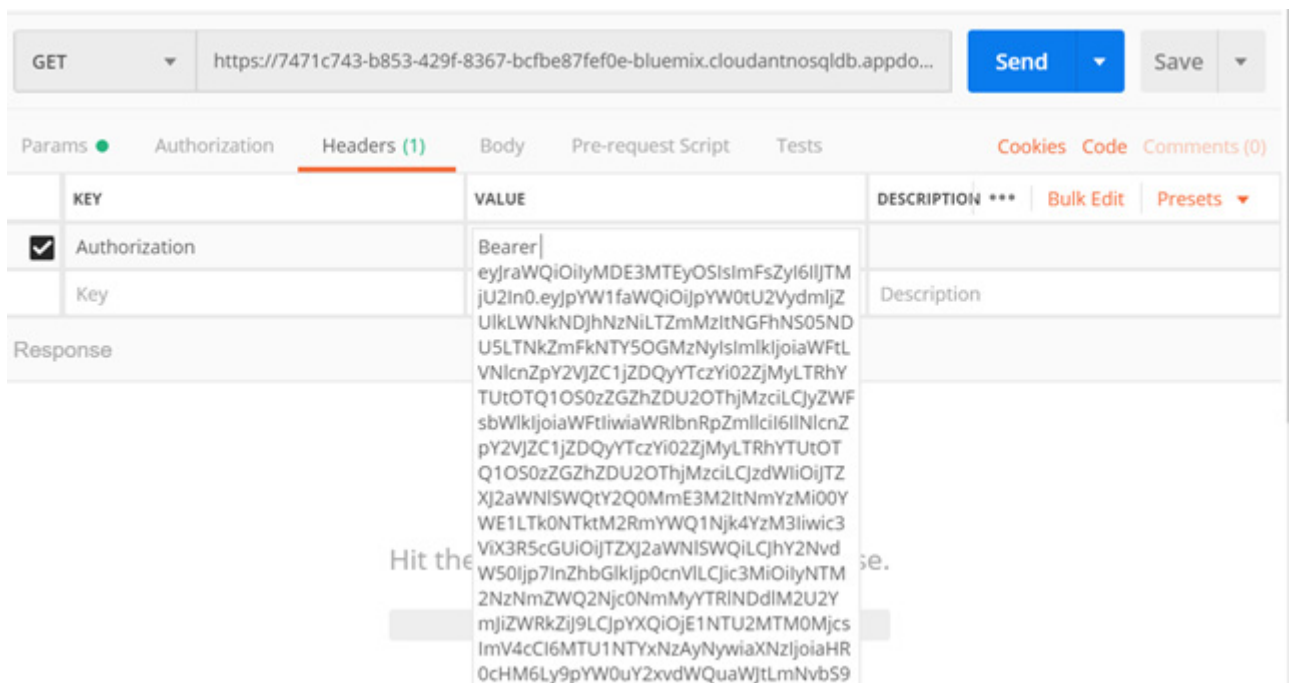
Replace \$DATABASE with the database name **novels**.



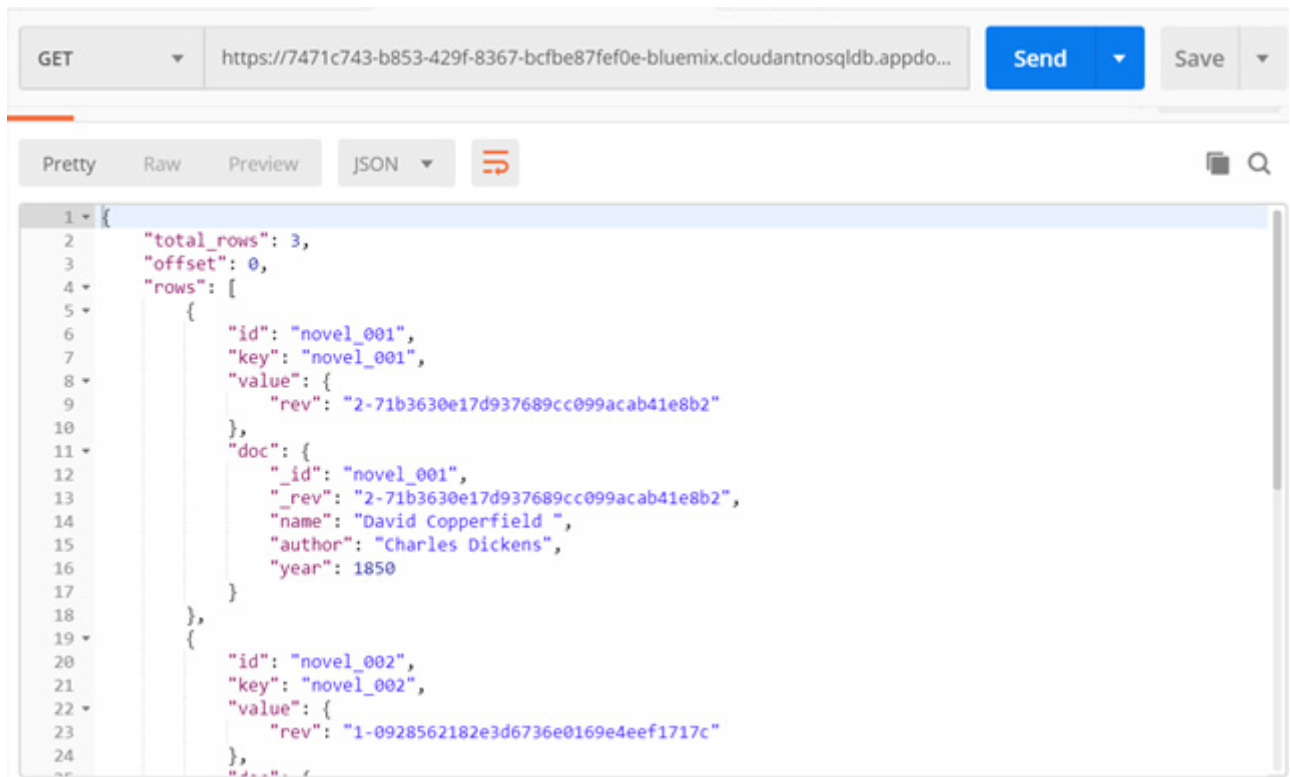
- ___ d. Select the **Headers** tab and add the following key and value, as shown in the following figure:

Key: Authorization.

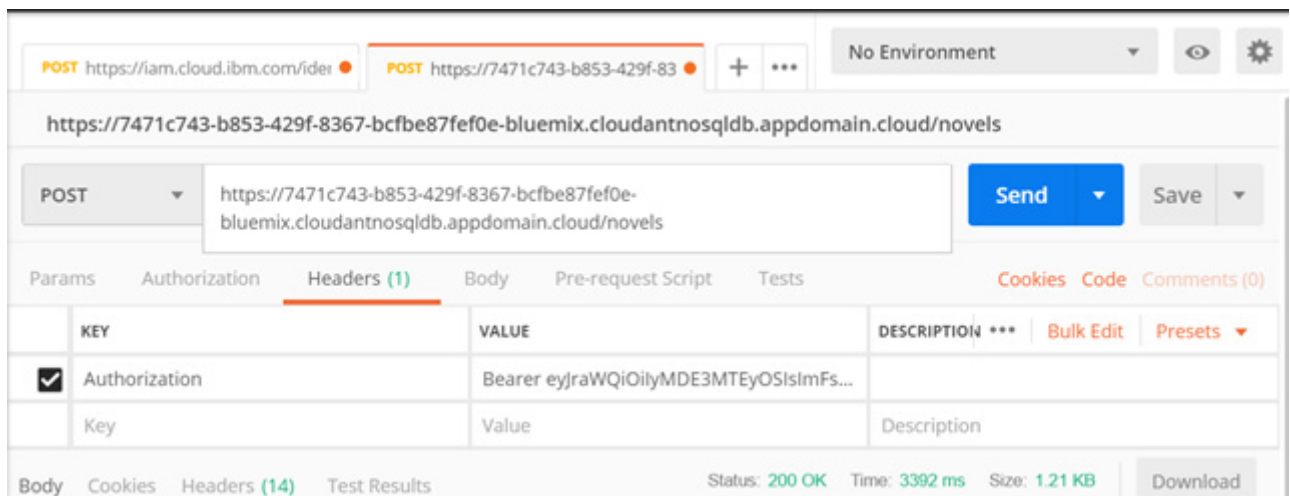
Value: Bearer \$ACCESS_TOKEN. Replace \$ACCESS_TOKEN with the access token that you obtained in the previous step Step 2).



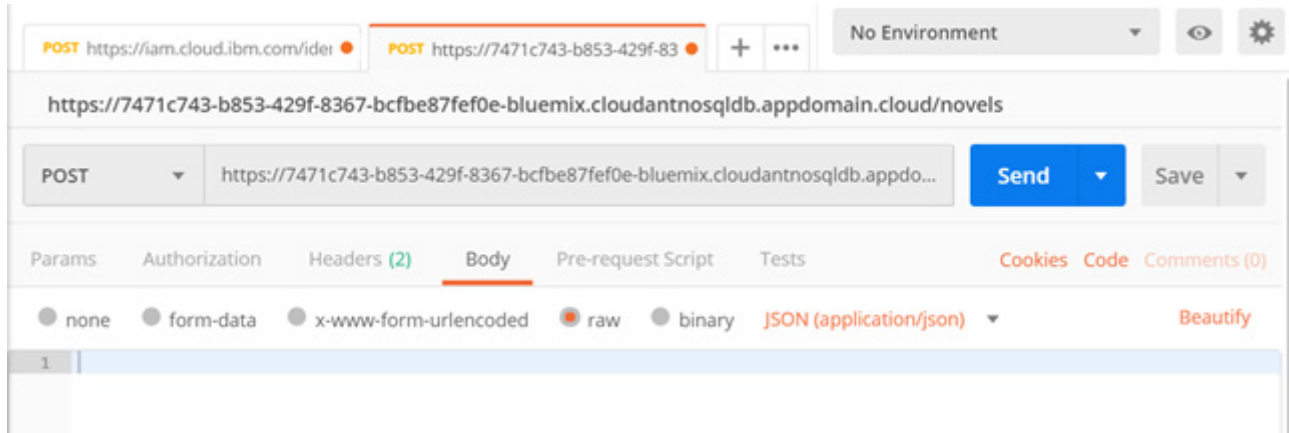
- e. Click **Send**. All three documents are displayed, as shown in the following figure.



- ___ 5. To create a document, send a **POST** request to `$URL/$DATABASE` with the document's JSON content in the request body. To create a new document for “The Merry Adventures of Robin Hood” novel, complete the following steps, as shown in the following figure:
- ___ a. Update the request URL to `$URL/$DATABASE`.
 - ___ b. Update the HTTP method to **POST**.



- ___ c. To specify the content of the document that you want to create, click the **Body** tab from the tabs bar below the request URL, select the **raw** radio button, and then select the type as **JSON (application/json)**, as shown in the following figure.



___ d. Enter the following code as the content of the document:

```
{
  "_id": "novel_004",
  "name": "The Merry Adventures of Robin Hood",
  "author": "Howard Pyle",
  "year": 1883
}
```



Information

The `_id` should be a unique identifier for the document. If the `_id` is not provided, Cloudant generates an ID.

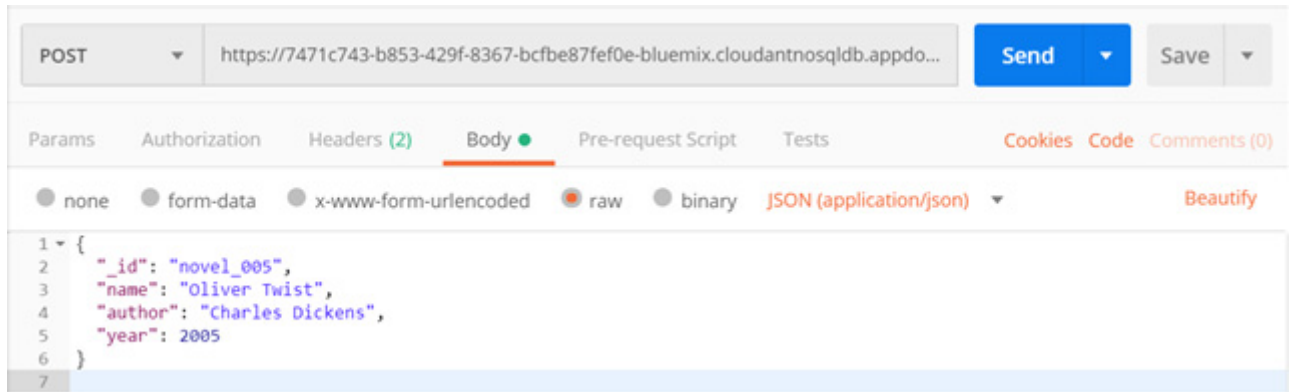
___ e. Click **Send**.

___ f. Check the response that shows the `_id` and `_rev` fields to verify the creation of the document, as shown in the following figure.

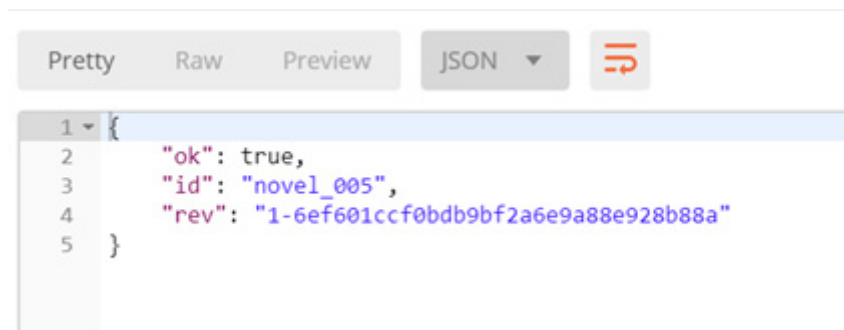


- ___ 6. Create another document for the “Oliver Twist” novel by completing the following steps:
- ___ a. Update the content of the body as follows. The results are shown in the following figure.

```
{
  "_id": "novel_005",
  "name": "Oliver Twist",
  "author": "Charles Dickens",
  "year": 2005
}
```

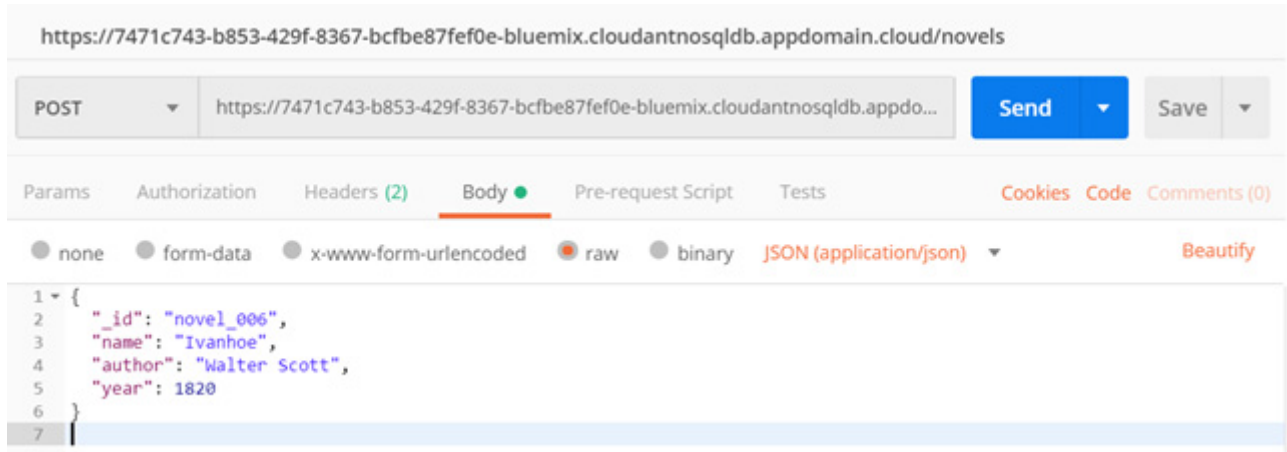


- ___ b. Click **Send**.
- ___ c. Check the response that shows the `_id` and `_rev` fields to verify the creation of the new document, as shown in the following figure.

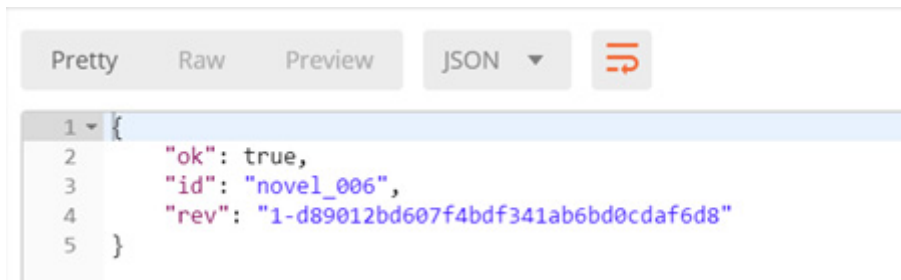


- ___ 7. Create another document for the “Ivanhoe” novel by completing the following steps:
- ___ a. Update the content of the body as follows. The results are shown in the following figure.

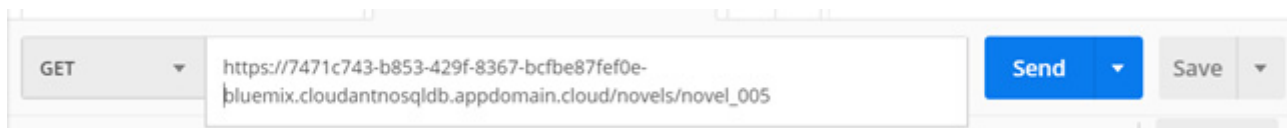
```
{
  "_id": "novel_006",
  "name": "Ivanhoe",
  "author": "Walter Scott",
  "year": 1820
}
```

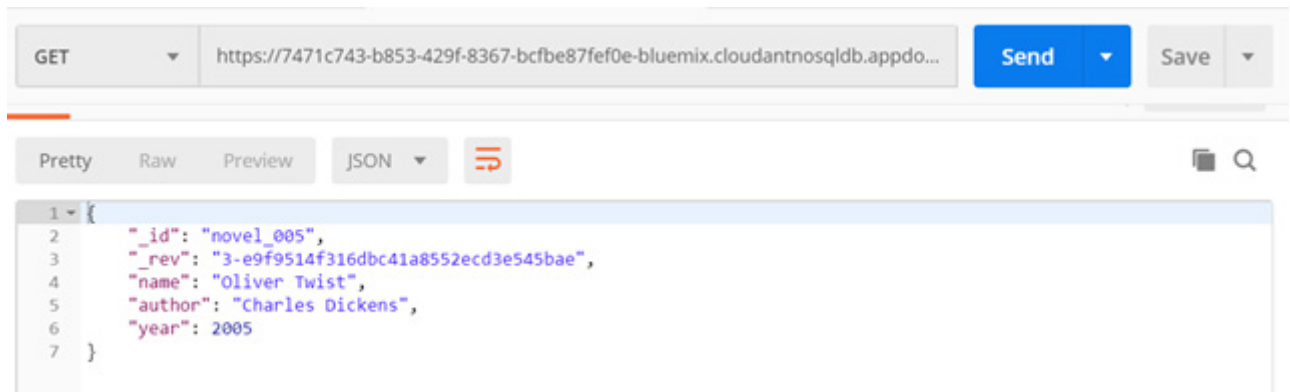
- ___ b. Click **Send**.
- ___ c. Check the response that shows the `_id` and `_rev` fields to verify the creation of the new document, as shown in the following figure.



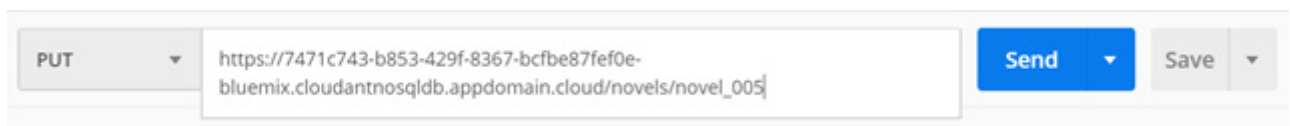
- ___ 8. To read the data of a specific document, send a **GET** request to `$URL/$DATABASE/$DOCUMENT_ID`. To get the data of the document of the “Oliver Twist” novel, complete the following steps. The results are show in the following figure.
 - ___ a. Update the request URL to `$URL/$DATABASE/$DOCUMENT_ID`.
 - ___ b. Update `$DOCUMENT_ID` with the ID of the document of the “Oliver Twist” novel, which is `novel_005`.
 - ___ c. Update the HTTP method to **GET**.



- ___ d. Click **Send**.
- ___ e. Check the response that is shown in the following figure and copy the `_rev` value because it is required for updating the document in the next step.



- ___ f. Copy the value of the `_rev` field.
- ___ 9. To update a document, send a **PUT** request to `$URL/$DATABASE/$DOCUMENT_ID` with the updated document JSON content and the latest `_rev` field. To update the year in the document of the “Oliver Twist” novel, complete the following steps, as shown in the following figure:
- ___ a. Keep the request URL as `$URL/$DATABASE/novel_005`.
- ___ b. Update the HTTP method to **PUT**.

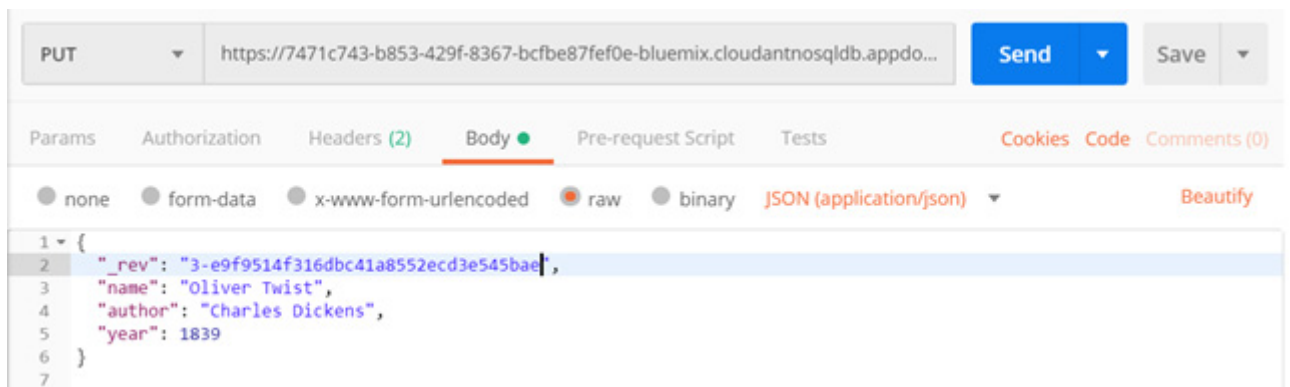


- ___ c. Update the request body with the following code, as shown in the following figure. Replace `$REV` with the `_rev` value that you copied in the previous step.

```

{
  "_rev": "$REV",
  "name": "Oliver Twist",
  "author": "Charles Dickens",
  "year": 1839
}

```



- ___ d. Click **Send**. In the response, notice that the value of `_rev` is updated (Send response), as shown in the following figure.

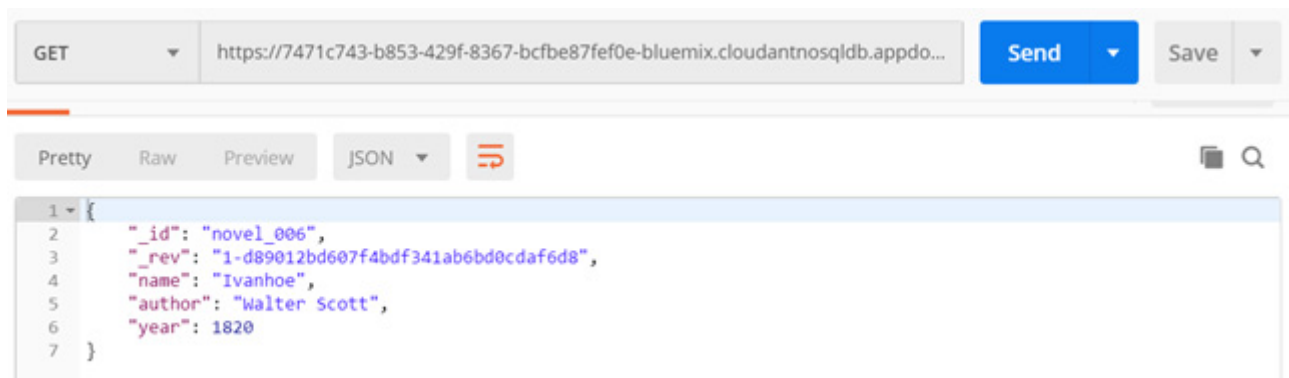


___ 10. To read the data of a specific document, send a **GET** request to `$URL/$DATABASE/$DOCUMENT_ID`. So, to get the data of the document of the “Ivanhoe” novel, complete the following steps, as shown in the following figure:

- ___ a. Keep the request URL as `$URL/$DATABASE/$DOCUMENT_ID`.
- ___ b. Update `$DOCUMENT_ID` with the ID of the document of the “Ivanhoe” novel, which is `novel_006`.
- ___ c. Update the HTTP method to **GET**.



- ___ d. Click **Send**.
- ___ e. Check the response as shown in the following figure and copy the `_rev` value because it is required for deleting the document in the next step.



___ 11. To delete a document, issue a **DELETE** request for `$URL/$DATABASE/$DOCUMENT_ID?rev=$REV`. To delete the document of the “Ivanhoe” novel, complete the following steps, as shown in the following figure:

- ___ a. Update the request URL to `$URL/$DATABASE/$DOCUMENT_ID?rev=$REV`.
- ___ b. Update `$DOCUMENT_ID` with the ID of the document of the “Ivanhoe” novel, which is `novel_006`.
- ___ c. Update `$REV` with the `_rev` value that you copied in the previous step

- ___ d. Update the HTTP method to **DELETE**.

- ___ e. Click **Send**.
- ___ f. Check the response that is shown in the following figure to verify the deletion of the document.

```

1 {
2   "ok": true,
3   "id": "novel_006",
4   "rev": "2-3e13de27a669e6f3dca4e738dad254be"
5 }

```



Troubleshooting

If you receive a conflict error in the response, as shown in the following figure, consider these reasons:

- Document creation: the error indicates that the `_id` that is used to create this document is not unique and belongs to another document in the database
- Document update or deletion: either the `_id` or the `_rev` that are used in the request are wrong.

```

1 {
2   "error": "conflict",
3   "reason": "Document update conflict."
4 }

```

- ___ 12. In the next steps, you query the documents of the novels that are published after the year 1880 and sort them by year in ascending order. To achieve this query, create an index for the year field that you apply to the query in the next step.
- ___ 13. To create an index, send a **POST** request to `$URL/$DATABASE/_index` with a body that includes the fields to be indexed. To create an index for the `year` field, complete the following steps, as shown in the following figure:
- ___ a. Update the request URL to `$URL/$DATABASE/_index`.
- ___ b. Update the HTTP method to **POST**.

https://7471c743-b853-429f-8367-bcfbe87fef0e-bluemix.cloudantnosqldb.appdomain.cloud/novels/_index

POST Send Save

___ c. Update the request body with the following code, as shown in the following figure:

```
{
  "index": {
    "fields": [
      "year"
    ]
  },
  "name": "year-json-index",
  "type": "json"
}
```

POST Send Save

Params Authorization Headers (2) **Body** Pre-request Script Tests Cookies Code Comments (0)

none form-data x-www-form-urlencoded **raw** binary JSON (application/json) Beautify

```
1 {
2   "index": {
3     "fields": [
4       "year"
5     ]
6   },
7   "name": "year-json-index",
8   "type": "json"
9 }
10
```

___ d. Click **Send**.

___ e. Check the response that is shown in the following figure and verify that the index is created successfully.

Pretty Raw Preview **JSON**

```
1 {
2   "result": "created",
3   "id": "_design/4a53d1a437fa6d983869064423f5575a9de6047a",
4   "name": "year-json-index"
5 }
```

___ 14. To query a document, issue a **POST** request to \$URL/\$DATABASE/_find with a selector in the body. A selector is a JSON object that describes the criteria that is used to select documents. So, to query the documents of the novels that are published after the year 1880 and sort them by year in ascending order, complete the following steps:

___ a. Update the Request URL to \$URL/\$DATABASE/_find.

- ___ b. Keep the HTTP Method as **POST**.
- ___ c. Update the Request body with the Cloudant Query content:
 - “selector” specifies querying all documents with a `year` greater than 1880.
 - “fields” specifies that `_id`, `name`, `author`, and `year` should be returned in the query results.
 - “sort” specifies to sort by year. To sort by any other field, an index should be created for the other field.

```
{
  "selector": {
    "year": {
      "$gt": 1880
    }
  },
  "fields": [
    "_id",
    "name",
    "author",
    "year"
  ],
  "sort": [
    {
      "year": "asc"
    }
  ]
}
```

- ___ d. Click **Send**. The query results are returned in the response that is shown in the following figure. It is a good practice to create an index for each field that you are searching for in the selector to optimize query performance.

```

1 {
2   "docs": [
3     {
4       "_id": "novel_003",
5       "name": "Treasure Island",
6       "author": "Robert Louis Stevenson",
7       "year": 1883
8     },
9     {
10      "_id": "novel_004",
11      "name": "The Merry Adventures of Robin Hood",
12      "author": "Howard Pyle",
13      "year": 1883
14    },
15    {
16      "_id": "novel_002",
17      "name": "King Solomon's Mines",
18      "author": "H. Rider Haggard",
19      "year": 1885
20    }
21  ],
22  "bookmark": "g2wAAACaA3kAA5zdGFydGtleV9kb2NpZG0AAAA3bm92ZWxfMDAyaA3kAAhzdGFydGtlewAAAAABYgAAB11qag"
23 }

```



Information

By creating an index for the `year` field, you create and store a type of document that is called a *design document*, which you store it in the Cloudant database. Design documents are special documents that serve specific functions other than storing the data. Design documents are used to build indexes, validate updates, and format query results.



Troubleshooting

If in the response to a Cloudant HTTP API request you receive the error HTTP status code 401 Unauthorized, as shown in the following figure, the access token is expired and you must create a new access token.

The screenshot shows a REST client interface. The request method is GET, and the URL is `https://7471c743-b853-429f-8367-bcfbe87fef0e-bluemix.cloudantnosqldb.appdo...`. The Headers tab is selected, showing an Authorization header with a Bearer token. The response body is displayed in JSON format, showing an error: `{ "error": "unauthorized", "reason": "exp not in future" }`. The status bar indicates a 401 Unauthorized status, a response time of 3391 ms, and a size of 547 B.

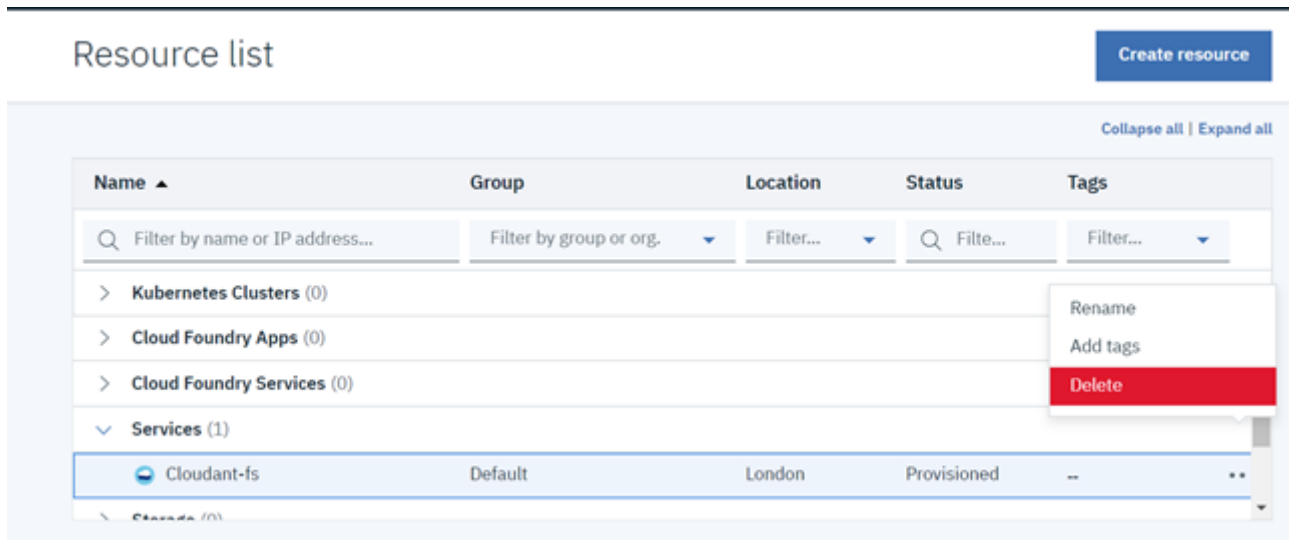
Part 7: Deleting your Cloudant service instance

In this part, you delete your Cloudant service instance from your IBM Cloud account by completing the following steps:

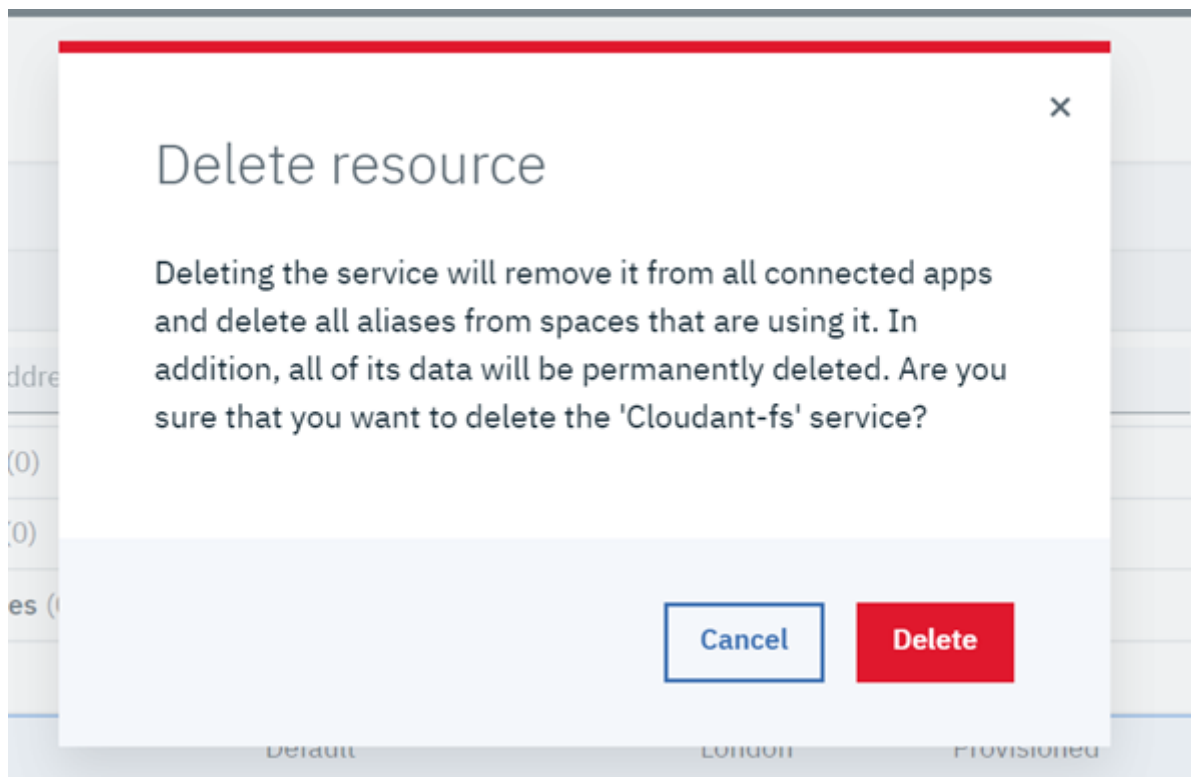
1. Open the IBM Cloud dashboard. In the Resource summary pane, click **Services**, as shown in the following figure.

The screenshot shows the IBM Cloud Dashboard. The 'Resource summary' pane is visible, showing a list of resources. Under the 'Services' category, there is a count of 1. A 'View resources' link is present next to the count.

2. You are redirected to the Resource list page. Under Services, you find your Cloudant service instance. Click the **More Actions** icon (the three horizontal dots), and then click **Delete**, as shown in the following figure.



- ___ 3. Confirm that you want to delete the service by clicking **Delete**, as shown in the following figure.



- ___ 4. Wait until the service is deleted.

Exercise review and wrap-up

In this exercise, you created an instance of Cloudant on IBM Cloud. You created credentials for the service to make requests from an HTTP API client by using these credentials. You explored the Cloudant dashboard and the features that are available in the Cloudant dashboard. You also created, read, updated, deleted, and queried Cloudant documents by using an HTTP API client.