National College of Ireland

Configuration Manual

MSc Research Project
MSc Cloud Computing

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Project Submission Sheet
School of Computing

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Signature:	Shreya Modak
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Configuration Manual

Shreya Modak
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1 Introduction

The steps to configure the code files (.ipynb files) are outlined in the configuration manual.

2 Requirements

HARDWARE REQUIREMENT

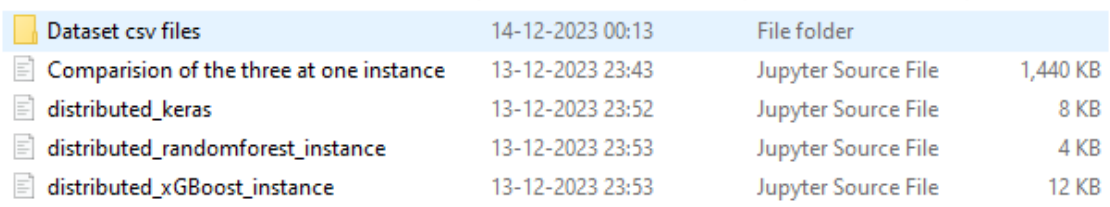
- Operating System: Compatible with multiple operating systems, Windows, Mac and Linux.

  SOFTWARE REQUIREMENT

- AWS Account
- AWS Sagemaker Access

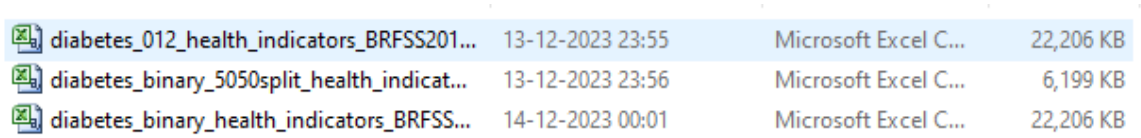
3 Code Configuration

- There are four .ipynb files and as their name suggest, there are three separate and one combine or comparative analysis done on the code.
- A total of six models were trained under a distributed and parallel processing environment to be run on the Amazon Sazemaker.



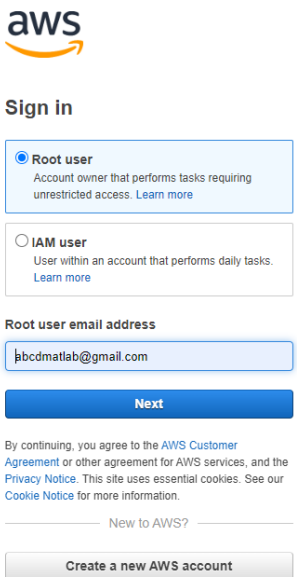
4 Dataset Configuration

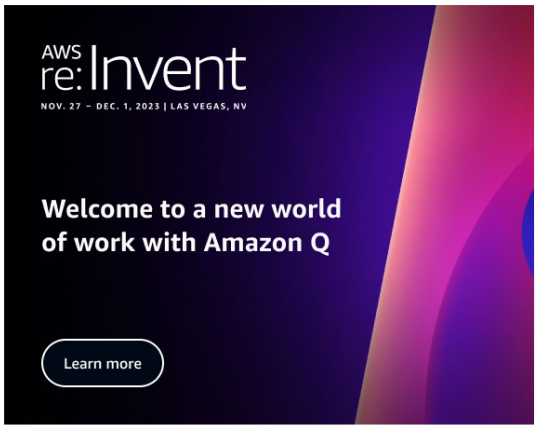
- The dataset folder contains the csv data files required to run the code.



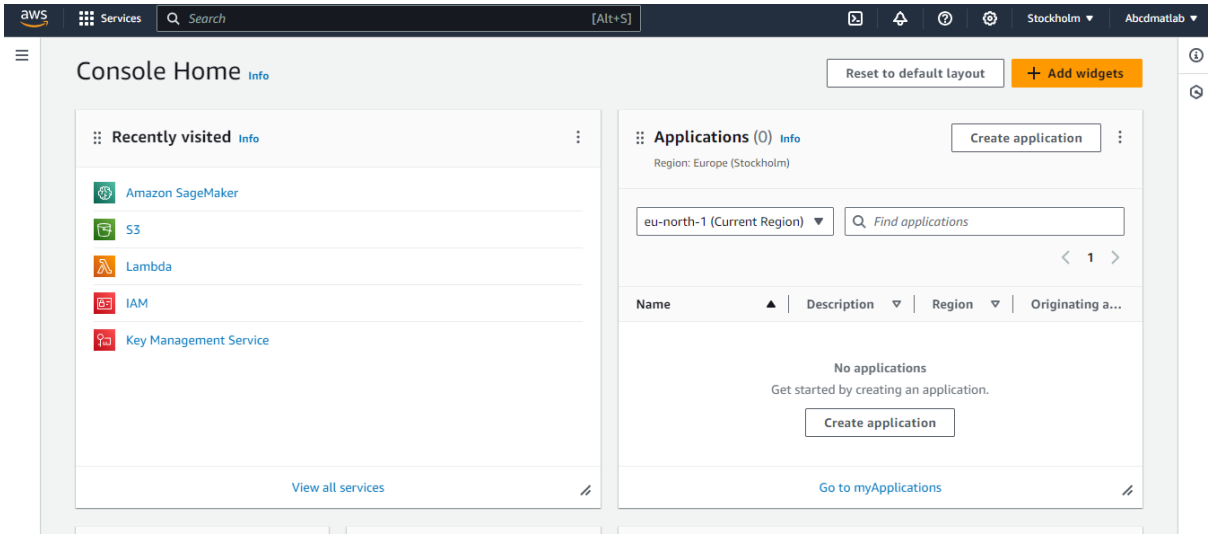
5 Implementation

- Login to AWS MANAGEMENT CONSOLE using root user login and password.

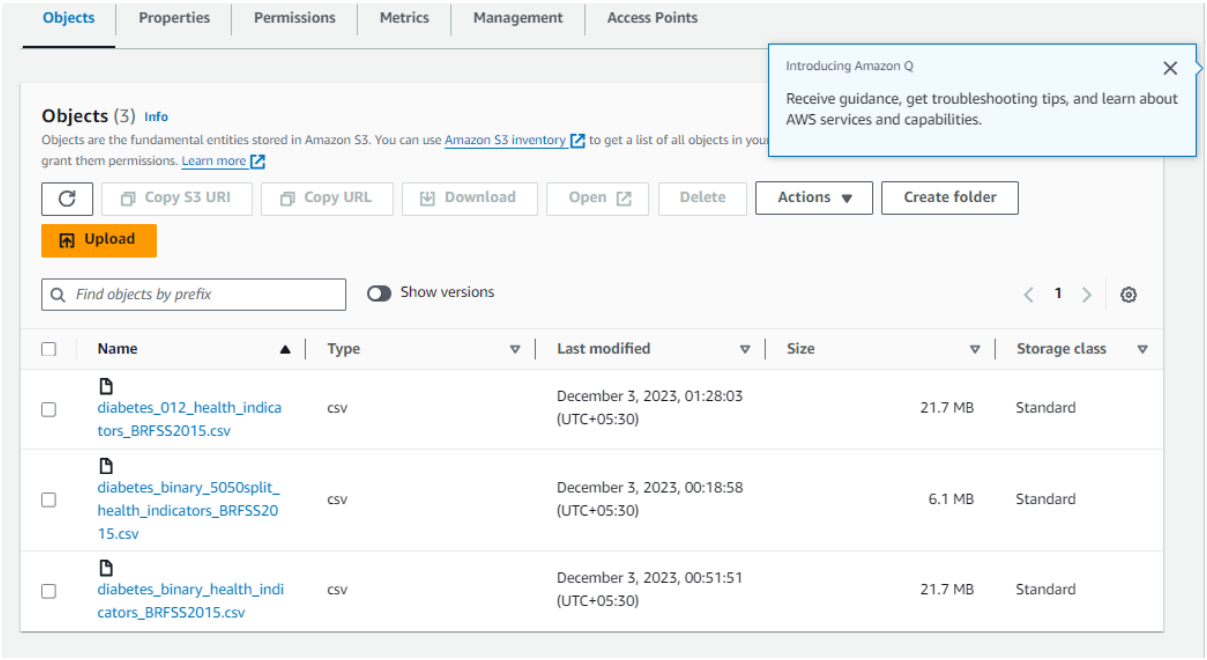


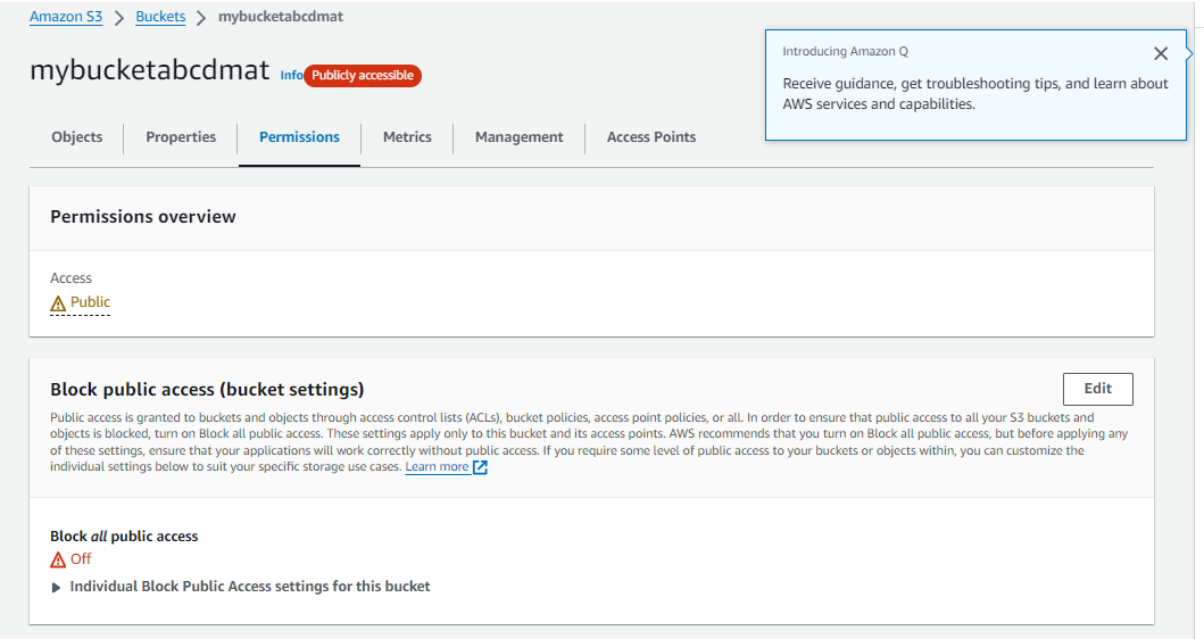


- Open S3 bucket

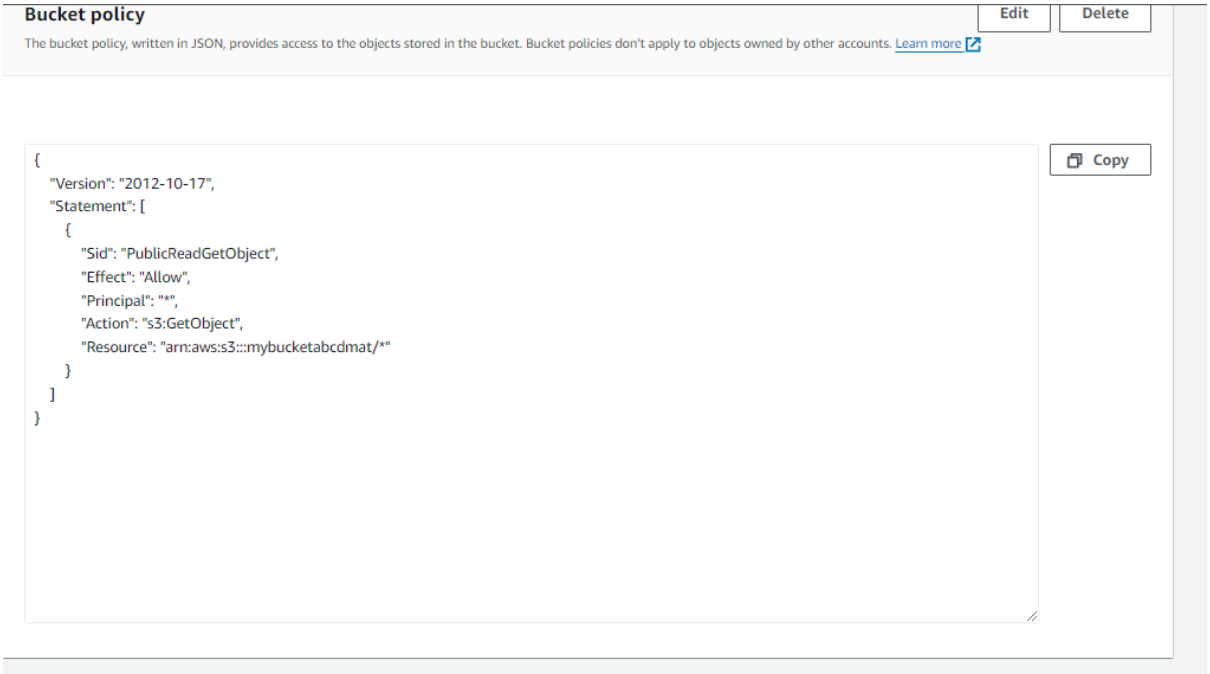


- Upload all three csv data to a s3 bucket, which have all the permissions for s3 functions.

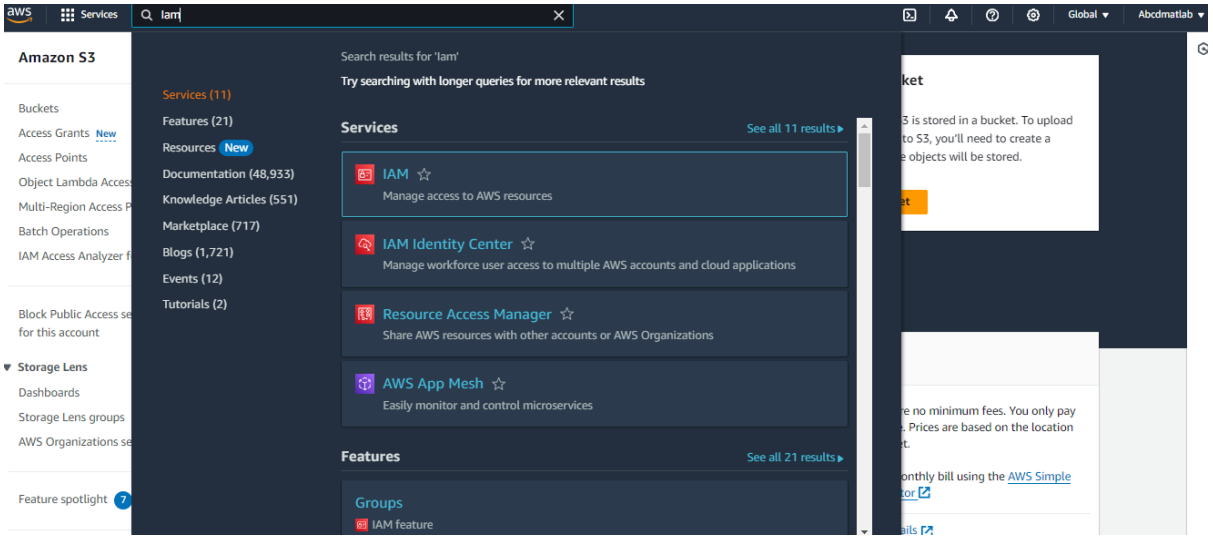




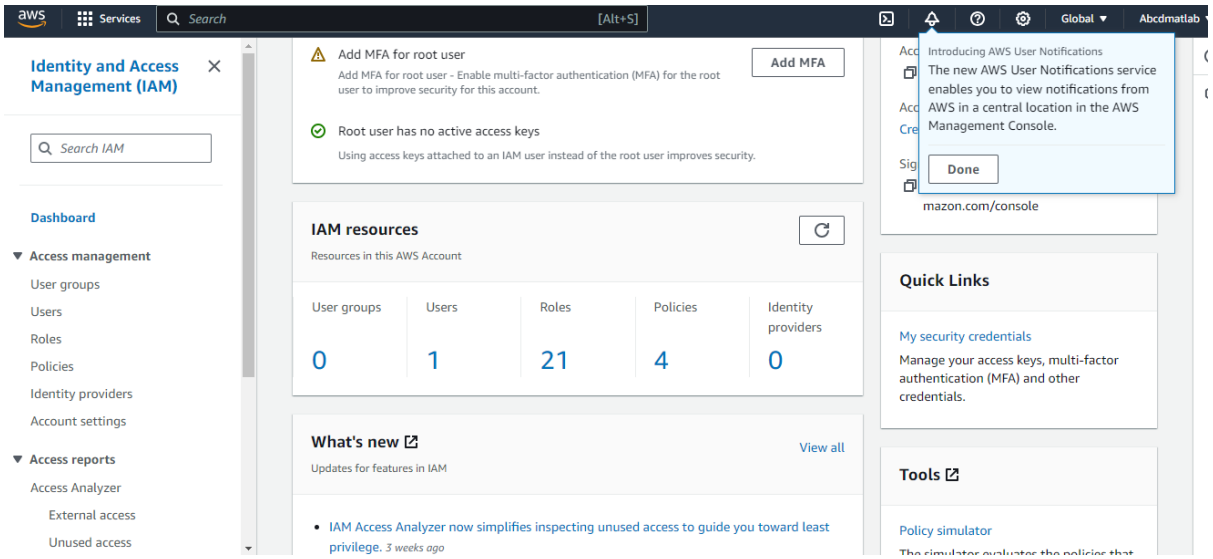
- Set the bucket policy as shown



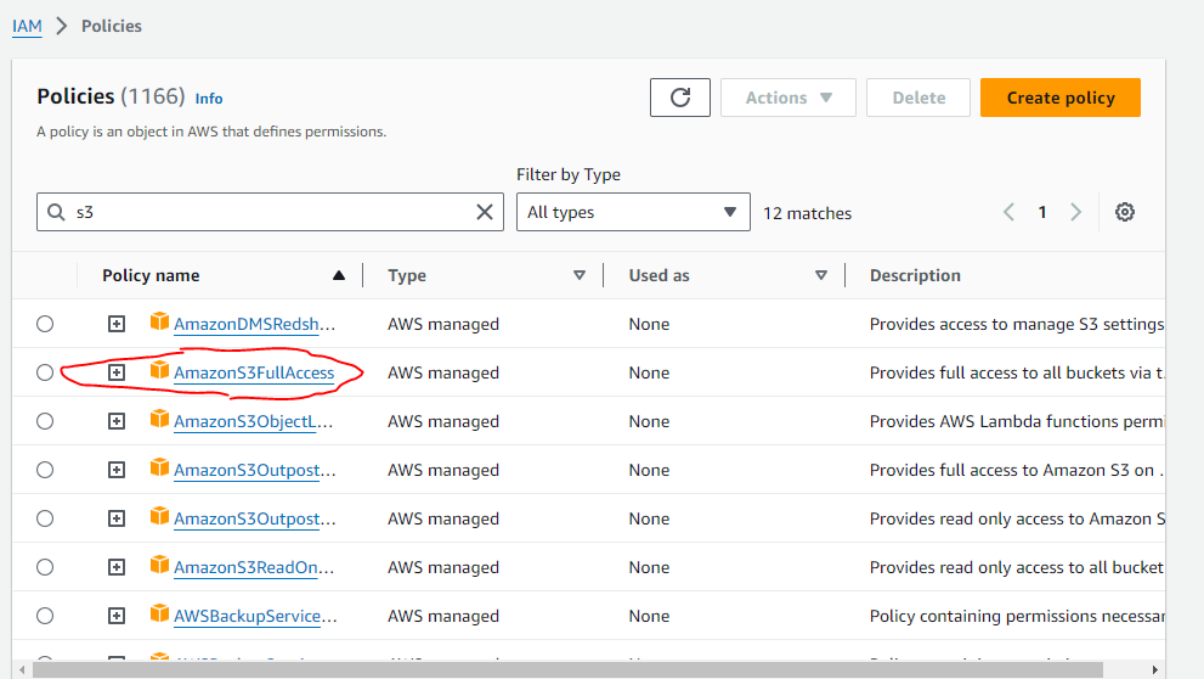
- Create IAM Roles in a separate tab for accessing the buckets



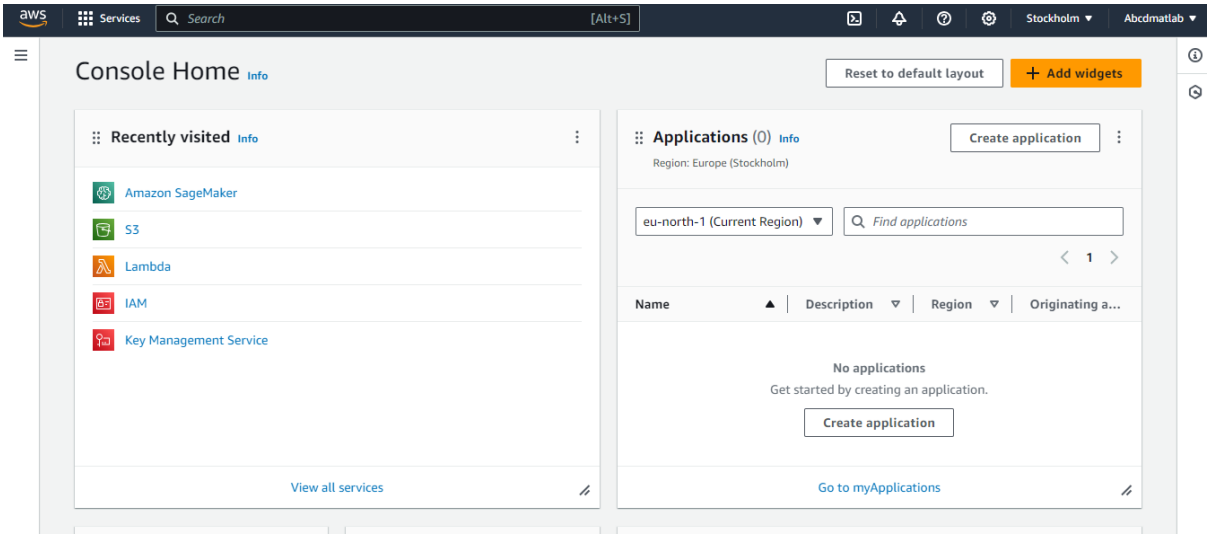
- Create a user and then their role



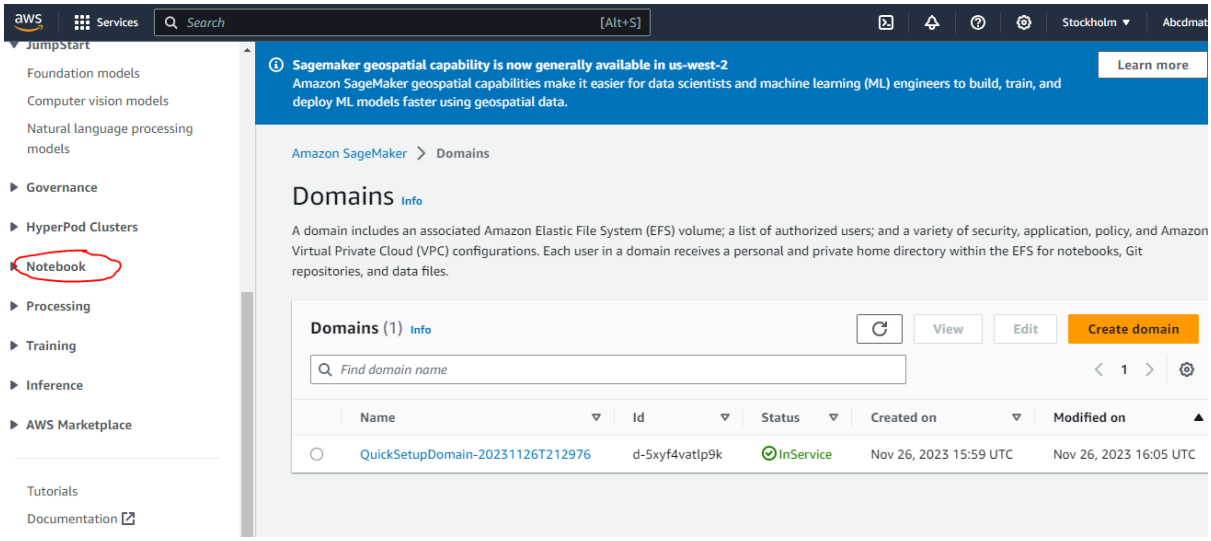
- Under Policies, allow for s3 Full access

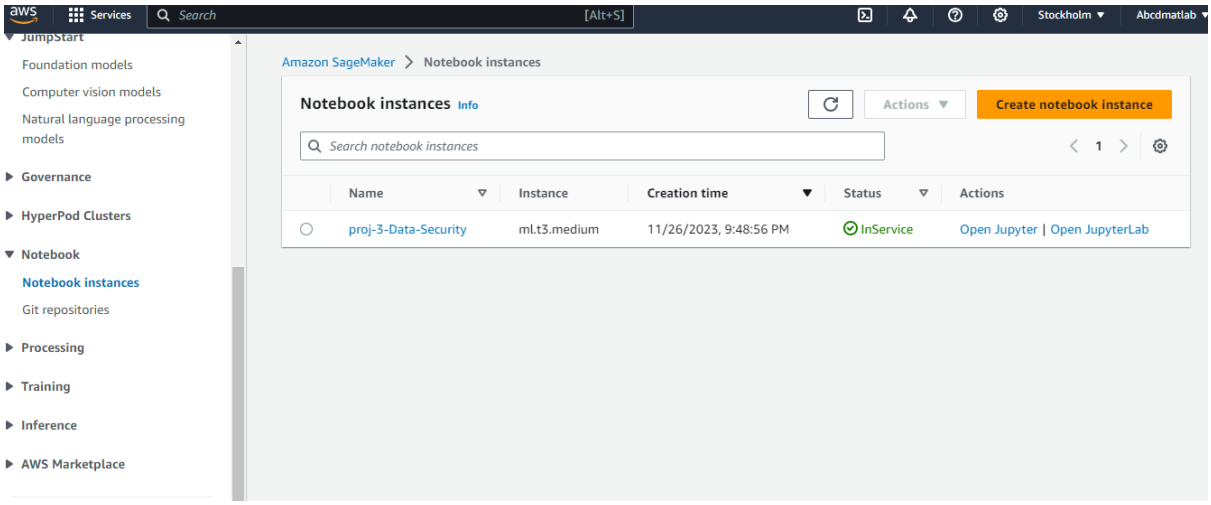


- Open Amazon Sagemaker, by going back to managemnt console and opening AWS Sagemaker

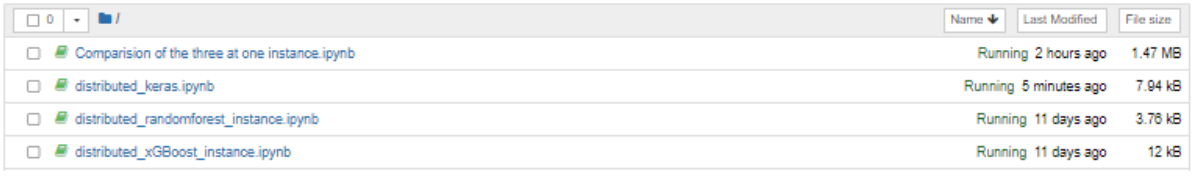


- Search for the notebook instances in the left pane





- Create a notebook instance if you don't have open. After a notebook instance has been created and ready, you can further open it in jupyter and upload code files as shown below



- Open the distributed_keras.ipynb and do the required pip installs.

pip install pandas numpy seaborn boto3 matplotlib skcit-learn

- Run the model for keras and observe the accuracy and classification score

```python
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from sklearn.metrics import accuracy_score, classification_report

# Create a simple neural network model
model = Sequential()
model.add(Dense(64, input_dim=X_train.shape[1], activation='relu'))
model.add(Dense(32, activation='relu'))
model.add(Dense(3, activation='softmax'))  # Adjust the number of units based on your target classes

# Compile the model
model.compile(loss='sparse_categorical_crossentropy', optimizer='adam', metrics=['accuracy'])

# Train the model
model.fit(X_train, y_train, epochs=10, batch_size=32, validation_data=(X_test, y_test))


# Evaluate the model
nn_predictions = model.predict(X_test)
nn_predictions_classes = np.argmax(nn_predictions, axis=1)  # Get the index of the maximum value along axis 1

nn_accuracy = accuracy_score(y_test, nn_predictions_classes)
nn_classification_report = classification_report(y_test, nn_predictions_classes)


# Print the results
print(f'Neural Network Accuracy: {nn_accuracy}')
print('Neural Network Classification Report:')
print(nn_classification_report)
```

```
Epoch 1/10
2023-12-02 22:29:49.652841: W external/local_tsl/tsl/framework/cpu_allocator_impl.cc:83] Allocation of 34094592 exceeds 10% of
free system memory.
6342/6342 [==============================] - 16s 2ms/step - loss: 0.4239 - accuracy: 0.8432 - val_loss: 0.4028 - val_accuracy:
0.8481
Epoch 2/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.4055 - accuracy: 0.8464 - val_loss: 0.3969 - val_accuracy:
0.8492
Epoch 3/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.4019 - accuracy: 0.8474 - val_loss: 0.3947 - val_accuracy:
0.8496
Epoch 4/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.3999 - accuracy: 0.8475 - val_loss: 0.3943 - val_accuracy:
0.8476
Epoch 5/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.3985 - accuracy: 0.8478 - val_loss: 0.3942 - val_accuracy:
0.8484
Epoch 6/10
6342/6342 [==============================] - 13s 2ms/step - loss: 0.3976 - accuracy: 0.8480 - val_loss: 0.3933 - val_accuracy:
0.8499
Epoch 7/10
6342/6342 [==============================] - 13s 2ms/step - loss: 0.3975 - accuracy: 0.8485 - val_loss: 0.3955 - val_accuracy:
0.8480
Epoch 8/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.3971 - accuracy: 0.8480 - val_loss: 0.3914 - val_accuracy:
0.8501
Epoch 9/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.3967 - accuracy: 0.8481 - val_loss: 0.3922 - val_accuracy:
0.8499
Epoch 10/10
6342/6342 [==============================] - 12s 2ms/step - loss: 0.3964 - accuracy: 0.8486 - val_loss: 0.3925 - val_accuracy:
0.8486
1586/1586 [==============================] - 2s 1ms/step
Neural Network Accuracy: 0.8486281929990539
Neural Network Classification Report:
              precision    recall  f1-score   support

         0.0       0.87      0.97      0.92     42795
         1.0       0.00      0.00      0.00       944
         2.0       0.53      0.22      0.31      6997

    accuracy                           0.85     50736
   macro avg       0.47      0.40      0.41     50736
weighted avg       0.81      0.85      0.82     50736
```

- Similarly, run the random forest model

In [17]:
```
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score, classification_report

# Example: Random Forest Classifier
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
model = RandomForestClassifier()
model.fit(X_train, y_train)
predictions = model.predict(X_test)

# Evaluate the model
print("Accuracy:", accuracy_score(y_test, predictions))
print("Classification Report:\n", classification_report(y_test, predictions))
```

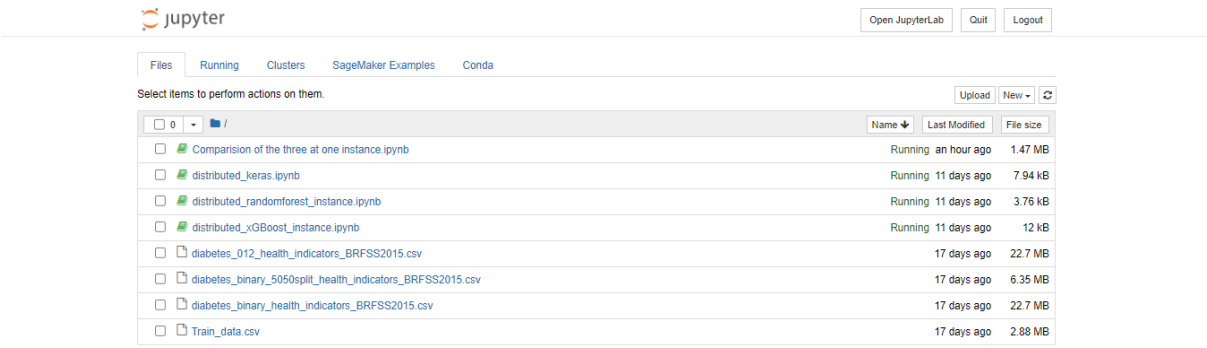
```
Accuracy: 0.8417888678650268
Classification Report:
              precision    recall  f1-score   support

         0.0       0.86      0.97      0.91     42795
         1.0       0.00      0.00      0.00       944
         2.0       0.47      0.20      0.28      6997

    accuracy                           0.84     50736
   macro avg       0.45      0.39      0.40     50736
weighted avg       0.79      0.84      0.81     50736
```

- Similarly, run the xgboost model and observe the results

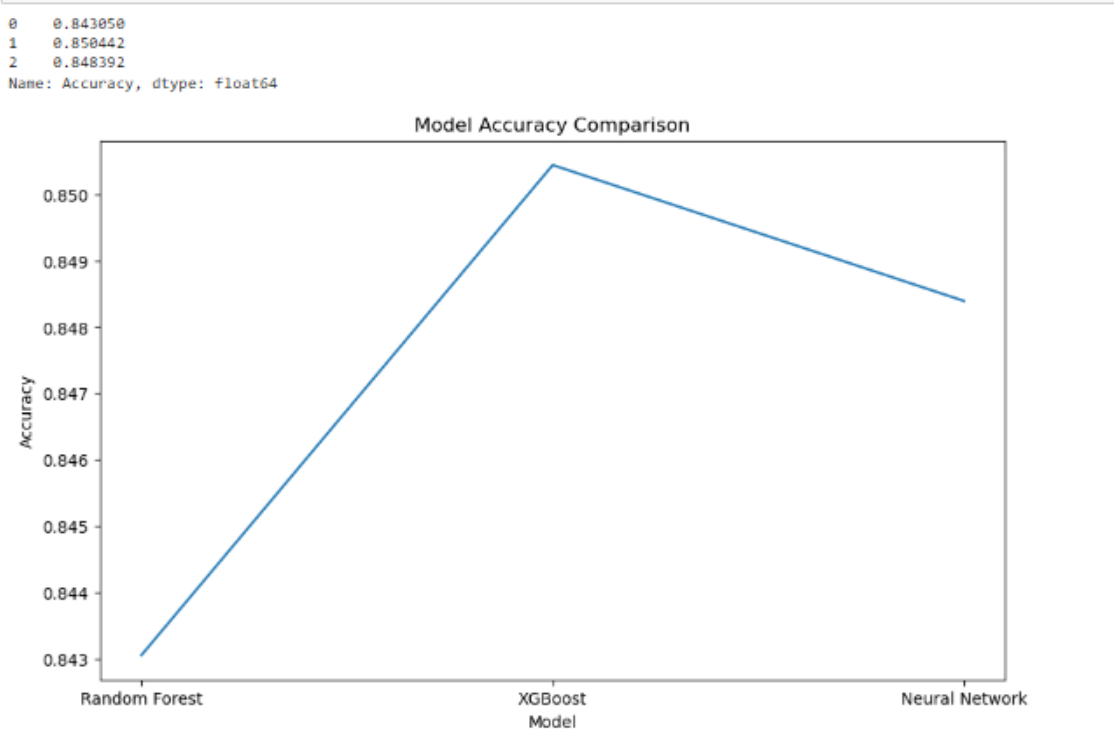
In [61]:
```
from xgboost import XGBClassifier
from sklearn.metrics import accuracy_score, classification_report

# Assuming X_train, X_test, y_train, and y_test are defined

# Create and train the XGBoost model
xgb_model = XGBClassifier()
xgb_model.fit(X_train, y_train)

# Make predictions
xgb_predictions = xgb_model.predict(X_test)

# Evaluate the model
xgb_accuracy = accuracy_score(y_test, xgb_predictions)
xgb_classification_report = classification_report(y_test, xgb_predictions)

# Print the results
print(f'XGBoost Accuracy: {xgb_accuracy}')
print('XGBoost Classification Report:')
print(xgb_classification_report)
```

```
XGBoost Accuracy: 0.8504415011037527
XGBoost Classification Report:
              precision    recall  f1-score   support

         0.0       0.87      0.98      0.92     42795
         1.0       0.00      0.00      0.00       944
         2.0       0.55      0.20      0.29      6997

    accuracy                           0.85     50736
   macro avg       0.47      0.39      0.40     50736
weighted avg       0.81      0.85      0.81     50736
```

- Upload the csv files to the jupyter also, so that it will be easier to compare for large processing such as comparisons of three models in a single notebook instance



- Now run the comparative instance, containing the comparison of the three model at once, and observe the results



6 Video Demonstration

Link : `https://youtu.be/FdAEwxGc0XA`