

MSCS Cloud Computing

Final Project

Fall 2018, Professor Jin Hwang

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12.12.18

Introduction

IBM Cloud Application Environment

- The project that I have researched and implemented for this semester relates to Databases, Cloud Object Store, and Secure Gateway, all under the IBM Cloud Platform and Service.
- As such, my project for this course will highlight and implement:
 1. Db2Hosted and Db2Managed on Cloud Database
 2. IBM Cloud Object Store
 3. Secure Gateway

Functionality

- For this project I will be using three separate IBM Cloud services | systems.
- The overall application ecosystem will:
 - Successfully implement a Db2 Managed Cloud database
 - Connect this Managed Cloud Database with a Cloud Object Store. The Object Store will hold metadata.
 - Establish a Secure Gateway link to effectively migrate data from a legacy database server to a Cloud Managed instance.

The **database** will be a Db2 Managed environment, with a GUI for the user to interact with.

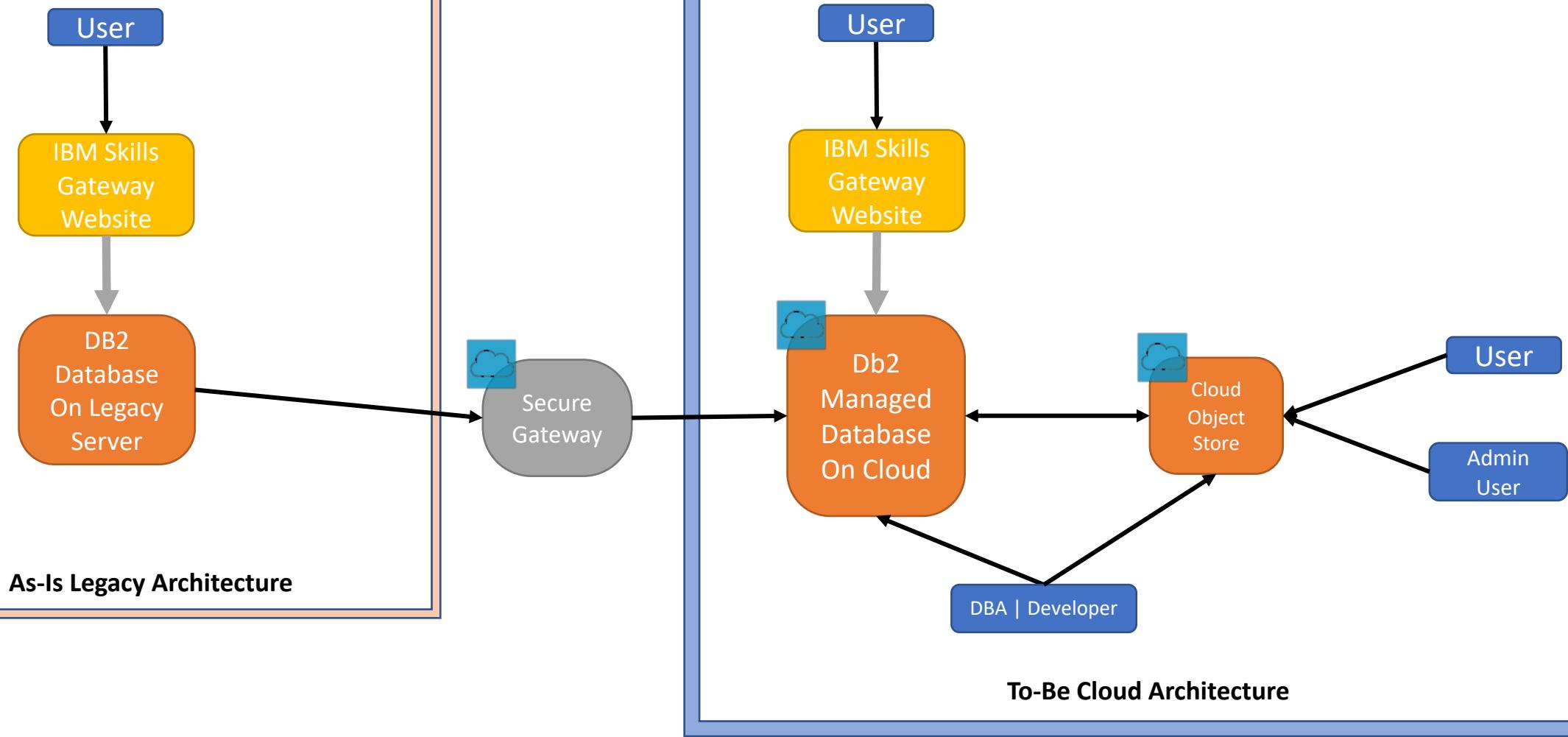
The **Object Store** will upload and download metadata and auxiliary files; for example, Word documents, .XLS spreadsheets, and PDFs.

The **Secure Gateway** will be launched from a Terminal shell, and initiated in a dockerized container. The Gateway will be started with Docker, and the IBM Bluemix Dashboard will track progress of data migrated from one database to another.

Definitions

- **Db2**: As defined on the IBM Analytics site, Db2 "includes products for operational databases, data warehouses, data lakes and fast data." Essentially, Db2 is a relational database that delivers advanced data management and analytics capabilities for a users transactional and warehousing workloads. The database offers features of high performance, insights, data availability, and reliability.
- **Cloud Object Store**: IBM Cloud Object Storage is a scalable storage tool that is commonly used for data archiving and backup, web and mobile applications, and analytics. Cloud Object Storage (COS) offers a Flex scalable plan; meaning that the size of storage can increase over time as more objects and data are stored in a single instance (or bucket).
- **Secure Gateway**: As defined within the IBM Cloud Bluemix Catalog, "the Secure Gateway Service provides a quick, easy, and secure solution for connecting resources in a protected environment to cloud resources." A Secure Gateway is a lightweight client that allows users to establish a secure and persistent connection between their own environment and the Cloud. Once the client is started, applications and resources can safely be connected to one another.

Architecture Diagram



ARCHITECTURE DIAGRAM

Configuration Walkthrough

General Steps

- The next set of slides will be step-by-step configuration instructions to complete the project.
- The instructions order are as follows:
 - DB2 Managed On Cloud Configuration
 - Cloud Object Store Configuration
 - Secure Gateway Configuration
- We will begin with three General Steps, that must be taken before each configuration.

Log In to IBM Cloud

IBM Cloud Catalog Docs Cookie Preferences Log in (highlighted with a red border) Sign up

Catalog

Search the catalog... Filter

All Categories

- Compute
- Containers
- Networking
- Storage
- AI (highlighted with a blue border)
- Analytics

AI

 **Watson Assistant (formerly Conversation)**
Lite • IBM
Watson Assistant a platform that allows developers and non-technical users to collaborate on building conversational AI-powered assistants.

 **AI OpenScale**
Lite • IBM
IBM AI OpenScale is an enterprise-grade environment for AI infused applications that provides enterprises with visibility into how AI is being built, used, and

 **Compare Comply**
Lite • IBM
Process contracts and governing documents to convert, identify, classify, and compare important elements.

FEEDBACK

Select Dashboard

The screenshot shows the IBM Cloud Catalog interface. On the left, a sidebar lists various service categories: Cloud Foundry, Kubernetes, Infrastructure, VMware, APIs, Apple Development (New), Blockchain, DevOps, Finance, Functions, Integrate, Managed Solutions, Mobile, Observability, Security, Watson, and Web Apps. The 'Dashboard' option is highlighted with a red box. At the top, there is a navigation bar with links for Catalog, Docs, Support, Manage, and a search bar. To the right of the search bar is a user profile section for 'Christopher Iacobellis's...' with a red box around it. Below the navigation is a 'Filter' button. The main content area is titled 'AI' and displays nine service cards:

- Watson Assistant (formerly Conversation)** Lite • IBM: Watson Assistant is a platform that allows developers and non-technical users to collaborate on building conversational AI-powered assistants.
- AI OpenScale** Lite • IBM: IBM AI OpenScale is an enterprise-grade environment for AI infused applications that provides enterprises with visibility into how AI is being built, used, and
- Compare Comply** Lite • IBM: Process contracts and governing documents to convert, identify, classify, and compare important elements.
- Discovery** Lite • IBM: Add a cognitive search and content analytics engine to applications.
- Knowledge Catalog** Lite • IBM: Discover, catalog, and securely share enterprise data.
- Knowledge Studio** Lite • IBM: Teach Watson the language of your domain.
- Language Translator** Lite • IBM: Translate text, documents, and websites from one language to another. Create industry or region-specific translations via the service's customization capability.
- Machine Learning** Lite • IBM: IBM Watson Machine Learning - make smarter decisions, solve tough problems, and improve user outcomes.
- Natural Language Classifier** IBM: Natural Language Classifier uses advanced natural language processing and machine learning techniques to create custom classification models. Users train

A vertical 'FEEDBACK' button is located on the right side of the main content area.

*Make sure to choose your Account name in the top right hand corner

Create a Resource

The screenshot shows the IBM Cloud dashboard interface. At the top, there is a navigation bar with links for Catalog, Docs, Support, and Manage, along with a search bar and a user profile. Below the navigation bar is a header section with filters for Resource Group, Cloud Foundry Org, Cloud Foundry Space, Location, Category, and a search input field. A prominent blue button labeled "Create resource" is located on the right side of this header. The main content area is titled "Dashboard" and contains a table titled "Services". The table lists four service instances with columns for Name, Location, Resource Group, Plan, Details, and Service Offering. Each row has a three-dot menu icon on the far right. A vertical "FEEDBACK" button is visible on the right edge of the dashboard area.

Name	Location	Resource Group	Plan	Details	Service Offering
Watson MoS Comments Analytics	Washington DC	Default	Lite	Provisioned	Knowledge Studio
cloud-object-storage-dsx	global	Default	Lite	Provisioned	Cloud Object Stor...
data-science-experience-ow	Dallas	Default	Lite	Provisioned	Watson Studio
pm-20-dsx	Dallas	Default	Lite	Provisioned	Machine Learning

*We will begin with creating a DB2 Managed Resource

DB2 Managed On Cloud

*See GitHub repository for a more detailed instruction configuration and tutorial.

Select DB2 in Databases Section

IBM Cloud Catalog Docs Support Manage Search for resource... Christopher Iacobellis's... Filter

Catalog

All Categories (5) >

Storage

 **Db2 Warehouse**
IBM • Dedicated
Db2 Warehouse on Cloud is a flexible and powerful data warehouse for enterprise-level analytics.

FEEDBACK

Databases

 **Db2**
Lite • IBM
A next generation SQL database. Formerly dashDB For Transactions.

 **Db2 Hosted**
IBM
Db2 Hosted: Offers customers the rich features of an on-premise Db2 deployment without the cost, complexity, and risk of managing their own

 **Db2 Warehouse**
IBM • Dedicated
Db2 Warehouse on Cloud is a flexible and powerful data warehouse for enterprise-level analytics.

FEEDBACK

Name Resource and Create

The screenshot shows the IBM Cloud service catalog interface. At the top left is a back arrow labeled "View all". Below it is the "Db2" service card, which includes the IBM logo and the text "Lite • IBM". The service description states: "A fully-managed cloud SQL database. Powered by a turbo-charged Db2 engine." Below the description are links for "View Docs" and "Terms". To the right of the description are four input fields: "Service name" ((Db2-qu), highlighted with a red border), "Choose a region/location to deploy in" (Dallas), "Choose an organization" (christopher.iacobellis@ibm.com), and "Choose a space" (dev). Below these fields is an "Email:" field containing "email@example.com". A note at the bottom of this section says "Please provide an email address where we can reach you for updates". On the far right of the card is a "FEEDBACK" button. The main body of the card is titled "Features" and lists two bullet points: "Fast, Reliable & Robust" and "Fully managed, safe, and secure". The "Fast, Reliable & Robust" section describes the use of Db2 technology for enterprise-level OLTP performance and mentions 99.99% uptime SLA, high availability plans, geo-isolated disaster recovery, and compatibility with Netezza and Oracle. The "Fully managed, safe, and secure" section discusses daily backups for 14 days, SSL connections, and various security options like HIPAA, ISO2K1, and SOC2/3. At the bottom of the card are links for "Need Help?", "Contact IBM Cloud Support", "Estimate Monthly Cost", and "Cost Calculator". On the far right is a large blue "Create" button, also highlighted with a red border.

← View all

 **Db2**

Lite • IBM

A fully-managed cloud SQL database. Powered by a turbo-charged Db2 engine.

[View Docs](#) [Terms](#)

AUTHOR IBM

PUBLISHED 12/07/2018

TYPE Service

LOCATION Sydney, Frankfurt, London, Dallas

Service name:

Db2-qu

Choose a region/location to deploy in:

Dallas

Choose an organization:

christopher.iacobellis@ibm.com

Choose a space:

dev

Email:

email@example.com

Please provide an email address where we can reach you for updates

FEEDBACK

Features

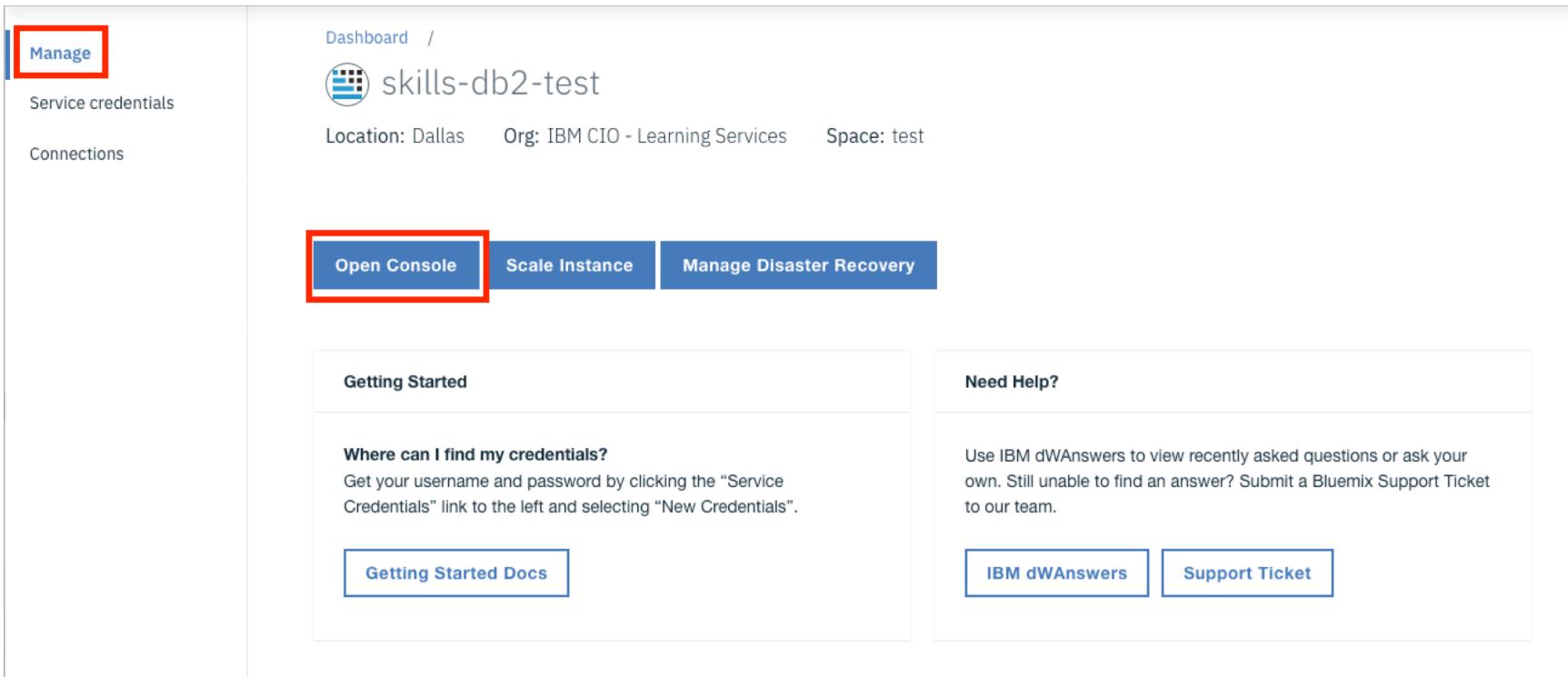
- Fast, Reliable & Robust**
Uses Db2 technology for enterprise-level OLTP performance. 99.99% uptime SLA with high availability plans and now with options for full geo-isolated disaster recovery. Supports .NET, ODBC, JDBC and REST. Compatible with Netezza and Oracle.
- Fully managed, safe, and secure**
Includes daily backups for 14 days, at-rest database encryption, and SSL connections. High availability plans include two servers configured as an HA pair. HIPAA option, ISO2K1, SOC2/3 and more.

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

Estimate Monthly Cost
[Cost Calculator](#)

Create

Open Resource and Open the GUI Console



View the DB2 Managed Dashboard

IBM Db2 on Cloud Storage: 10%

Discover Discover Discover Discover

Quick stats

Storage usage %

Date	Storage Usage (%)
12/05	38
12/06	38
12/07	38
12/08	40
12/09	10
12/10	12
12/11	12

Connect to IBM Db2 on Cloud

Select a client

Select a client to connect your applications to IBM Db2 on Cloud.

Load activity

Refresh

STATUS	SOURCE	FILENAME	TARGET	REQUESTED BY	ROWS LOADED	ROWS REJECTED
No items to display. If you see a progress indicator, please wait.						

Load

View Schemas and Tables

The screenshot shows the IBM Db2 on Cloud 'Explore' interface. The top navigation bar includes 'IBM Db2 on Cloud', 'Storage: 10%', 'Discover', and a user profile icon. Below the header, there are two main sections: 'Schema' on the left and 'Table' on the right. Both sections have search bars ('Find a schema' and 'Find a table in TADB2') and buttons for creating new ('New Schema' and 'New Table'). A toggle switch at the top right allows users to 'Show system schemas'. The 'Schema' section lists several schemas: AUDIT, GSI, IDAX, ITESPL, LSRUN, ST_INFORMTN_SCHEMA (marked as 'Sample'), and TADB2. The 'Table' section lists numerous tables, many of which are preceded by a small circular icon with a question mark, indicating they are system schemas: ADVMTHD, ASSET_LIFECYCLE_STATUS, AUDITCSEMASTER, BRAND, BRAND_STRATEGY, BUSINESS, CLASSTAT_Z, CMS_USERS, CMS_USERS_BRAND, CMS_USERS_EXT, CONTENT_TRACKING, COUNTRYISO, COUNTRY_Z, COURSEGLOBAL, COURSE_ADVMTHD, COURSE_FILES, COURSE_PACKAGES, COURSE_Z, CSELANGUAGE, CSEMASTER_Z, CSEMASTER_Z2, CURRICULUM_Z, and CURRUNIT_Z.

*The schemas and tables above were created within the DB2 Managed GUI. It is an intuitive and simple interface.

Choose Run SQL in the Menu Dashboard

The screenshot shows the IBM Db2 on Cloud dashboard. The top navigation bar includes the IBM Db2 on Cloud logo, a storage status of "Storage: 10%", and links for "Discover", a bell icon, and a user profile. The left sidebar has sections for "HOME", "LOAD", "EXPLORE" (with "RUN SQL" highlighted by a red box), "MONITOR", "SETTINGS", "CONNECTION INFO", and "HELP". The main area features a line chart with data points from December 6 to 11, showing a dip on December 8 followed by a recovery. Below the chart is a table header with columns: SOURCE, FILENAME, TARGET, REQUESTED BY, ROWS LOADED, and ROWS REJECTED. A "Load" button is located at the bottom of this section. To the right, a panel titled "Connect to IBM Db2 on Cloud" contains a "Select a client" dropdown and a note: "Select a client to connect your applications to IBM Db2 on Cloud." A "Refresh" button is also present.

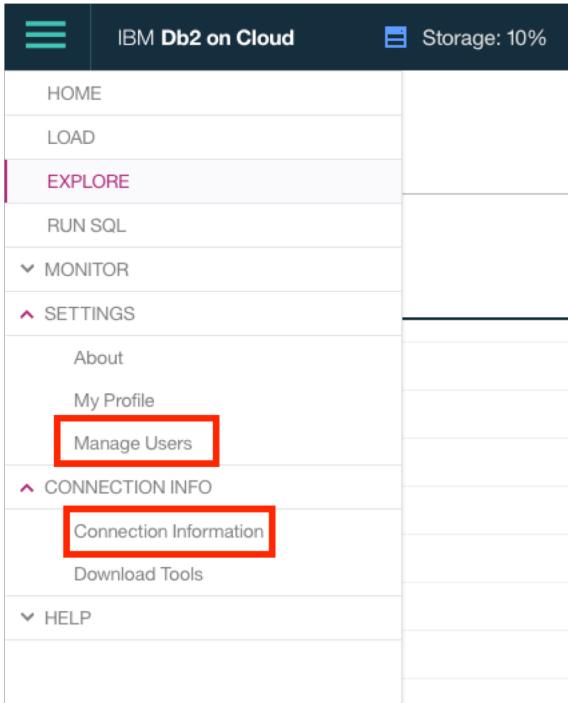
SOURCE	FILENAME	TARGET	REQUESTED BY	ROWS LOADED	ROWS REJECTED
--------	----------	--------	--------------	-------------	---------------

Run Sample SQL

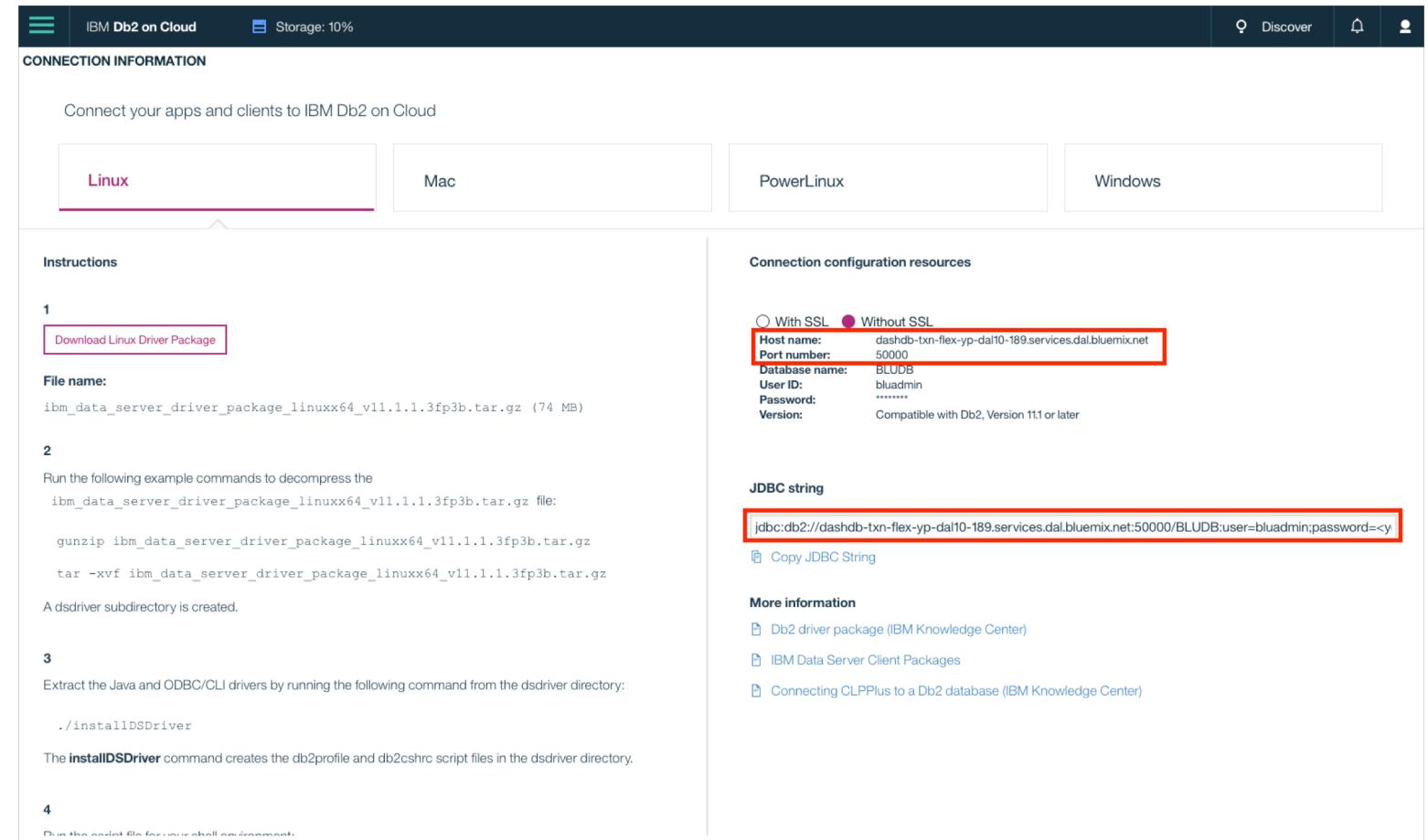
The screenshot shows the IBM Db2 on Cloud interface. At the top, it displays "IBM Db2 on Cloud" and "Storage: 10%". Below that is a navigation bar with "Discover", "Bell", and a user icon. The main area is titled "RUN SQL" with tabs for "Run", "Script", "Edit", "Favorites", and "New tab". A red box highlights the SQL query "SELECT * FROM TADBZ.BRAND;". The results section has tabs for "Saved scripts" and "Result". Under "Result", there is a "Filter by status" dropdown set to "All" and a "Delete All" button. It shows "All(1), Failed(0)". A green icon indicates a successful run. The "Result set" tab is selected, showing a table with columns: BRAND_ID, DESCRIPT, TINSERTTS, TLASTUPDT, and BUSINESSID. The table contains 13 rows of data. A red box highlights this table. The "Log" tab is also visible. At the bottom, it says "Total rows: 37".

BRAND_ID	DESCRIPT	TINSERTTS	TLASTUPDT	BUSINESSID
1	System Z	2014-08-14 07:08:19.0	2015-06-15 09:01:24.0	2
2	Modular Systems	2014-08-14 07:08:19.0	2015-06-15 09:01:24.0	2
3	IBM Analytics	2014-08-14 07:08:19.0	2018-04-11 08:40:48.0	1
4	Power Systems	2014-08-14 07:08:19.0	2015-06-15 09:01:25.0	2
5	Storage	2014-08-14 07:08:19.0	2014-09-10 09:56:30.0	2
6	Cross Brand	2014-08-14 07:08:19.0	2015-06-15 09:01:25.0	2
7	Solutions	2014-08-14 07:08:19.0	2015-06-15 09:01:25.0	1
8	IBM Watson Health - Cur...	2014-08-14 07:08:19.0	2018-09-19 12:33:51.0	6
9	IBM Cloud Management ...	2014-08-14 07:08:19.0	2015-06-15 09:01:26.0	4
10	IBM Watson Customer E...	2014-08-14 07:08:19.0	2017-10-17 21:34:13.0	3
11	IBM Security	2014-08-14 07:08:19.0	2015-06-15 09:01:27.0	5
12	Cloud Data Services	2014-08-14 07:08:19.0	2015-06-15 09:01:27.0	1
13	Miscellaneous	2014-08-14 07:08:19.0	2016-02-09 09:08:16:15.0	4

Manage User ID's



The screenshot shows the IBM Db2 on Cloud navigation menu. The 'SETTINGS' section is expanded, showing 'About', 'My Profile', and 'Manage Users'. The 'CONNECTION INFO' section is also expanded, showing 'Connection Information' and 'Download Tools'. Both 'Manage Users' and 'Connection Information' are highlighted with red boxes.



The screenshot shows the 'CONNECTION INFORMATION' page for IBM Db2 on Cloud. It includes sections for 'Instructions', 'Connection configuration resources', and 'JDBC string'. The 'Connection configuration resources' section shows a 'Without SSL' configuration with a red box around the host name, port number, database name, user ID, password, and version fields. The 'JDBC string' section shows the generated JDBC URL: `jdbc:db2://dashdb-txn-flex-yp-dal10-189.services.dal.bluemix.net:50000/BLUDB:user=bluadmin;password=<REDACTED>`. A 'Copy JDBC String' button is also present.

Connection configuration resources

With SSL Without SSL

Host name: dashdb-txn-flex-yp-dal10-189.services.dal.bluemix.net
Port number: 50000
Database name: BLUDB
User ID: bluadmin
Password: *****
Version: Compatible with Db2, Version 11.1 or later

JDBC string

`jdbc:db2://dashdb-txn-flex-yp-dal10-189.services.dal.bluemix.net:50000/BLUDB:user=bluadmin;password=<REDACTED>`

[Copy JDBC String](#)

More information

- [Db2 driver package \(IBM Knowledge Center\)](#)
- [IBM Data Server Client Packages](#)
- [Connecting CLPPlus to a Db2 database \(IBM Knowledge Center\)](#)

View Database Connection Pointer and Related Information

Cloud Object Storage

*See GitHub repository for a more detailed instruction configuration and tutorial.

Select Object Storage in Storage Section

IBM Cloud Catalog Support Manage Search for resource... Christopher Iacobellis's... Filter

Catalog

cloud object stor

All Categories (3) >

Storage

Object Storage Lite • IBM

Provides flexible, cost-effective, and scalable cloud storage for unstructured data.

FEEDBACK

- Compute
- Containers
- Networking
- Storage (1)
- AI
- Analytics (1)

Name Resource and Create

IBM Cloud Catalog Docs Support Manage

Search for resource... Christopher Iacobellis's...

View all

Cloud Object Storage

Lite • IBM

IBM Cloud Object Storage is a highly scalable cloud storage service, designed for high durability, resiliency and security. Store, manage and access your data via our self-service portal and RESTful APIs. Connect applications directly to Cloud Object Storage use other IBM Cloud Services with your data.

[View Docs](#) [Terms](#)

AUTHOR IBM
PUBLISHED 11/14/2018
TYPE Service

Service name:
Cloud Object Storage-jx

Select a resource group: [i](#)
Default

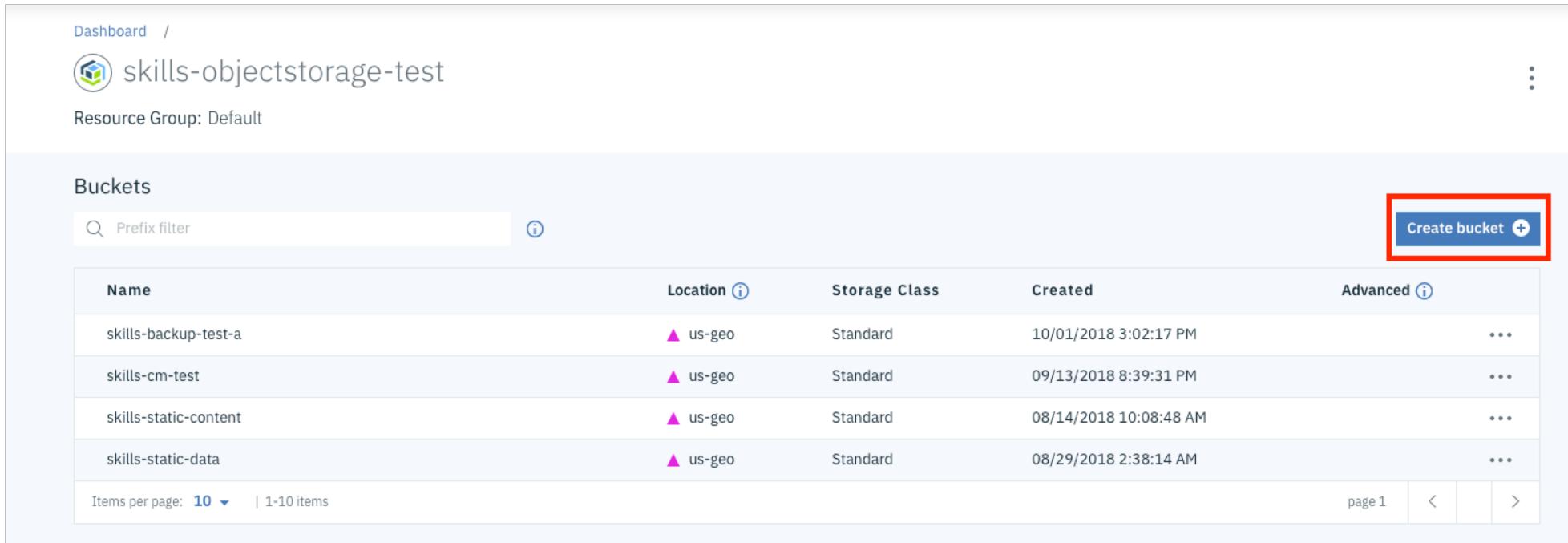
Features

- Storage for the IBM Cloud**
IBM Cloud Object Storage provides unstructured data storage for cloud applications. Libraries and SDKs support a common set of S3 API functions for connecting new applications to scalable cloud storage and integrating your data into other services on the IBM Watson and Cloud Platform available with Regional and Cross Region resiliency options worldwide.
- Built-in Aspera high-speed transfer**
With IBM Cloud Object Storage Aspera high-speed data transfer, you can improve data transfer performance by quickly transferring data over long distances, and under various network conditions. It is natively integrated into Cloud Object Storage and there is no additional cost for uploading data.
- Storage Classes and Archive Policy**
Choose storage classes based on your usage patterns for active, less-active, and cold workloads with Standard,
- Access and Key Management**
IBM Identity and Access Management (IAM) policies allow for granular access control at the bucket level using role-based

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

Create

Create a Bucket



The screenshot shows the AWS S3 Buckets page. At the top, it displays the dashboard path "Dashboard / skills-objectstorage-test" and the resource group "Default". On the right, there is a three-dot menu icon. Below this, the "Buckets" section is shown with a "Prefix filter" input field and an information icon. A prominent blue "Create bucket +" button is located on the right side of the header. The main area contains a table with the following data:

Name	Location ⓘ	Storage Class	Created	Advanced ⓘ
skills-backup-test-a	▲ us-geo	Standard	10/01/2018 3:02:17 PM	...
skills-cm-test	▲ us-geo	Standard	09/13/2018 8:39:31 PM	...
skills-static-content	▲ us-geo	Standard	08/14/2018 10:08:48 AM	...
skills-static-data	▲ us-geo	Standard	08/29/2018 2:38:14 AM	...

At the bottom left, it says "Items per page: 10 | 1-10 items". At the bottom right, there are navigation icons for "page 1", "less than", "more than", and "greater than".

*A Bucket is a repository for both uploading files and downloading.

Configure Bucket Details

The screenshot shows the 'Create bucket' dialog box from the AWS S3 console. At the top, it displays the current bucket name 'skills-objectstorage-test' and its resource group 'Default'. Below this, the main title 'Create bucket' is centered. A note 'Unique bucket name: [See naming rules](#)' is present, followed by a text input field containing 'Unique name from all other buckets in our system'. Under the 'Resiliency' section, 'Regional' is selected. In the 'Location' section, 'us-east' is chosen. A note 'Best performance' is shown below the location dropdown. The 'Storage class' dropdown is set to 'Standard'. At the bottom of the dialog, there are three optional checkboxes: 'Add Key Protect Keys (optional)', 'Add archive policy (optional)', and 'Add retention policy (optional)'. A large blue 'Create bucket' button is located at the bottom right, which is highlighted with a red rectangular border.

Dashboard /

skills-objectstorage-test

Resource Group: Default

⋮

Create bucket ×

Unique bucket name: [See naming rules](#)

Unique name from all other buckets in our system

Resiliency

Region ▼

us-east ▼

Best performance

Location

Storage class [See pricing for each class](#)

Standard ▼

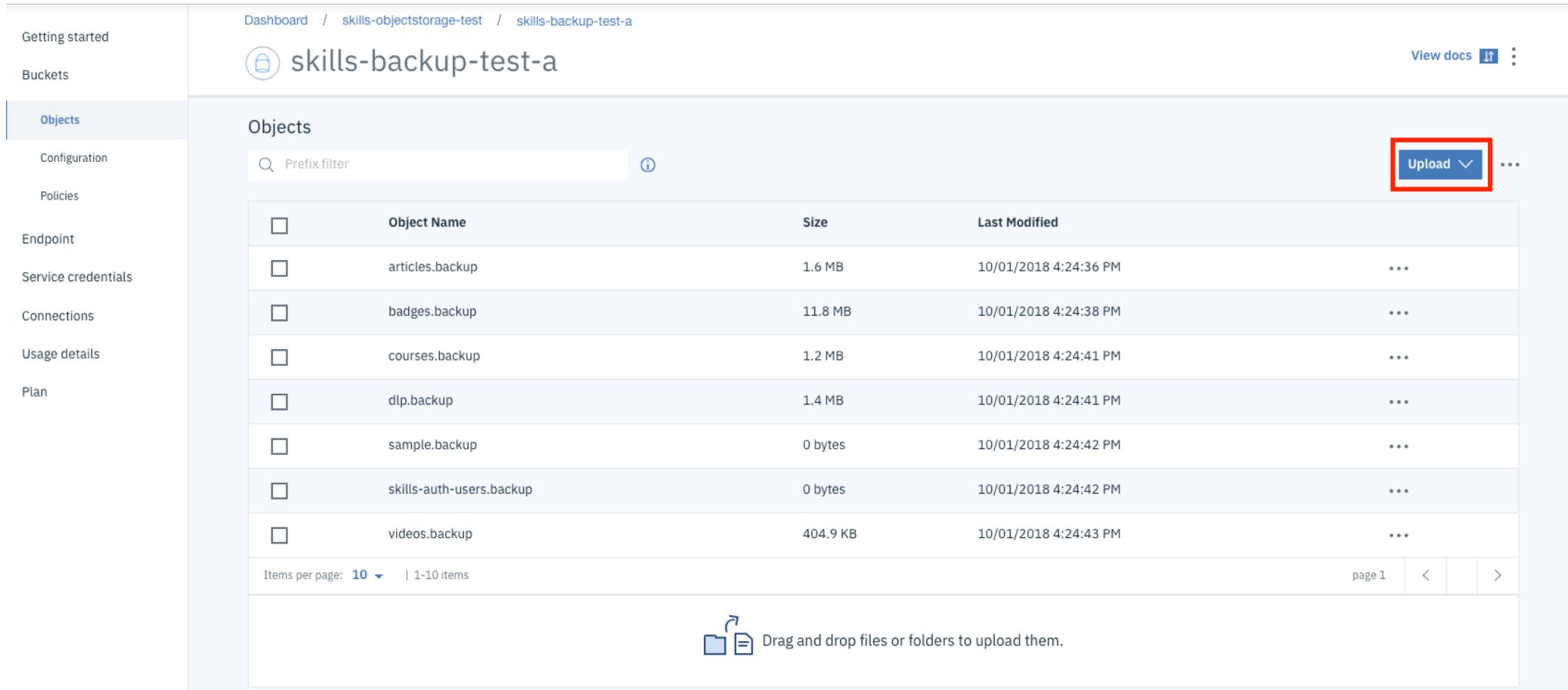
Add Key Protect Keys [\(optional\)](#)

Add archive policy [\(optional\)](#)

Add retention policy [\(optional\)](#)

Create bucket

Upload Content



The screenshot shows the AWS S3 console interface. On the left, a sidebar lists various navigation options: Getting started, Buckets, Objects (which is selected and highlighted in blue), Configuration, Policies, Endpoint, Service credentials, Connections, Usage details, and Plan. The main content area displays the 'skills-backup-test-a' bucket. At the top of this area, there's a breadcrumb trail: Dashboard / skills-objectstorage-test / skills-backup-test-a, followed by the bucket name 'skills-backup-test-a' with a folder icon, 'View docs' (with a link count of 11), and a more options menu. Below this is a search bar with a 'Prefix filter' placeholder and an information icon. To the right of the search bar is a blue 'Upload' button with a downward arrow, which is highlighted with a red box. The main table lists objects in the bucket:

	Object Name	Size	Last Modified	Actions
<input type="checkbox"/>	articles.backup	1.6 MB	10/01/2018 4:24:36 PM	...
<input type="checkbox"/>	badges.backup	11.8 MB	10/01/2018 4:24:38 PM	...
<input type="checkbox"/>	courses.backup	1.2 MB	10/01/2018 4:24:41 PM	...
<input type="checkbox"/>	dlp.backup	1.4 MB	10/01/2018 4:24:41 PM	...
<input type="checkbox"/>	sample.backup	0 bytes	10/01/2018 4:24:42 PM	...
<input type="checkbox"/>	skills-auth-users.backup	0 bytes	10/01/2018 4:24:42 PM	...
<input type="checkbox"/>	videos.backup	404.9 KB	10/01/2018 4:24:43 PM	...

At the bottom of the table, there are pagination controls: 'Items per page: 10' (with a dropdown arrow), '1-10 items', 'page 1', and navigation arrows (< and >). Below the table, there's a large input field with a 'Drag and drop files or folders to upload them.' placeholder, accompanied by a file icon.

*Here, a user can upload content. For example, .docx, .png, .pdf, etc.

Secure Gateway

*See GitHub repository for a more detailed instruction configuration and tutorial.

Select Secure Gateway in Integration Section

IBM Cloud Catalog Docs Support Manage Search for resource... Christopher Iacobellis's... Filter

Catalog

All Categories (1) > Integration

secure gateway

Filter

FEEDBACK

Secure Gateway
IBM

IBM Secure Gateway for Bluemix enables users to integrate cloud services with enterprise systems on premises.

The screenshot shows the IBM Cloud Catalog interface. At the top, there is a dark header bar with links for 'IBM Cloud', 'Catalog', 'Docs', 'Support', 'Manage', a search bar, and a user profile. Below the header, the word 'Catalog' is displayed. A search bar contains the text 'secure gateway'. To the right of the search bar is a blue 'Filter' button. On the left, a sidebar lists categories: 'All Categories (1) >', 'Compute', 'Containers', 'Networking', 'Storage', 'AI', and 'Analytics'. The main area is titled 'Integration' and contains a card for 'Secure Gateway' by IBM. The card has a red border around it. The card text states: 'IBM Secure Gateway for Bluemix enables users to integrate cloud services with enterprise systems on premises.' A vertical 'FEEDBACK' button is located on the far right edge of the main content area.

Name Resource and Create

The screenshot shows the IBM Cloud interface for the Secure Gateway service. At the top, there's a navigation bar with links for Catalog, Docs, Support, Manage, and a search bar. Below that, a user profile is shown.

The main content area displays the "Secure Gateway" service card. It includes a brief description of the service, a list of features, and some metadata like author, published date, and type. At the bottom, there are links for help and cost estimation.

A red box highlights the deployment configuration section, which includes dropdowns for "Choose a region/location to deploy in" (set to Dallas), "Choose an organization" (set to christopher.iacobellis@ibm.com), and "Choose a space" (set to dev).

Another red box highlights the large blue "Create" button at the bottom right of the page.

Choose a region/location to deploy in: Dallas

Choose an organization: christopher.iacobellis@ibm.com

Choose a space: dev

Features

- Fast and Simple**
Quickly set up Gateways to connect your environments, manage the mapping between your local and remote destinations, and monitor all of your traffic.
- Access Control List**
Simple access management controls are available from the Secure Gateway Client to allow or deny access on a per resource basis to prevent any unauthorized access. This list will automatically synchronize to any Client connected to the same Gateway.
- Encryption and Authentication**
All communication with Secure Gateway is easily configurable to provide TLS encryption and mutual authentication.
- Load Balancing and High Availability**
On Professional and Enterprise plans, you can connect multiple instances of the Secure Gateway Client to your gateway to automatically leverage built-in connection load balancing and connection fail-over should one Client instance go down.
- Resource Monitoring**
Monitor all your gateways from the Secure Gateway Dashboard or monitor individual gateways from the Secure Gateway Client.

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

Estimate Monthly Cost [Cost Calculator](#)

Create

View Dashboard and Add a Gateway Client

Dashboard /

 skills-securegateway-test

Location: Dallas Org: IBM CIO - Learning Services Space: test

Secure Gateway Dashboard

1 Current Connections 0.00 MB Total Inbound 0.00 MB Total Outbound



MB

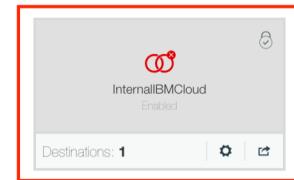
0.8
0.6
0.4
0.2
0

8:34 9:14 9:54 10:34 11:14 11:54 12:34 13:14 13:54 14:34 15:14 15:54 16:34 17:14 17:54 18:34 19:14 20:14

InternalIBMCloud



A teal button with a white plus sign inside a circle. To its right is a vertical toolbar with three icons: a wrench, a trash can, and a download arrow.



InternalIBMCloud
Created
Destinations: 1   

Enter Credentials for Source and Target

The screenshot shows the Secure Gateway Dashboard for the organization 'skills-securegateway-test'. The dashboard displays a summary with 0 current connections and 00 MB total outbound traffic. A red box highlights a specific connection configuration for 'InternalIBMCloud'. This configuration includes:

- Gateway ID:** 5Ph4rPiqyxw_prod_ng
- Node:** cap-sg-prd-3.integration.ibmcloud.com
- Created at:** 7/16/2018, 3:36:41 PM
- Last modified at:** 10/22/2018, 11:22:09 AM
- Security:** Regenerate Gateway Cert and Key

At the bottom of the configuration window, there are three buttons: 'Edit' (teal), 'Disable' (white), and 'Delete' (red). A red arrow points to the 'Delete' button.

* The Node is the Secure Gateway custom host that allows the user to establish a connection. In our case, from a Legacy Server to the IBM Cloud infrastructure.

Create a Destination

The screenshot shows the IBM Cloud Secure Gateway Test dashboard for the organization "IBM CIO - Learning Services" and space "test". The location is Dallas. The top right corner features a red box around a two-circles-overlapping icon, with a red arrow pointing to it from the text below. Below the dashboard, there's a teal bar with a plus sign icon, which is also highlighted with a red box.

Dashboard /

skills-securegateway-test

Location: Dallas Org: IBM CIO - Learning Services Space: test

InternalIBMCloud

1 Current Connections 0.00 MB Total Inbound 0.00 MB Total Outbound

MB

0.8
0.6
0.4
0.2
0

8:34 9:14 9:54 10:34 11:14 11:54 12:34 13:14 13:54 14:34 15:14 15:54 16:34 17:14 17:54 18:34 19:14 20:14

TADB2 Test Server

Destinations (1)

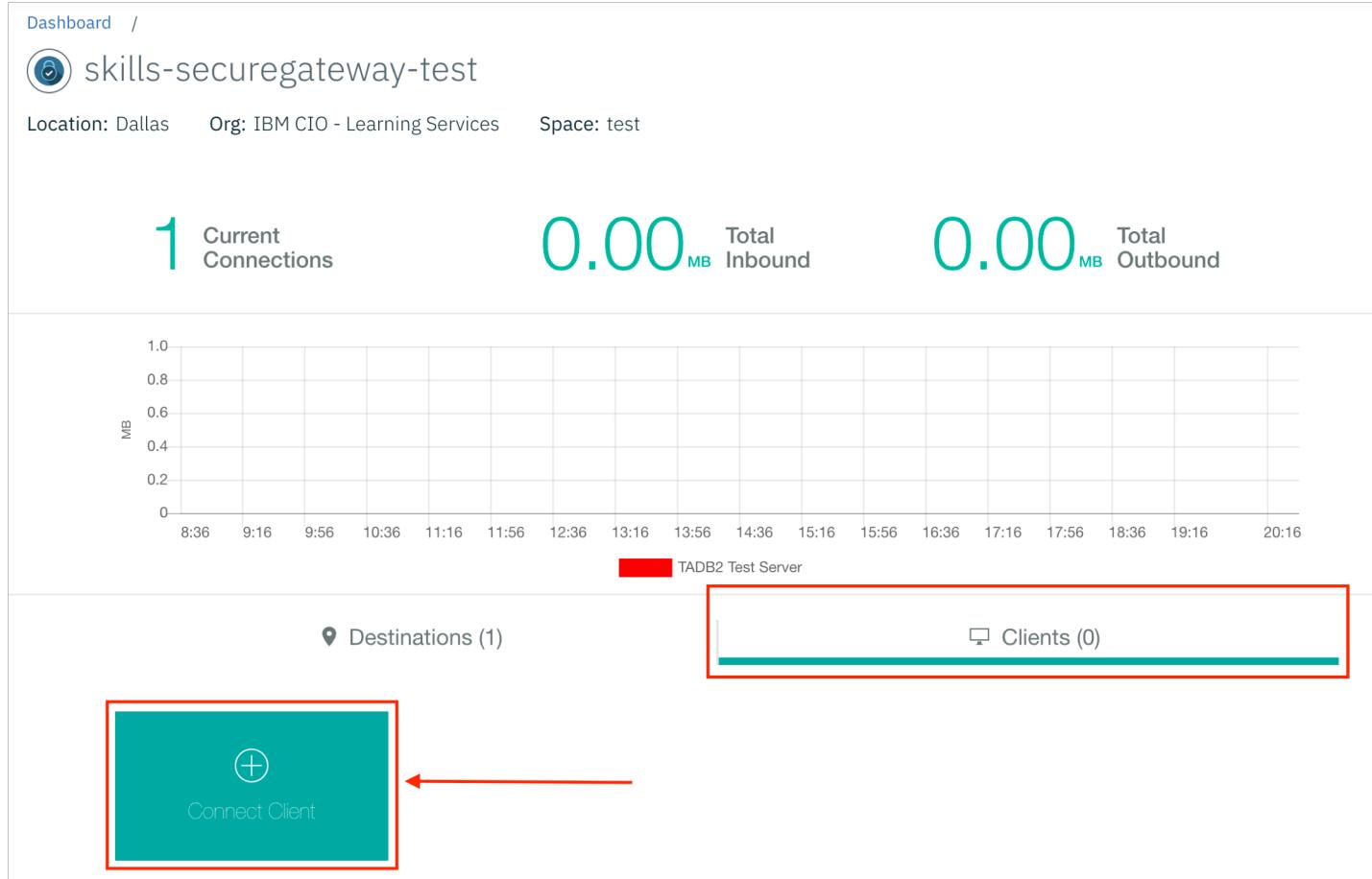
Clients (0)

+

TADB2 Test Server
Created
Connections: 0

*The two circles overlapping symbol (top right) signifies that the Gateway is **not** active and connected.

Connect to a Client



Connect to Gateway using Docker

How would you like to connect this new gateway?

IBM  IBM Installer  Docker  IBM DataPower

- 1 Install Docker if not already installed
- 2 Open a terminal window
- 3 Copy and paste the command line below and run

```
docker run -it ibmcom/secure-gateway-client 5Ph4rPiqyxw_prod_ng -t eyJhbGciOiJIUzI1NilsInR5cCl6IkpXV
```

To update your Docker image, copy and paste the command line below and run

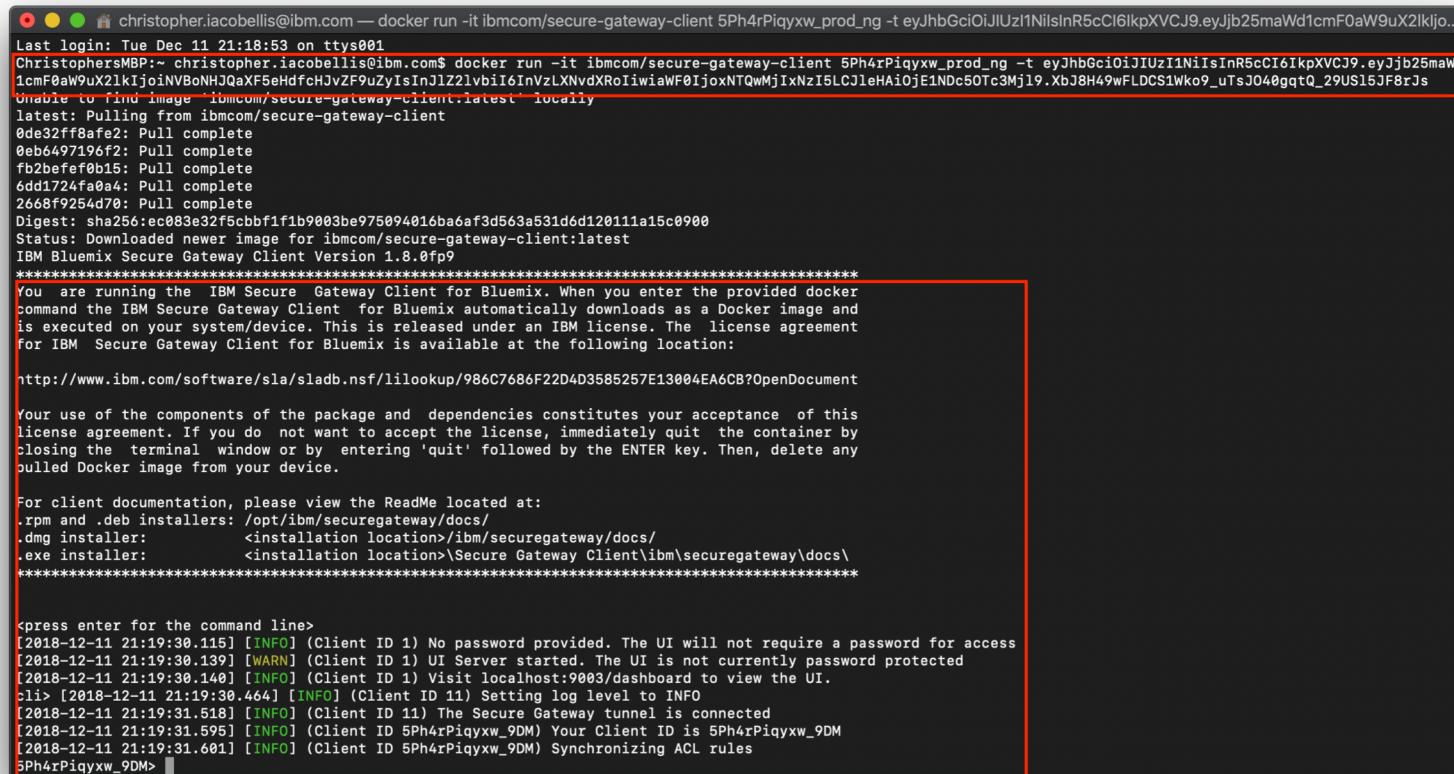
```
docker pull ibmcom/secure-gateway-client
```

Docker Resources

If Docker is not already installed, follow the [installation guide](#) for your target operating system before proceeding. Explore the [user guides](#) that will explain the fundamentals Docker and its integration into your environment.

*The IBM Secure Gateway allows a user to initiate the gateway connection through Docker. Since we've used Docker all semester, it is great for this example.

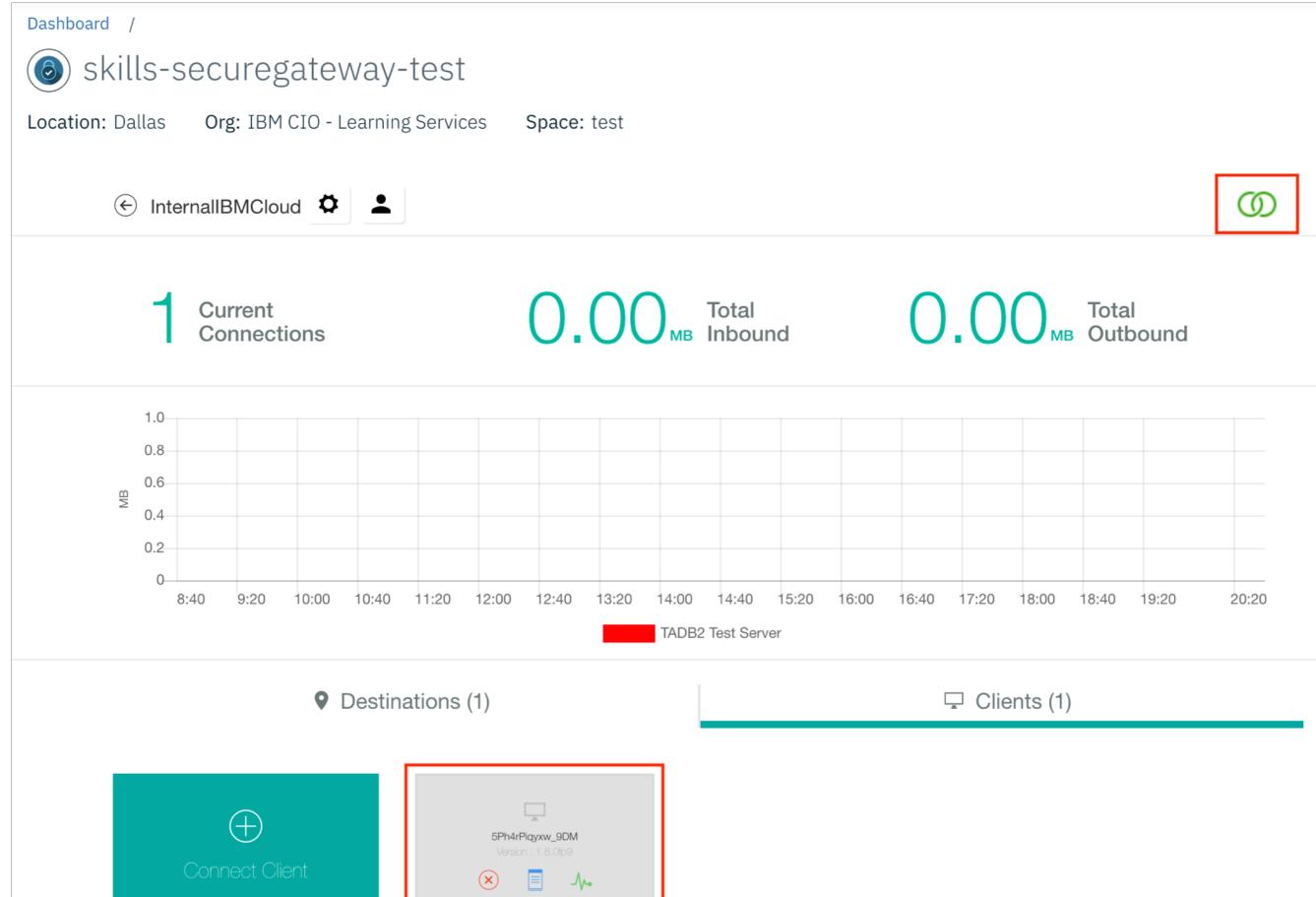
Copy the Link and Run in Terminal Shell



```
christopher.iacobellis@ibm.com — docker run -it ibmcom/secure-gateway-client 5Ph4rPiqyxw_prod_ng -t eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9eyJjb25maWd1cmF0aW9uX2lkjo...  
Last login: Tue Dec 11 21:18:53 on ttys001  
christopher.iacobellis@ibm.com$ docker run -it ibmcom/secure-gateway-client 5Ph4rPiqyxw_prod_ng -t eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9eyJjb25maWd1cmF0aW9uX2lkjo...  
1cmF0aW9uX2lkjoNVBoNHQaXF5eHdfchJvZP9uZyIsInJlZ2lvbii6InVzLXNvdXRoIiwiaWF0IjoxNTQwMjIxNzI5LCJleHAiOjE1NDc5OTc3MjI9.XbJ8H49wFLDCS1Wko9_uTsJ040gqtQ_29USl5JF8rJs  
Unable to find image 'ibmcom/secure-gateway-client:latest' locally  
latest: Pulling from ibmcom/secure-gateway-client  
0de32ff8afe2: Pull complete  
0eb6497196f2: Pull complete  
fb2befef0b15: Pull complete  
6dd1724fa04: Pull complete  
2668f9254d70: Pull complete  
Digest: sha256:ec083e32f5cbff1f1b9003be975094016ba6af3d563a531d6d120111a15c0900  
Status: Downloaded newer image for ibmcom/secure-gateway-client:latest  
IBM Bluemix Secure Gateway Client Version 1.8.0fp9  
*****  
You are running the IBM Secure Gateway Client for Bluemix. When you enter the provided docker  
command the IBM Secure Gateway Client for Bluemix automatically downloads as a Docker image and  
is executed on your system/device. This is released under an IBM license. The license agreement  
for IBM Secure Gateway Client for Bluemix is available at the following location:  
http://www.ibm.com/software/sla/sladb.nsf/lilookup/986C7686F22D4D3585257E13004EA6CB?OpenDocument  
Your use of the components of the package and dependencies constitutes your acceptance of this  
license agreement. If you do not want to accept the license, immediately quit the container by  
closing the terminal window or by entering 'quit' followed by the ENTER key. Then, delete any  
pulled Docker image from your device.  
For client documentation, please view the ReadMe located at:  
.rpm and .deb installers: /opt/ibm/securegateway/docs/  
.dmg installer: <installation location>/ibm/securegateway/docs/  
.exe installer: <installation location>\Secure Gateway Client\ibm\securegateway\docs\  
*****  
Press enter for the command line>  
[2018-12-11 21:19:30.115] [INFO] (Client ID 1) No password provided. The UI will not require a password for access  
[2018-12-11 21:19:30.139] [WARN] (Client ID 1) UI Server started. The UI is not currently password protected  
[2018-12-11 21:19:30.140] [INFO] (Client ID 1) Visit localhost:9003/dashboard to view the UI.  
cli> [2018-12-11 21:19:30.464] [INFO] (Client ID 11) Setting log level to INFO  
[2018-12-11 21:19:31.518] [INFO] (Client ID 11) The Secure Gateway tunnel is connected  
[2018-12-11 21:19:31.595] [INFO] (Client ID 5Ph4rPiqyxw_9DM) Your Client ID is 5Ph4rPiqyxw_9DM  
[2018-12-11 21:19:31.601] [INFO] (Client ID 5Ph4rPiqyxw_9DM) Synchronizing ACL rules  
5Ph4rPiqyxw_9DM>
```

*Paste the link in your local Terminal Shell and run. A successful connection is shown at the bottom, in green.

Confirm Gateway is Established



*Now the overlapping circles are green; meaning the Gateway has been secured.

Final Results & Retrospect

Final Results

- At the completion of this project, I am proud to say that I have learned a great deal of information on the IBM Cloud and its services.
- The IBM Cloud allows for a user to create their own database and insert corresponding data. At the same time, users can upload and download metadata (such as PDF's, Documents, Photos, etc.)
- A user can also create their own version of Object Storage on the Cloud. Here they can store [upload] metadata and other filetypes, and can access them at any time to download.
- Finally, a user can initialize a Secure Gateway connection between two servers (one legacy and one Cloud), in order to migrate data from one to the other.
- I was able to complete these various steps seamlessly and efficiently. The IBM Cloud is an excellent tool for this type of functionality.

My Statistics

- In the end, I was able to:
 - Create my own instance of a DB2 Managed Database with:
 - 4 Schemas
 - Over 50 tables
 - Table data
 - Create an instance of Cloud Object Storage and:
 - Upload over 10 different filetypes.
 - Re-Download these files to my local from the GUI
 - Instantiate a Secure Gateway connection
 - Between a legacy server to an IBM Cloud server.
 - Use Docker through a local terminal shell to initiate the connection.

In Retrospect ...

- In retrospect, I am glad I chose this project. As stated prior, I am using technologies that my team is currently researching and eventually implementing for our system in my career [IBM Skills Gateway].
- Therefore, I was able to gain a greater insight on these cloud technologies over the semester; both from this class and from my research at IBM.
- If I were to continue this research in the future, I would investigate:
 - Other DB2 services (such as Hosted and Warehouse)
 - IBM Blockchain technologies

Thank You!