Introduction to Watson Knowledge Catalog

Introduction

This lab will introduce Watson Knowledge Catalog. Watson Knowledge Catalog is a secure enterprise catalog to discover, catalog and govern your data/models with greater efficiency. The catalog is underpinned by a central repository of metadata describing all the information managed by the platform. Users will be able to securely share data with their colleagues more easily, regardless of what the data is, where it is stored, or how they intend to use it. In this way, the intelligent asset catalog will unlock the value held within that data across user groups helping organizations use this key asset to its full potential.

End-to-End Data Science

The general flow of the End to End Data Science PoT will be guided by the activities shown in Figure 1- End to End Flow. This lab will focus on the **Find Governed Data** activity and demonstrate **Connect to Data**.

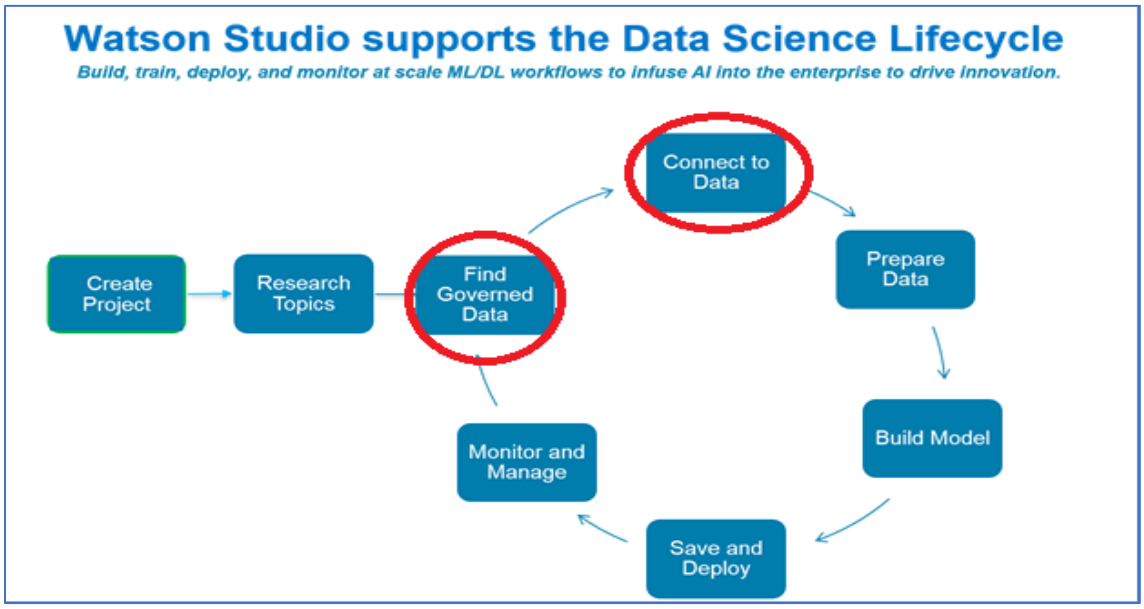


Figure 1- End to End Flow

Objectives

The goal of the lab is for the users to gain familiarity with the features of the Watson Knowledge Catalog. We will perform the following catalog tasks:

1. Create a governed catalog
2. Add a member to the catalog
3. Add Data Assets to the catalog
4. Search the catalog
5. Edit/Review/Profile a structured Data Asset
6. Demonstrate access control features

7. Demonstrate policy creation and enforcement (optional)
8. Push the Data Assets to the project set up in Lab-1

Download Files

Step 1: Download the trafficking_data.zip from the github repository

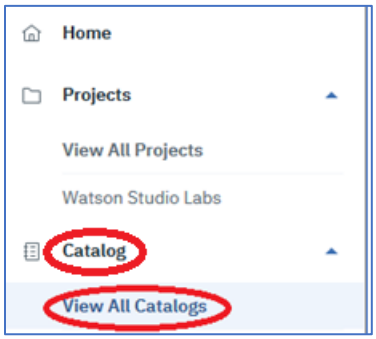
1. Click on trafficking_data.zip, to download the zipped file.
2. Extract the file contents. You should have two files extracted, (1) Categories.csv, and (2) Occupation.csv.

Perform Catalog Tasks

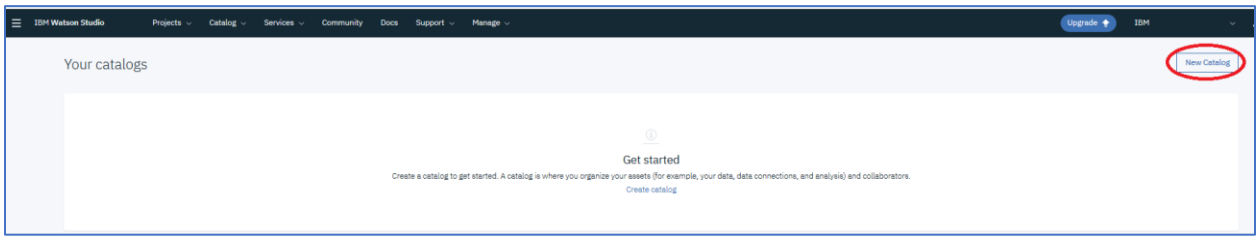
Step 1 – Create a Governed Catalog

1. Click on the **IBM Watson Studio** browser tab to return to Watson Studio.
2. Click on **Watson Studio** to go to the home screen.

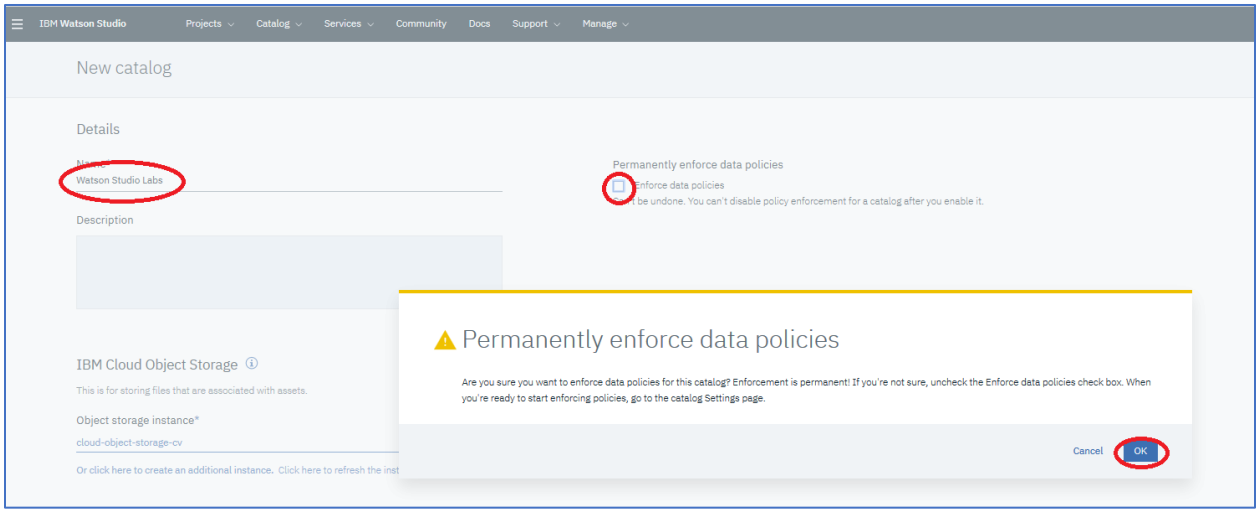
3. Click on icon, click on **Catalog**, and then **View All Catalogs**.



4. Click on **New Catalog**.



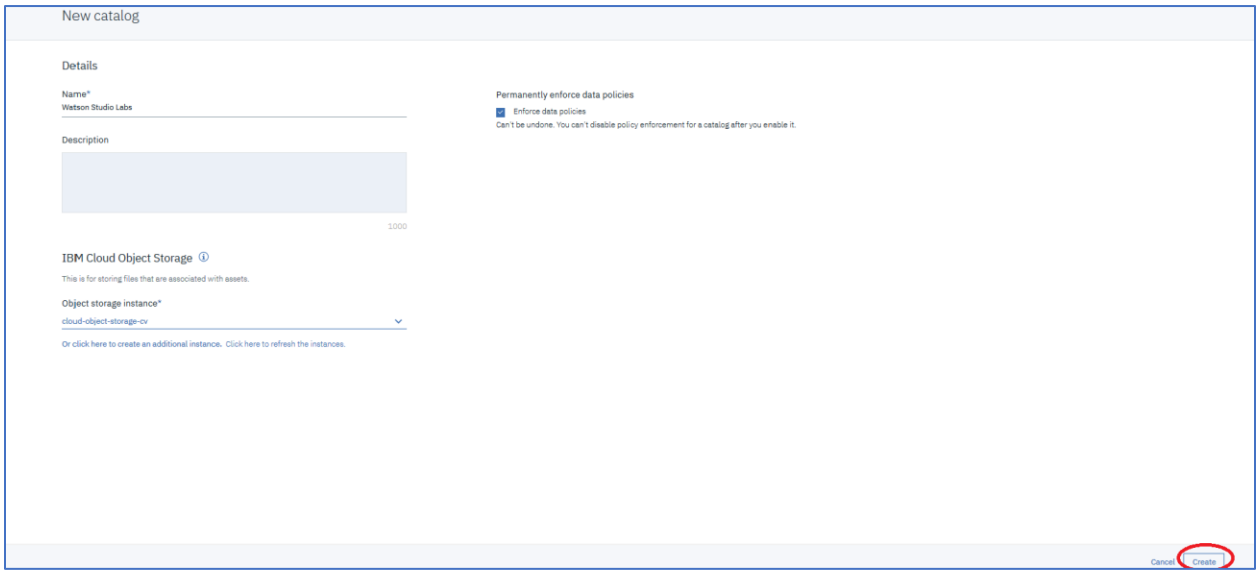
5. Enter **Watson Studio Labs** for the **Catalog** name. Click on **Permanently enforce data policies.** You will get a pop-up as shown below. Click on **OK**.



Note: By default, access to data assets in a catalog are only restricted by the privacy settings of the data assets. Privacy settings and policy rules can limit which members of the catalog can view and use the assets. You can implement data policies to restrict access to data based on the contents of the data. Data policies help you control data access and ensure that the right people can access the right data. Selecting the option to **enforce data policies** enables the enforcement of data policy rules to allow or deny access to a data asset or mask, anonymize and redact data at the data asset field level.

Setting this option for a catalog is a good best practice. Once it is enabled it cannot be undone, but it does not restrict or impede any functionality, it provides additional security measures to protect data assets.

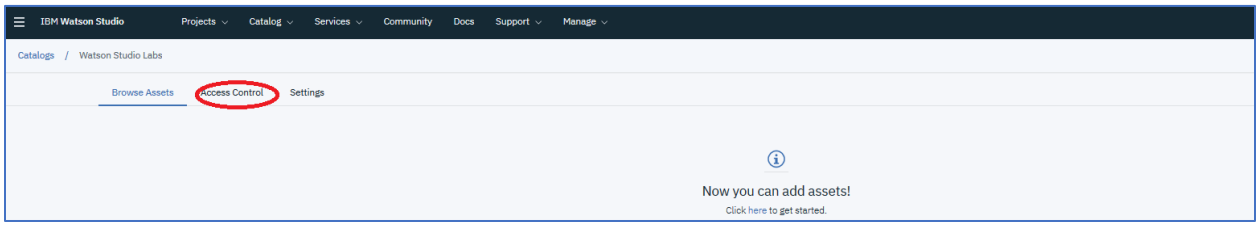
6. Click **Create** to create the catalog.



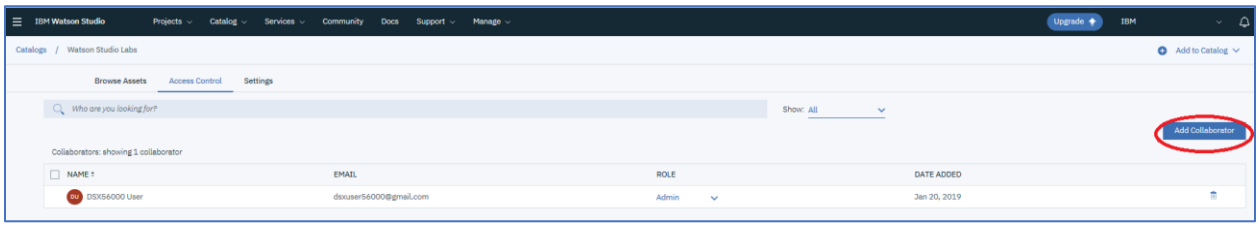
Step 2: Add a Member to the Catalog

To demonstrate the Catalog access control capability, we will add the **CATALOG COLLABORATOR**, which was provided by the lab instructor on an index card, as a member of the catalog. For illustrative purposes, we are using wsuserblb@gmail.com in this document. This may or may not be the e-mail address for the **CATALOG COLLABORATOR** on the index card. Note that the name of this user is "John Doe".

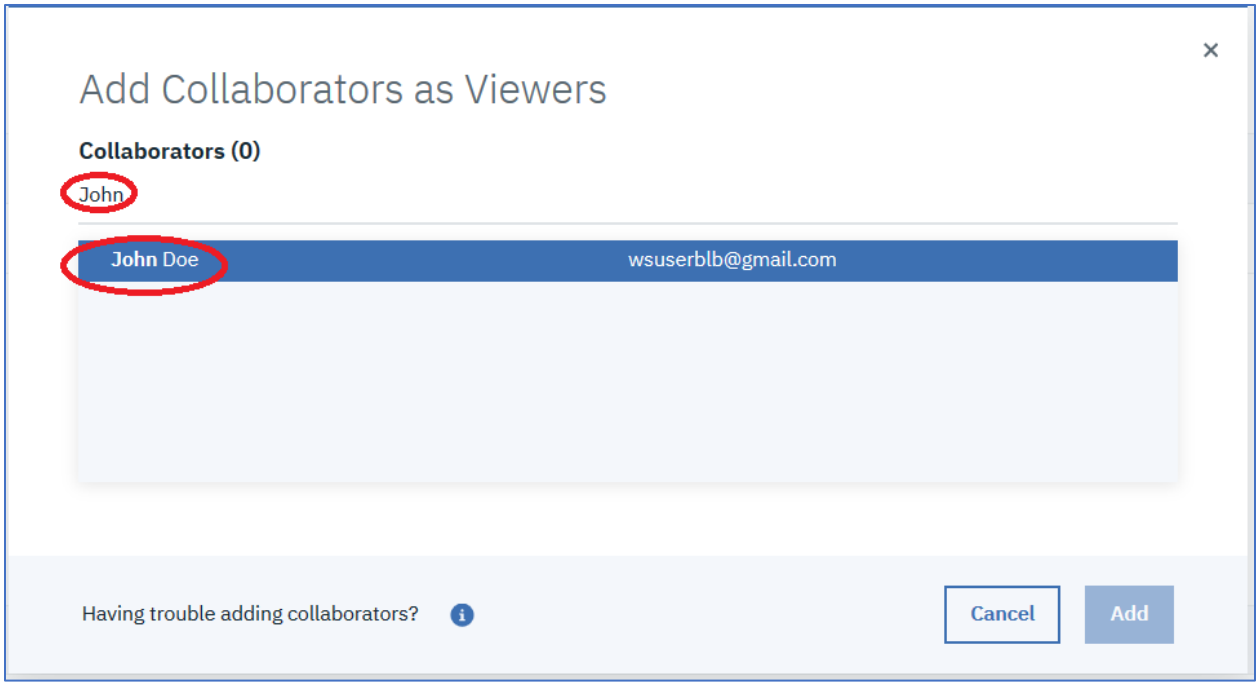
1. Click on **Access Control**.



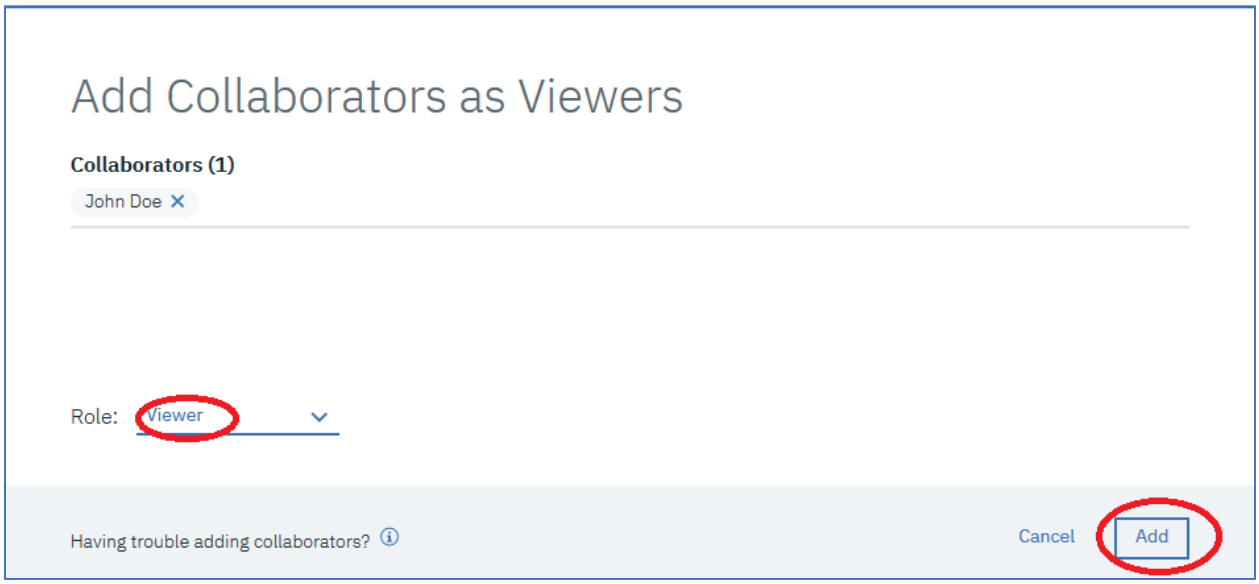
2. Click on **Add Collaborator**.



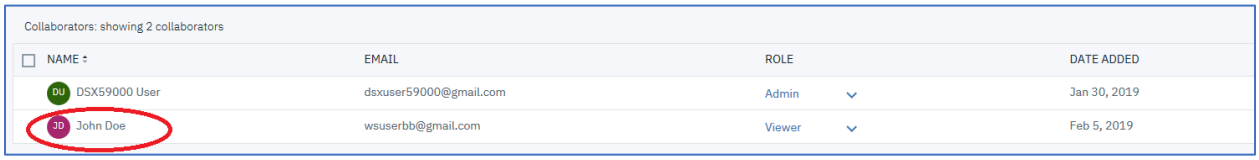
3. Enter the first name of the CATALOG COLLABORATOR from the index card. The list should populate with the full name of the CATALOG COLLABORATOR and the CATALOG COLLABORATOR's e-mail address. For illustrative purposes we are showing John Doe with e-mail address wsuserblb@gmail.com. You may have been provided with a different name, and password. Click on the **John Doe** entry in the list box.



4. Leave the Viewer as the **Role** and click on **Add**.



5. "John Doe" is added as a member of the catalog.



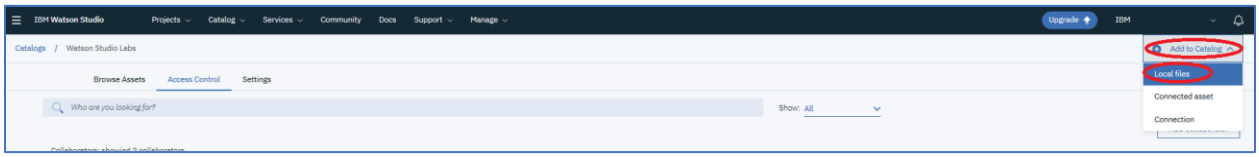
Step 3: Add Data Assets to the Catalog

In this step, we will add two local files, a connection, and a connected data asset. The local files we will add are the “Occupation.csv” file, and the “Categories.csv” file. We will set up a connection to a DB2 Warehouse service. We will add a connected data asset that will point to the FEMALE_HUMAN_TRAFFICKING table in the DB2 Warehouse service instance.

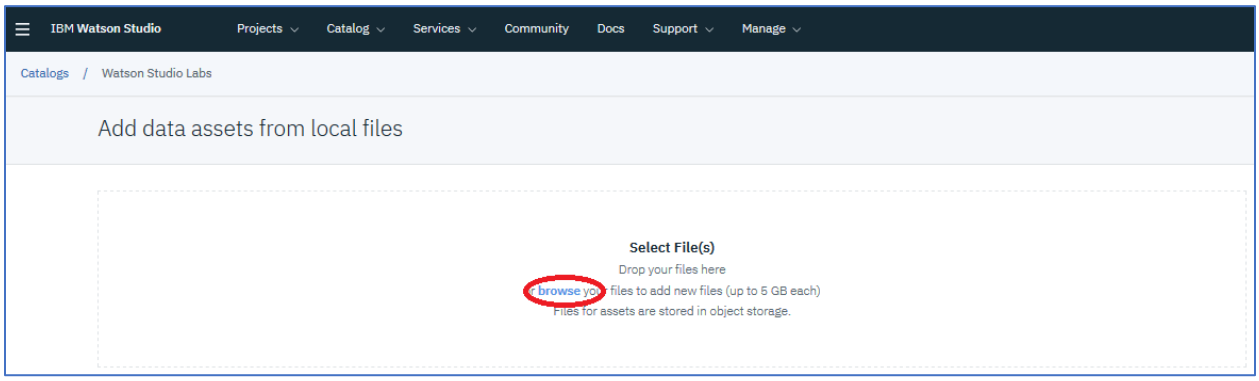
This step will introduce you to the three methods available to discover and catalog data assets; **Local files, Connected asset and Connection**. You will use these methods to catalog data assets into the newly created Knowledge Catalog and then tag them for users to easily find them, understand their content and make them available throughout IBM Watson Studio, for use during data preparation and within models, dashboards and notebooks as we will see in our lab exercises.

Add Local Files

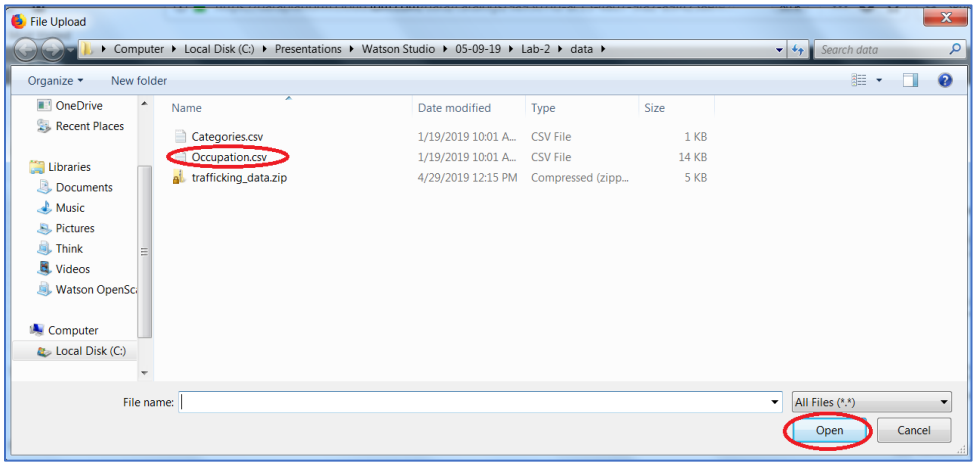
1. Click on **Add to Catalog** and click on **Local Files**.



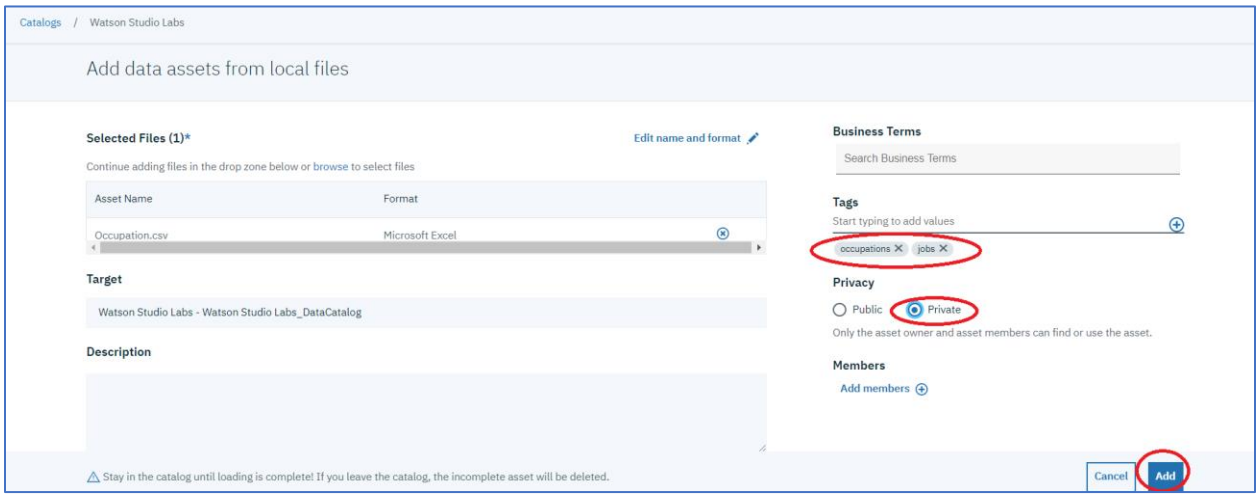
2. Click on **browse** to navigate to the folder where the “Occupation.csv” file is stored.



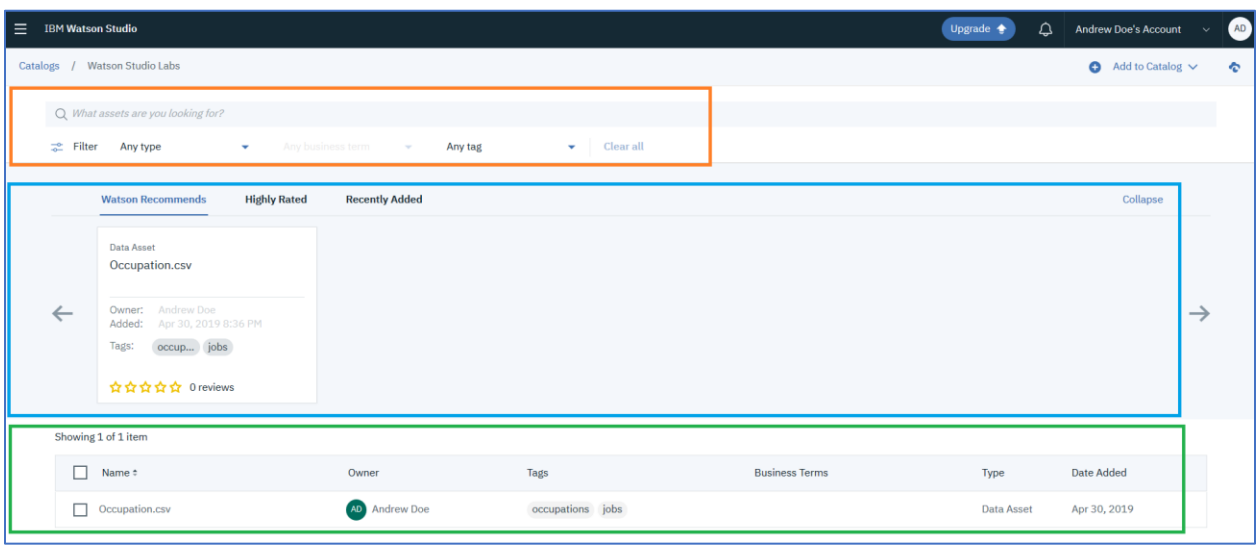
3. Click on **Occupation.csv** and then click **Open**.



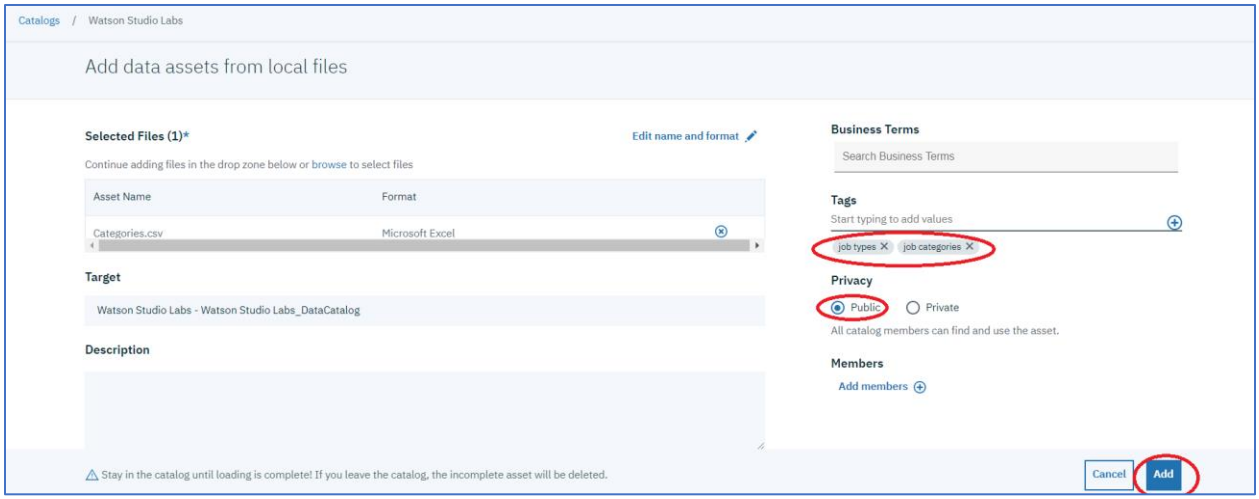
4. We can add tags to the newly added data asset to more easily search for it. Add two tags, enter “occupations”, click on the + icon, and enter “jobs” and click on the + icon. Click on Private for the **Privacy.** Click on **Add**.



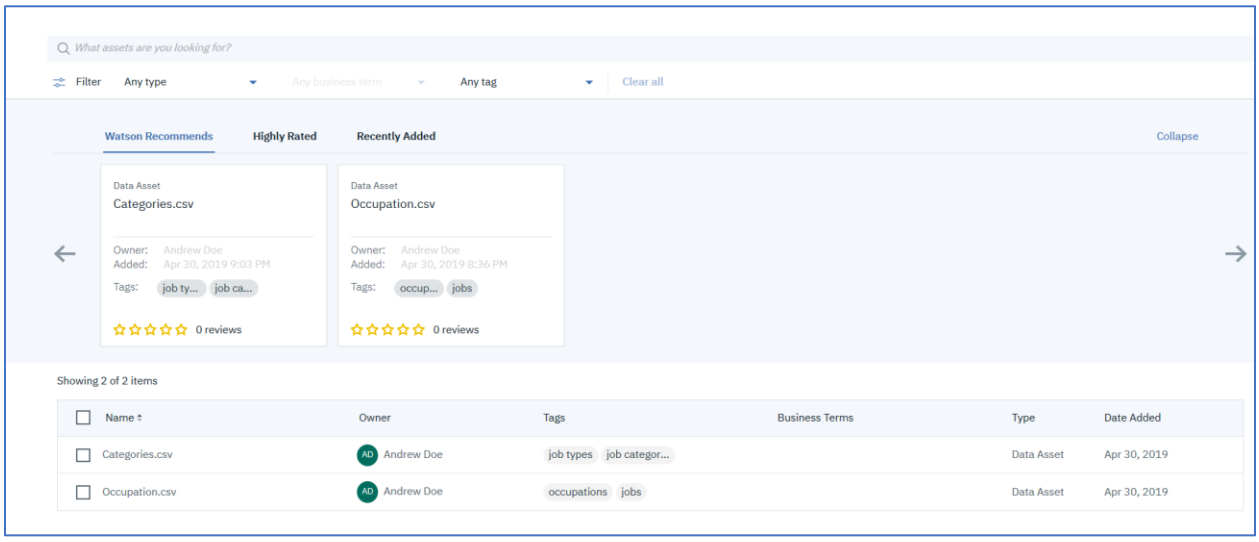
5. The Occupation.csv asset metadata is displayed. Note a number of features on the panel. The top part of the page contains the search area. This consists of an entry field to type search text and three filters, one by data type, one by tags, and one by business term (filters shown in red below). Note the business term filter is disabled since we have not defined any business terms. Underneath the search area, are 3 tabs: **Watson Recommended**, **Highly Rated**, and **Recently added.** The square below contains assets that are displayed when one of these tabs are selected (shown in blue below). Note this area can be collapsed. At the bottom is the list of assets (shown in green).



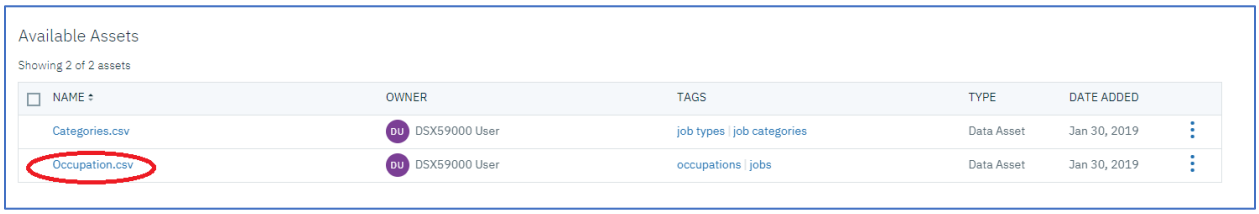
6. Follow the same procedure (1-4) above to add the local file “Categories.csv” file to the catalog. For step 4, enter the tag “job types” and then click on the “+” icon, enter the tag “job categories” and then click on the “+” icon, leave the **Privacy** as Public, and then click on **Add**.



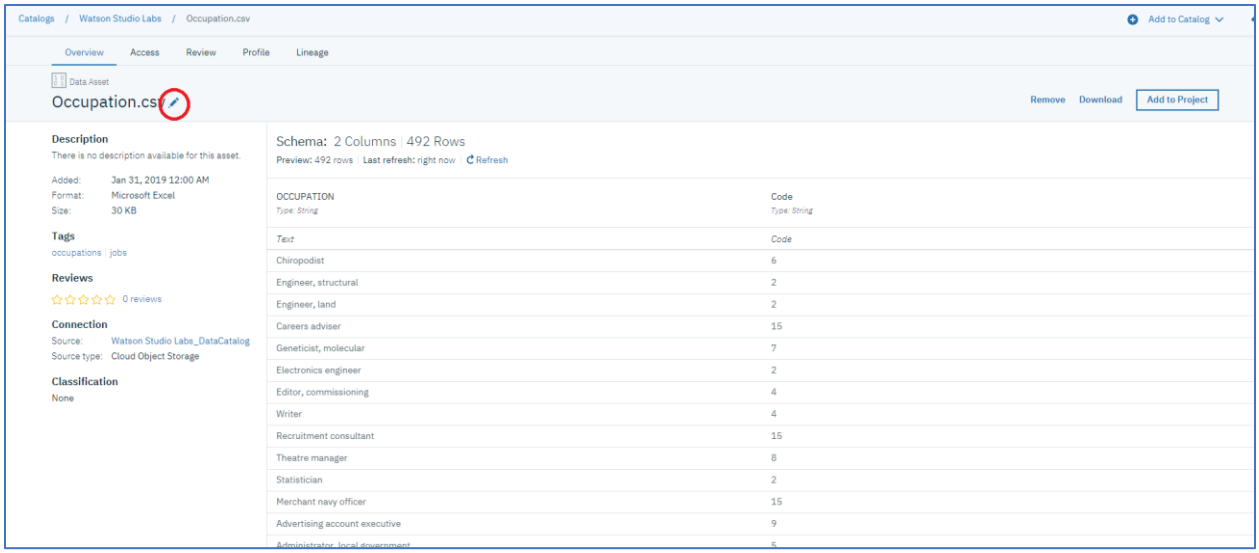
7. The Categories.csv asset is displayed



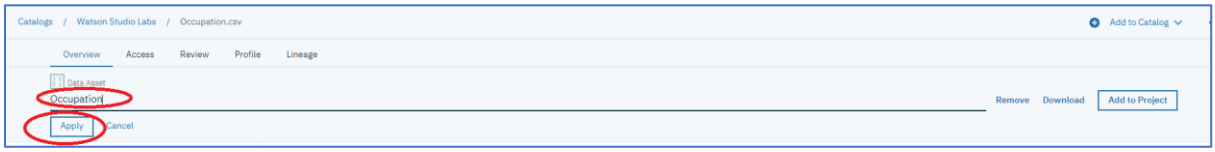
8. Change the name of the Occupation.csv asset to be just Occupation by clicking on the **Occupation.csv** asset.



9. Hover the mouse on the **Occupation.csv**. Click the “pencil” icon when it appears.



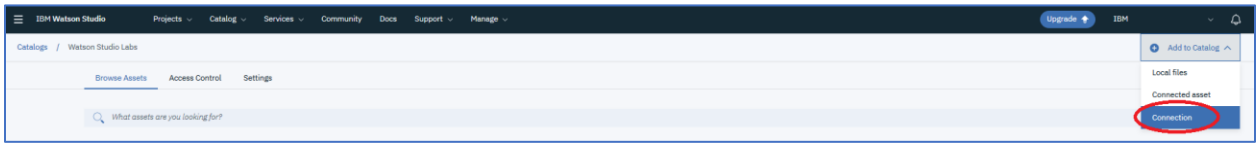
10. Change the name to Occupation and click **Apply.**



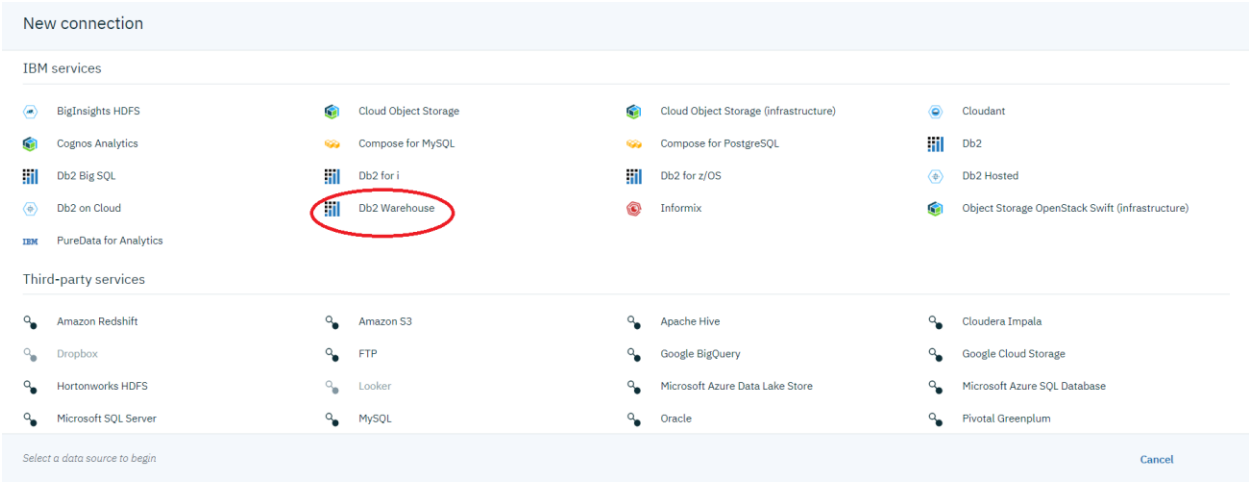
11. Click on **Watson Studio Labs** to return to the catalog display.
12. Follow steps 8-10 to change the Categories.csv asset name to be Categories.

Add Connection

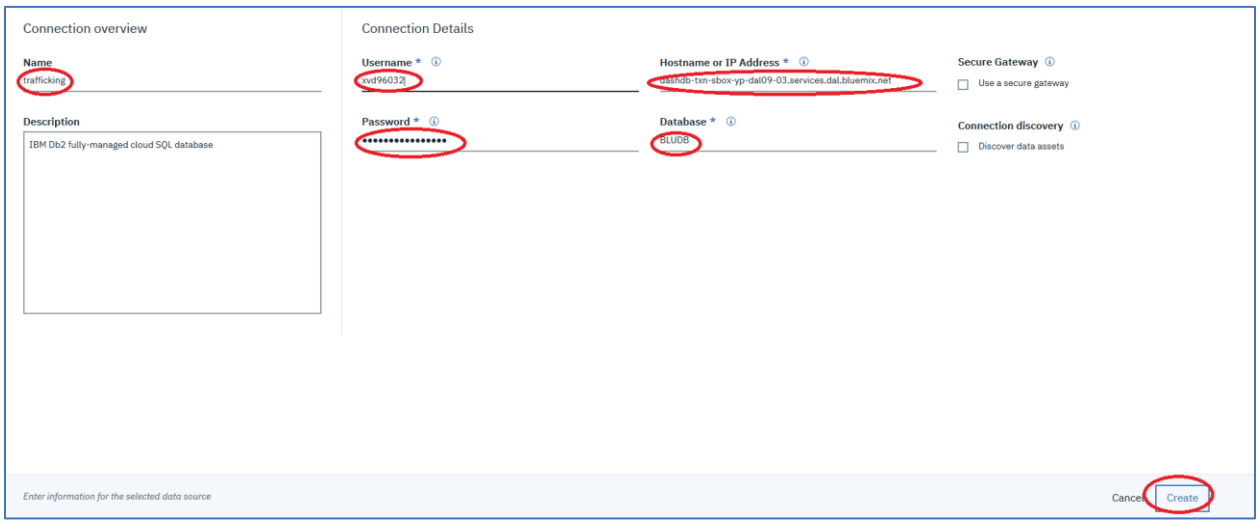
1. Click on **Add to Catalog**, and then click on **Connection**.



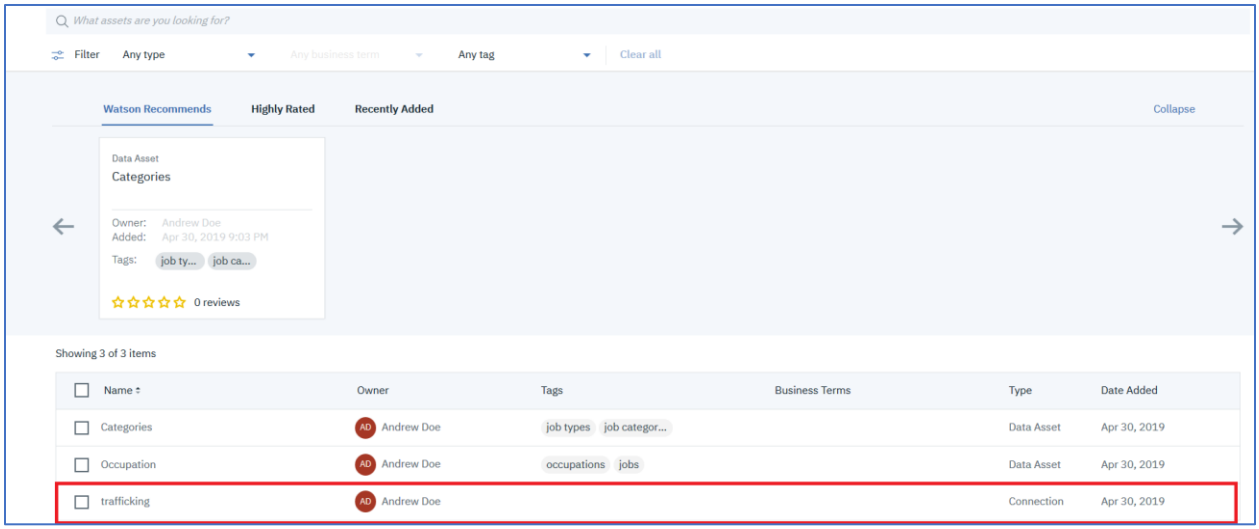
2. The Connection page is displayed with the various connectivity options. Click on **DB2 Warehouse.**



3. Enter "trafficking" for the **Name** of the connection. Click on Access DB2 Warehouse Credentials to obtain the DB2 Warehouse Credentials. You should have an index card that provides your assigned database warehouse. If not, ask your instructor. Locate the credentials that match your assigned database. Cut and paste the values for username, hostname, password, and database into the corresponding entry areas on the screen. Click on **Create**.



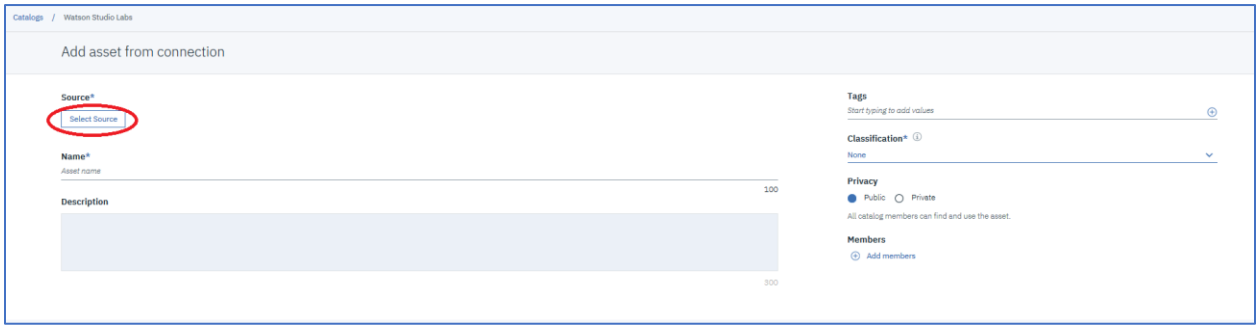
4. The connection asset is displayed.



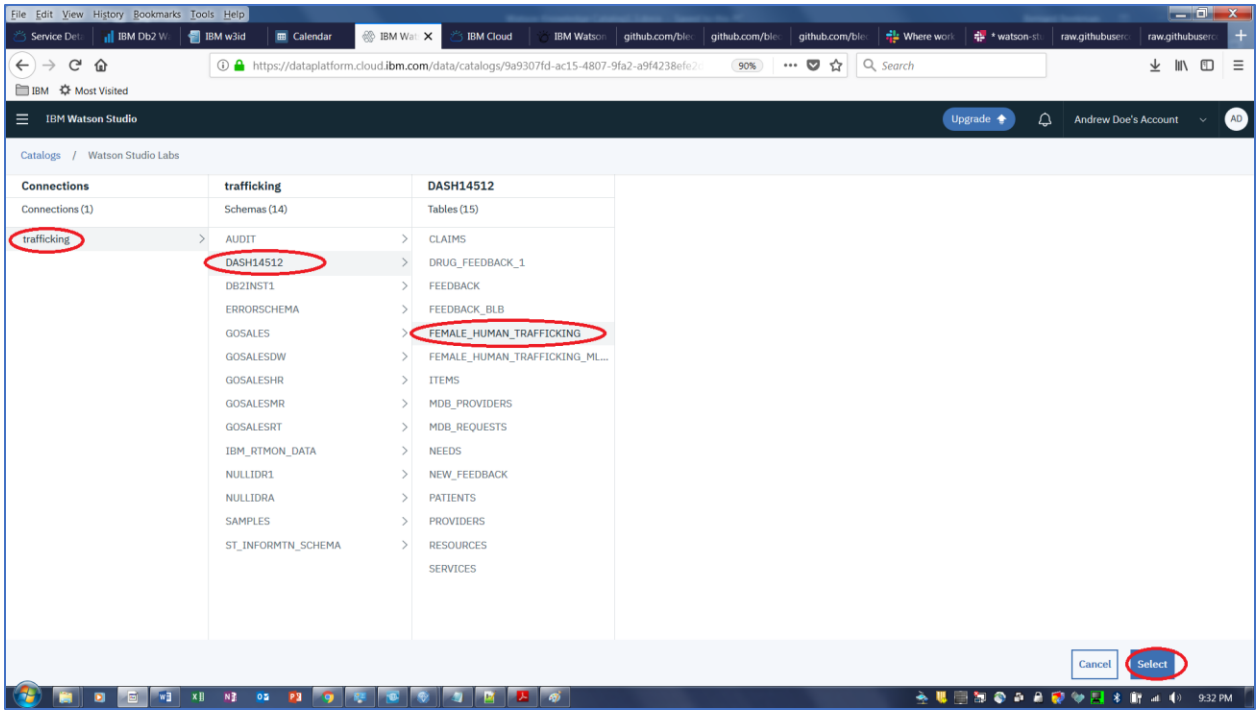
Add Connected Data

1. We have added a connection to the DB2 Warehouse service. We will now add a Connected Data Asset to point to the FEMALE_HUMAN_TRAFFICKING table in the warehouse. Click on **Add to Catalog** and click on **Connected asset**.

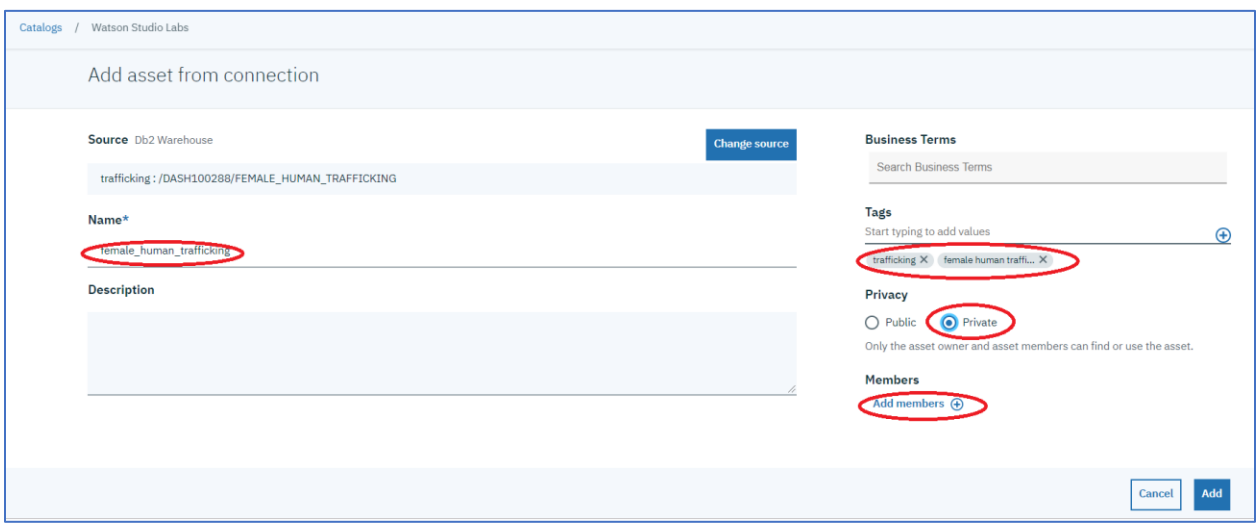
2. Click on **Select Source**.



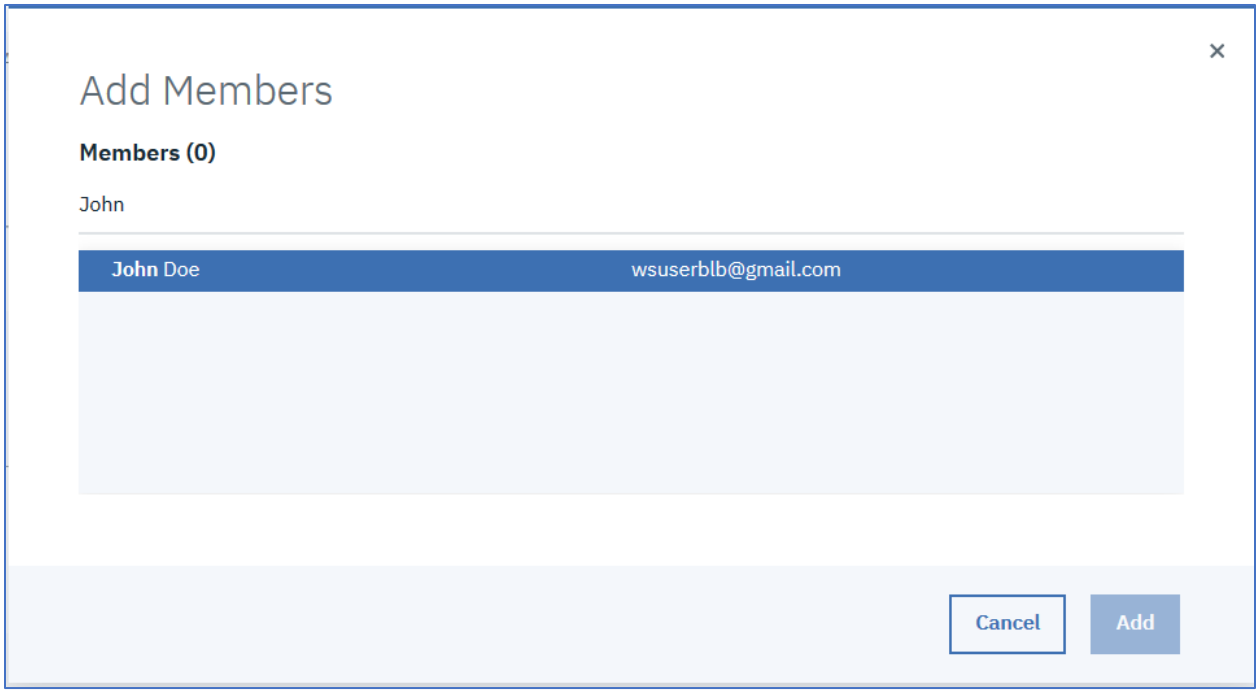
3. Click on the **trafficking** connection, click on the **Schema name** (should be DASHnnnnn where "nnnnn" is a number), click on FEMALE_HUMAN_TRAFFICKING, and then click **Select**.



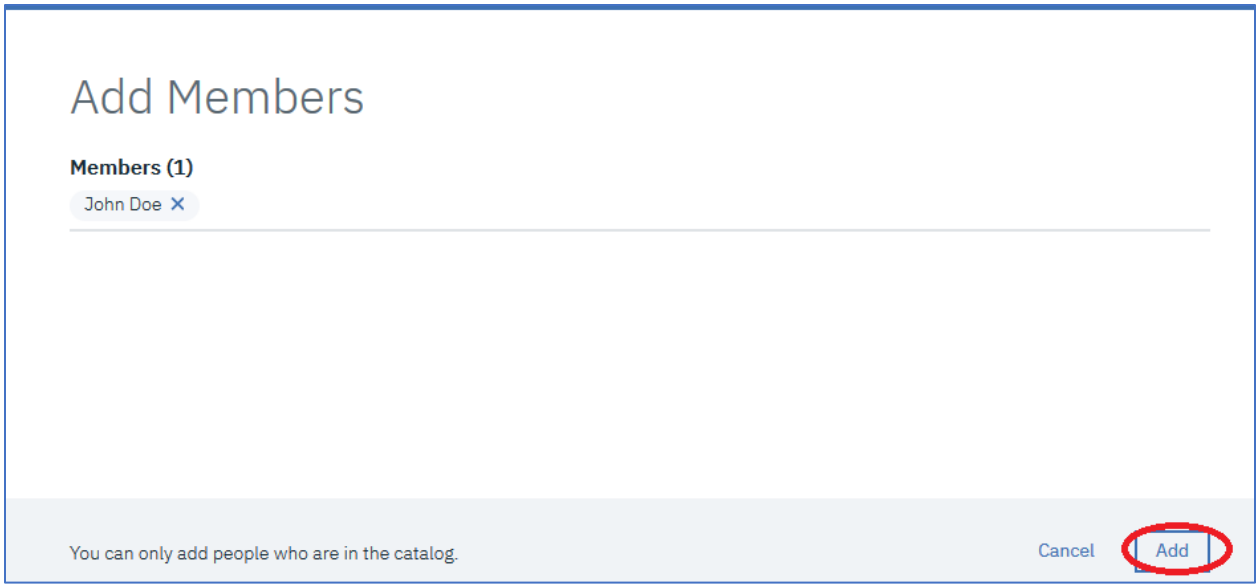
4. Enter female_human_trafficking for **Name**, enter "trafficking" for **Tags** , click the "+" icon, enter "female human trafficking for **Tags**, click the "+" icon. Click on **Private**, for Privacy, and click on **Add members**. The privacy setting of "Private" specifies that only catalog members on the access control list for this data asset will have access to the data asset.



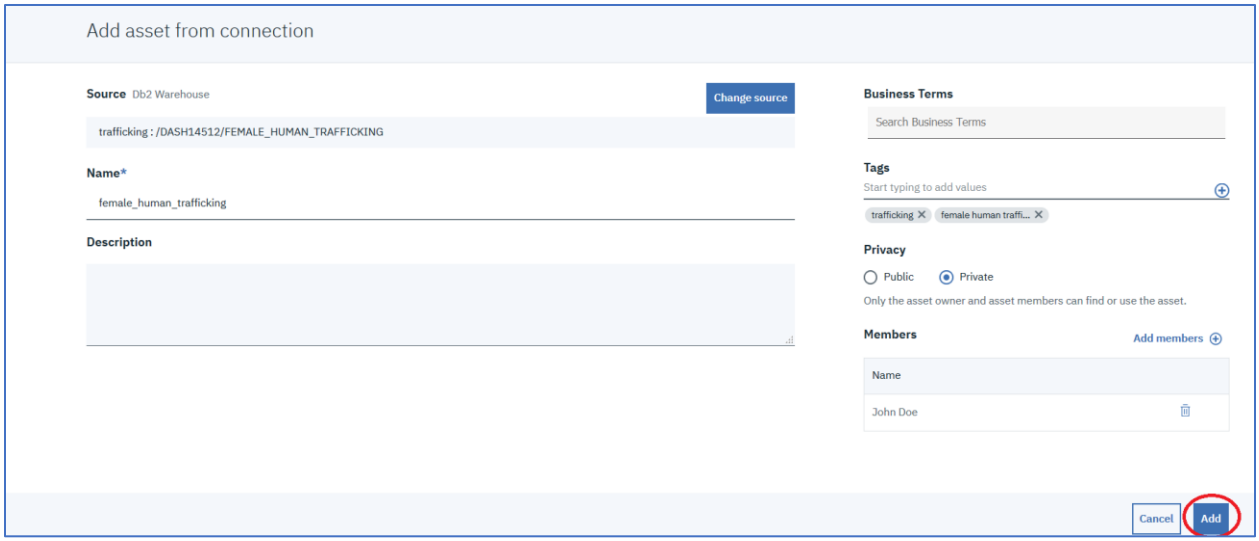
5. Enter John in the **Members** field. The list of matching users is displayed in the member list. Click on **John Doe**.



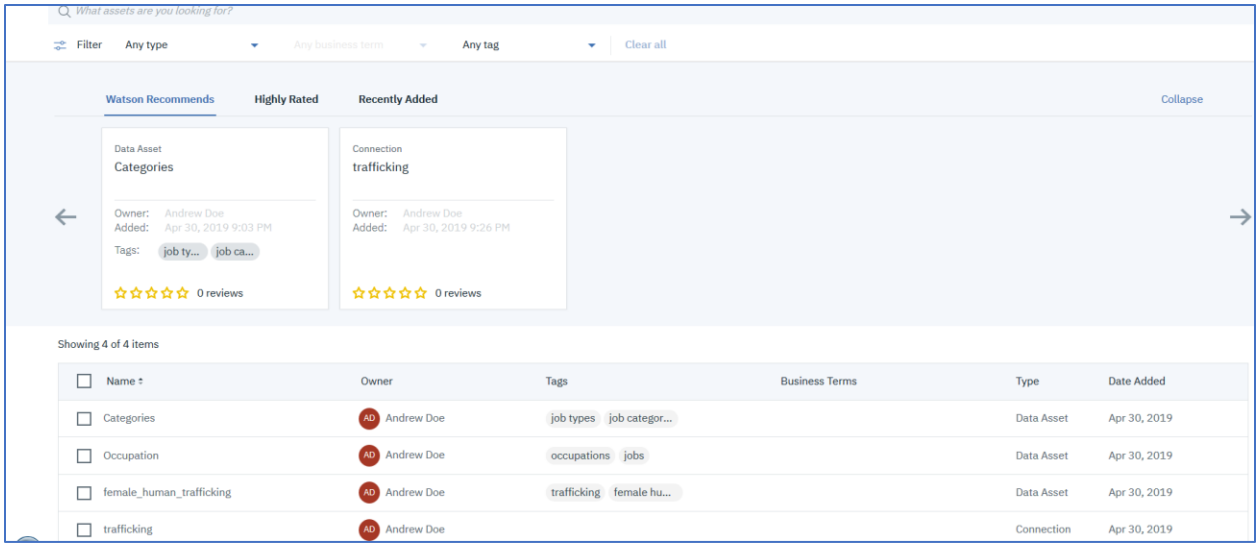
6. Click on **Add** to add John Doe to the access control list for the female_human_trafficking asset.



7. Click on **Add**.



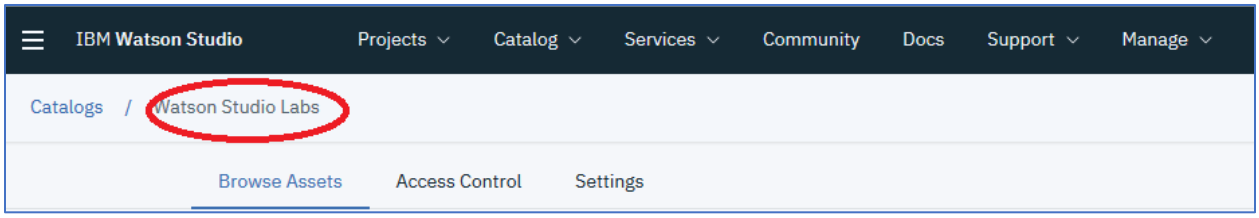
8. All of the assets have now been added to the catalog. The catalog display should appear as below.



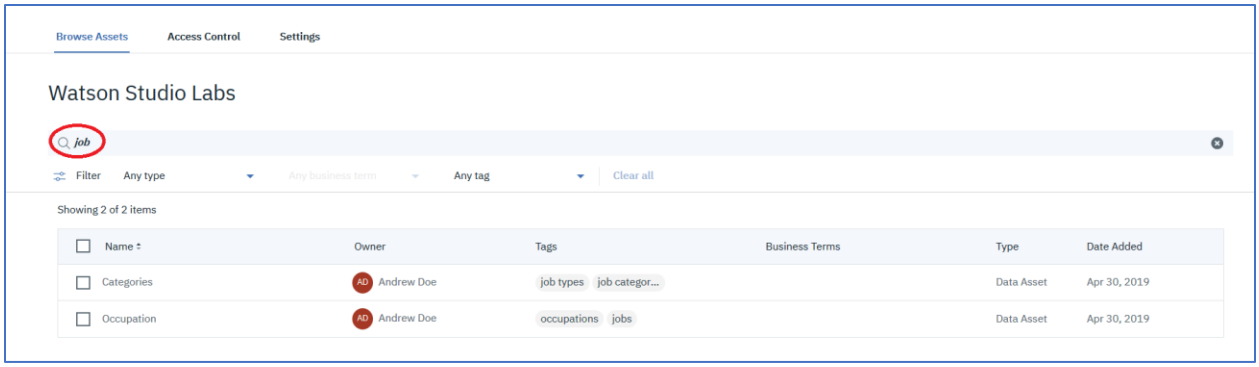
Step 4: Search the Catalog

Several options exist for searching the assets in the catalog. We can enter text in the search input text field and the system will match against asset names and tags. We can then further filter the search results by selecting the Asset Type, and/or the Tags. Or we can directly select the Asset Type or Tags without entering anything in the search text field.

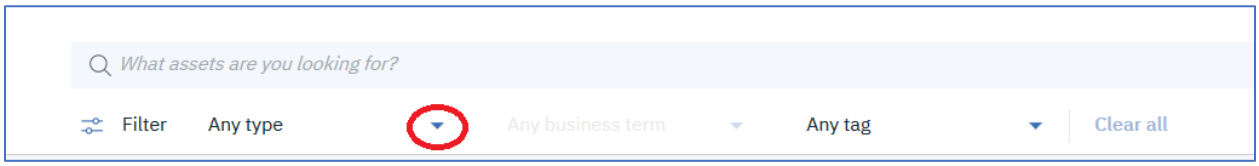
1. Click on **Watson Studio Labs** to return to the Catalog home screen.



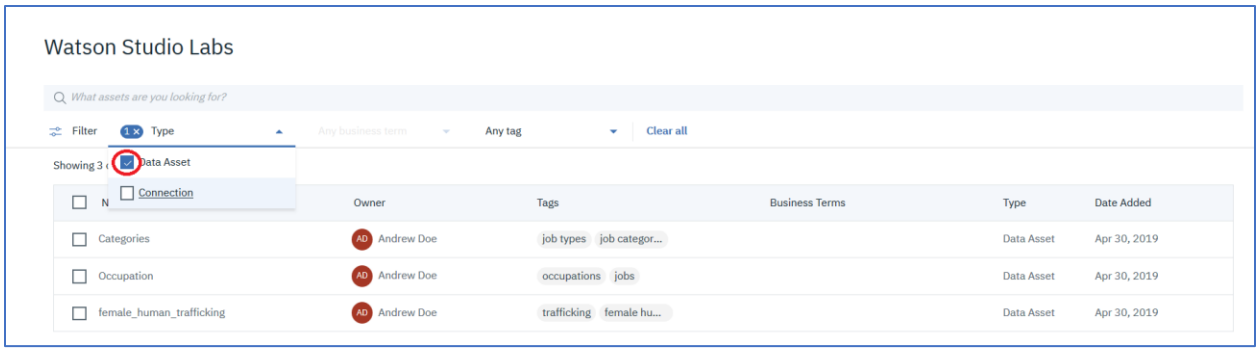
2. Enter **job** in the **search text field**. Data assets are displayed that contain the word or letters **job** in their Name, Description, or tags.



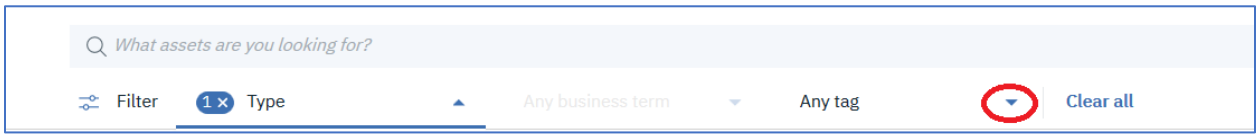
3. Clear the **search text field.** Click on the down arrow next to **Any Type**.



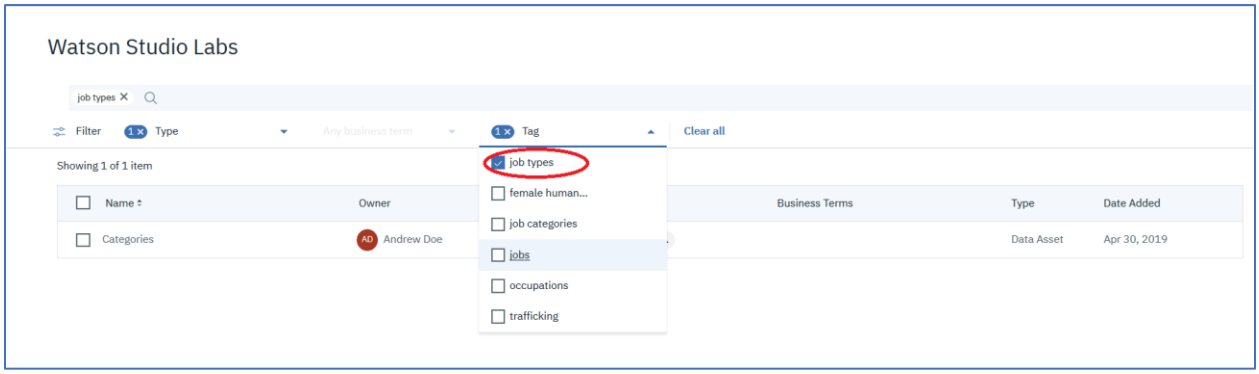
4. Click on the check box next to **Data Asset.** The search results list the 3 Data Assets. The 1 Connected asset, and the 2 uploaded files. Note: Other asset types that can be cataloged include, Connections, Models, Notebooks, and Dashboards.



5. Click on the down arrow next to **Any Tag**.



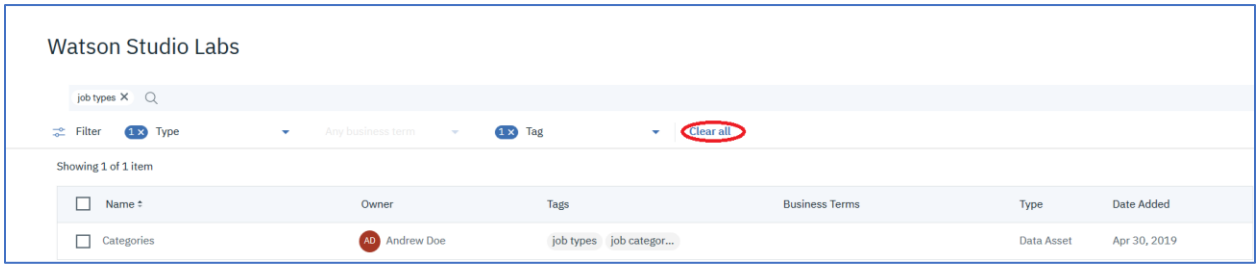
6. Click on the check box next to **job types**. The Categories Data Asset is listed.



Step 5: Edit/Review/Profile Data Asset

In this step, we will drill down on the female_human_trafficking data asset to show how to edit the metadata describing the asset, to provide a rating and review of the asset, and to profile the asset.

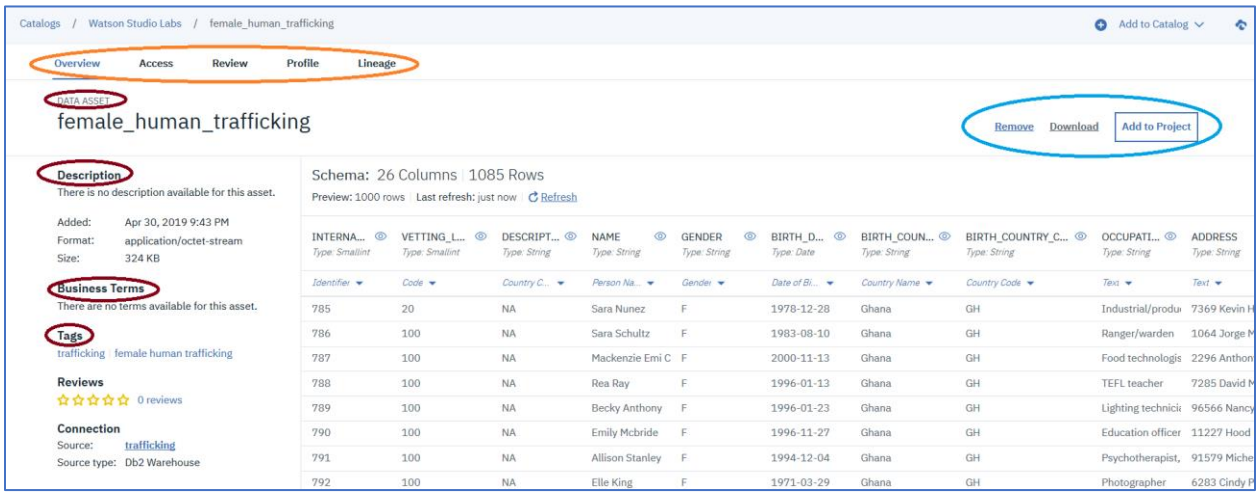
1. Click on **Clear all**.



2. Click on the female_human_trafficking asset.

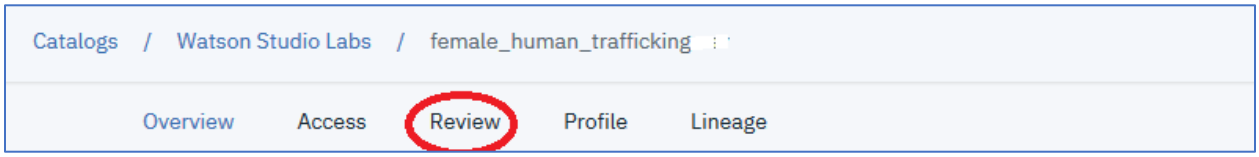
3. The metadata and data contents of the asset are displayed as shown below. Toward the top of the screen, are 5 tabs, circled in red below. The panel shown below corresponds to the **Overview** tab. The **Access** tab allows the user to edit the access control list for this asset. The **Review** tab enables the user to provide a rating and descriptive review of the asset. These social features aid in searching for relevant and useful assets. The **Profile** tab invokes an auto-profiling capability where the columns of the data asset are classified based on machine learning scoring into one of many classifiers that are built into the

platform. This capability will be shown below. Finally, the **Lineage** tab tracks the changes made to the data asset over its lifecycle. This capability is not available in the lite catalog offering so will not be exercised in this lab.

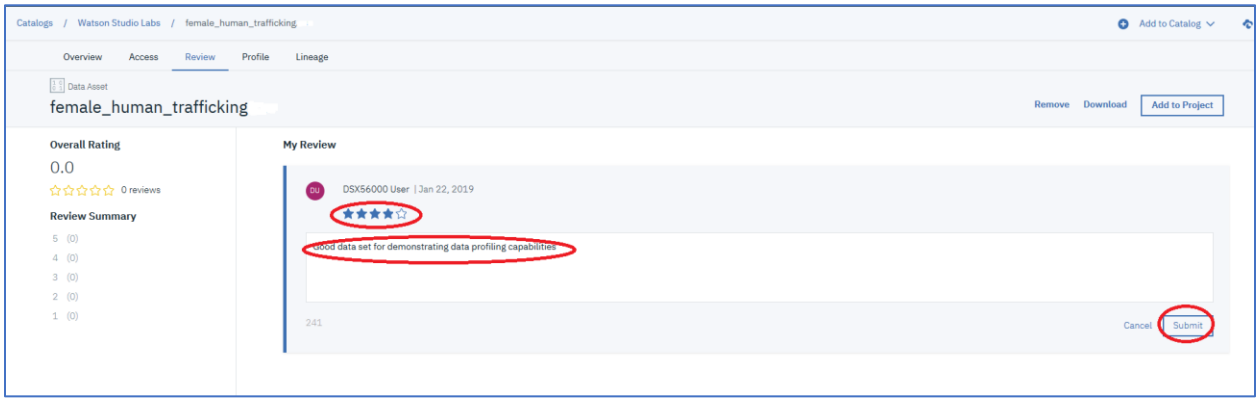


The actions circled in blue will **Remove** the asset from the catalog, **Download** the asset to the local file system, or add the asset to a catalog enabled project (**Add to Project)**. Hovering over the **Name** of the data asset, the **Description**, the **Business Terms**, or the **Tags** will popup an Edit icon that allows the user to edit these entities.

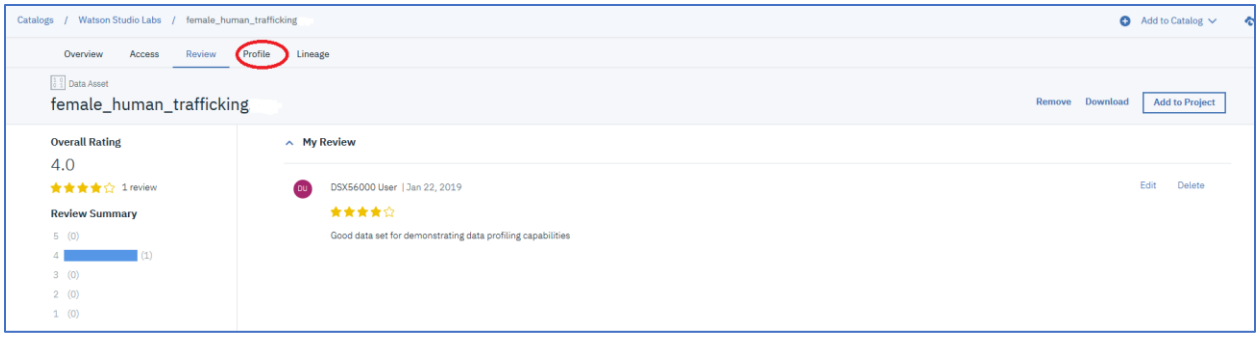
4. Click on the **Review** tab.



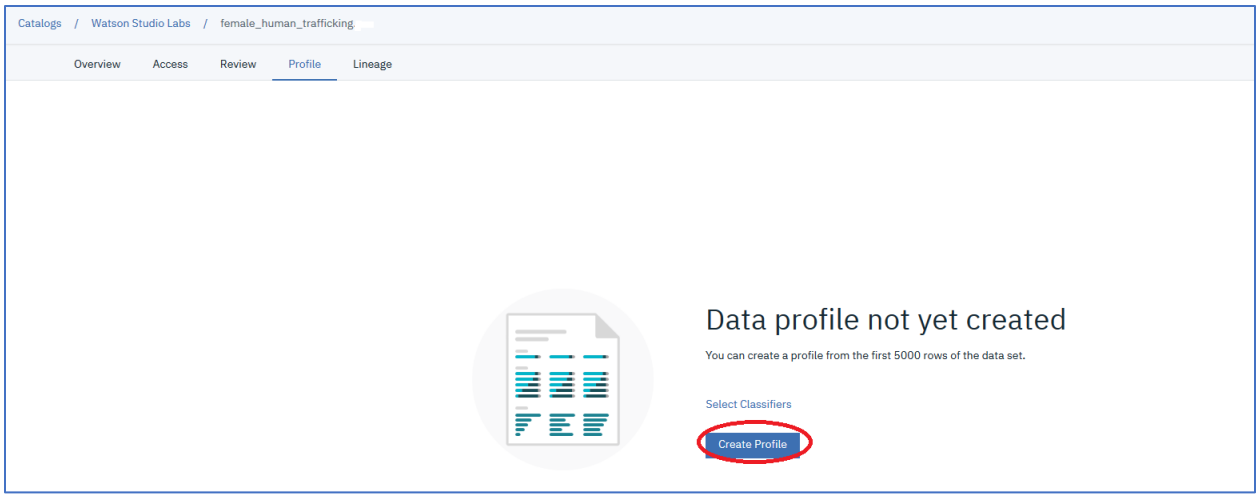
5. Click on the fourth star to rate this asset. Enter "Good data set for demonstrating data profiling capabilities" in the **My Review** text field. Click on the **Submit** button.



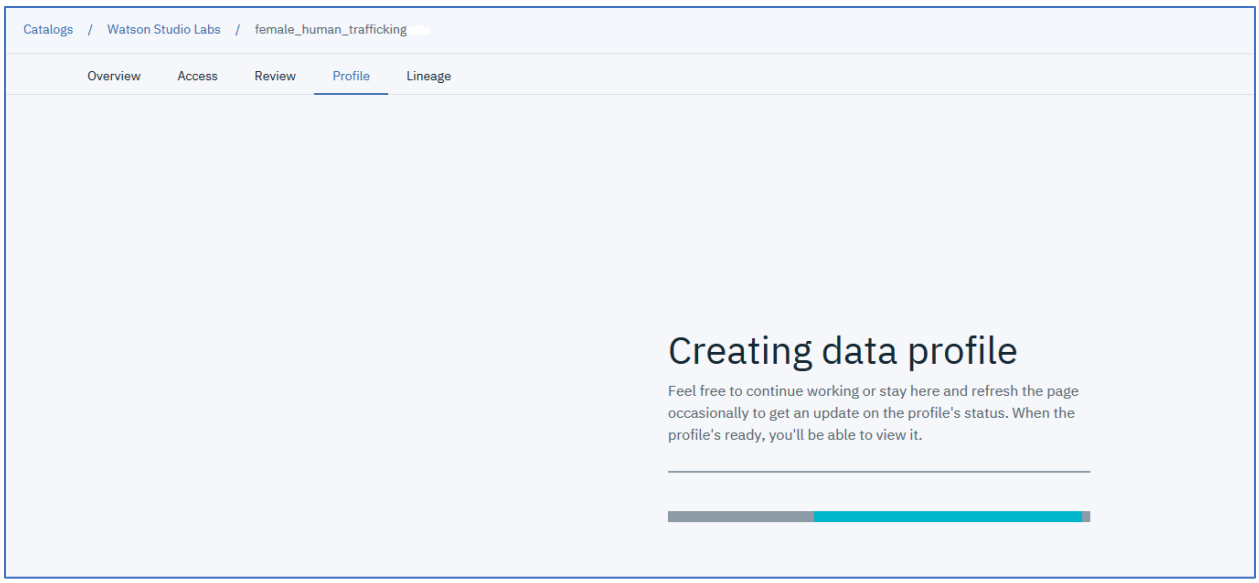
6. The review of the asset is displayed. Click on the Profile tab.



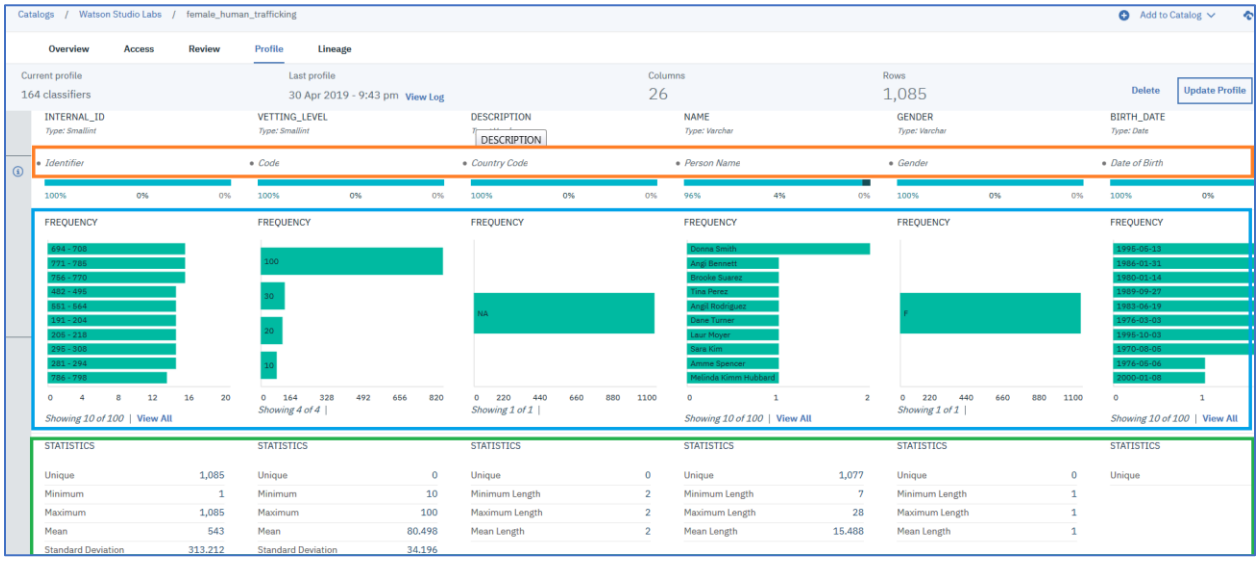
7. Click on **Create Profile**. If a profile was already created, it would be displayed instead of this prompt screen.



8. This step could take some time. Please wait a minute or so, and then click on browser refresh.

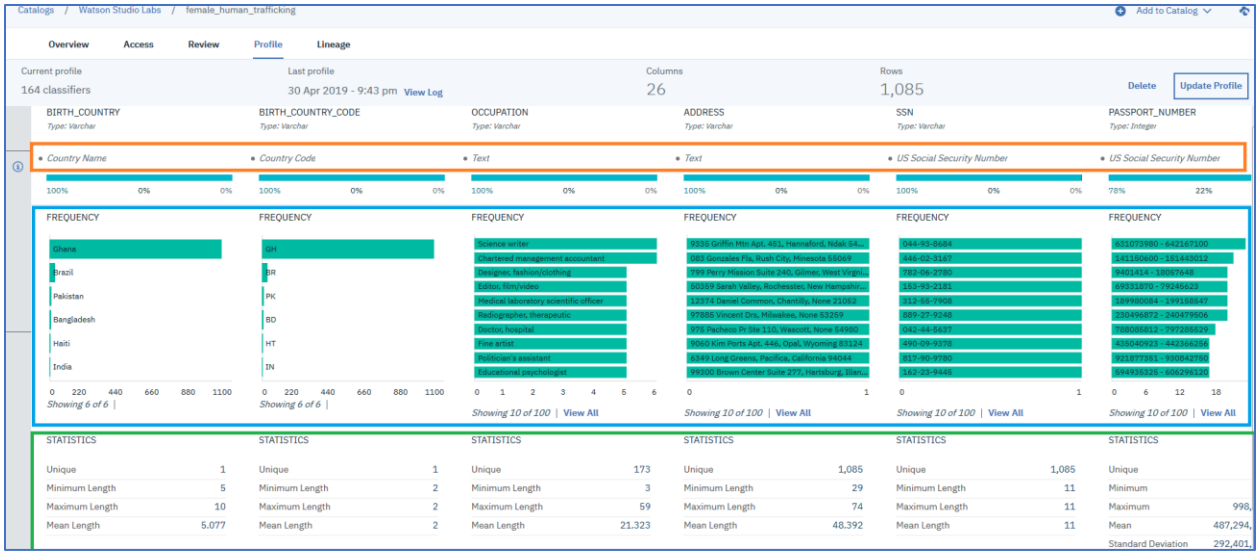


9. The profile information is displayed below using several screenshots, based on horizontal scrolling, to display many of the columns of the data asset. The highlighted red box contains the inferred column classifications. The highlighted blue box contains counts of the number of occurrences of each value (for discrete fields), and a histogram for continuous fields. The green box contains statistics calculated from the contents of the columns.

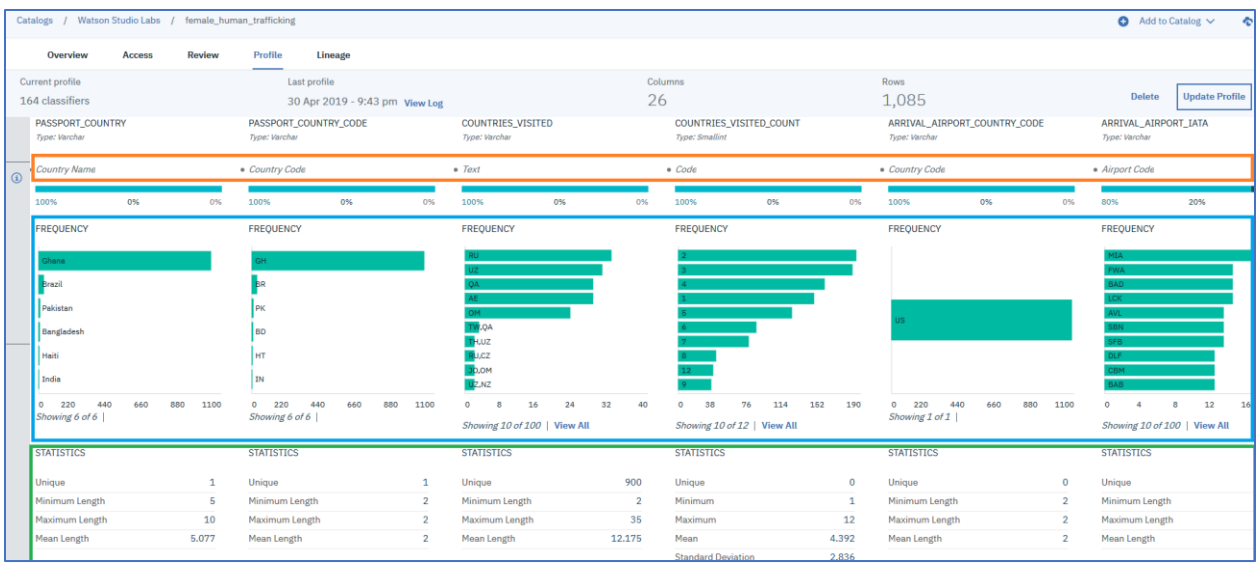


The classifications of the columns are listed below:

- INTERNAL_ID – Identifier
- VETTING_LEVEL – Code
- DESCRIPTION – Country Code – this is an error due to the description input as NA. We can correct this misclassification.
- NAME: PersonName – the classification accurately determines that this field is the name of a person.
- GENDER: Gender
- BIRTH_DATE: Date of Birth – the classification accurately determines that this field represents a date of birth.



- BIRTH_COUNTRY: Country Name- correctly classified as a country
- BIRTH_COUNTRY_CODE – Country Code - correctly classified
- OCCUPATION – Text – there is not a classifier for occupation, so it determines that this is a text string.
- ADDRESS: Text
- SSN – US Social Security Number – correctly classifies the column as a social security number.
- PASSPORT_NUMBER – incorrectly classifies as a social security number. This can be corrected as we will see below.



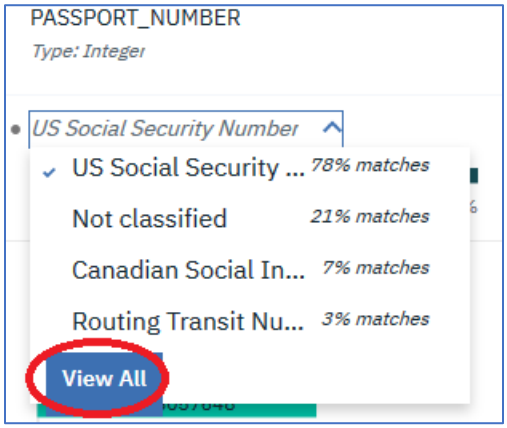
- PASSPORT_COUNTRY - Country Name- correctly classified as a country
- PASSPORT_COUNTRY_CODE: Country Code - correctly classified
- COUNTRIES_VISITED – Text

- COUNTRY_VISITED_COUNT – Code – this is an error. It's not a code. This can be re-classified if necessary.
- ARRIVAL_AIRPORT_COUNTRY_CODE – Country Code – correctly classified.
- ARRIVAL_AIRPORT_IATA: Airport Code – the classification accurately determines that this field represents an Airport Code.

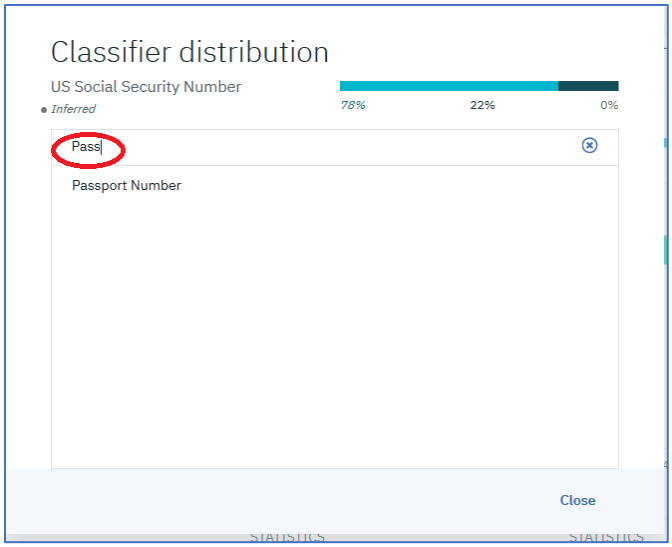
There are more columns in the data set but this gives a representative sample of the profiling capability. The classification of the columns becomes important when we create and enforce security policies.

10. Let's fix the classification for passport. Hover the mouse over the US Social Security Number in the **PASSPORT NUMBER** Column and click on the icon.

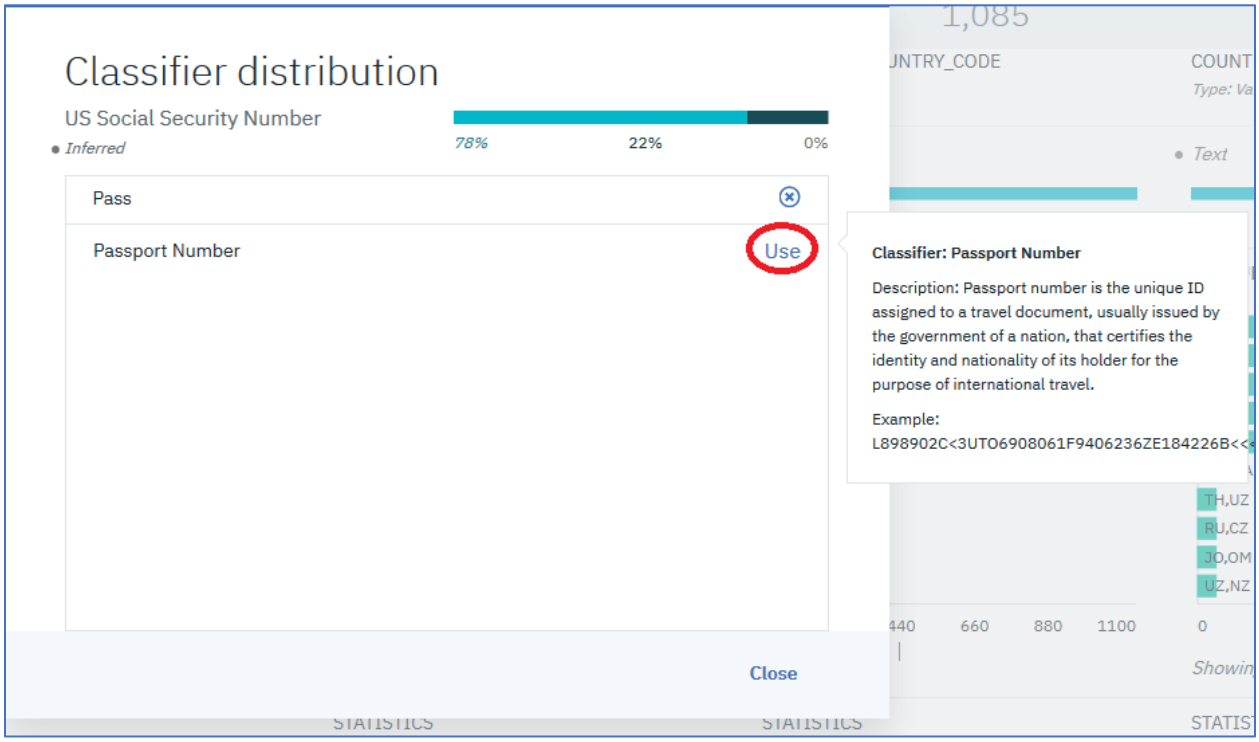
11. Click on **View All**.



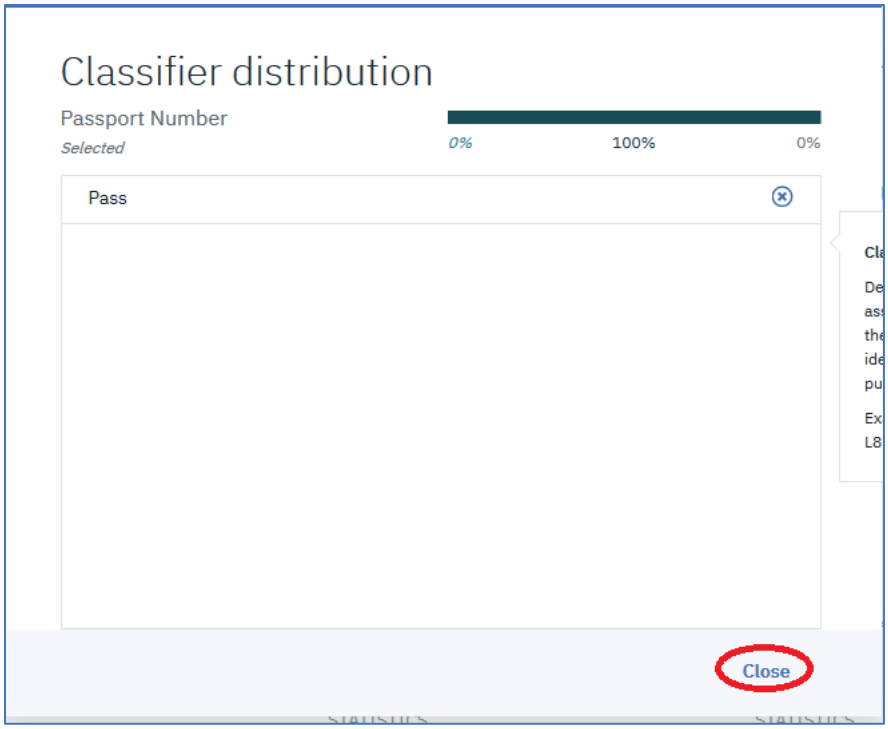
12. Type "Pass" in the **Search** field.



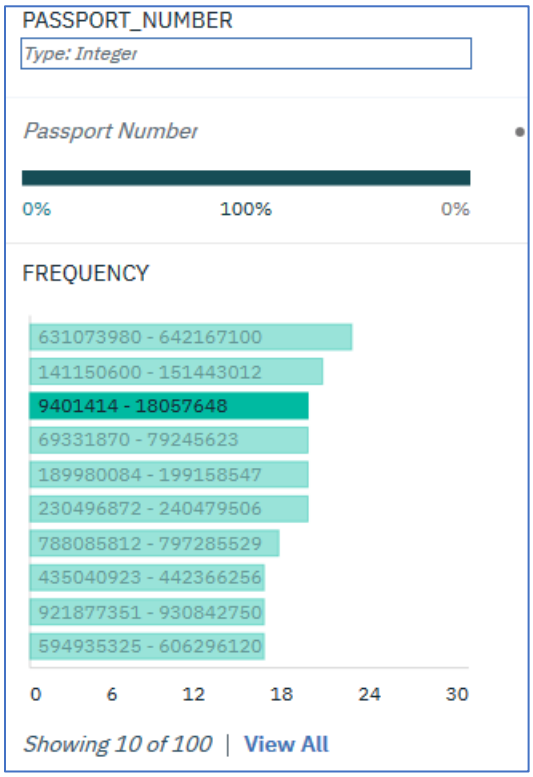
13. Hover over Passport Number and click on **Use**.



14. Click **Close**.



15. The column classification has been changed.



Step 6: Access Control

All Catalog members can access assets with a privacy setting of Public. Assets that have a privacy setting of Private are secured based on the asset access control list. A summary of the access control settings for our Watson Studio Labs catalog and the contained Data Assets is shown below.

Watson Studio Lab Catalog members:

1. Catalog owner (logged on user)
2. E-mail of user provided by lab instructor (used here for illustrative purposes - wsuserblb@gmail.com.)

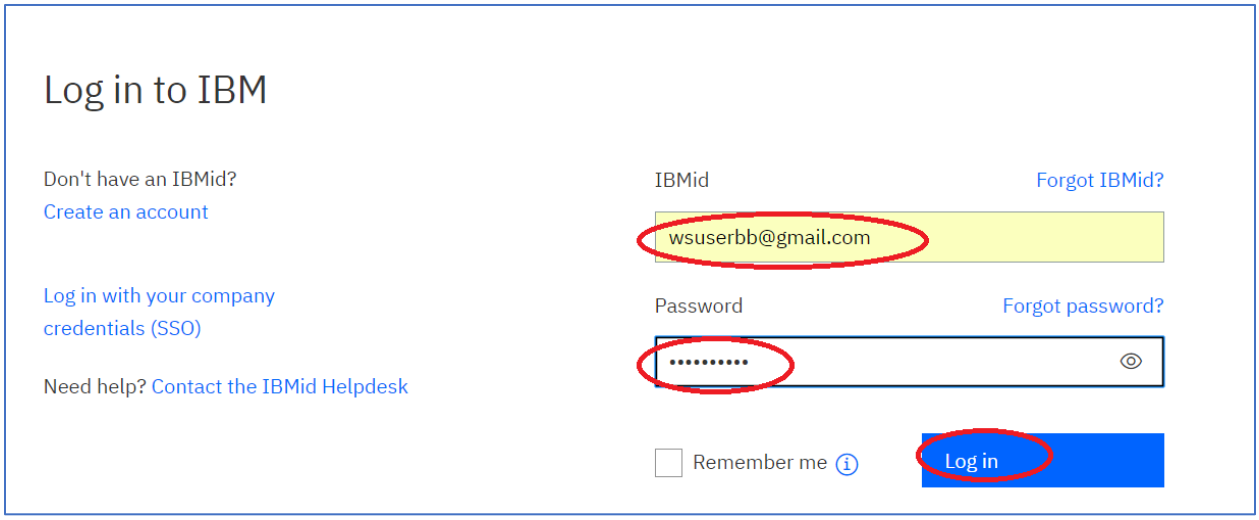
Data Asset Privacy:

1. female_human_trafficking (Private) ACL Members:
   a. asset owner (logged on user)
   b. e-mail of user provided by lab instructor (used here for illustrative purposes - wsuserblb@gmail.com)
2. Occupations (Private) ACL Members:
   a. asset owner (logged on user)
3. Categories (Public)
4. trafficking (Connection) (Public)

We would expect that if we log in as wsuserblb@gmail.com, that only 3 Data Assets would appear. The two public Data Assets, and the Private Data Asset where wsuserblb@gmail is on the access control list. This user would not have access to the Occupations asset, since it is a Private asset, and the user is NOT on the access control list for this asset. To verify complete the following steps.

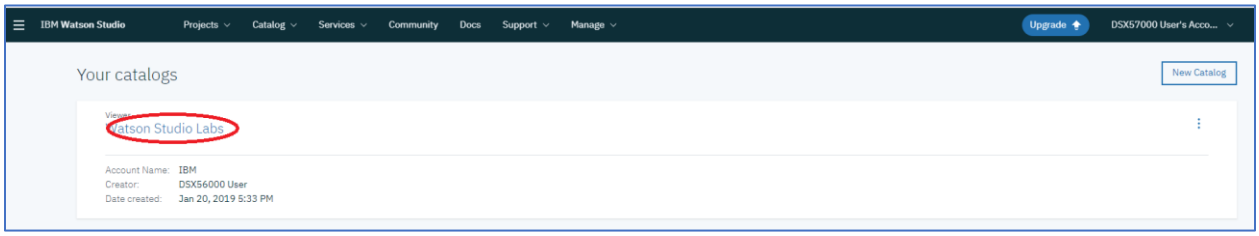
1. Open a different browser (if you are using FireFox, then open Chrome or vice versa).
2. Type in datascience.ibm.com for the URL to navigate to.
3. Click on **Sign into IBM Watson Studio Cloud**

4. Login using wsuserblb@gmail.com for the user name and wsPassw0rd for the password.

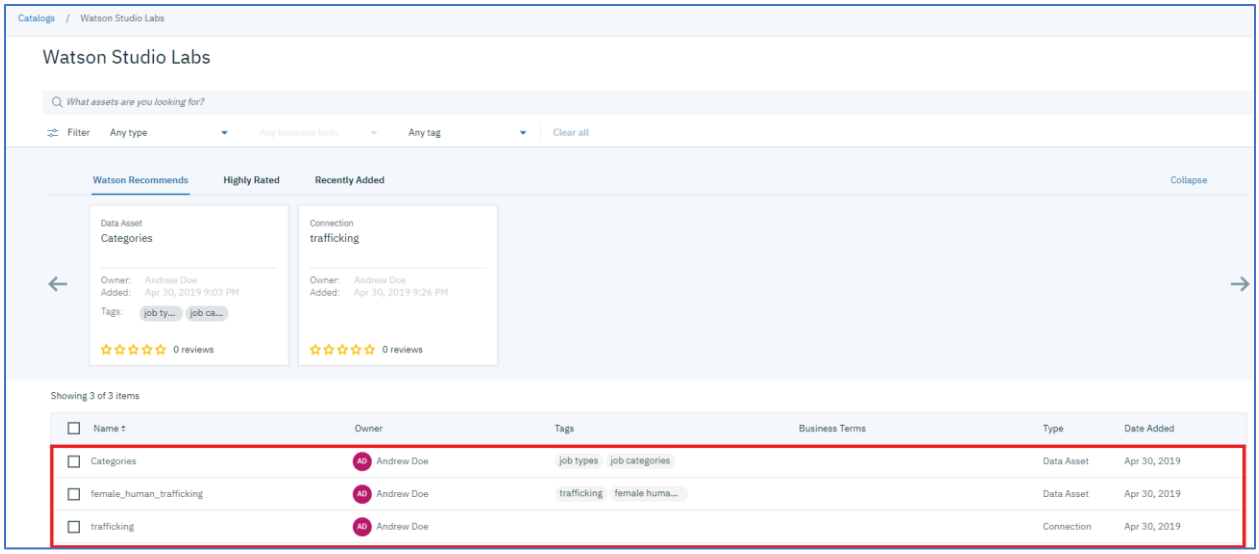


5. Click on icon. Click on **Catalog** and then **View All Catalogs**

6. Scroll down to find the **Watson Studio Labs** catalog that corresponds to your username. Note that there will be 1 catalog per lab participant.



7. The Watson Studio Labs catalog is displayed. Three Data Assets are listed as expected.

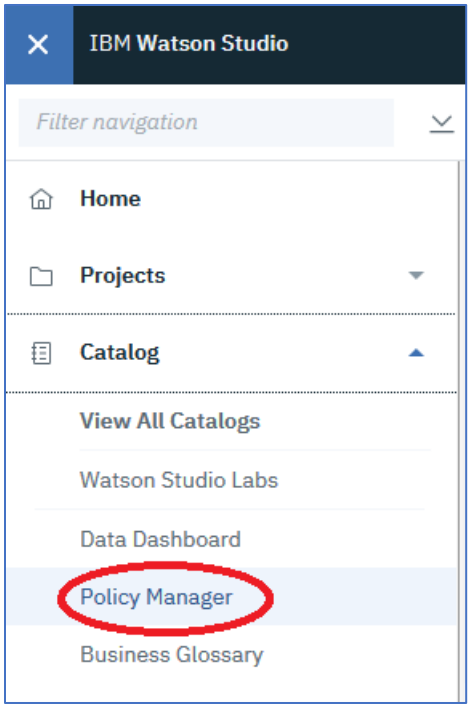


8. Leave this browser at this screen for Step 7.

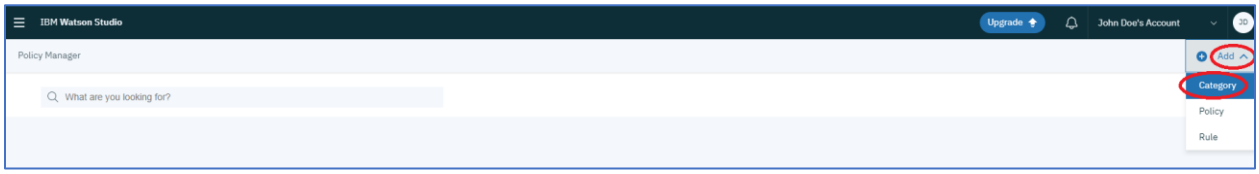
Step 7: Create and Enforce Policy (optional)

In this step, we will create a policy that will anonymize the SSN and Passport fields when user wsuserblb@gmail.com tries to access the female_human_trafficking data asset.

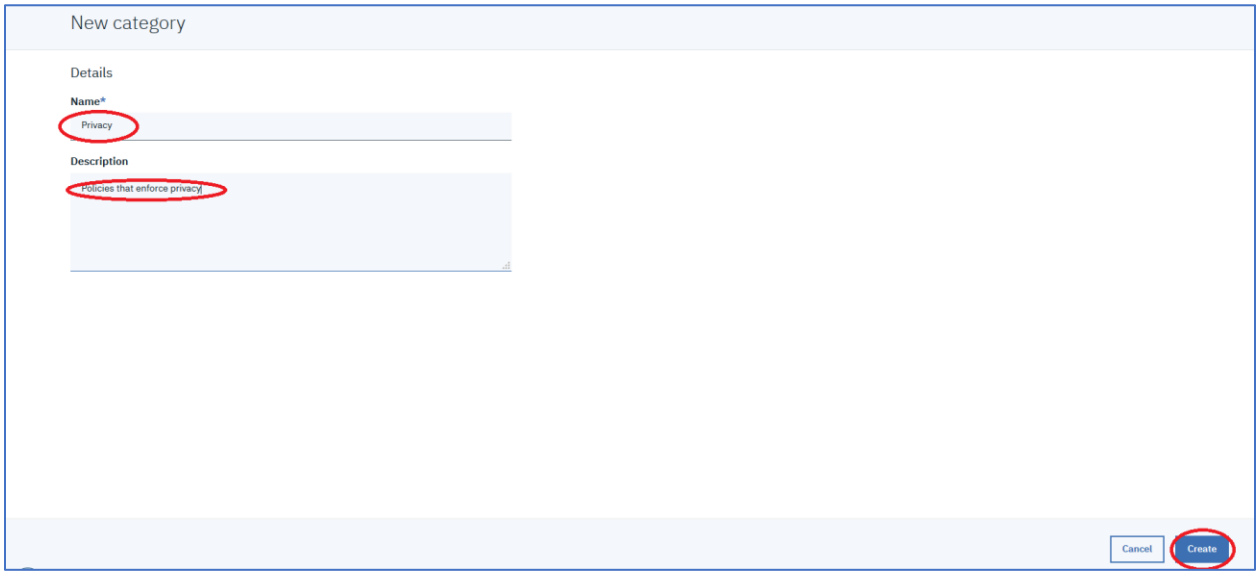
1. Return to the browser where **your** Watson Studio id is logged in.
2. Click on the icon. Click on **Catalog** and then **Policy Manager**.



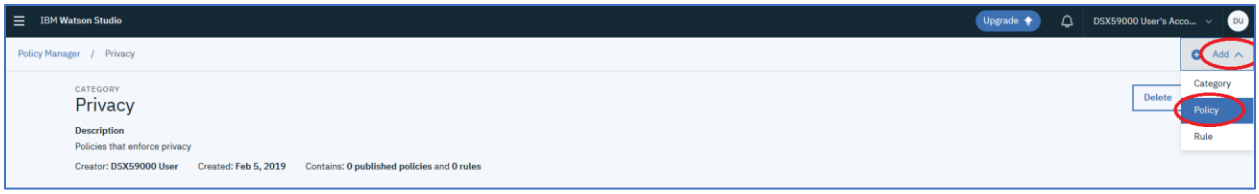
3. Click on **Add** and then **Category**.



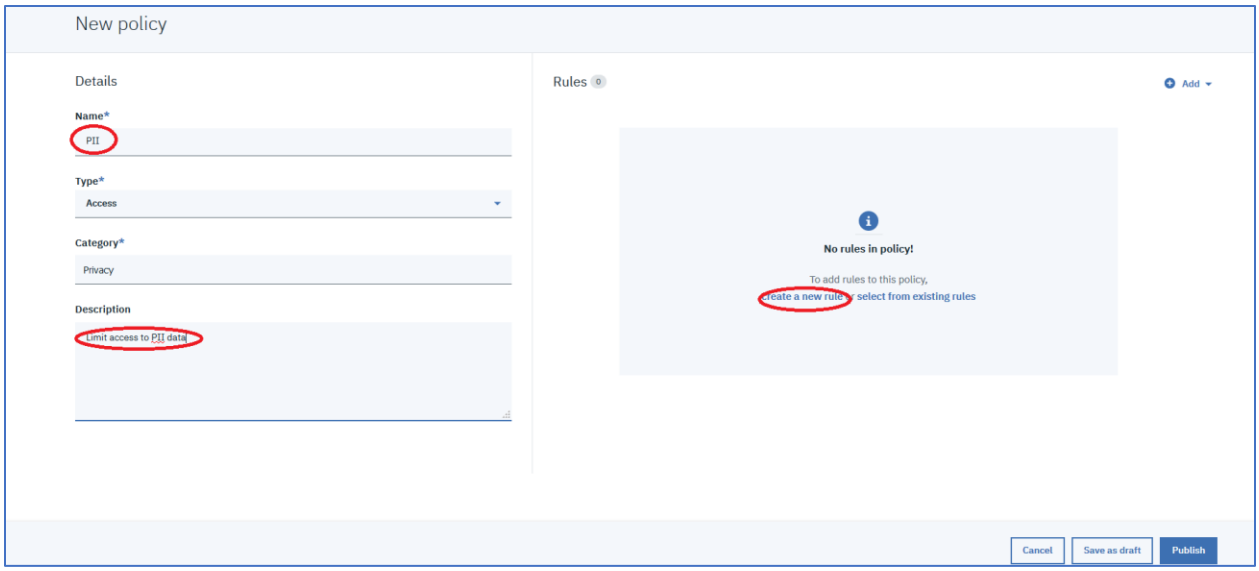
4. Type in **Privacy** for the **Name** of the Category, and optionally a **Description**, and click on **Create**.



5. Click on **Add** and then **Policy** to add a policy to the Privacy Category.



6. Type in PII for the Policy **Name**, type in "Limit access to PII data" for the Policy **Description**, click on **create a new rule.**



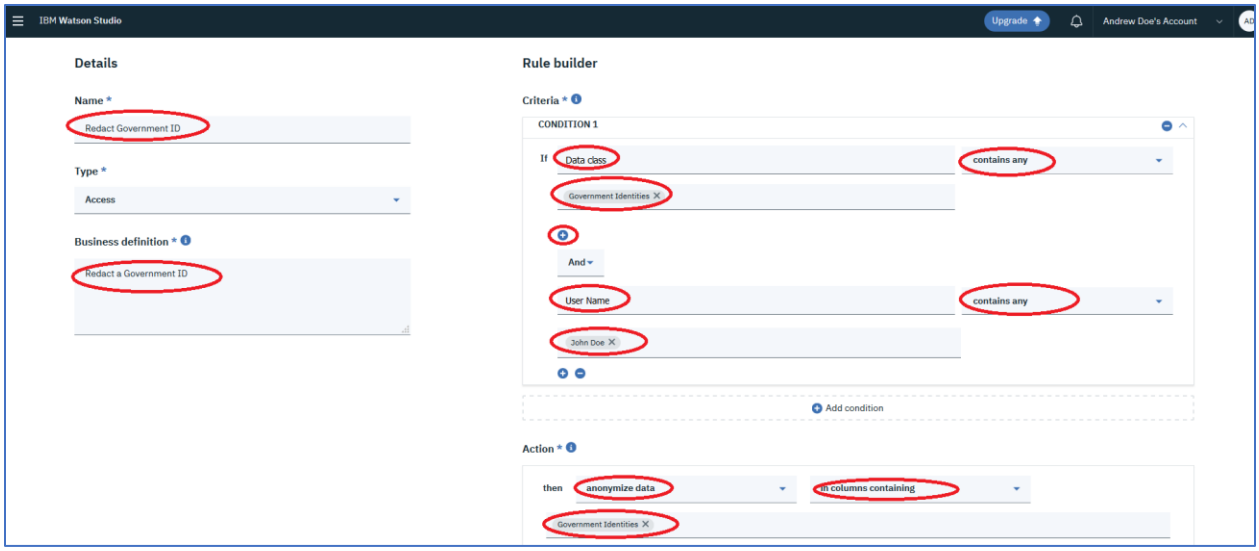
7. Enter "Redact Government ID" for the rule **Name**, enter "Redact a Government ID" for the rule **Description**, for the rule click in the entry fields to select the following:

   If **Data Class** **contains any**
   Government Identities

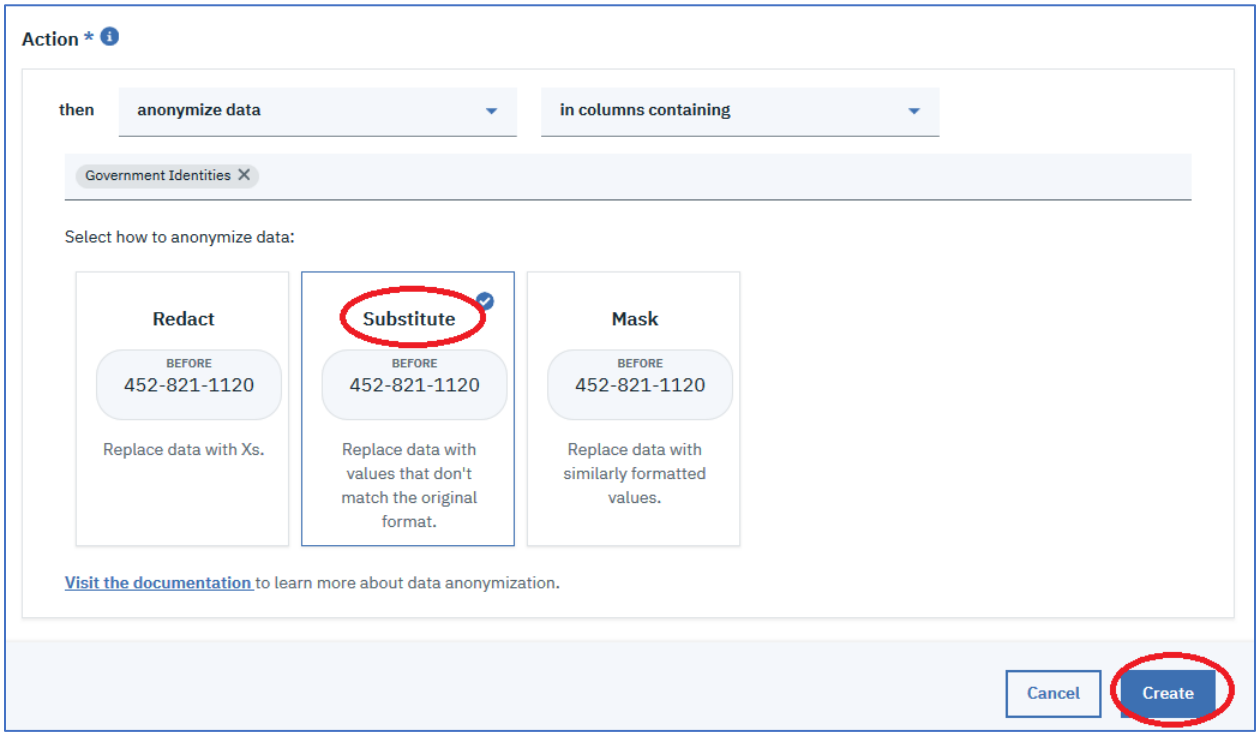
   And

   If **User Name** **contains any**
   John Doe

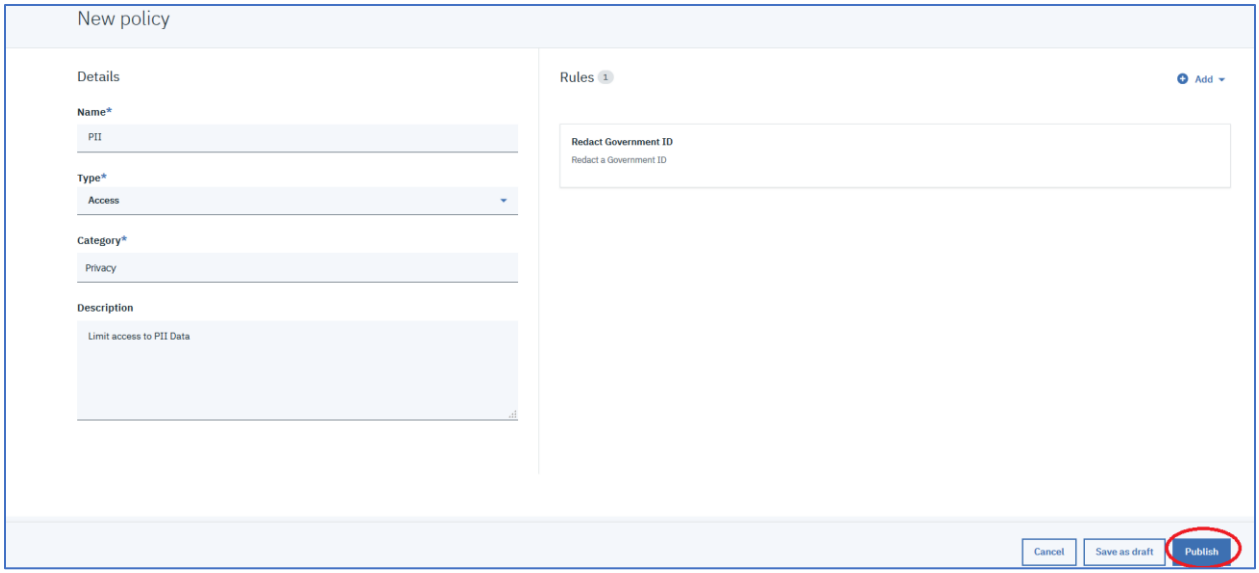
   then **anonymize data** where **in columns containing**
   Government Identities



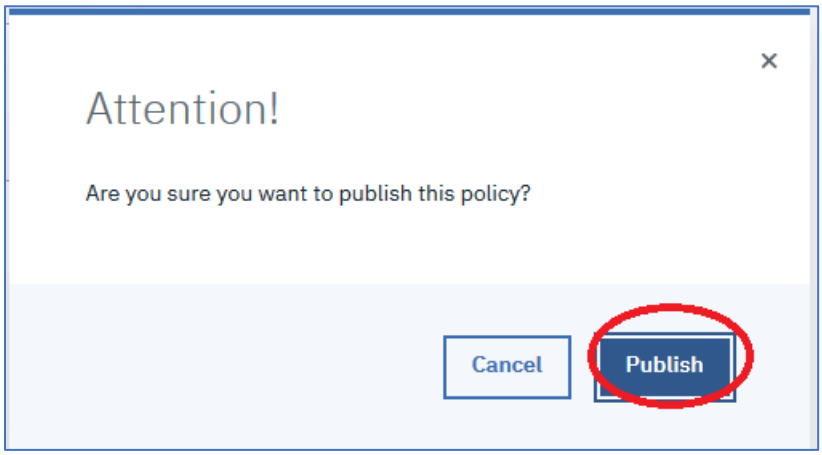
8. Select how to anonymize data: **Substitute**, and then click **Create**.



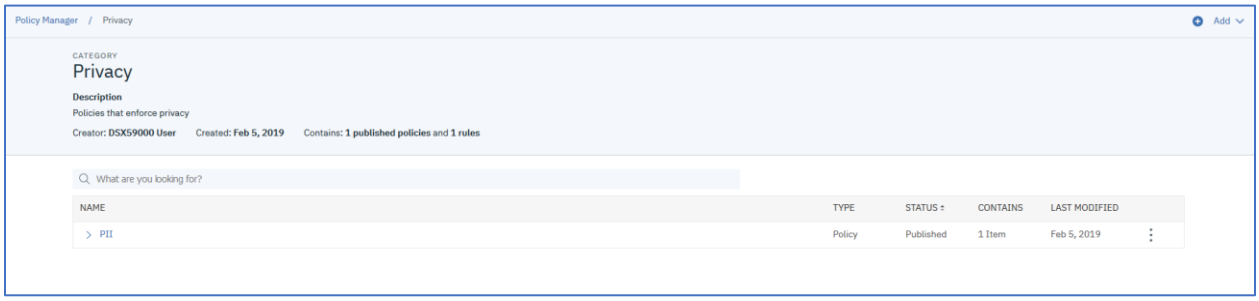
9. Click on **Publish**.



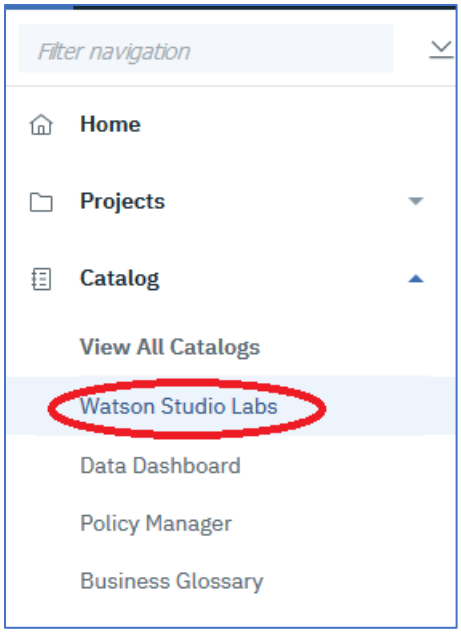
10. Click on **Publish**.



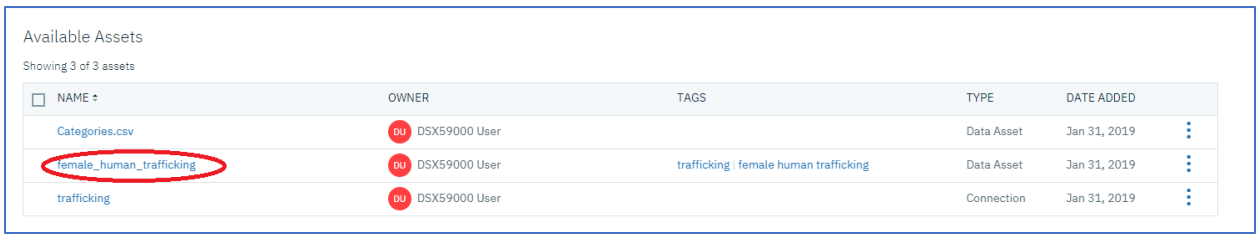
11. The PII policy has been added.



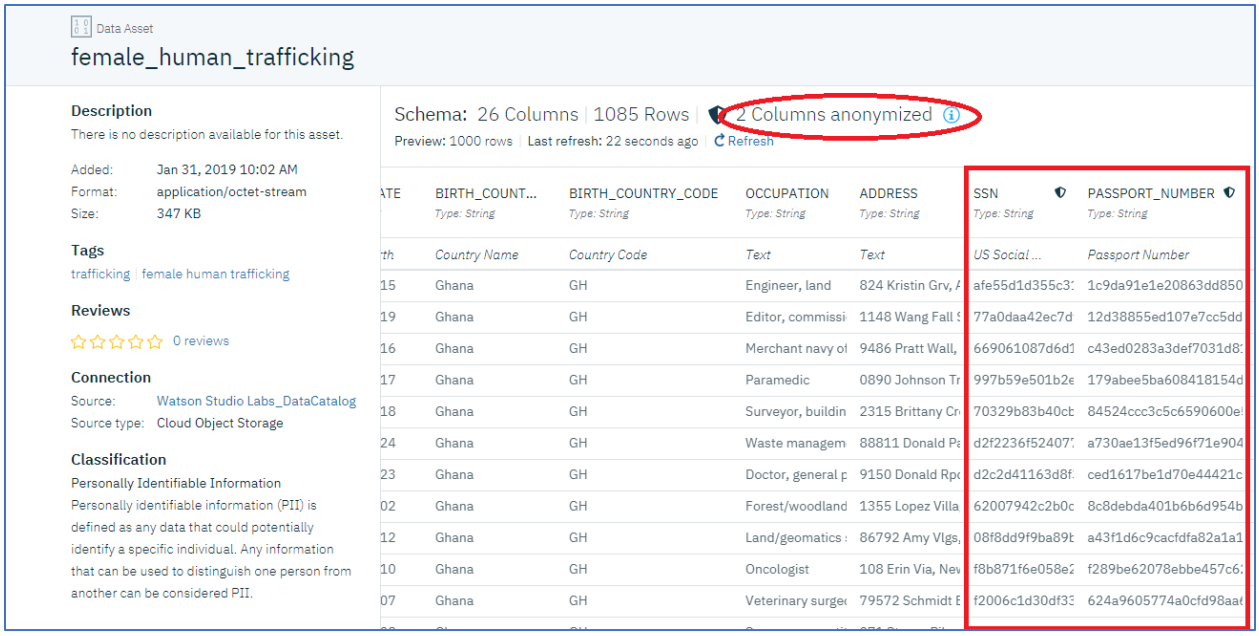
12. Click on the icon, then click on **Catalog** and then **Watson Studio Labs**.



13. Switch back to the browser with the wsuserblb@gmail.com logged in. Click on the **female_human_trafficking** asset.



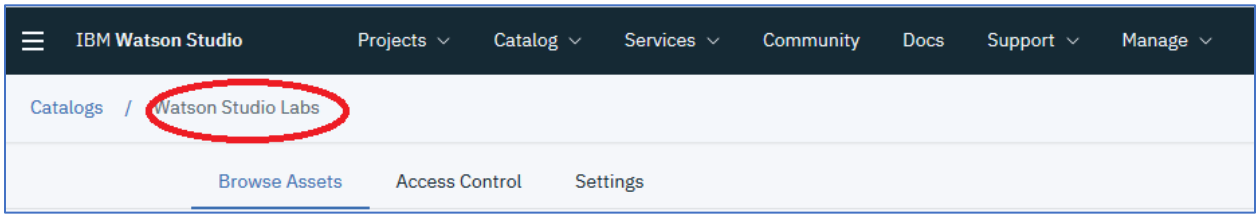
14. The female_human_trafficking asset is displayed. Wait for the anonymization to complete. Note that 2 columns are anonymized.



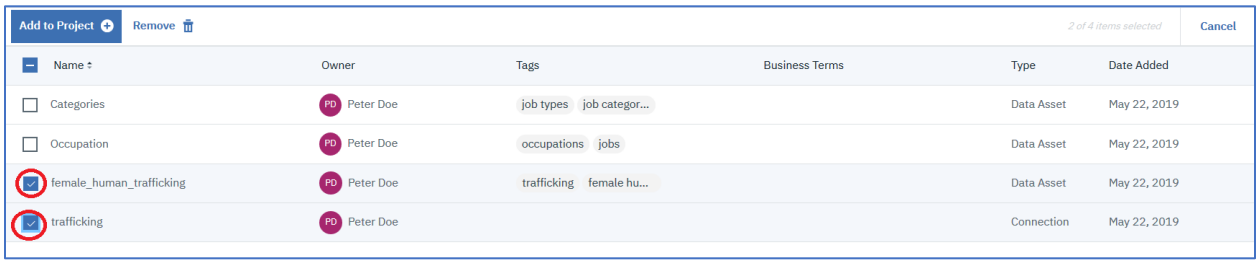
Step 8: Push the data assets to the project

This step will add the cataloged data assets to our Watson Studio project to be used in subsequent labs. Return to your Watson Studio account.

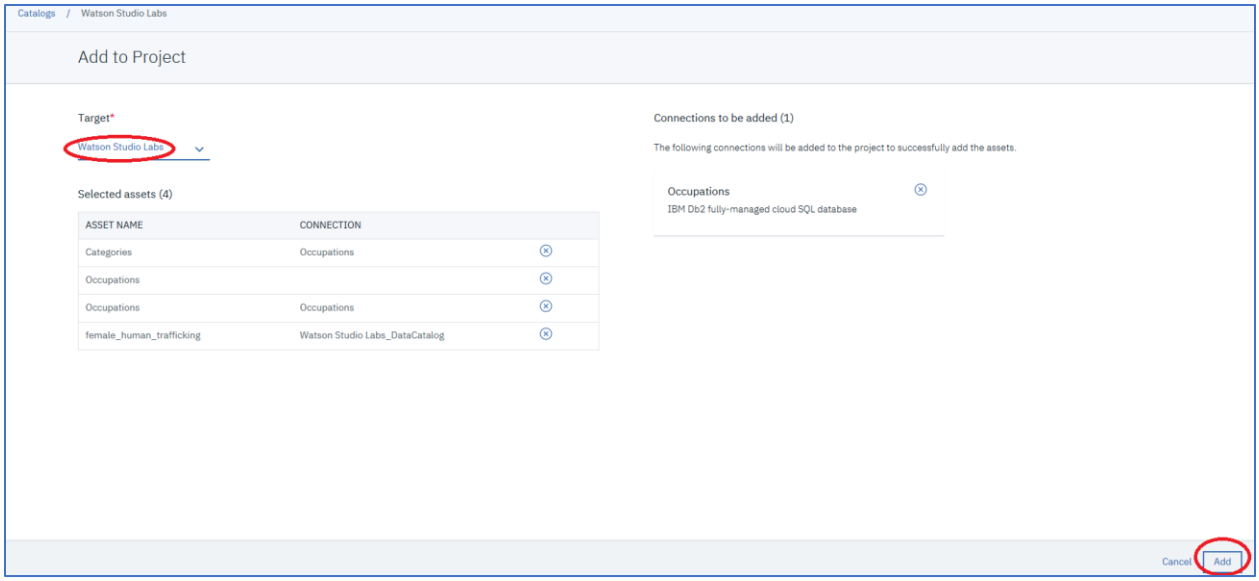
1. Click on **Watson Studio Labs** to go to the Catalog home screen.



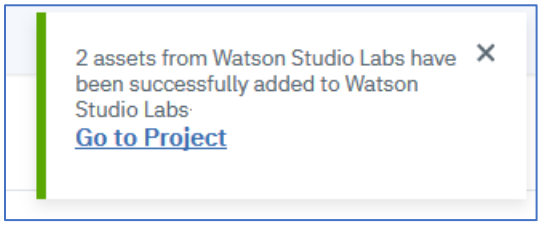
2. Click on the checkbox to the left of the **female_human_trafficking** asset and the **trafficking** asset. Click on **Add to Project**.



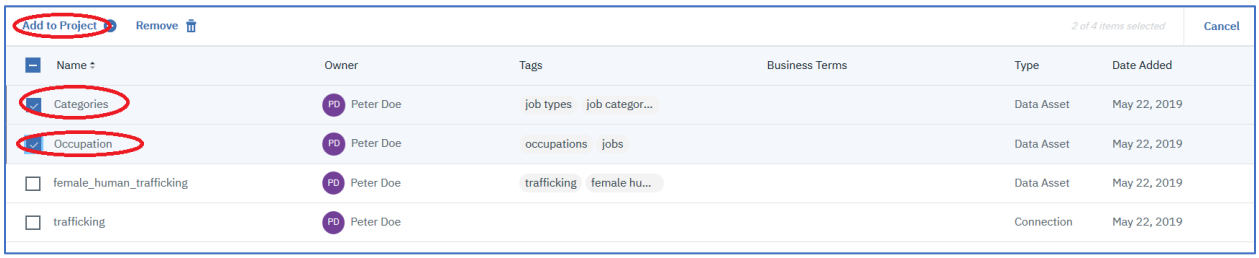
3. Select the Watson Studio Labs as the **Target**. Click on **Add.**



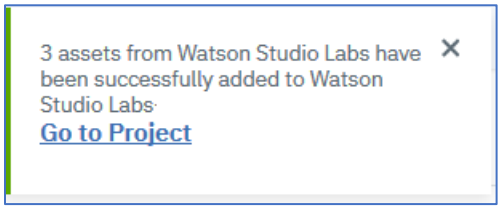
4. Wait for the message that 2 assets have been added to the project in the top right.



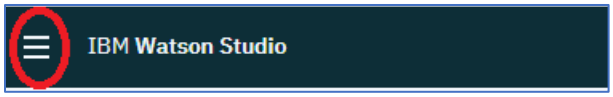
5. Click on **Categories,** and **Occupation**, and then click again on **Add to Project**. Select **Watson Studio Labs** as the **Target** and click **Add**.



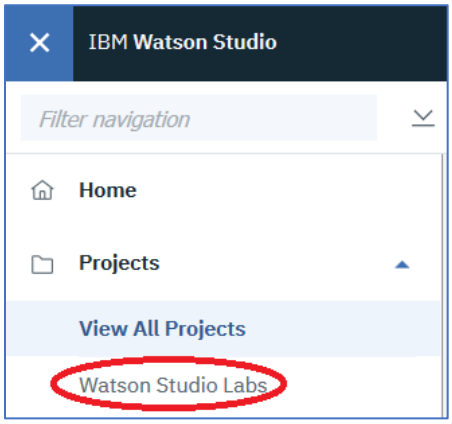
6. Wait for the message that **3** assets have been added to the project in the top right. Two data assets and a connection to the catalog object storage.



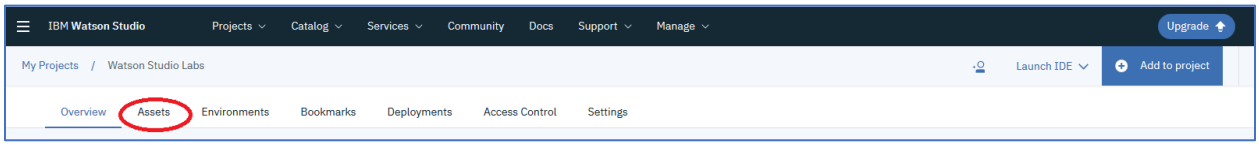
7. Click on the hamburger icon ☰.



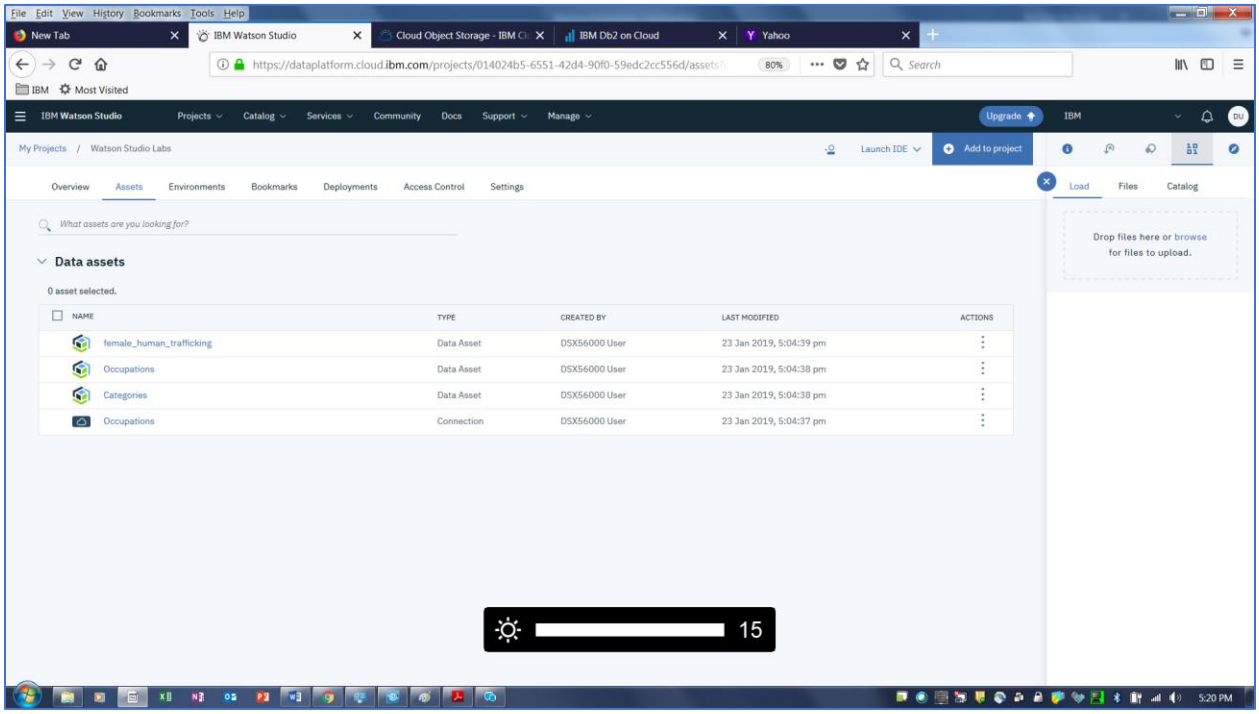
8. Click on **Watson Studio Labs** under **Projects**.



9. Click on the **Assets** tab.



10. The Data assets are now incorporated in the project.



You have completed Lab-2!

- ✓ Created a governed catalog
- ✓ Added a member to the catalog
- ✓ Added Data Assets to the catalog
- ✓ Searched the catalog
- ✓ Edited/Reviewed/Profiled a structured Data Asset
- ✓ Demonstrated access control features
- ✓ Demonstrated policy creation and enforcement (optional)
- ✓ Pushed the Data Assets to the project set up in Lab-1