

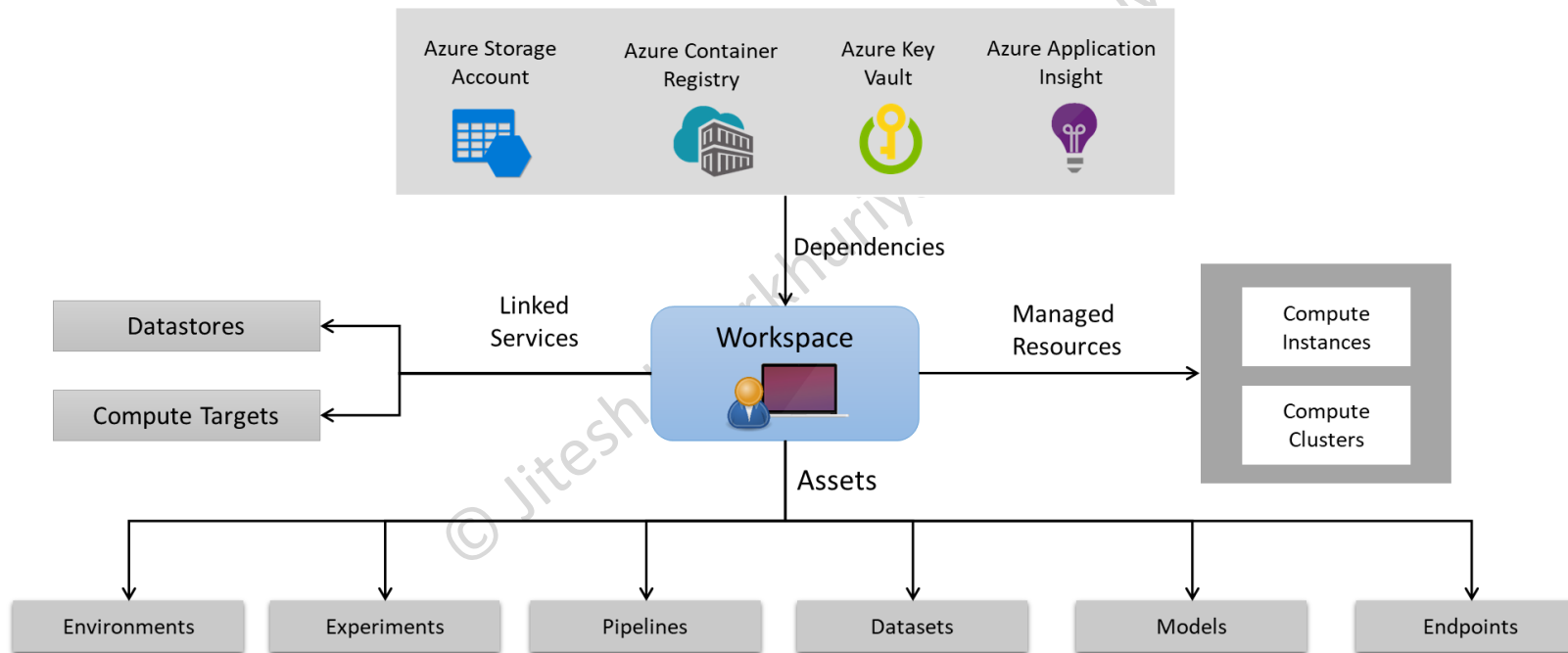
Azure Machine Learning

AzureML SDK



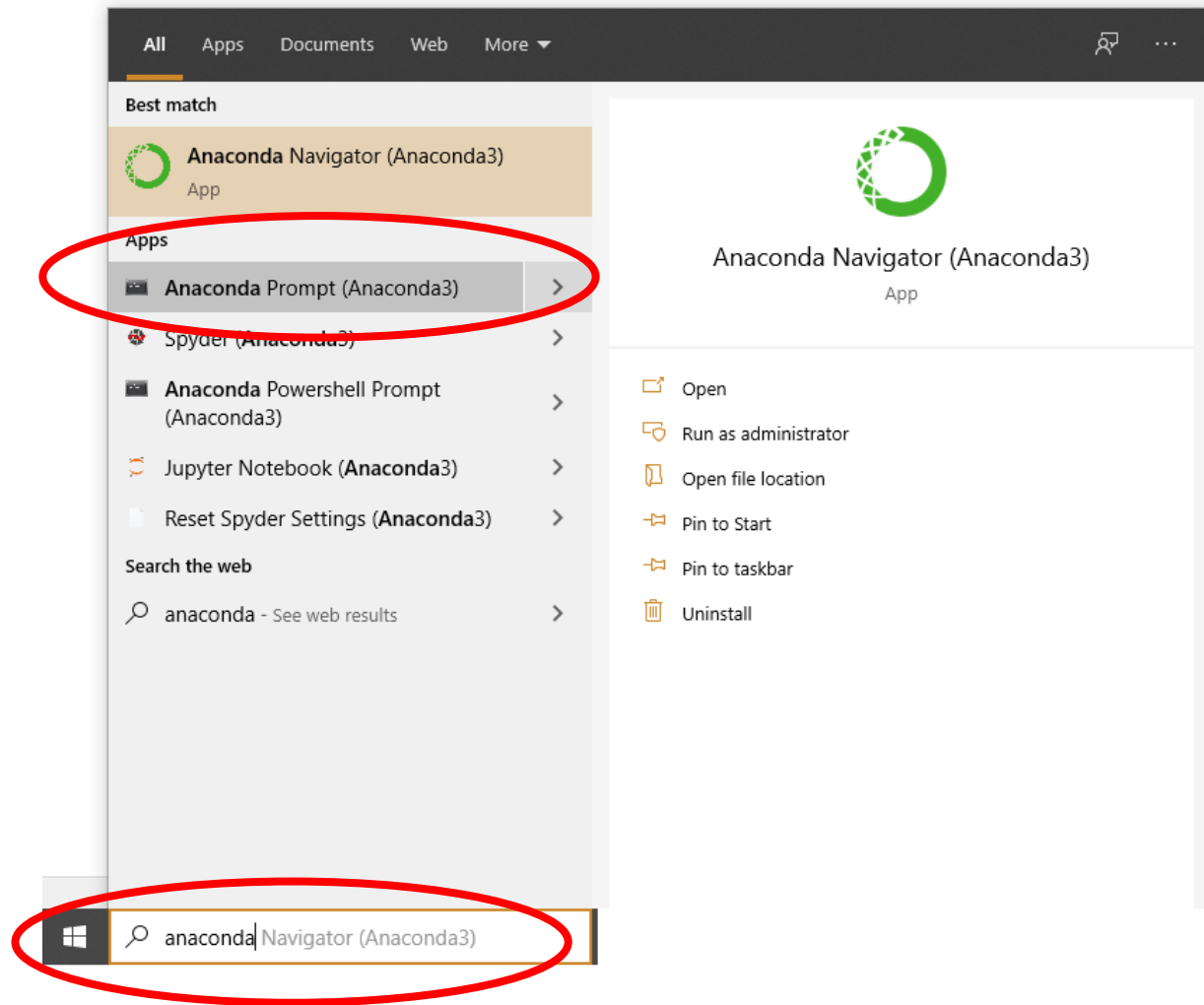
AzureML SDK

- Manage Cloud resources of AzureML in Python environment
- Train Models locally with replicable environments
- Available across all Python IDEs and Notebooks

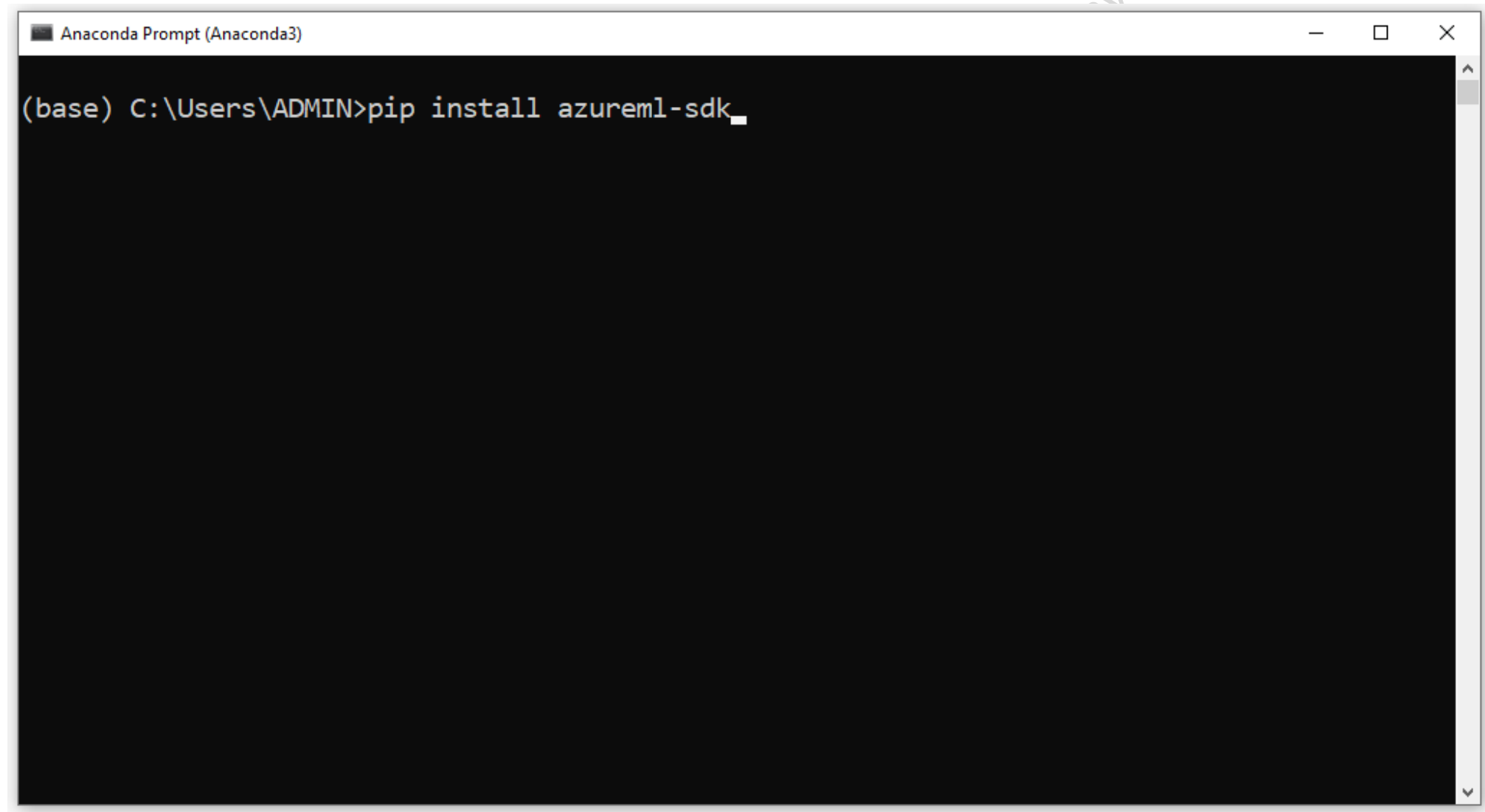


- `Workspace ()`
- `Environment ()`
- `Dataset ()`
- `Experiment ()`
- `Pipeline ()`
- `Run ()`
- `Model ()`
- `ComputeTarget ()`
- `AutoMLConfig ()`

Installing AzureML SDK



Installing AzureML SDK



An Anaconda Prompt window titled "Anaconda Prompt (Anaconda3)" is shown. The window has a black background and a white border. The title bar includes standard Windows window controls (minimize, maximize, close). The command prompt shows the prompt "(base) C:\Users\ADMIN>" followed by the command "pip install azureml-sdk_" with a cursor at the end of the line. A vertical scrollbar is visible on the right side of the window.

```
(base) C:\Users\ADMIN>pip install azureml-sdk_
```

Installing AzureML SDK

```
Anaconda Prompt (Anaconda3)

(base) C:\Users\ADMIN>pip install azureml-sdk
Collecting azureml-sdk
  Downloading azureml_sdk-1.19.0-py3-none-any.whl (4.4 kB)
Collecting azureml-core~=1.19.0
  Downloading azureml_core-1.19.0-py3-none-any.whl (2.1 MB)
    |████████████████████████████████████████| 2.1 MB 71 kB/s
Collecting azureml-pipeline~=1.19.0
  Downloading azureml_pipeline-1.19.0-py3-none-any.whl (3.7 kB)
Collecting azureml-dataset-runtime[fuse]~=1.19.0
  Downloading azureml_dataset_runtime-1.19.0-py3-none-any.whl (3.4 kB)
Collecting azureml-train~=1.19.0
  Downloading azureml_train-1.19.0-py3-none-any.whl (3.3 kB)
Collecting azureml-train-automl-client~=1.19.0
  Downloading azureml_train_automl_client-1.19.0-py3-none-any.whl (109 kB)
    |████████████████████████████████████████| 109 kB 21 kB/s
Collecting jsonpickle
  Downloading jsonpickle-1.4.2-py2.py3-none-any.whl (36 kB)
Collecting ruamel.yaml>=0.15.35
  Downloading ruamel.yaml-0.16.12-py2.py3-none-any.whl (111 kB)
    |████████████████████████████████████████| 111 kB 20 kB/s
Collecting azure-mgmt-storage<16.0.0,>=1.5.0
  Downloading azure_mgmt_storage-11.2.0-py2.py3-none-any.whl (547 kB)
```

Installing AzureML SDK

```
Anaconda Prompt (Anaconda3)

Downloading azure_mgmt_storage-11.2.0-py2.py3-none-any.whl (547 kB)
|████████████████████████████████████████| 547 kB 16 kB/s
Collecting azure-mgmt-keyvault<7.0.0,>=0.40.0
  Downloading azure_mgmt_keyvault-2.2.0-py2.py3-none-any.whl (89 kB)
|████████████████████████████████████████| 89 kB 4.8 kB/s
Collecting azure-mgmt-authorization<1.0.0,>=0.40.0
  Downloading azure_mgmt_authorization-0.61.0-py2.py3-none-any.whl (94 kB)
|████████████████████████████████████████| 94 kB 12 kB/s
Collecting azure-graphrbac<1.0.0,>=0.40.0
  Downloading azure_graphrbac-0.61.1-py2.py3-none-any.whl (141 kB)
|████████████████████████████████████████| 141 kB 23 kB/s
Collecting pathspec
  Downloading pathspec-0.8.1-py2.py3-none-any.whl (28 kB)
Requirement already satisfied: contextlib2 in c:\programdata\anaconda3\lib\site-packages (from azureml-core~=1.19.0->azureml-sdk) (0.6.0.post1)
Requirement already satisfied: pyopenssl<20.0.0 in c:\programdata\anaconda3\lib\site-packages (from azureml-core~=1.19.0->azureml-sdk) (19.1.0)
Collecting adal>=1.2.0
  Downloading adal-1.2.5-py2.py3-none-any.whl (55 kB)
|████████████████████████████████████████| 55 kB 31 kB/s
Collecting docker
  Downloading docker-4.4.0-py2.py3-none-any.whl (146 kB)
|████████████████████████████████████████| 146 kB 22 kB/s
```

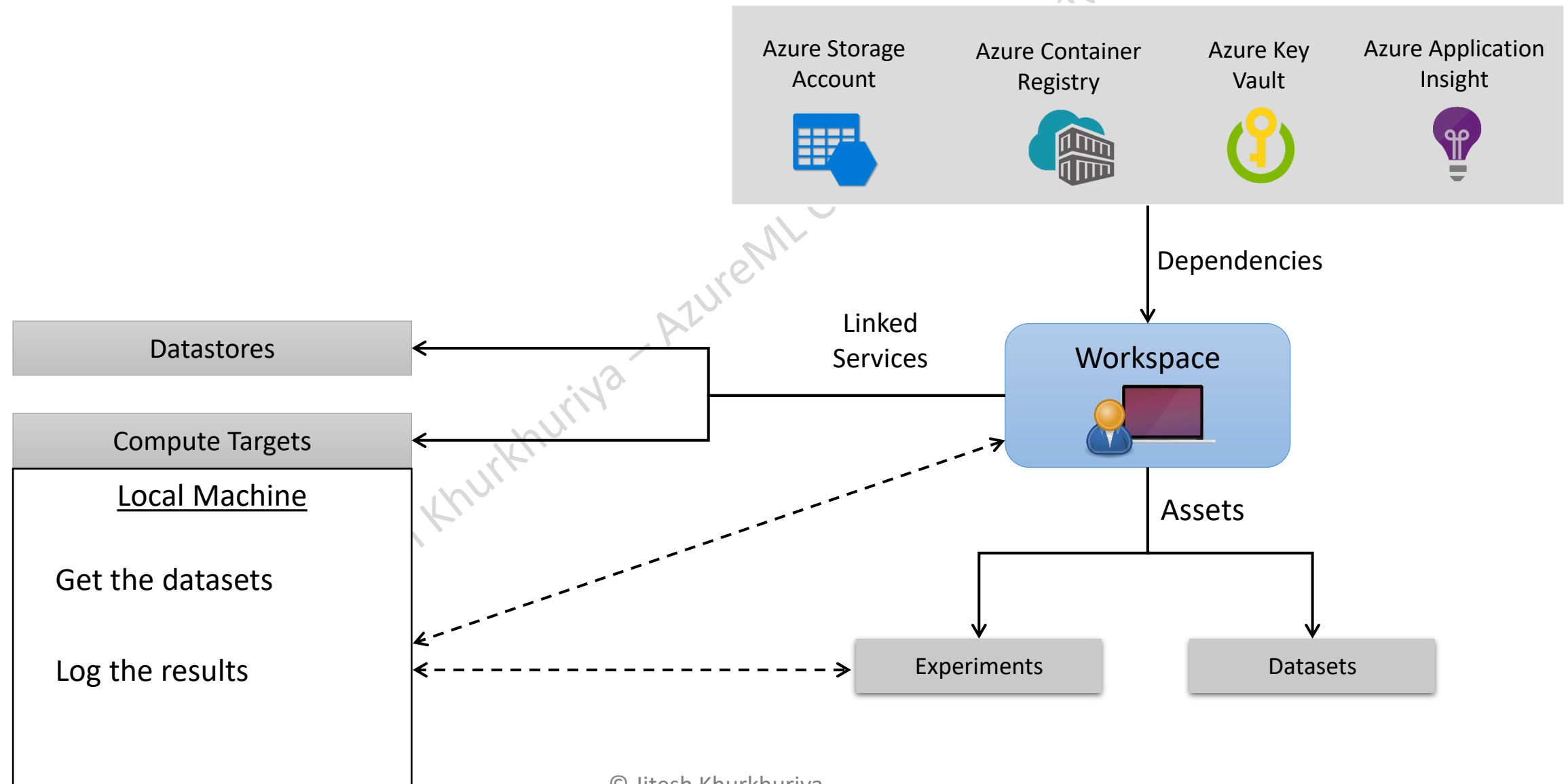
Installing AzureML SDK

```
Anaconda Prompt (Anaconda3)
Created wheel for fusepy: filename=fusepy-3.0.1-py3-none-any.whl size=10507 sha256=9f0b36b0e4f90817567c5
be48d2b547fd06453c39e6addb32405e37a74c5a290
Stored in directory: c:\users\admin\appdata\local\pip\cache\wheels\89\07\84\a5ebfafeefbbc56ceda9d6935a54
a8be7a4eccf4ea7e9bf980
Successfully built fusepy
Installing collected packages: jsonpickle, ruamel.yaml.clib, ruamel.yaml, azure-common, isodate, oauthlib,
requests-oauthlib, msrest, PyJWT, adal, msrestazure, azure-mgmt-storage, azure-mgmt-keyvault, azure-mgmt-
authorization, azure-graphrbac, pathspec, websocket-client, docker, jmespath, jeepney, SecretStorage, pyas
n1, ndg-httpsclient, azure-mgmt-resource, azure-mgmt-containerregistry, azureml-core, applicationinsights,
azureml-telemetry, azureml-dataprep-native, azureml-dataprep-rslex, msal, azure-core, portalocker, msal-e
xtensions, azure-identity, distro, dotnetcore2, azureml-dataprep, pyarrow, fusepy, azureml-dataset-runtime
, azureml-automl-core, azureml-train-automl-client, azureml-pipeline-core, azureml-train-restclients-hyper
drive, azureml-train-core, azureml-pipeline-steps, azureml-pipeline, azureml-train, azureml-sdk
Successfully installed PyJWT-1.7.1 SecretStorage-3.3.0 adal-1.2.5 applicationinsights-0.11.9 azure-common-
1.1.26 azure-core-1.9.0 azure-graphrbac-0.61.1 azure-identity-1.4.1 azure-mgmt-authorization-0.61.0 azure-
mgmt-containerregistry-2.8.0 azure-mgmt-keyvault-2.2.0 azure-mgmt-resource-11.0.0 azure-mgmt-storage-11.2.
0 azureml-automl-core-1.19.0 azureml-core-1.19.0 azureml-dataprep-2.6.1 azureml-dataprep-native-26.0.0 azu
reml-dataprep-rslex-1.4.0 azureml-dataset-runtime-1.19.0 azureml-pipeline-1.19.0 azureml-pipeline-core-1.1
9.0 azureml-pipeline-steps-1.19.0 azureml-sdk-1.19.0 azureml-telemetry-1.19.0 azureml-train-1.19.0 azureml
-train-automl-client-1.19.0 azureml-train-core-1.19.0 azureml-train-restclients-hyperdrive-1.19.0 distro-1
.5.0 docker-4.4.0 dotnetcore2-2.1.19 fusepy-3.0.1 isodate-0.6.0 jeepney-0.6.0 jmespath-0.10.0 jsonpickle-1
.4.2 msal-1.7.0 msal-extensions-0.2.2 msrest-0.6.19 msrestazure-0.6.4 ndg-httpsclient-0.5.1 oauthlib-3.1.0
pathspec-0.8.1 portalocker-1.7.1 pyarrow-1.0.1 pyasn1-0.4.8 requests-oauthlib-1.3.0 ruamel.yaml-0.16.12 r
```

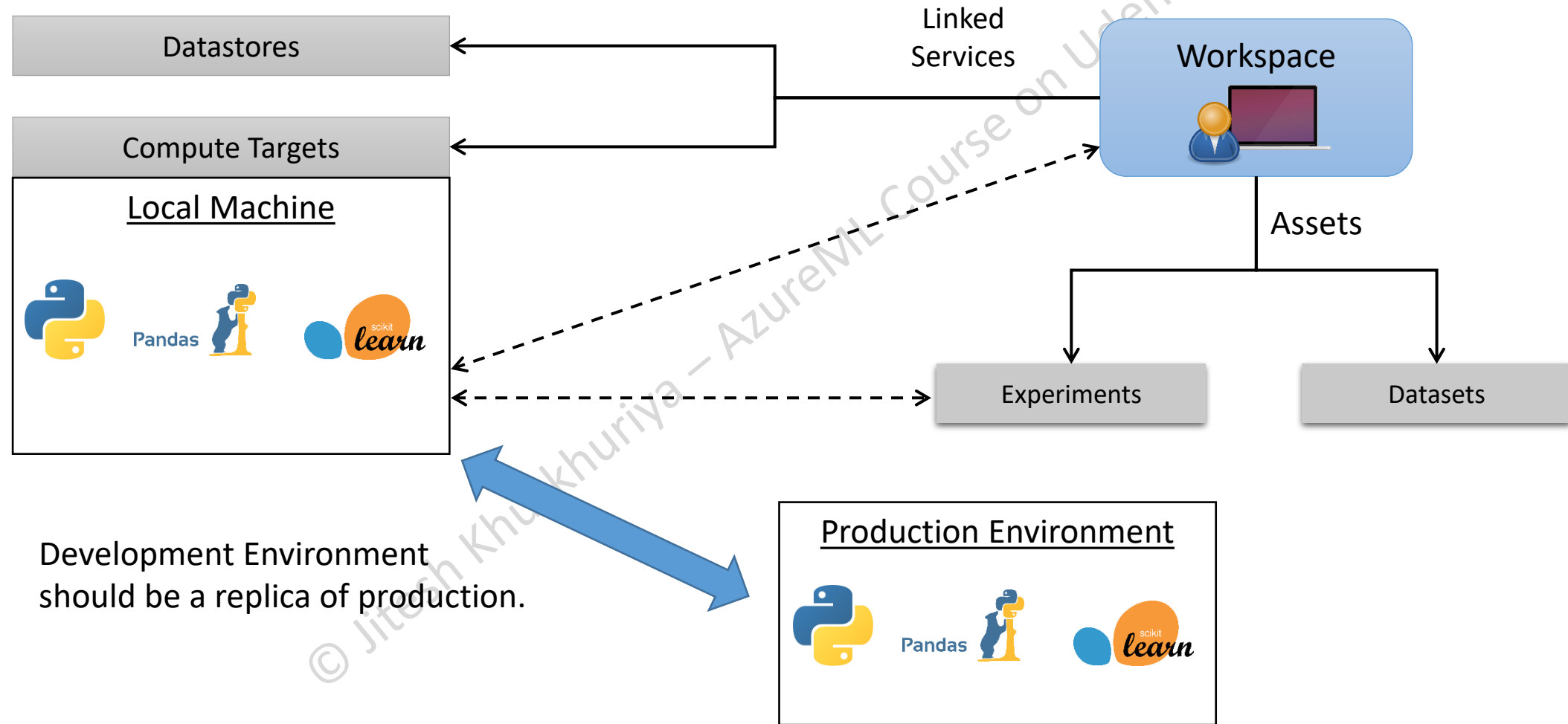
Verify AzureML SDK

```
import azureml.core
```


Azure Machine Learning SDK Running on Local machine



Running an experiment in an Environment



Python Versions

Release version	Release date
Python 3.8.7	Dec. 21, 2020
Python 3.9.1	Dec. 7, 2020
Python 3.9.0	Oct. 5, 2020
Python 3.8.6	Sept. 24, 2020
Python 3.5.10	Sept. 5, 2020
Python 3.7.9	Aug. 17, 2020
Python 3.6.12	Aug. 17, 2020
Python 2.7.18	April 20, 2020
Python 3.7.7	March 10, 2020
Python 3.8.2	Feb. 24, 2020
Python 3.8.1	Dec. 18, 2019
Python 3.7.6	Dec. 18, 2019

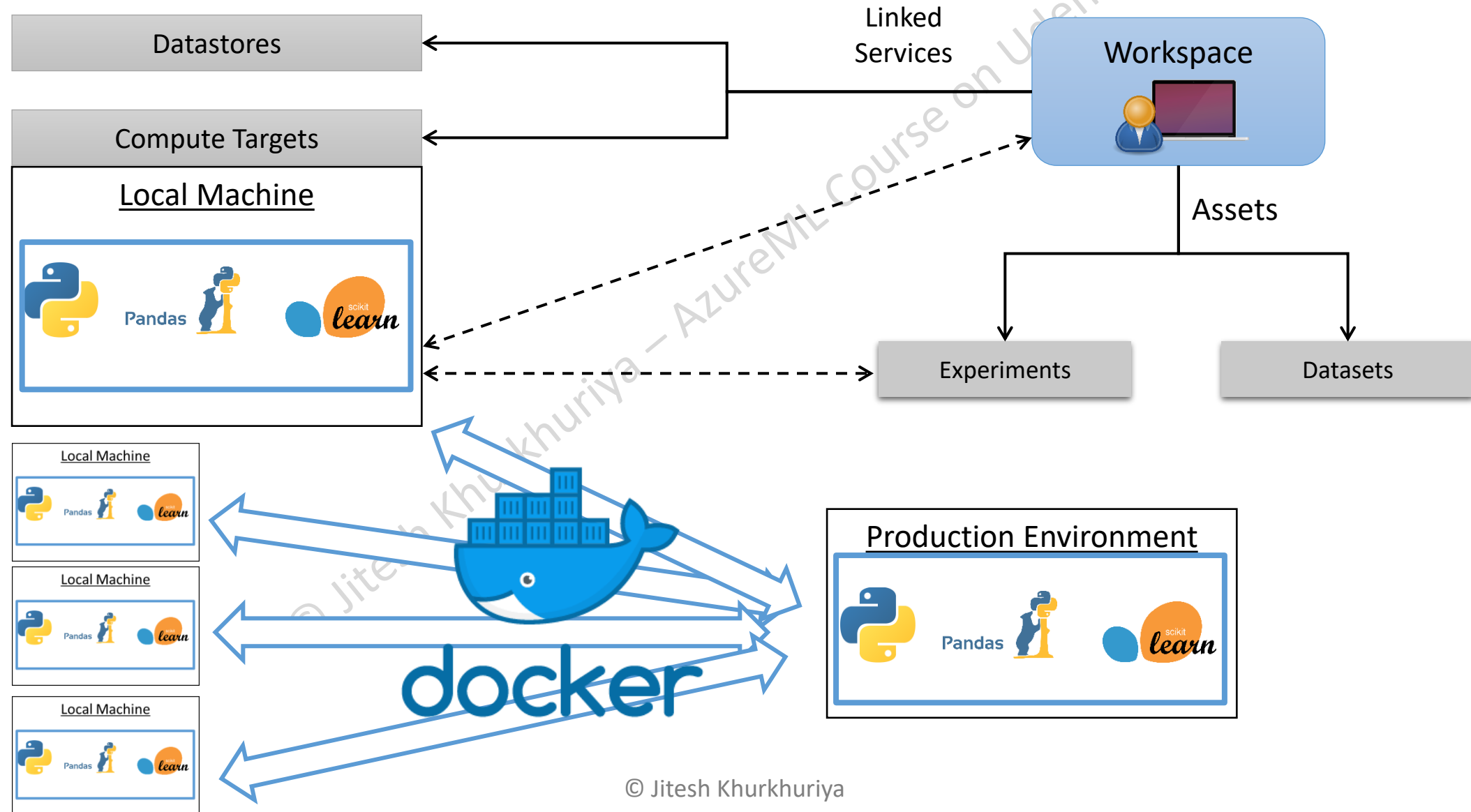
Pandas Versions

[1.1.5](#) (December 07, 2020)
[1.1.4](#) (October 30, 2020)
[1.1.3](#) (October 5, 2020)
[1.1.2](#) (September 8, 2020)
[1.1.1](#) (August 20, 2020)
[1.1.0](#) (July 28, 2020)
[1.0.5](#) (June 17, 2020)
[1.0.4](#) (May 28, 2020)
[1.0.3](#) (March 17, 2020)
[1.0.2](#) (March 12, 2020)
[1.0.1](#) (February 5, 2020)
[1.0.0](#) (January 29, 2020)
[0.25.3](#) (October 31, 2019)
[0.25.2](#) (October 15, 2019)

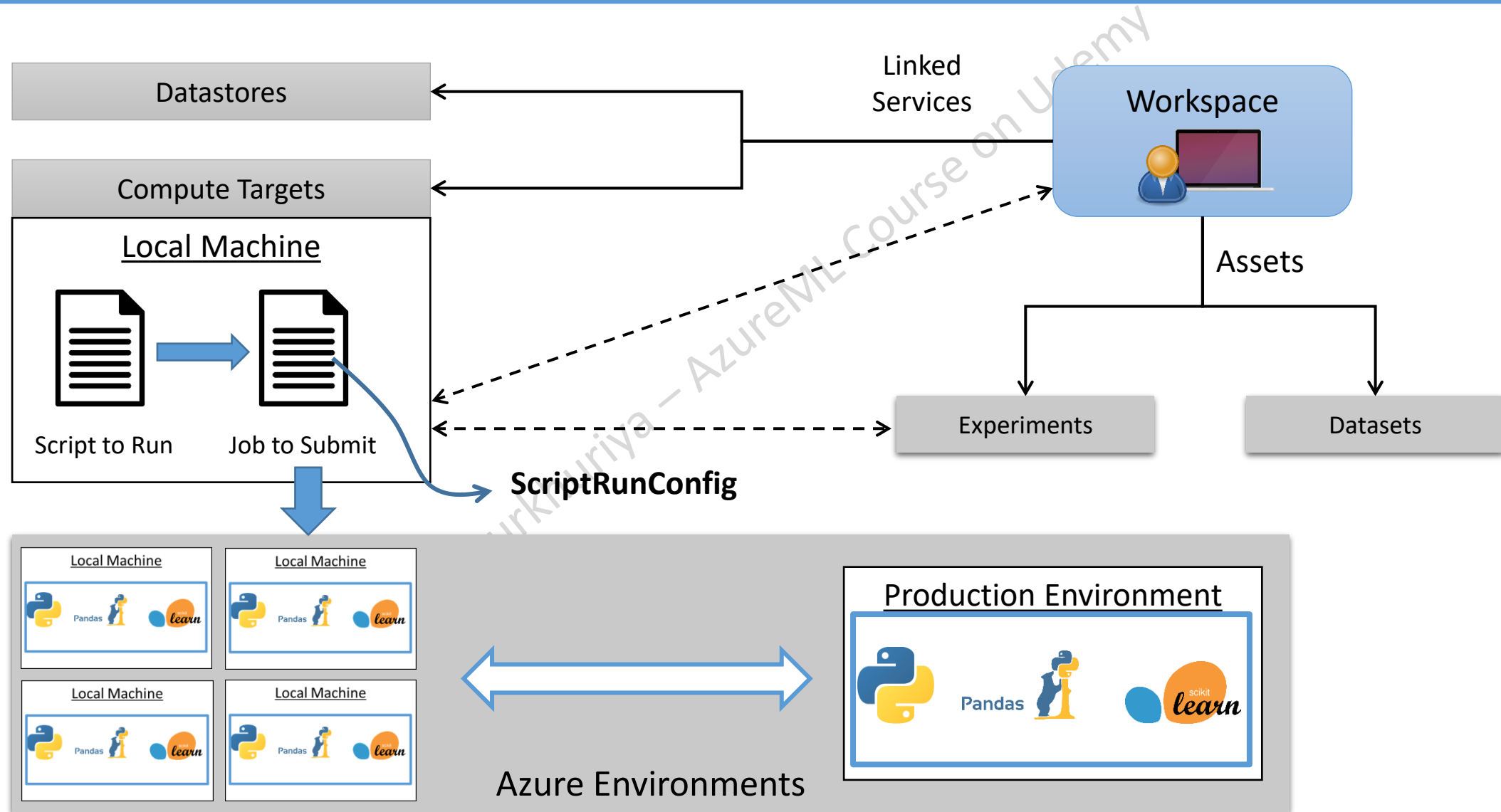
scikitlearn

[Version 0.24](#)
[Version 0.23.2](#) 3rd Aug, 2020
[Version 0.23.1](#) 18th May 2020
[Version 0.23.0](#)
[Version 0.22.2.post1](#)
[Version 0.22.1](#)
[Version 0.22.0](#)
[Version 0.21.3](#)
[Version 0.21.2](#)
[Version 0.21.1](#)
[Version 0.21.0](#)

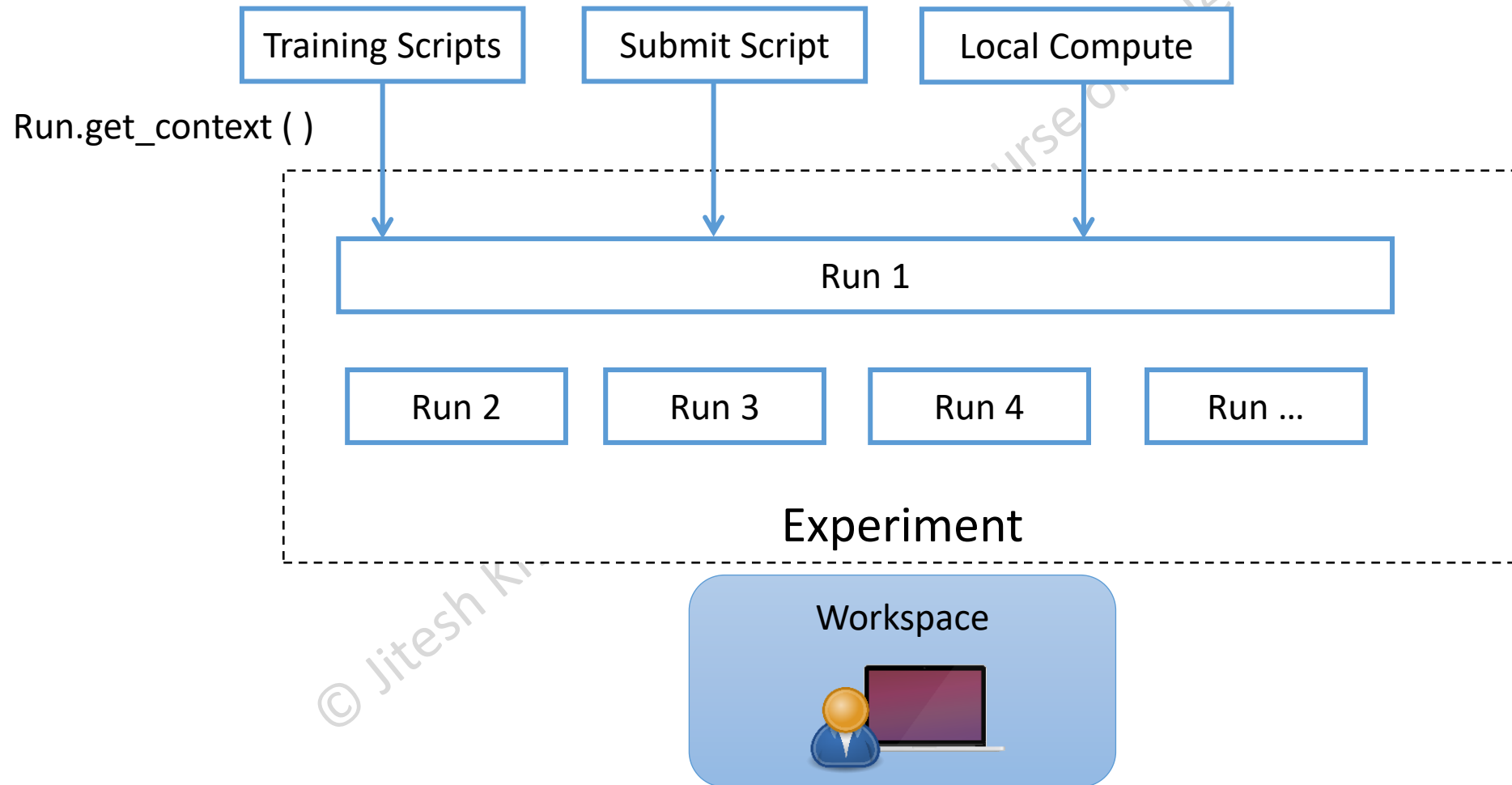
Running an experiment in an Environment



Running an experiment in an Environment



Running an experiment in an Environment



Train and run the model using script in
Azureml Environment

Changes to the Run Script

- Import the azureml.core classes

```
from azureml.core import Workspace, Run
```

- Access the workspace using config.json

```
ws = Workspace.from_config()
```

- Get the run context

```
new_run = Run.get_context()
```

- Get the data, Train and score the model

```
# Do your stuff here
```

- Log the metrics and send the output to the azureml workspace

```
Log
```

- Total Observations
- Confusion Matrix
- Accuracy Score

```
Output
```

- Scored dataset with predicted probabilities

Changes required for the Submit Job

- Import classes for dependencies
- Create Scikit-learn as the dependency
- Register the environment to the workspace

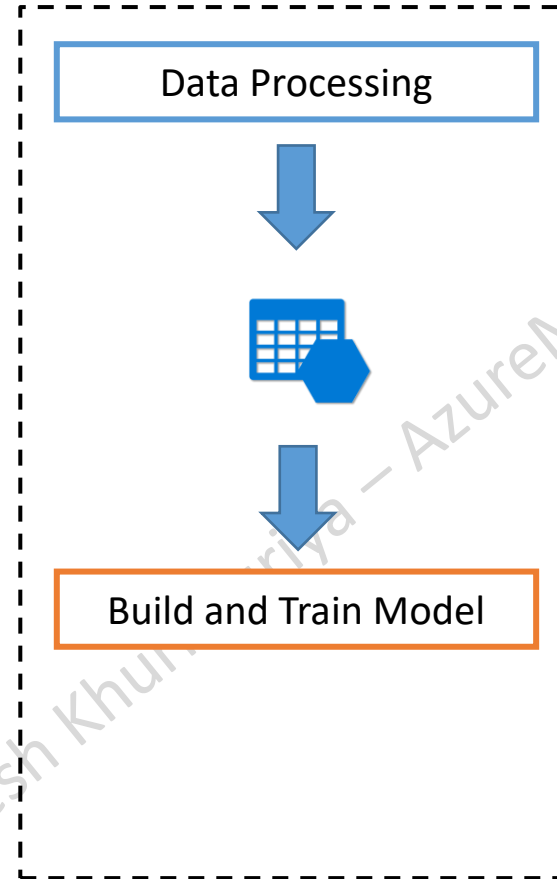
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Pipeline with AzureML SDK



Pipeline.py

1. Create the environment
2. Assign Compute clusters
3. Create Data Transfer Folder
4. Define Pipeline Steps
5. Build the Pipeline
6. Create/Access an experiment
7. Run the Pipeline



AzureML SDK Pipeline

1. Read the Data
2. Select/Drop columns
3. Replace Missing Values
4. Normalise the data
5. Upload the data and log metrics
6. Save and Pass the data to next step

1. Read the data saved in previous step
2. Split in train and test
3. Train and test the model
4. Upload results and log metrics



DataPrep.py



Training.py

Command Line Arguments in Python

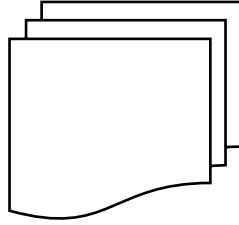
Arguments passed using Command Line Interface

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Command Line Arguments in Python



Data Processing Script

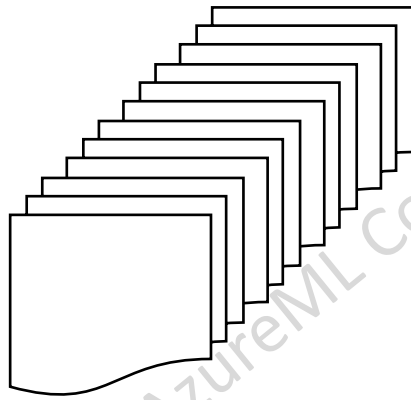


```
(base) C:\Jitesh\programs>python fileprocess.py  
Please enter the file name : C:\Jitesh\Data.csv
```

Command Line Arguments in Python

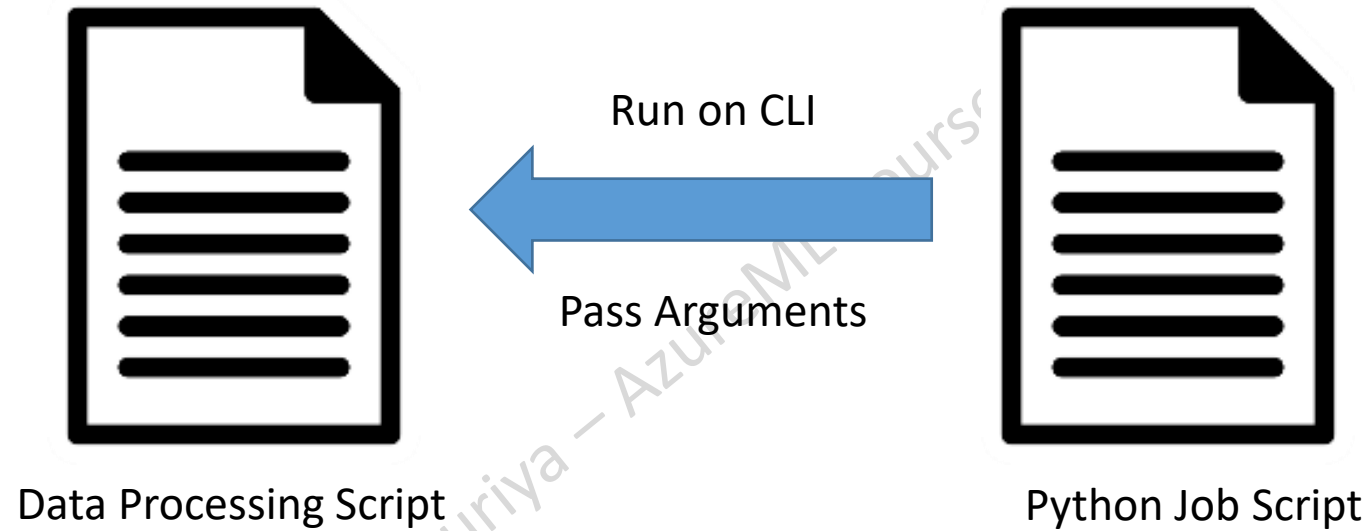


Data Processing Script



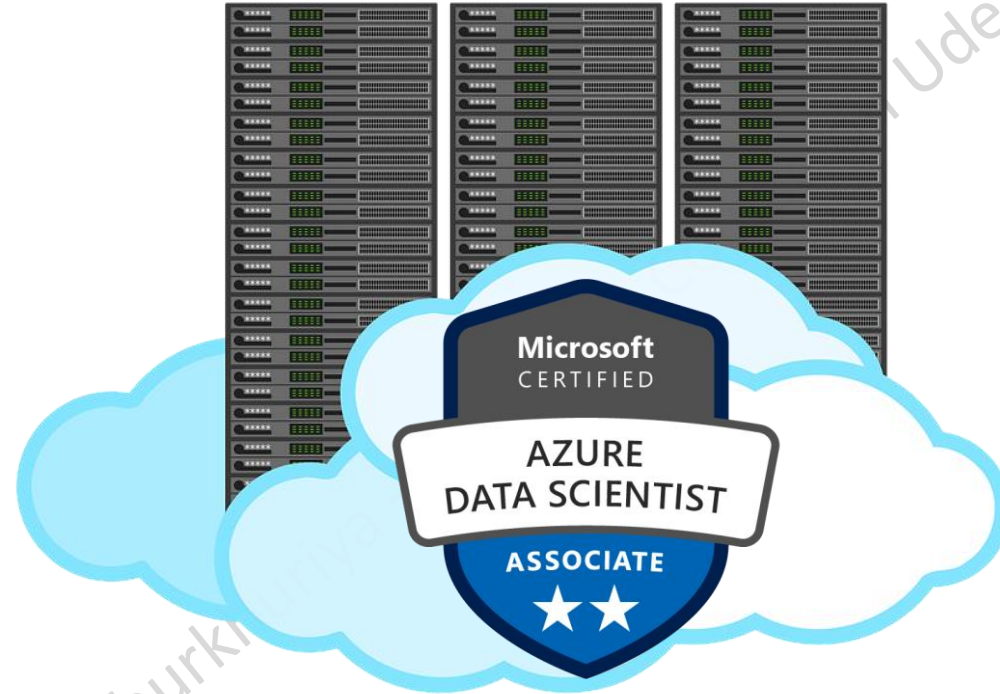
```
(base) C:\Jitesh\programs>python fileprocess.py --filename 'c:\Jitesh\data.csv' _
```

Command Line Arguments in Python





Azure Machine Learning



Thank You..!!