## Step 1:

Create a free IBM cloud account.

## Step 2; Adding the required resources:

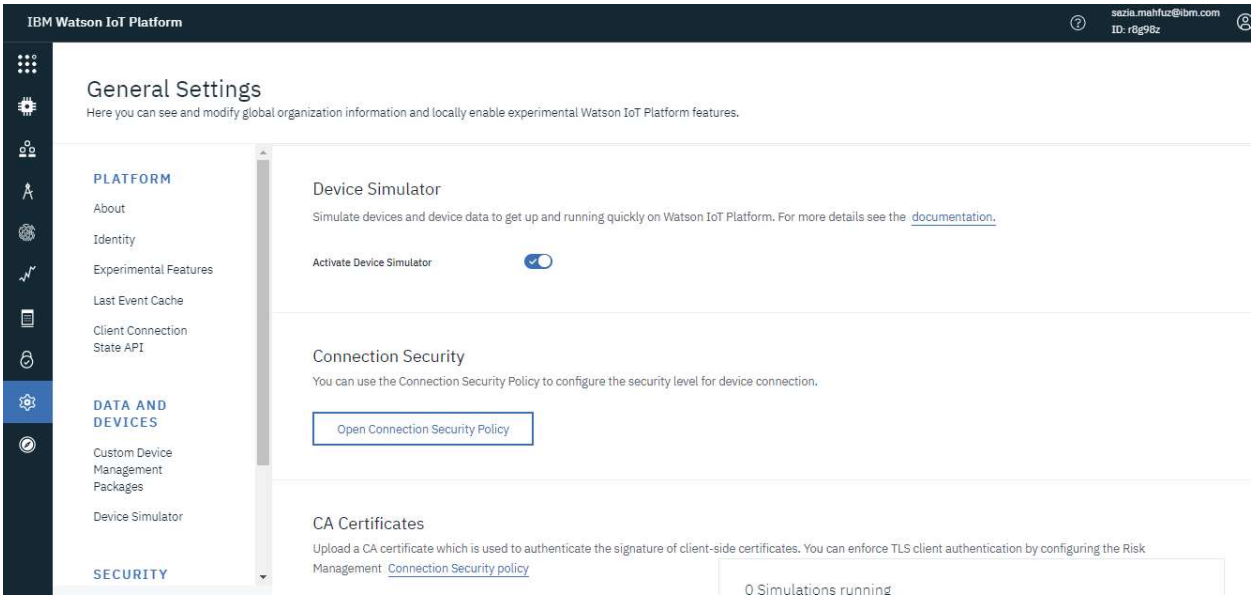
We will require the following resources:

1. Internet of Things Platform (Create resource → Internet of Things)
2. Streaming Analytics (Create resource → Analytics)
3. Watson Studio (Create resource → AI)
4. Cloud object storage (Create resource → Storage)
5. Machine learning (Create resource → AI)

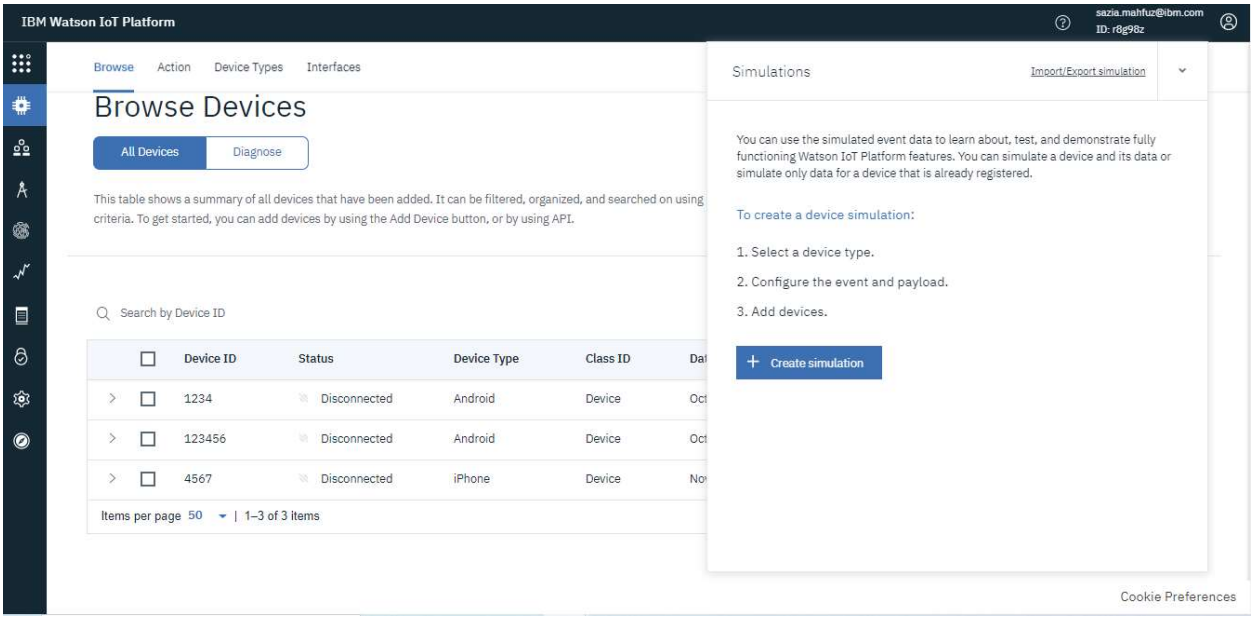
## Internet of Things Platform

## Setting up Internet of Things Platform for device simulator:

1. Click “Launch” on IBM Watson IoT Platform. Go to “Settings” from the left side of the menu, under “Data and Devices”, click on the option “Device Simulator”. Enable “Activate Device Simulator”.

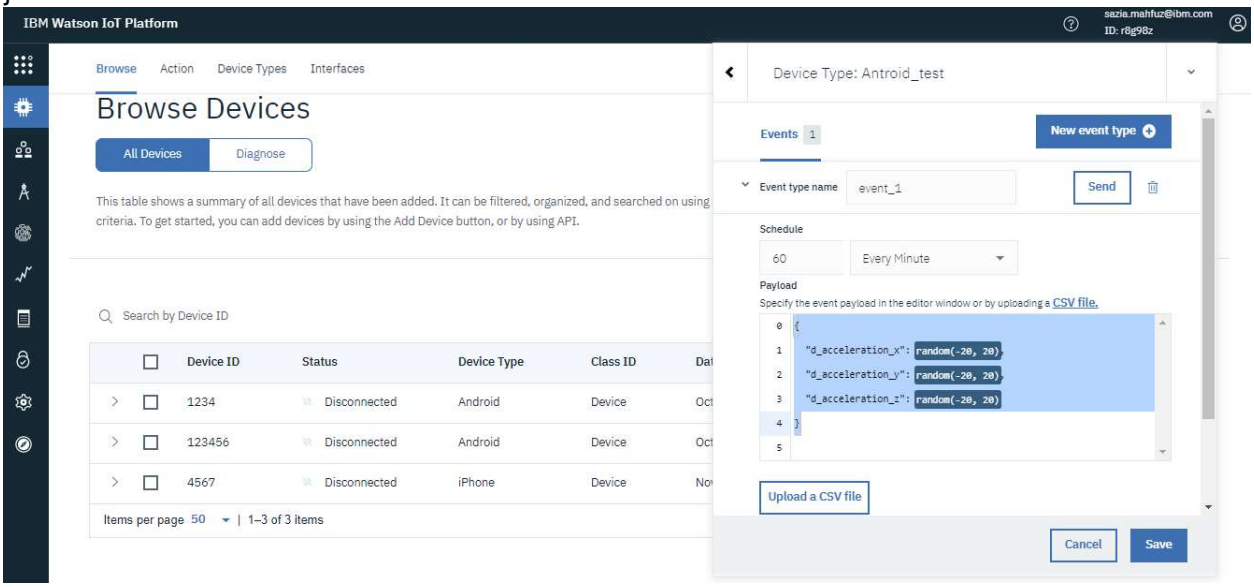



2. Go to “Devices” option from the left side, click on “0 Simulations running”.



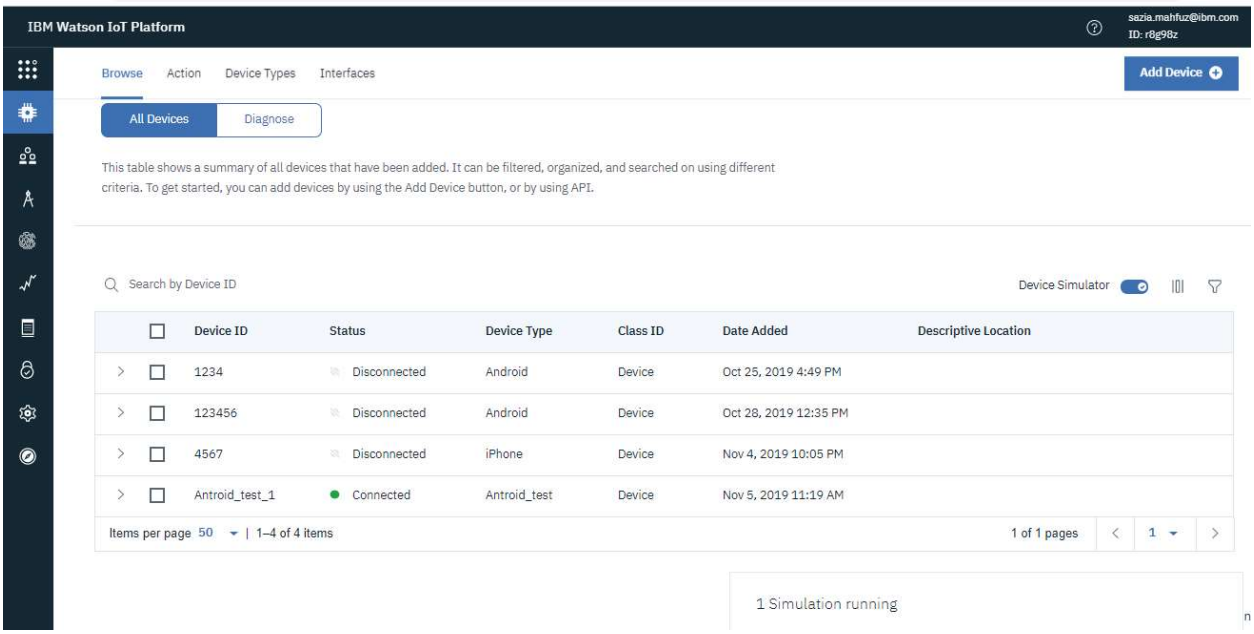

3. Click on “Create simulation”. Then type a name for the device type and click on create device type. Then on the next window, event type has to be created. Type the following information into the “payload” field:

```
{
  "d_acceleration_x": random(-20, 20),
  "d_acceleration_y": random(-20, 20),
  "d_acceleration_z": random(-20, 20)
}
```




Then click on “Save”.

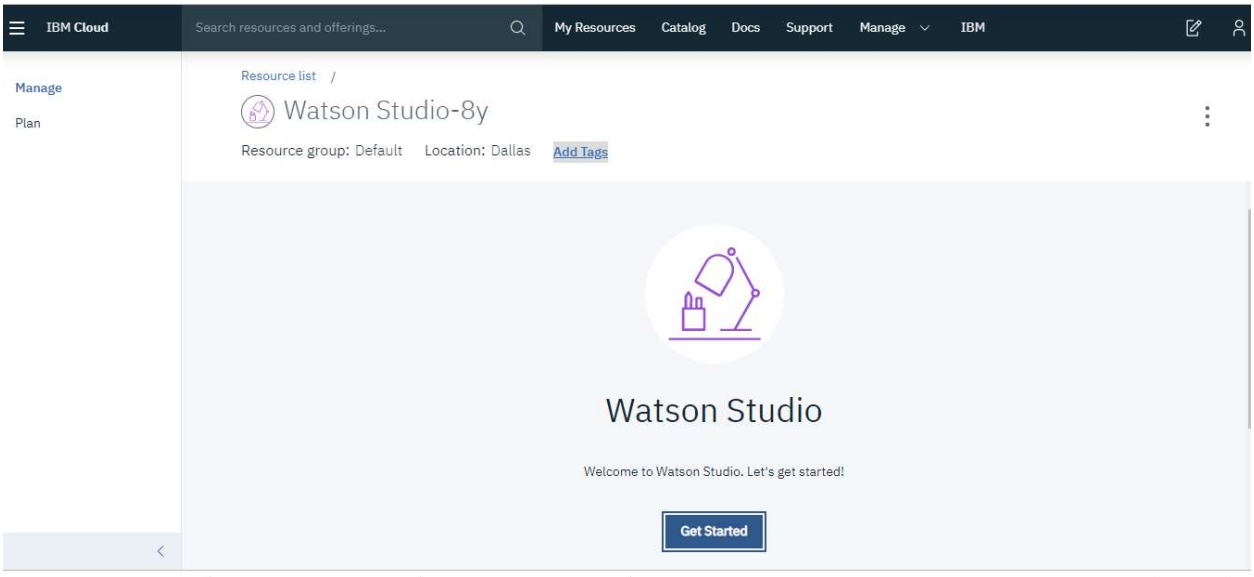
4. Click on “Create Simulated Device” on the next window to start the simulation.
5. Now, if you refresh the browser, you can view the simulated device connected. If you click on the device, go to the “Recent Events”, you can view the simulated data generating from the device.



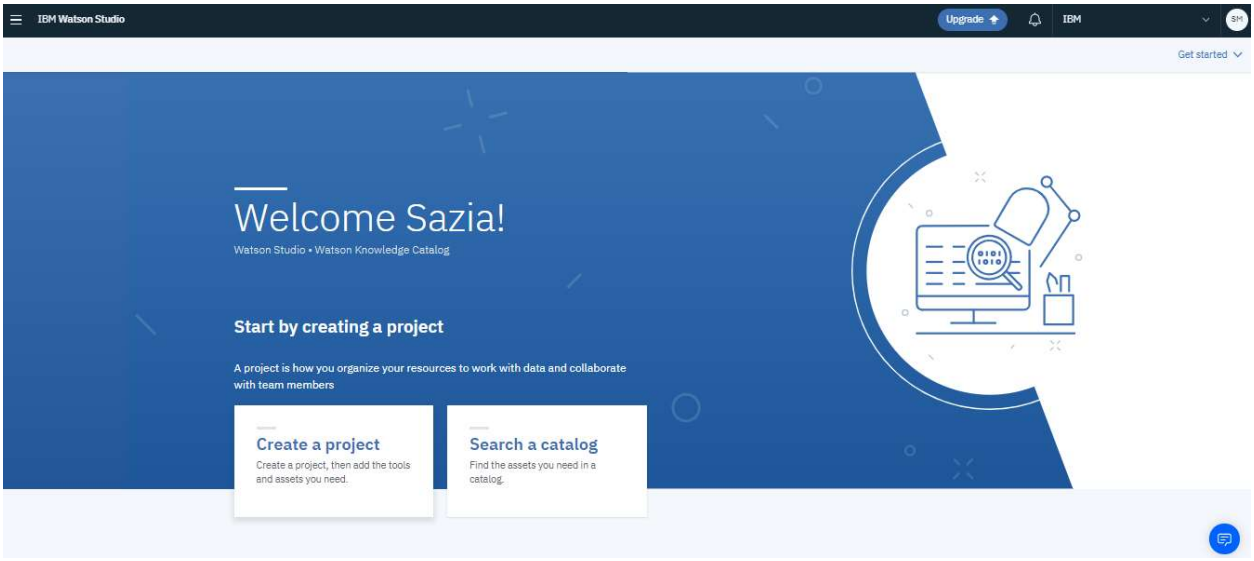

## Watson Studio

### Create a project:

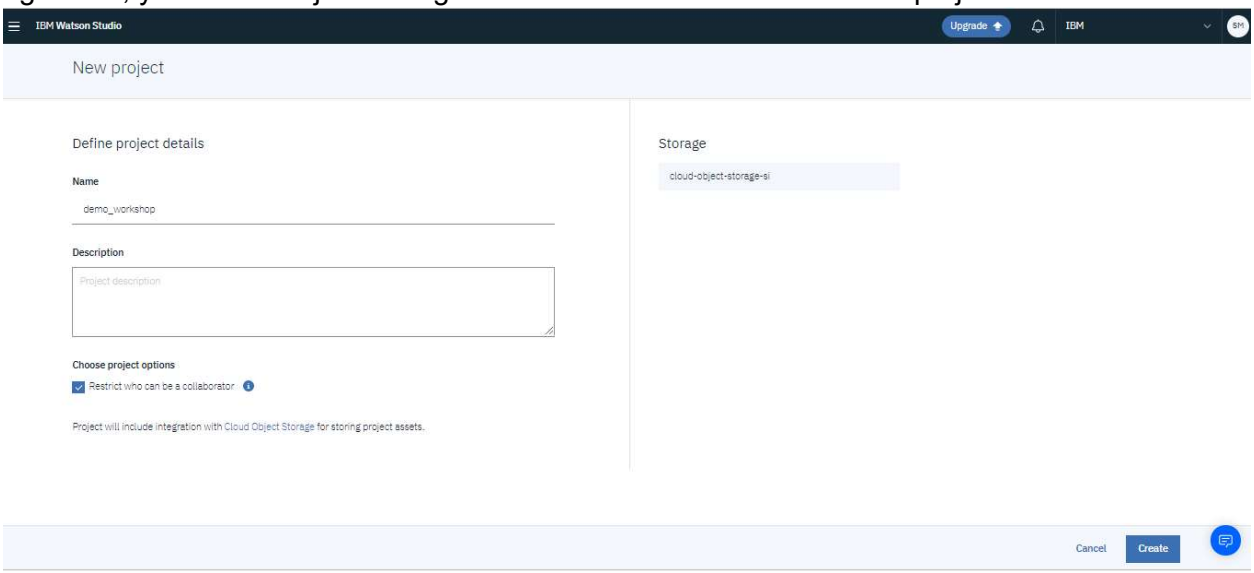
1. When you click on Watson Studio after adding the resource from your IBM cloud dashboard, click on “Get Started”.




2. Click on “Create a Project”.



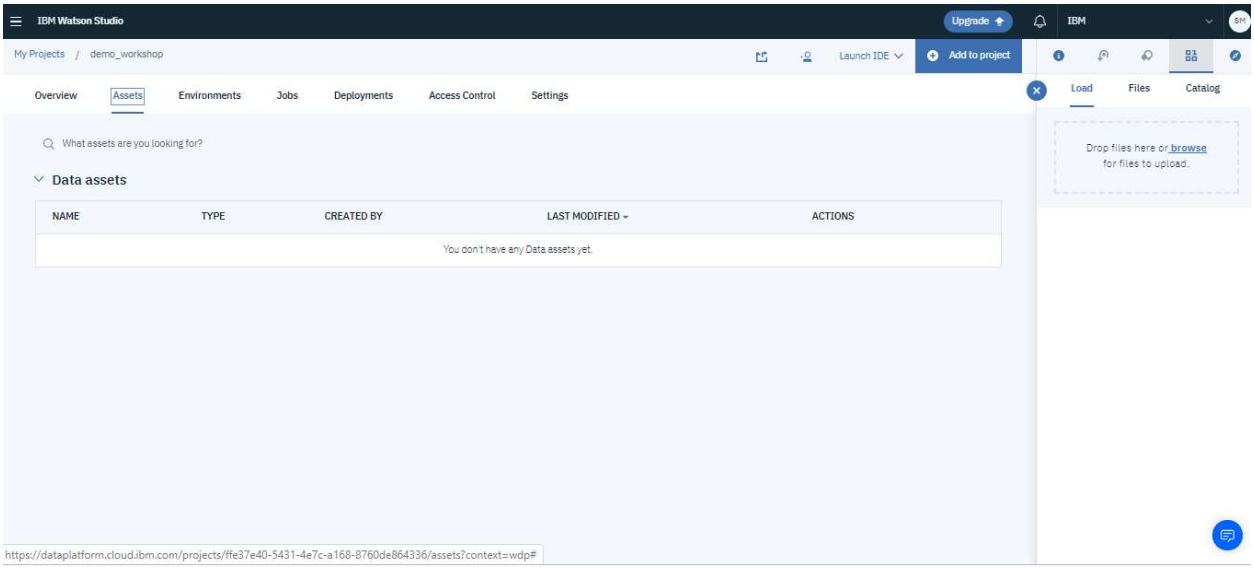

3. Click on “Create an empty project”. Then provide a name for the project name. On the right side, your cloud object storage will be shown associated with the project.



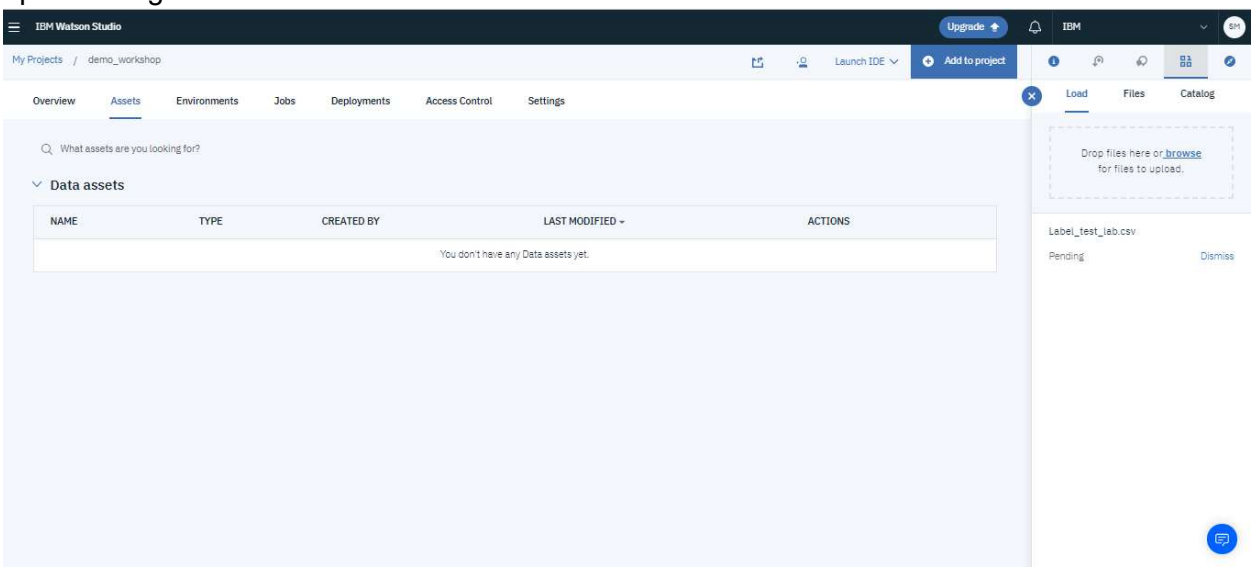

4. Click on “Create” to create the project.

## Add Data Assets to the project:

1. Click on the “Assets” tab.



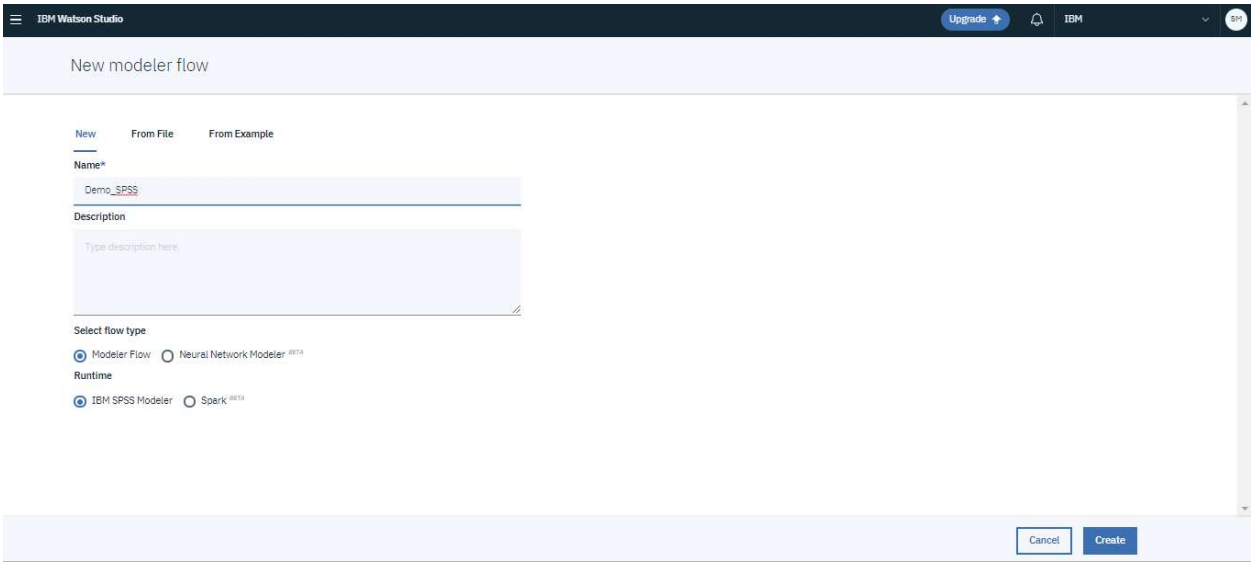

2. On the right side of the screen, click on “Browse” to browse your local file system and upload the given csv file.



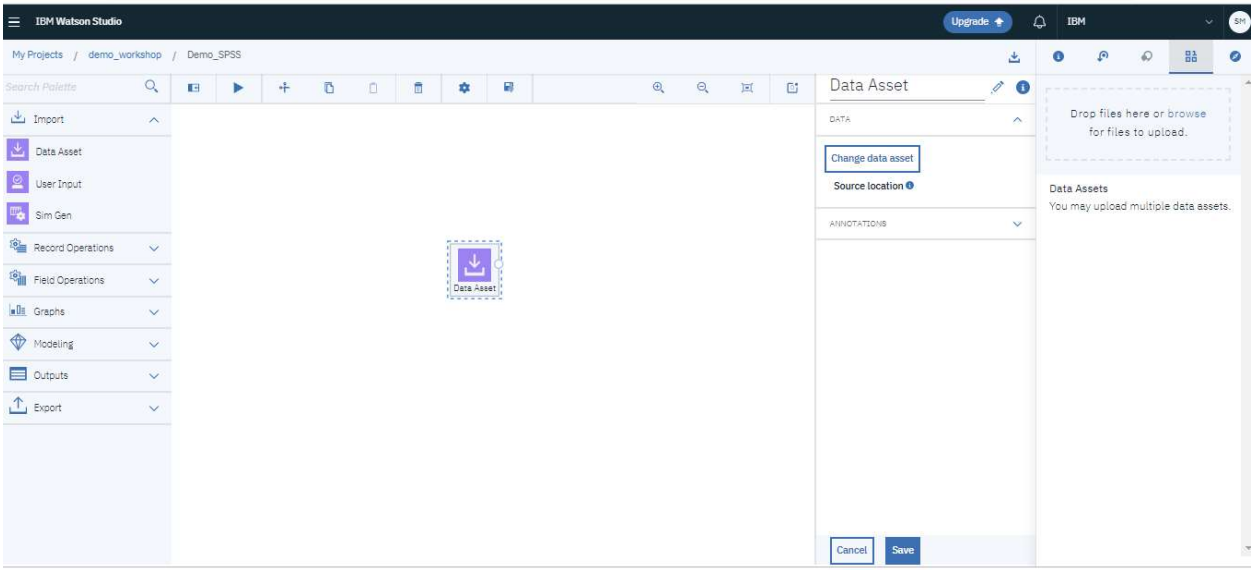

3. After upload has been completed the file will be displayed under “Data Assets” tab.

## Create an SPSS modeler flow:

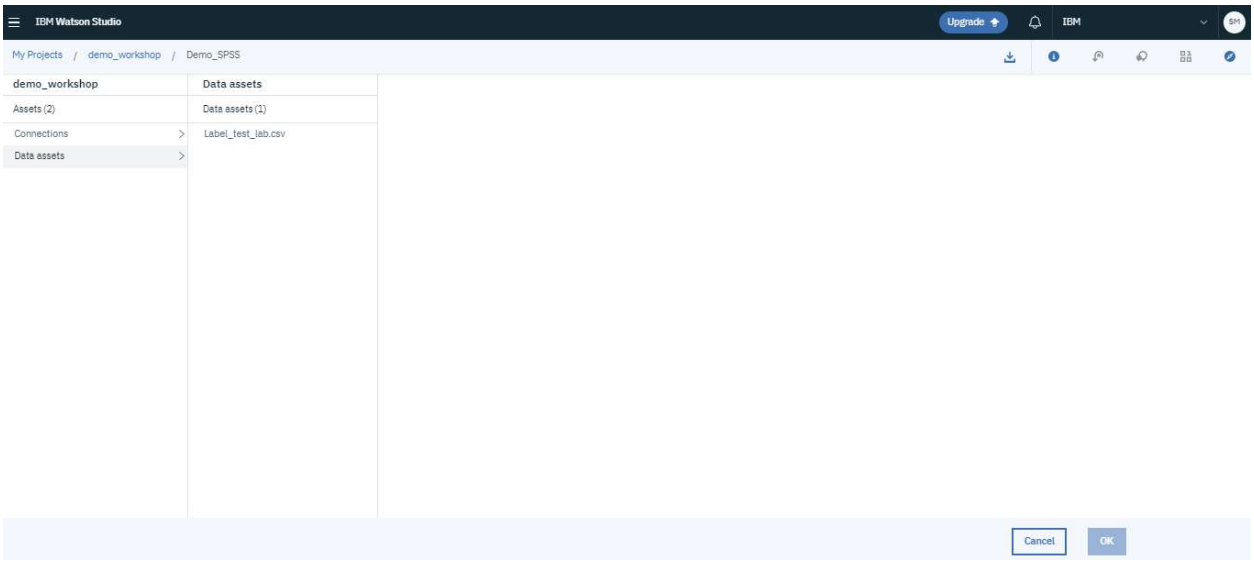
1. Click on “Add to project” from the top of the screen, and select “Modeler flow”.
2. Provide a name for the modeler flow. Maintain the flow type as Modeler Flow and the runtime as IBM SPSS modeler. Click on “Create”.



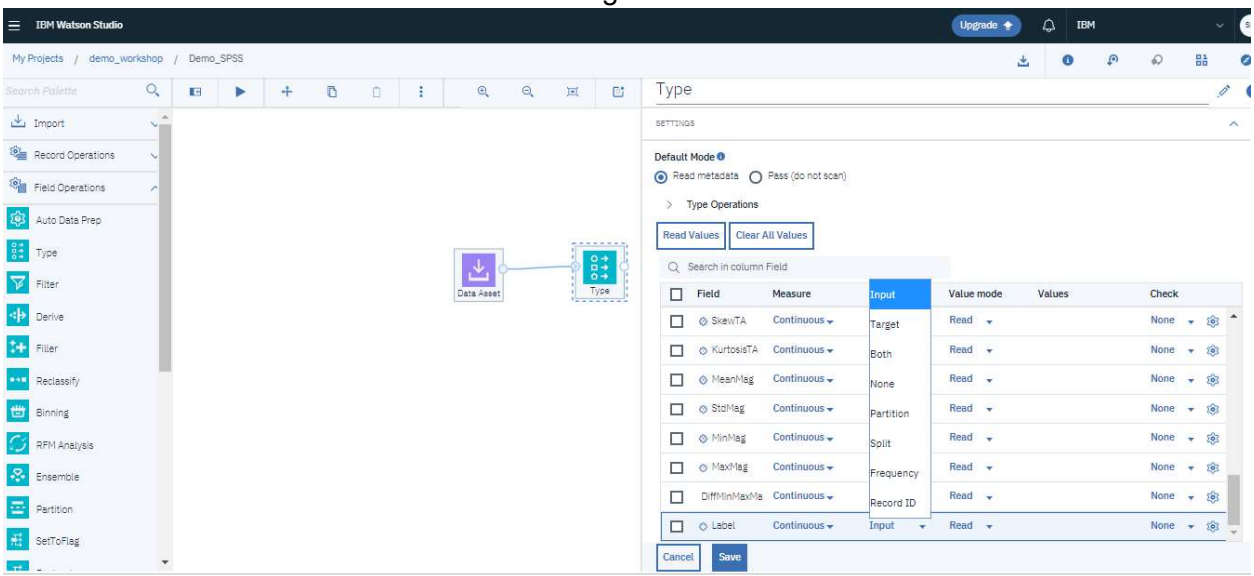

3. From the left side of the screen, click on “Import”, select “Data Asset”. Drag it onto the middle of the screen. Click on the just added Data Asset icon.



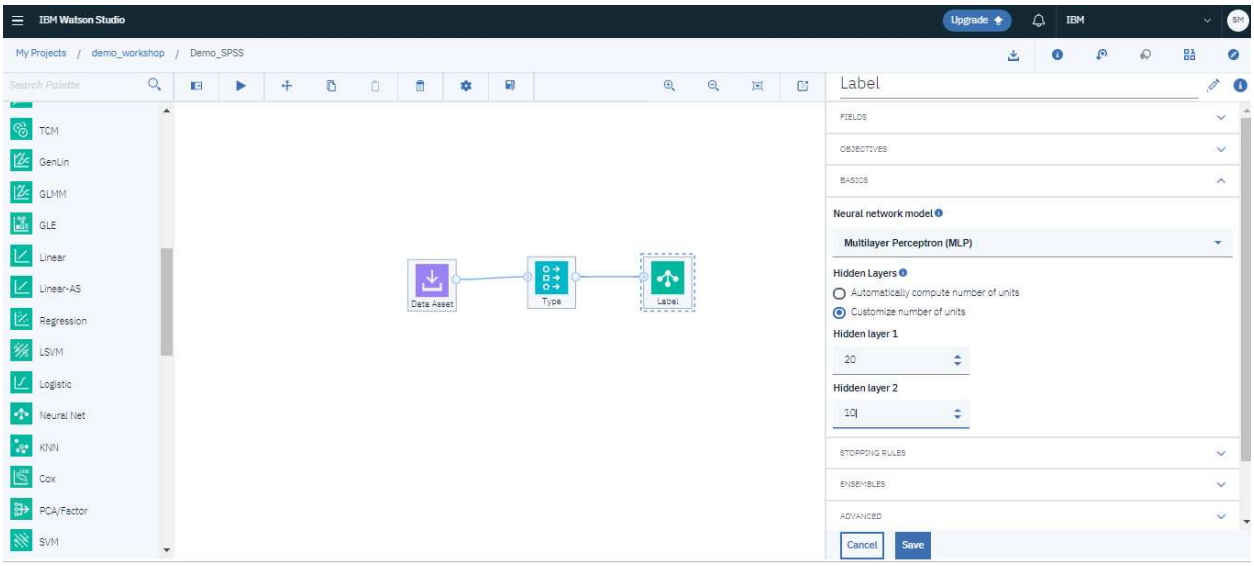

4. Click on “Change data asset”. On the next screen, click on “Data assets”, then select the CSV file that you previously uploaded. Then click on “OK”.



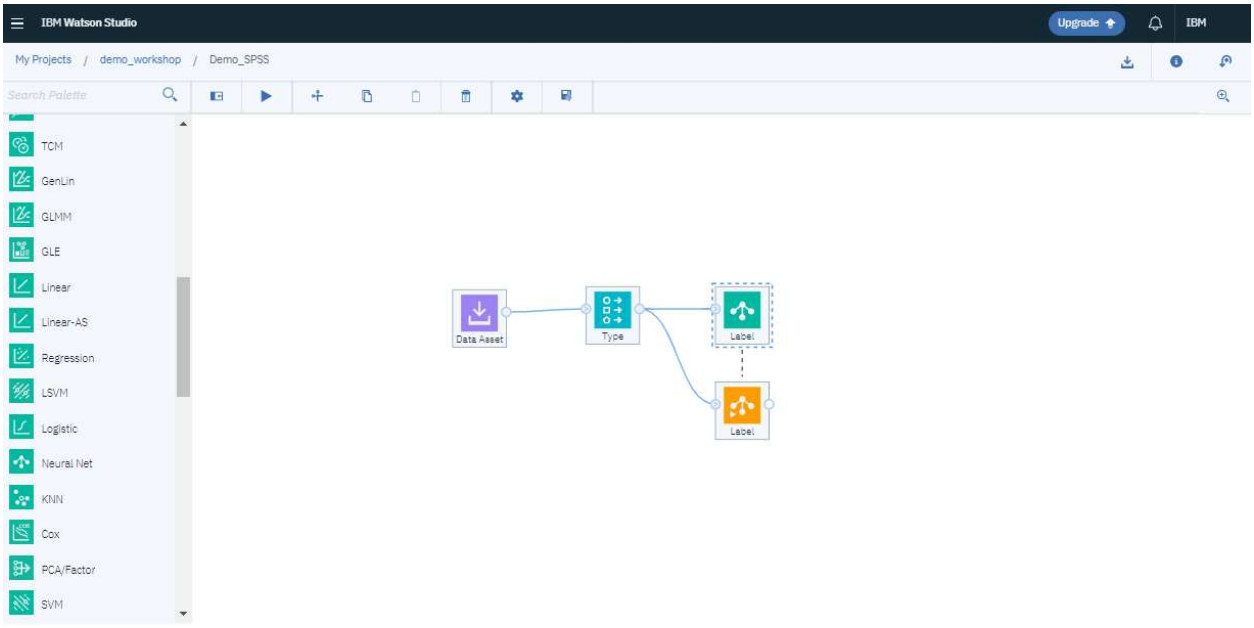

5. Now, from the left side of the screen, click on “Field Operations”, select “Type”. Drag it on to the middle. Then join Data Asset with Type by clicking on the circle on the right side of Data Asset icon and then dragging it to connect to the left circle on the Type icon.
6. Double click on the “Type” icon to open the options. Change the role of the Label field to Target instead of Input to specify that this is the target for our model. Change the measure to Nominal instead of Continuous as Label specifies two values: 0 for non-fall and 1 for fall. Click on “Save” to save the changes.



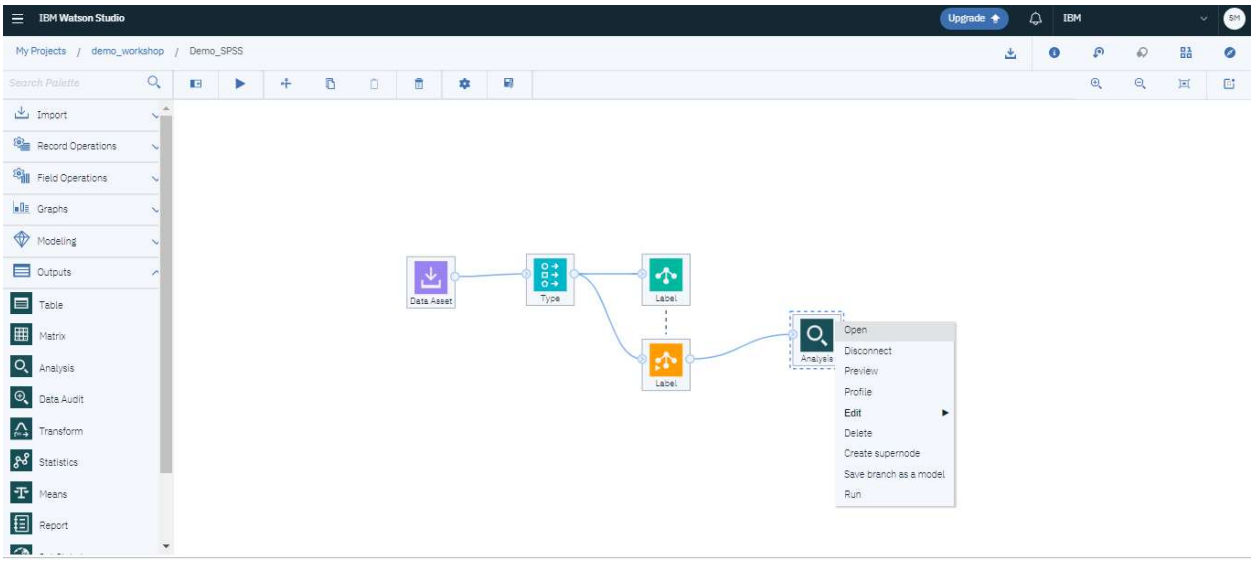

7. Now, from the left side of the screen, click on “Modeling”, then select “Neural Net”. Drag it to the middle of the screen. Connect the right circle of the Type icon with left circle of Neural Net icon. The name will change to Label to match with the target value. Double click on the Label icon, which will open up the options. Click on “Basics”, then change to “Customize number of units”. Enter 20 for hidden layer 1 and 10 for hidden layer 2. Click on “Save” to save the changes.




8. Click on Run (play button) from the top of the screen. This will create an orange icon for the trained model.

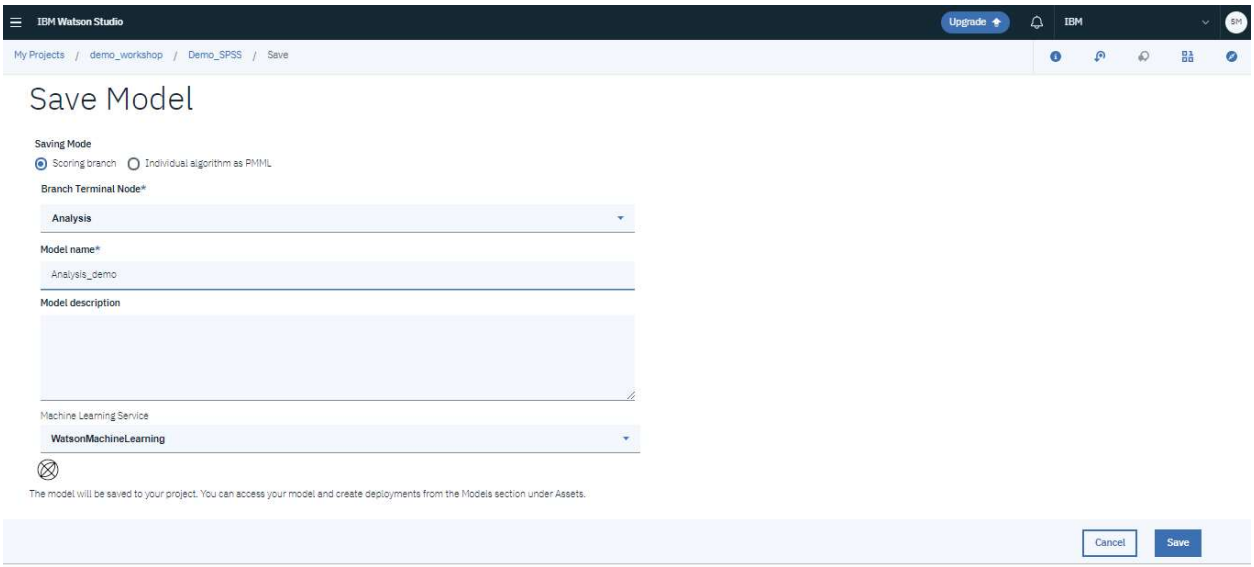



9. Click on “Outputs” from the left side, select “Analysis”, drag it on to the middle. Connect the orange Label icon to the Analysis icon. Then single click on the right 3 dots of the analysis icon and click run.



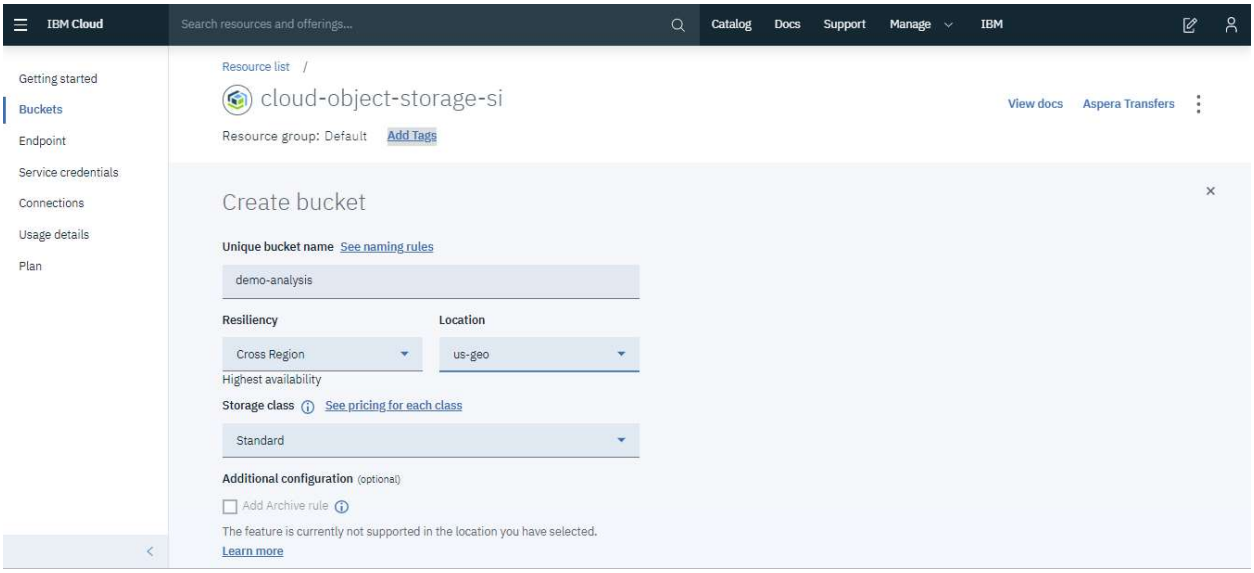

10. Click on “Analysis of [Label]” from the right side. This will show you the accuracy of the trained model on the training data.


11. Click on “Demo_SPSS” (name of the Modeler flow) to go back to the flow. Click again on the right 3 dots of the Analysis icon and select Save branch as a model. This will give you Required Service Missing error: “No Watson Machine Learning instances found. Create a new Watson Machine Learning service instance to save your model.”. Click on “Create a new Watson Machine Learning service instance”, then select the existing service instance from the list. Click on “Select”.
12. Again click on “Save branch as a model” from Analysis icon. Provide a unique model name. Then select “Save”.



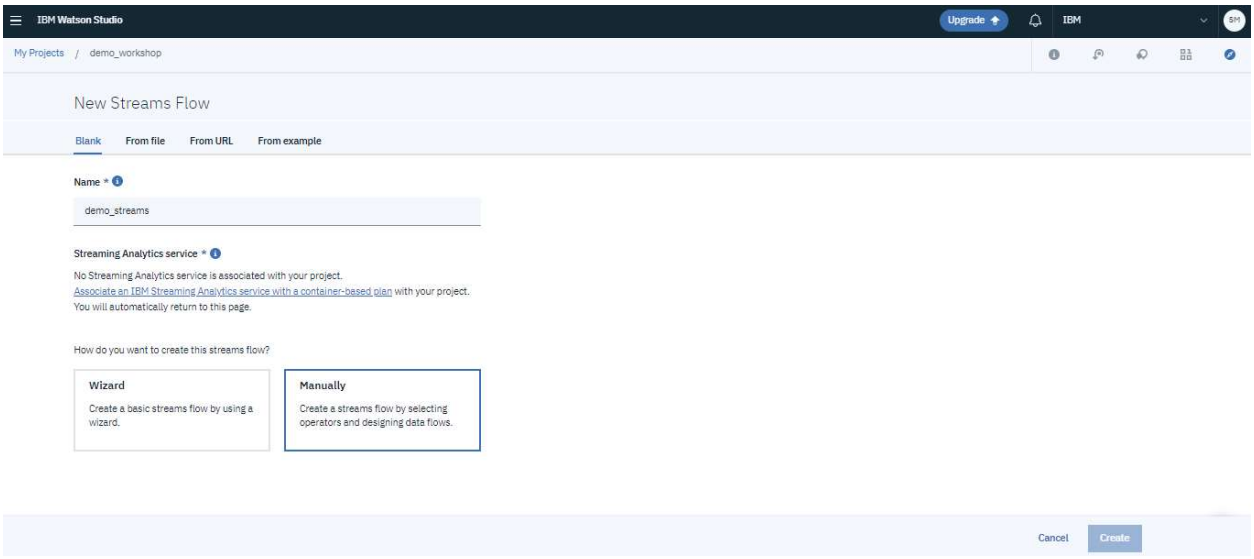

## Create a bucket in Cloud Object Storage:

5. Click on the storage instance from IBM Cloud dashboard. Once this opens, enter a unique bucket name, select “Cross Region” for Resiliency, “us-geo” for location, then click on “Create bucket”.

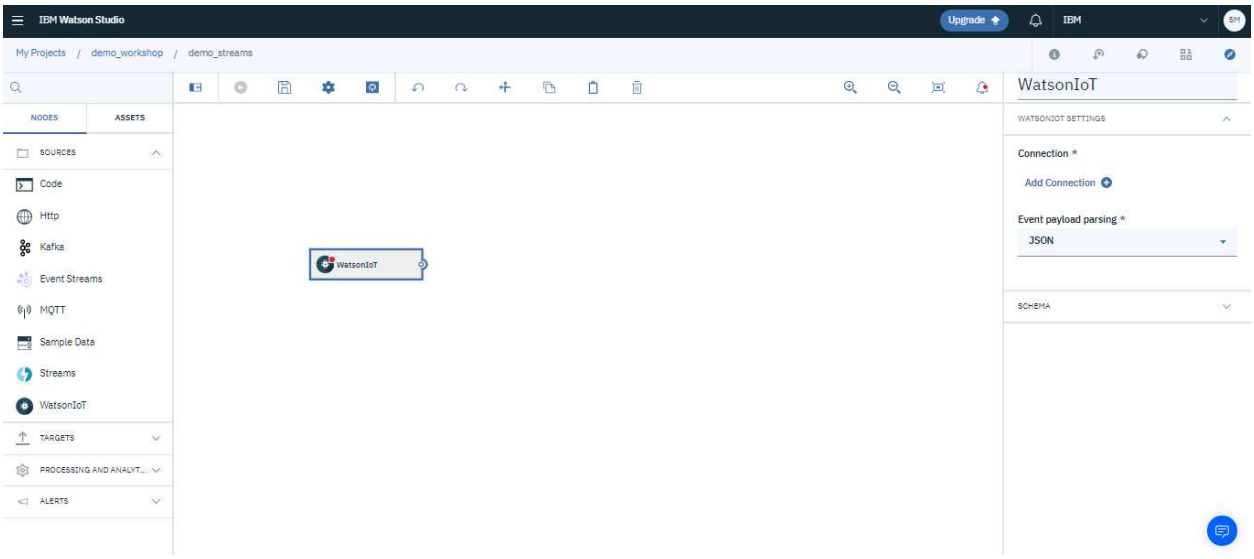



## Create a Streams Flow:

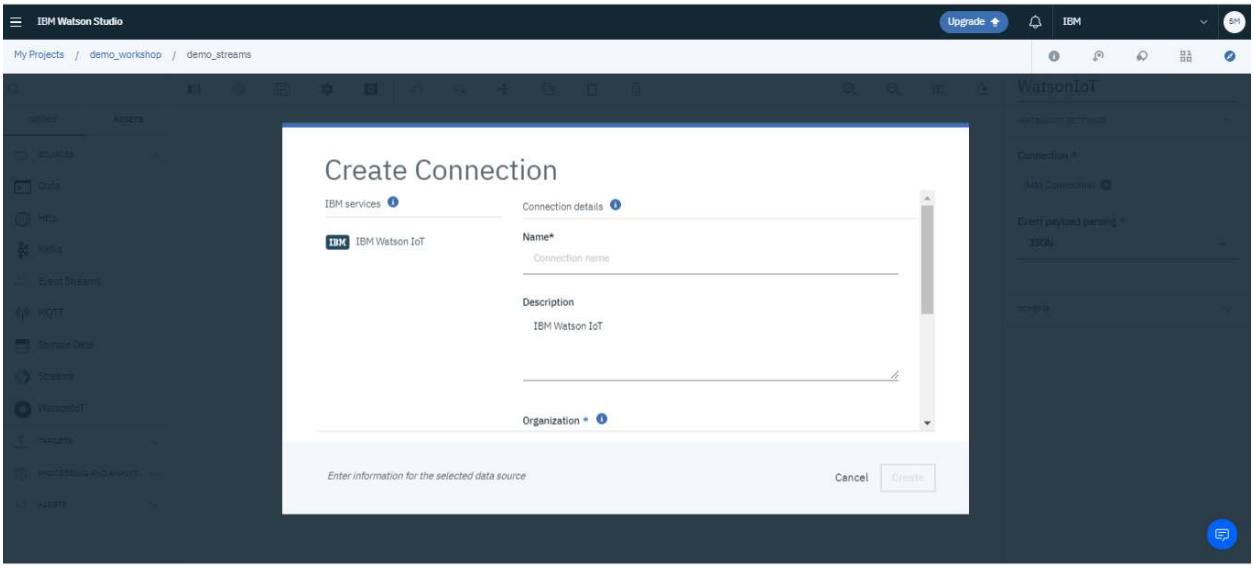
1. Click on “Add to project”, and then “Streams flow”.



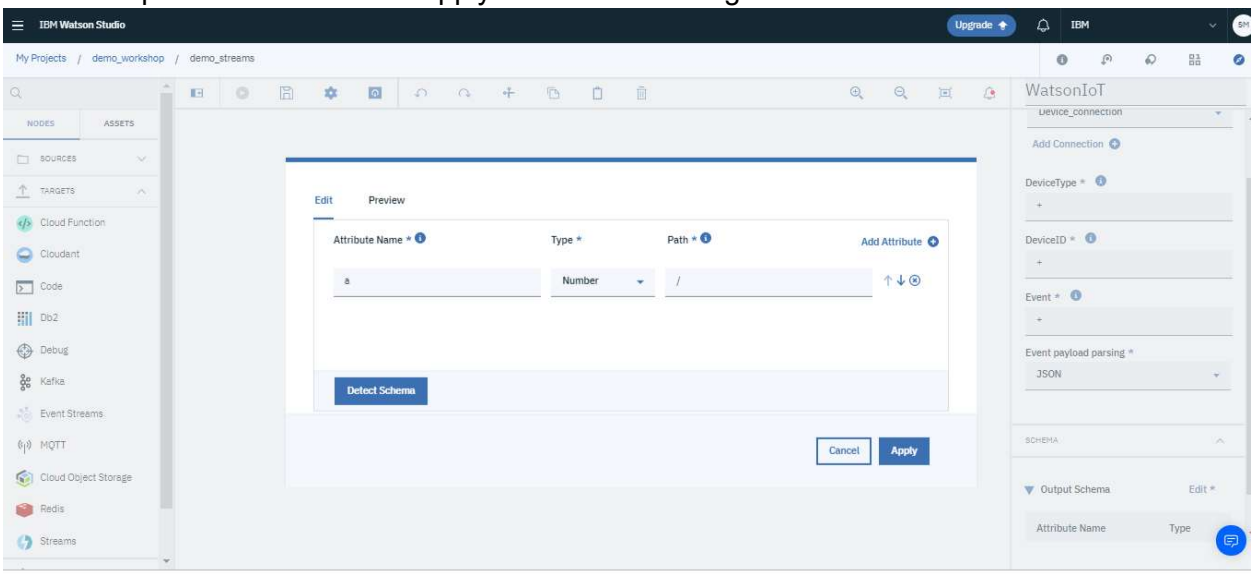

2. In the “Streaming Analytics service”, click on “Associate an IBM Streaming Analytics service with a container-based plan”. Select an existing service instance from the list. Then click on “Select”. Enter a name for the Streams flow, select “Manually” for creating the Streams flow, then click on “Create”.
3. From the left side of the screen, click “Watson IoT” from “Sources”, and drag it on to the canvas.



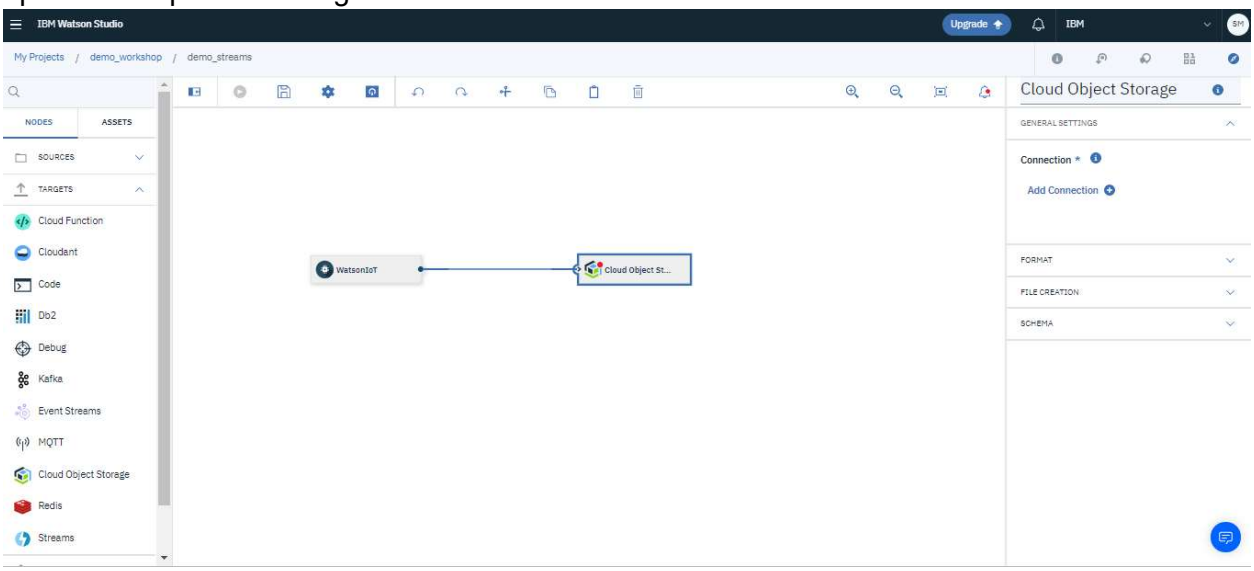

4. On the WatsonIoT operator settings, click on “Add Connection”. Select “IBM Watson IoT”, then a window will appear for adding a connection.



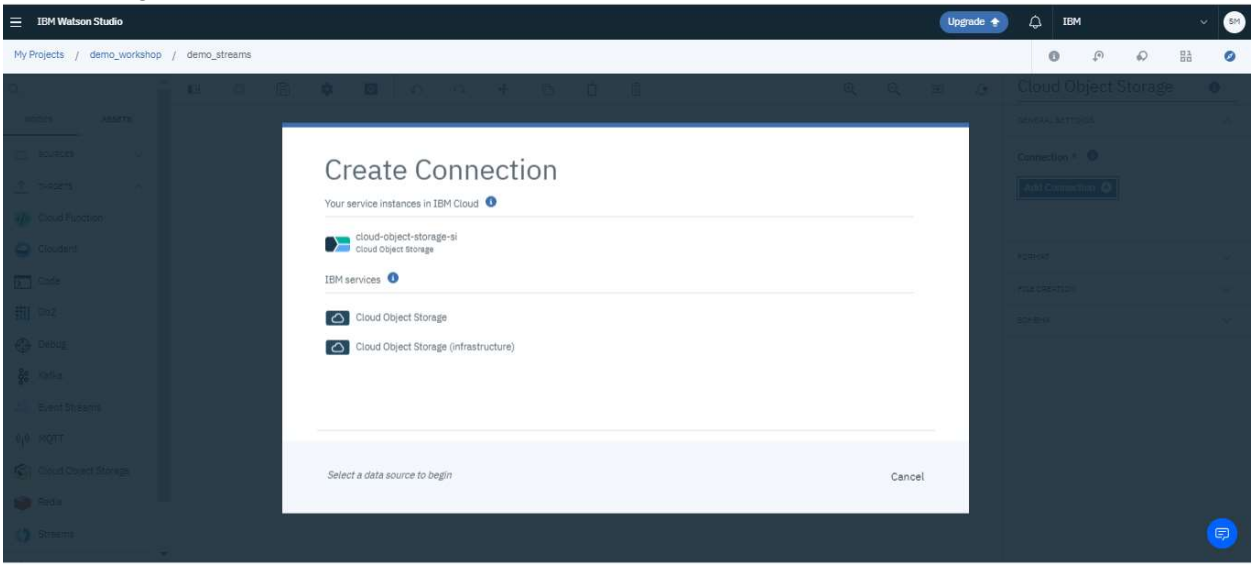

5. To add the connection, open Internet of Things Platform from IBM cloud dashboard in another window. Once opened, click “Launch”. In the opened window, click on “Apps” from the left side, then click “Generate API Key”. Provide a description for the connection, click on “Next”. In the next window, select “Standard Application” as Role from the list. Then click on “Generate Key”. In the next window, copy the authentication token, then paste it in the Watson Studio “Add connection” window authentication token box. Again copy the API key from the Internet of Things Platform window and paste it in the in the Watson Studio “Add connection” window API key box. In the Organization box, type the same organization that appears on the top right side of the Internet of Things Platform window. Then click on “Create”.
6. Now, in the WatsonIoT operator settings, click on expand “Schema” option, click on “Edit” beside “Output Schema”, then type a name for the attribute name, select “Number” as “Type”, enter “/” as “path”. This is just a dummy attribute. Once, the flow starts running, then we can use “Detect Schema” option to receive the actual attributes coming from the input stream. Click on “Apply” to save the changes.



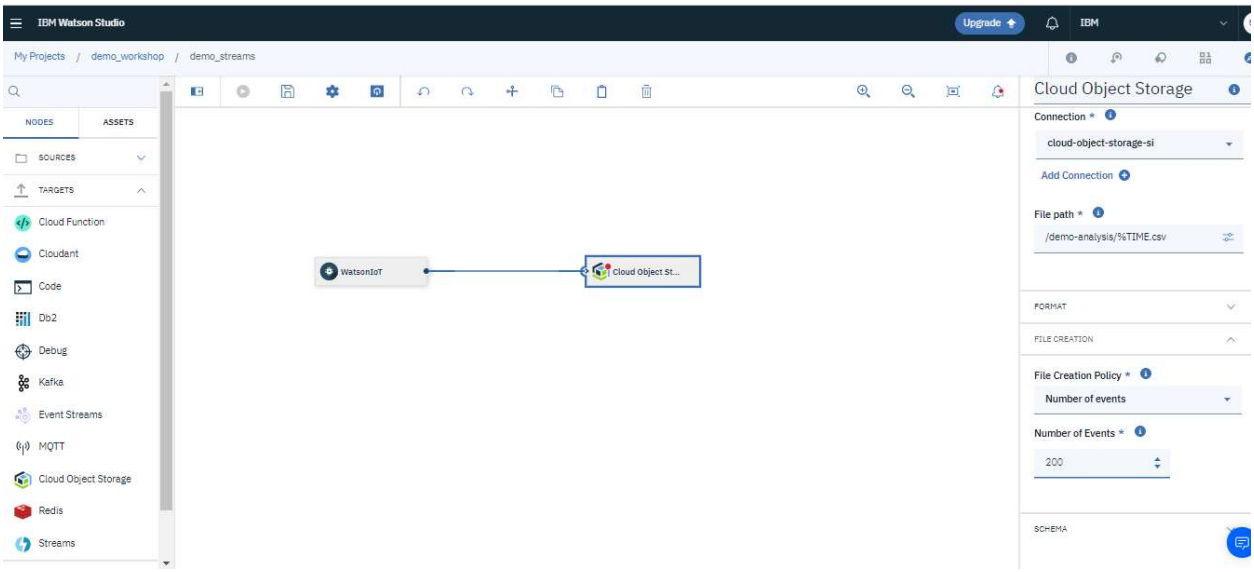
7. Now, from the “Targets” option on the left side, select “Cloud Object Storage”, drag it to the canvas. Connect WatsonIoT operator to the Cloud Object Storage operator by clicking on the circle on the right of WatsonIoT operator and then dragging it to include the circle on the left side of the Cloud Object Storage. Click on the Cloud Object Storage operator to open its settings.



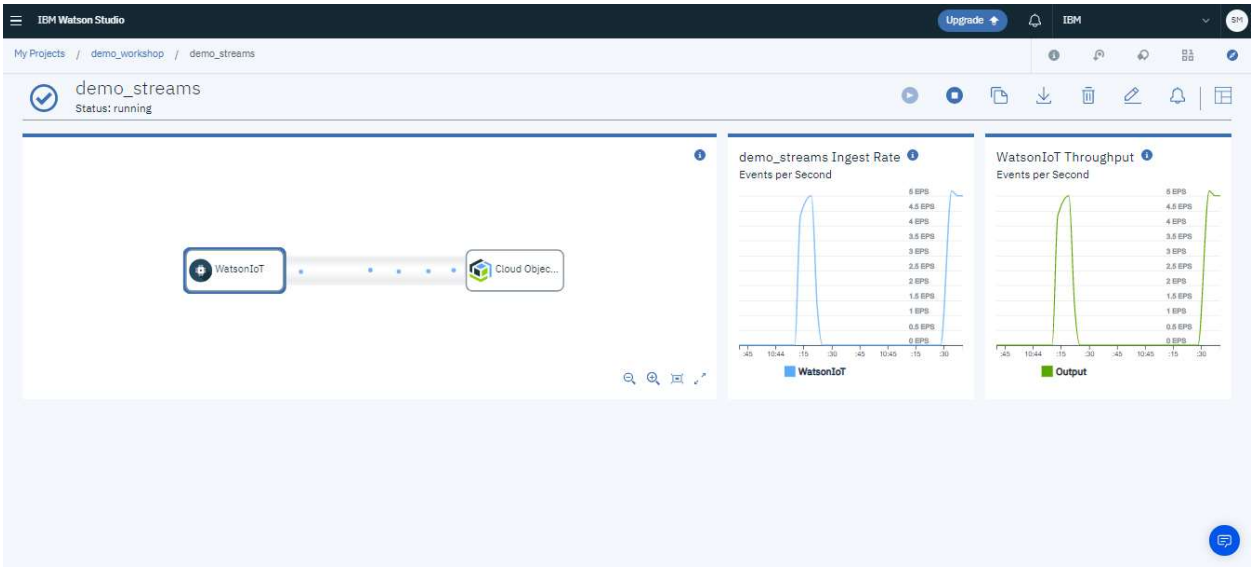

8. Click on “Add Connection” in the Cloud Object Storage settings. This will open a window for entering the connection information.



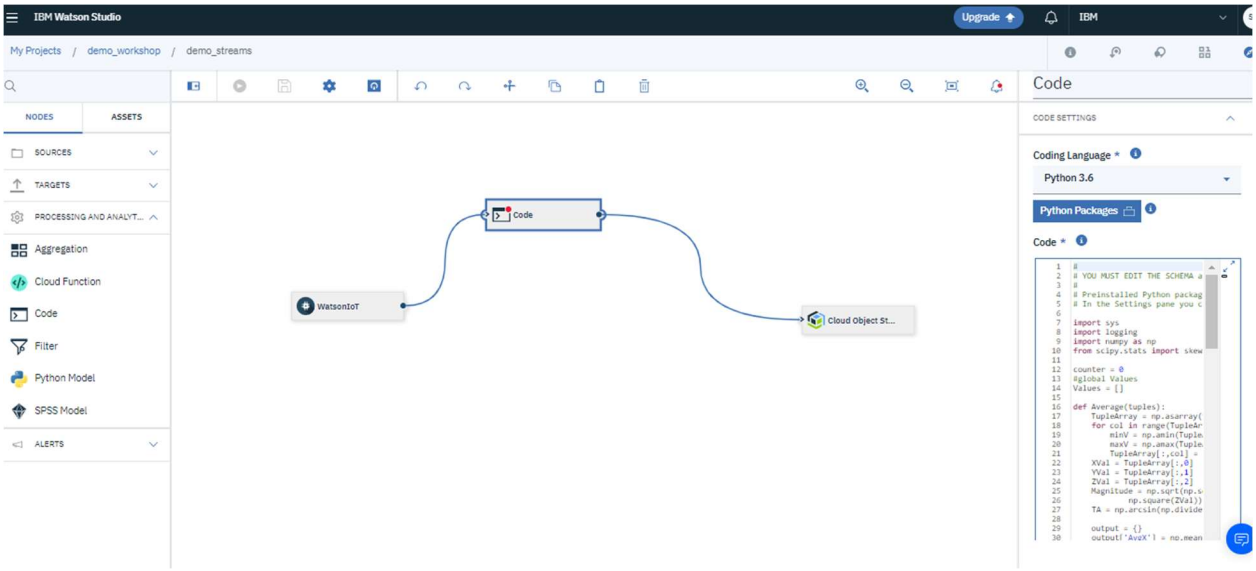

9. Select the cloud storage instance from “Create Connection” window. This will show you the connection details. Click on “Create”. Now, on the settings window, enter the file name on the file path; for example: /demo-analysis/%TIME.csv
In the “File Creation” option: select “Number of events” as the “File creation policy”, 200 as “Number of events”.



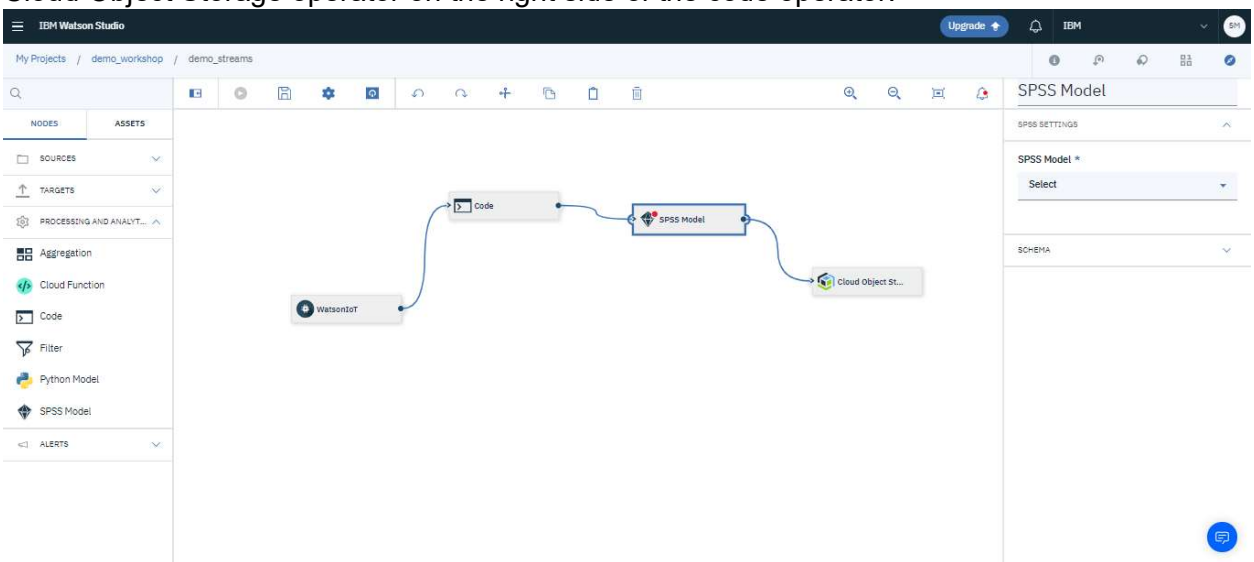

10. Click on Save (Floppy disk icon), then run (play icon) from the top. If the Streaming Analytics service has not already been started, there will be a prompt for starting the service. Click “Yes” to start the service.



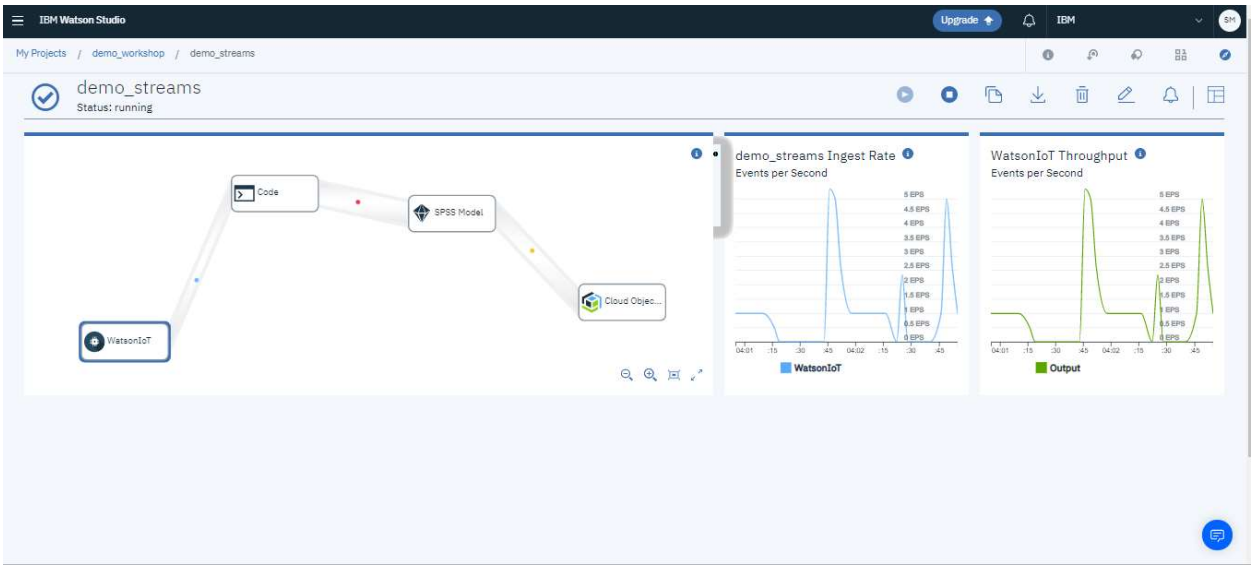

11. Once the Streams flow has successfully started running, you view the flow information on the right. If you click on the line of flow in between WatsonIoT and Cloud Object Storage operator, you can view the data samples passing through the operators as well.
12. Now, click on Edit (pencil icon) from the top, and click on the WatsonIoT to open the settings. Click on the “Schema” option, click on “Edit” beside “Output Schema”, then click on “Detect Schema”. Click “Yes” to the reversion warning. Then click “Apply” to save the changes.
13. From “Processing and Analytics” option on the left, select the “Code” operator, and drag it on to the canvas. Connect WatsonIoT operator on the left side of the Code and Cloud Object Storage operator on the right side of the code operator.




14. Click on the “Code” operator, this will open up the settings. Copy the code (given in the code_operator_edit.txt file) for the code operator and paste it in the “Code” section. Click on the Schema section, then click on “Edit” beside “Output Schema”. Add the attributes listed for output dictionary in the code section. All of the attribute types are “Number”. Add an additional attribute for Label of type “Number” to match the expected input schema for the SPSS model. Click on “Python Packages” just above the Code section, type “numpy==1.15.4”, and click “add”. This will add this Numpy version to the runtime.
15. From “Processing and Analytics” option on the left, select the “SPSS Model” operator, and drag it on to the canvas. Connect Code operator on the left side of the Code and Cloud Object Storage operator on the right side of the code operator.




16. Click on “SPSS Model” operator to open the settings. Select the previously saved SPSS model from the list under “SPSS Model” option.
17. Now, click on save (floppy disk icon), then run (play icon) from the top. The flow can be seen as follows:


IBM Watson Studio
Upgrade
IBM
My Projects / demo_workshop / demo_streams
demo_streams
Status: running
Code
SPSS Model
Cloud Objec...
WatsonIoT
demo_streams Ingest Rate
Events per Second
WatsonIoT
WatsonIoT Throughput
Events per Second
Output