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```
'endpoint_url': 'https://s3.us-south.cloud-object-storage.appdomain.cloud',
'guid': '21def732-1ffa-4b8c-8a5d-98a8e88adfa',
'resource_crn': 'crn:v1:bluemix:public:cloud-object-storage:global:a/a4b877eddb1f4f52988ec1c5d72f:21def732-1ffa-4b8c-8a5d-98a8e88adfa::',
'type': 'bmcos_object_storage'},
'metadata': {'created_at': '2022-11-18T17:51:17.086Z',
'creator_id': 'IBMId-550007XUH3',
'id': '0b567279-aeb0-49fb-b3eb-764d7b0d0c92',
'updated_at': '2022-11-18T17:51:50.788Z',
'url': '/v2/spaces/0b567279-aeb0-49fb-b3eb-764d7b0d0c92'}}}]

In [54]: space_uid = guid_from_space_name(client, 'sparks')
print("Space UID = " + space_uid)

Space UID = 0b567279-aeb0-49fb-b3eb-764d7b0d0c92

client.set.default_space(space_uid)

In [55]: client.set.default_space(space_uid)

Out[55]: 'SUCCESS'
```

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The screenshot displays the IBM Cloud Pak for Data web application. At the top, there's a navigation bar with the IBM logo and search functionality. Below it, a breadcrumb trail shows the path: Projects / IBM-Project-8633-1658926133 / g1. The main workspace contains a Jupyter Notebook with two visible code cells. The first cell, labeled 'Out[55]', contains the command `client.set_default_space(space_uid)` and returns the output `'SUCCESS'`. The second cell, labeled 'In [56]', contains the command `client.software_specifications.list()`, which has returned a list of software specifications. These specifications are presented as a table with three columns: NAME, ASSET_ID, and TYPE.

NAME	ASSET_ID	TYPE
default_py3.6	0062b8c9-8b7d-44a0-a9b9-46c416adcdbd9	base
kernel-spark3.2-scala2.12	020d69ce-7ac1-5e68-ac1a-31189867356a	base
pytorch-onnx_1.3-py3.7-edt	069ea134-3346-5748-b513-49120e15d288	base
scikit-learn_0.20-py3.6	09c5a1d0-9c1e-4473-a344-e7b665ff687	base
spark-mllib_3.0-scala_2.12	09f4cff0-90a7-5899-b9ed-1ef348aebdee	base
pytorch-onnx_rt22.1-py3.9	0b848dd4-e681-5599-be41-b5f6fcc6471	base
ai-function_0.1-py3.6	0cdb0f1e-5376-4f4d-92dd-da3b69aa9bdda	base
shiny-r3.6	0e6e79df-875e-4f24-8ae9-62dcc2148306	base
tensorflow_2.4-py3.7-horovod	1092590a-307d-563d-9b62-4eb7d64b3f22	base
pytorch_1.1-py3.6	10ac12d6-6b30-4ccd-8392-3e922c096a92	base
tensorflow_1.15-py3.6-ddl	111e41b3-de2d-5422-a4d6-bf776828c4b7	base
autoai-kb_rt22.2-py3.10	125b6d9a-5b1f-5e8d-972a-b251688ccf40	base
runtime-22.1-py3.9	12b83a17-24d8-5082-900f-0ab31fbfd3cb	base
scikit-learn_0.22-py3.6	154010fa-5b3b-4ec1-82af-4d5ee5abbcb85	base
default_r3.6	1b70aec3-ab34-4b87-8aa0-a4a3c8296a36	base

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```
software_space_uid

Out[57]: 'acd9c798-6974-5d2f-a657-ce06e986df4d'

In [ ]:

In [58]: model_details = client.repository.store_model(model='handwritten-digit-recognition-model_new.tgz',meta_props={
    client.repository.ModelMetaNames.NAME:"CNN Digit recognition model",
    client.repository.ModelMetaNames.TYPE:"tensorflow_2.7",
    client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_space_uid
})

In [30]: model_details

Out[30]: {'entity': {'hybrid_pipeline_software_specs': [],
  'software_spec': {'id': 'acd9c798-6974-5d2f-a657-ce06e986df4d',
    'name': 'tensorflow_rt22.1-py3.9'},
  'type': 'tensorflow_2.7'},
  'metadata': {'created_at': '2022-11-18T16:28:21.290Z',
    'id': 'd15aec32-1e4e-4894-9dc9-3910f765e242',
    'modified_at': '2022-11-18T16:28:27.253Z'}}
```

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```
client.repository.ModelMetaNames.TYPE:"tensorflow_2.7",
client.repository.ModelMetaNames.SOFTWARE_SPEC_UID:software_space_uid
})

In [30]: model_details

Out[30]: {'entity': {'hybrid_pipeline_software_specs': [],
  'software_spec': {'id': 'acd9c798-6974-5d2f-a657-ca06a986df4d',
    'name': 'tensorflow_rt22.1-py3.9'},
    'type': 'tensorflow_2.7'},
  'metadata': {'created_at': '2022-11-18T16:28:21.290Z',
    'id': 'd15aec32-1e4e-4894-9dc9-3910f765e242',
    'modified_at': '2022-11-18T16:28:27.253Z',
    'name': 'CNN Digit recognition model',
    'owner': 'IBMid-667000CZ2Y',
    'resource_key': 'affcac93-d73b-4c1f-a43c-dc8b0acc2640',
    'space_id': 'aa24227a-9f01-493f-90e6-1b6132057fc6'},
  'system': {'warnings': []}}

In [59]: model_id = client.repository.get_model_id(model_details)
model_id
```

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```
In [59]: model_id = client.repository.get_model_id(model_details)
        model_id

Out[59]: '2ca15d84-a94a-4f83-9363-1cc477297b1f'

In [61]: client.repository.download(model_id, 'DigitRecog_IBM_model1.tar.gz')

        Successfully saved model content to file: 'DigitRecog_IBM_model1.tar.gz'

Out[61]: '/home/wsuser/work/DigitRecog_IBM_model1.tar.gz'

In [62]: ls

        DigitRecog_IBM_model1.tar.gz          mnistCNN.h5
        DigitRecog_IBM_model.tar.gz          mnist.h5
        handwritten-digit-recognition-model_new.tgz  models/

In [63]: #test
        from tensorflow.keras.models import load_model
        from keras.preprocessing import image
        from PIL import Image
        import numpy as np
```

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```
cos_client = ibm_boto3.client(service_name='s3',
                              ibm_api_key_id='is_QZGPyU8oxZr3W-td-LCHXS3QPMaWArILi18FdSyGT',
                              ibm_auth_endpoint='https://iam.cloud.ibm.com/oidc/token',
                              config=Config(signature_version='oauth'),
                              endpoint_url='https://s3.private.ap.cloud-object-storage.appdomain.cloud')

bucket = 'handwrittenimagerecognition-donotdelete-pr-8tlrnykut46vpi'
object_key = 'mnist-dataset-1024x424 (2).png'

streaming_body_1 = cos_client.get_object(Bucket=bucket, Key=object_key)['Body']

# Your data file was loaded into a botocore.response.StreamingBody object.
# Please read the documentation of ibm_boto3 and pandas to learn more about the possibilities to load the data.
# ibm_boto3 documentation: https://ibm.github.io/ibm-cos-sdk-python/
# pandas documentation: http://pandas.pydata.org/
img = Image.open(streaming_body_1).convert("L") # convert image to monochrome
img = img.resize((28,28)) # resizing of input image
```

In [64]: img

Out[64]: 

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```
In [65]: im2arr = np.array(img) #converting to image
im2arr = im2arr.reshape(1, 28, 28, 1) #reshaping according to our requirement
pred = model.predict(im2arr)
print(pred)

[[9.9999964e-01 3.5338445e-14 3.5568146e-11 2.9403877e-13 1.1719936e-15
  9.0153961e-12 7.5158377e-09 1.1878461e-15 3.9492850e-08 3.5733865e-07]]

In [ ]:

In [66]: print(np.argmax(pred, axis=1)) #printing our Labels

[0]

In [ ]:
```

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Deployments /

sparks


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Assets

 CNN Digit recognition model
7 minutes ago
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Deployments

All

0	0
 Deployed	 Failed

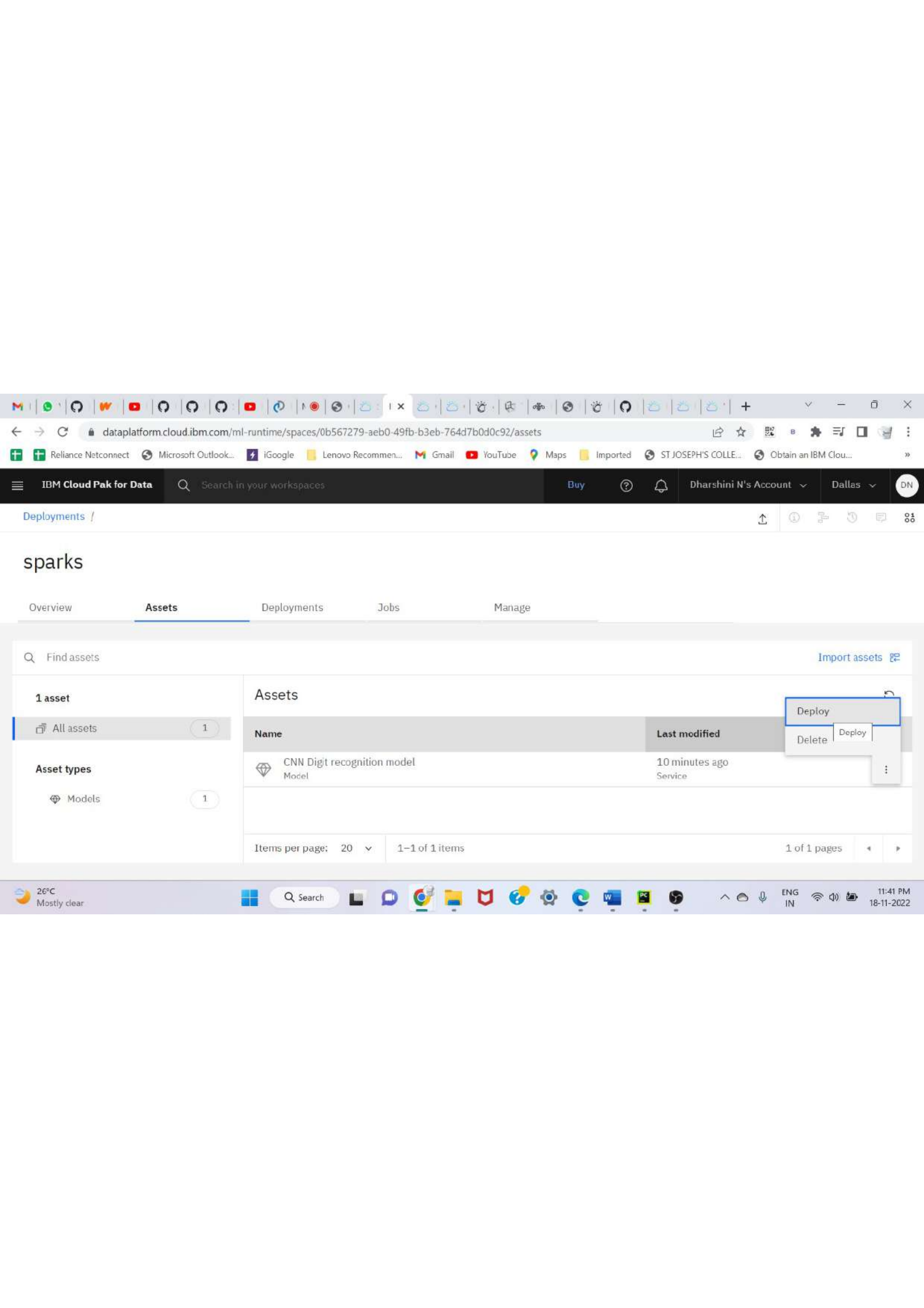
[View deployments](#)

Job runs

0	0
---	---

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Create a deployment

Associated asset
CNN Digit recognition model

Deployment type

Online

Run the model on data in real-time, as data is received by a web service.

Batch

Run the model against data as a batch process.

Name

Cancel Create

Overview **Assets** Deployments Jobs Manage

Import assets

1

1

5

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sparks

Online deployment
The online deployment of the handwritten digit recognition model

Overview

Assets

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Name	Type	Status	Asset	Last modified	
<div>Handwritten digit recognition</div>	Online	<div>Deployed</div>	CNN Digit recognition model	26 seconds ago Dharshini N (You)	

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