Introduction to Elyra: AI-centric extensions to JupyterLab

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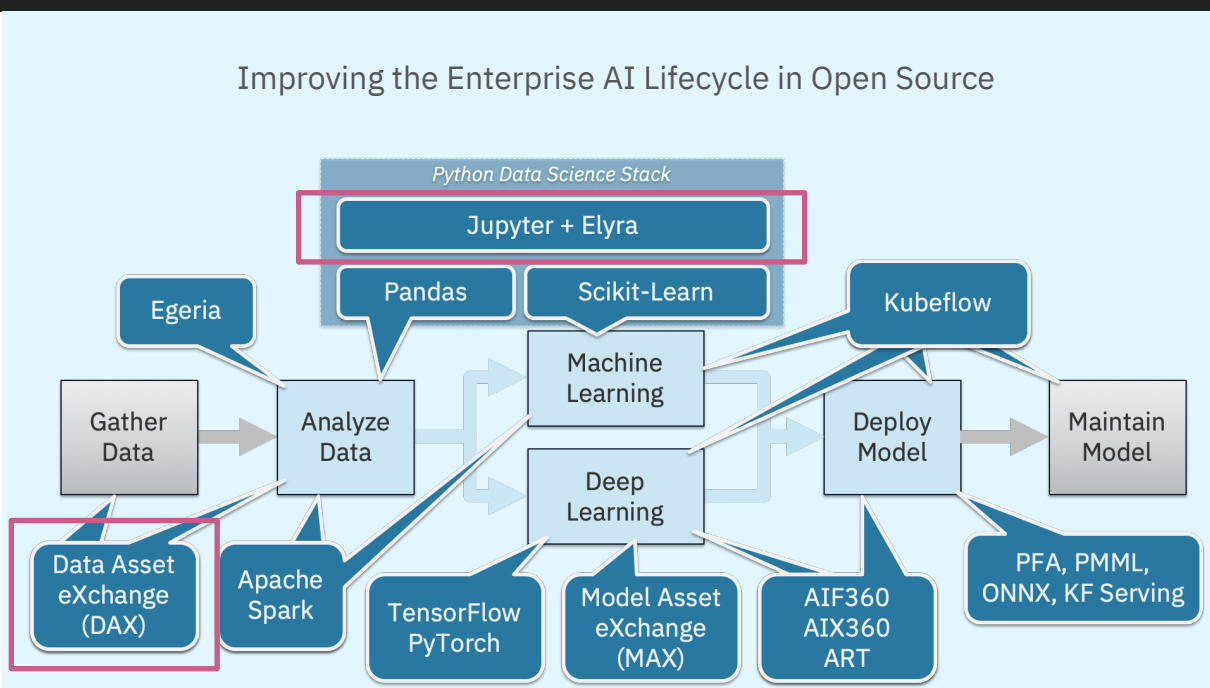
Center for Open Source Data & AI Technologies

CODAIT

Open Source @ IBM

codait.org

- CODAIT aims to make AI solutions dramatically easier to create, deploy, and manage in the enterprise.
- We contribute to and advocate for the open-source technologies that are foundational to IBM's AI offerings.
- 30+ open-source developers!



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Elyra

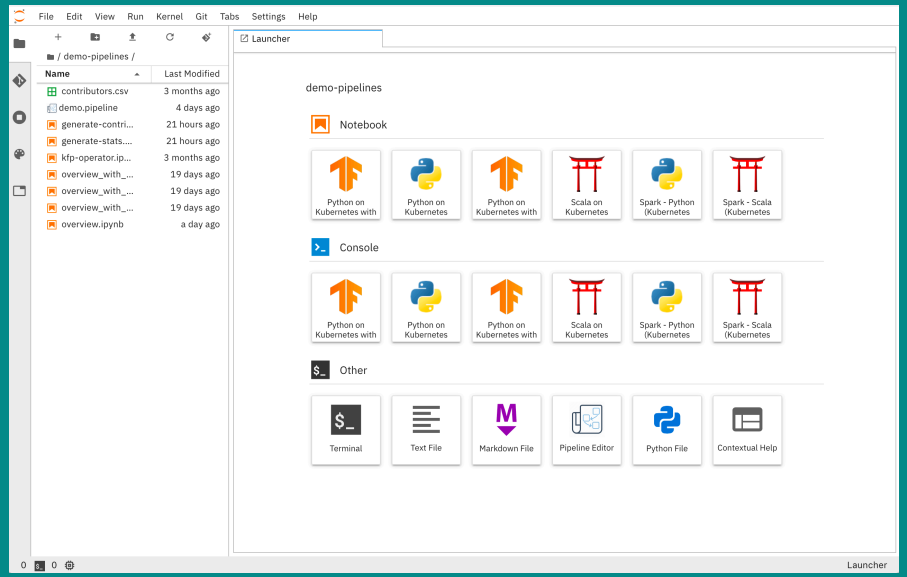
Elyra is a set of AI centric extensions to JupyterLab. It aims to help data scientists, machine learning engineers and AI developer's through the model development life cycle complexities.

Elyra at GitHub

https://github.com/elyra-ai/elyra

Elyra Documentation

https://elyra.readthedocs.io/en/latest/



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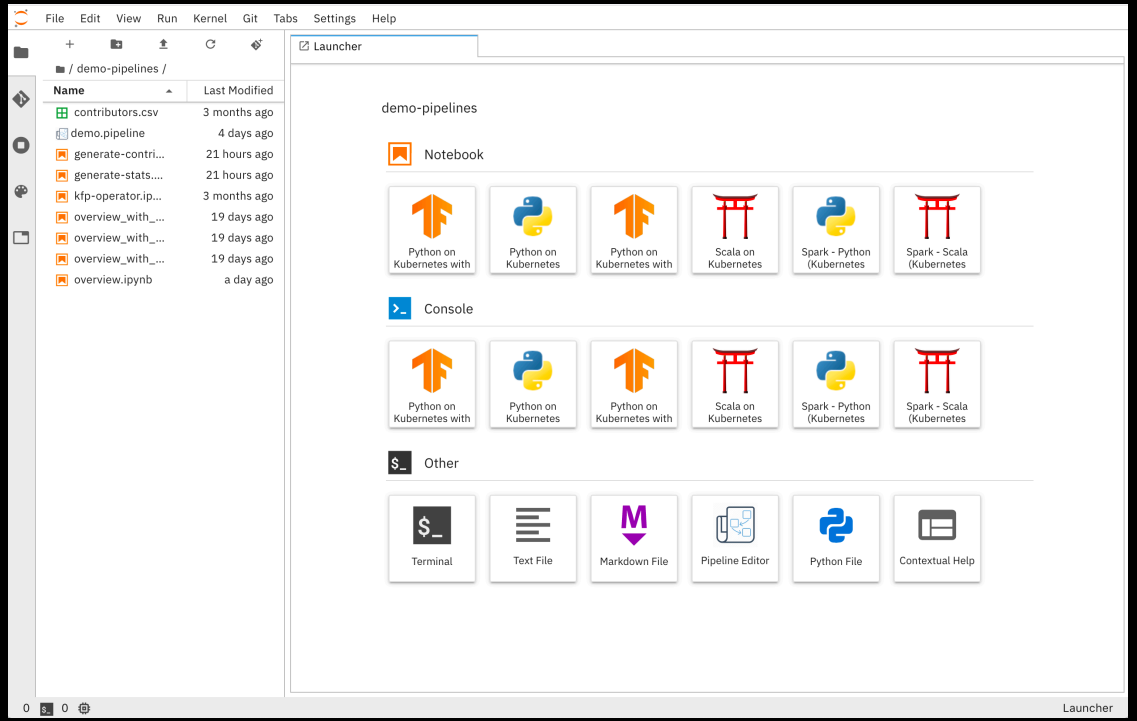
Elyra

Elyra is a set of
AI centric extensions for
JupyterLab

Elyra was officially announced as an open source project by IBM on April 29th.

The name Elyra is a word play with one of the Jupyter moons “Elara” where we introduce the “y” from “Jupyter” to make it “Elyra”



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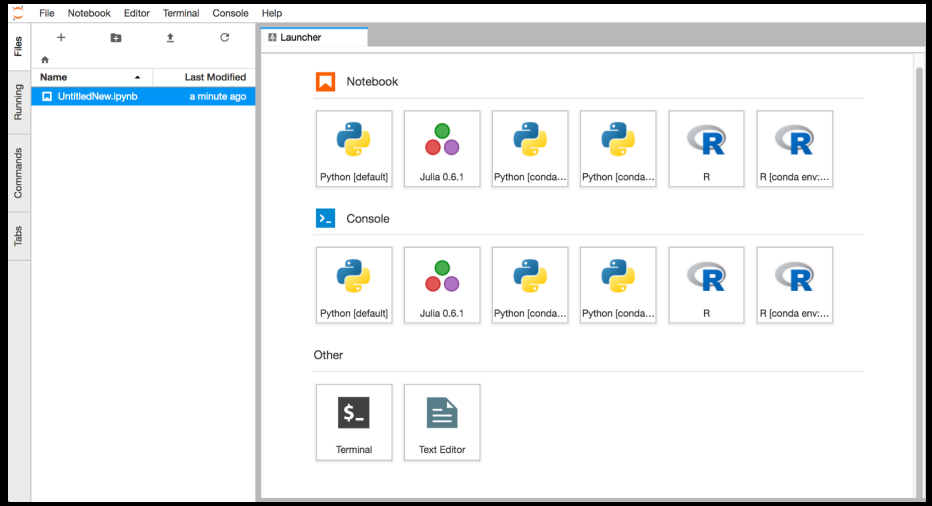
JupyterLab

JupyterLab is the next generation UI for the Jupyter Ecosystem.

Bring all the previous improvements into a single unified platform plus more!

Provides a modular, extensible architecture

Retains backward compatibility with the old notebook we know and love



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ELYRA

Fork me at: github.com/elyra-ai/elyra

Notebook Pipelines editor

Elyra provides a visual editor for building Notebook-based AI pipelines, enabling the conversion of multiple notebooks into batch jobs or workflows.

Notebook as batch jobs

Elyra extends the notebook UI to simplify the submission of notebooks as a batch job for model training

Hybrid runtime support

It simplifies the task of running the notebooks interactively on cloud machines, improving productivity by leveraging the power of cloud-based resources

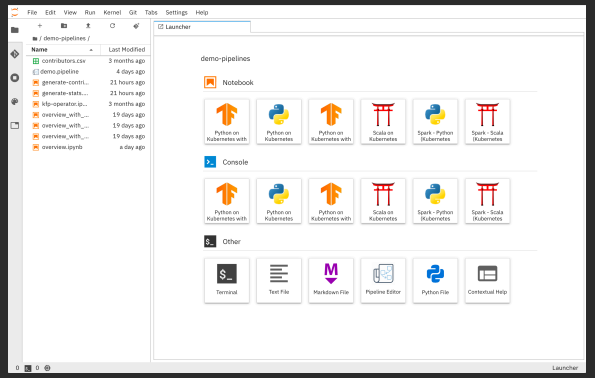
Python script execution

Exposes Python Scripts as first-class citizens allowing users to locally edit their scripts and execute them against local or cloud-based resources seamlessly.

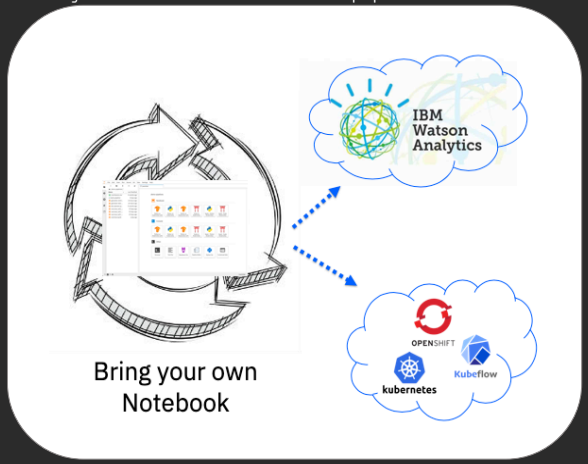
Versioning using git

Simplify tracking changes, enabling better sharing among teammates

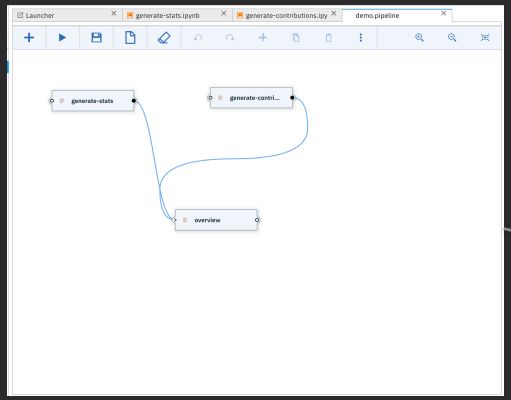
JupyterLab Extensions

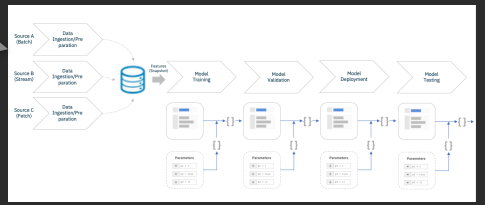


Hybrid Runtime Support



Notebook Pipelines





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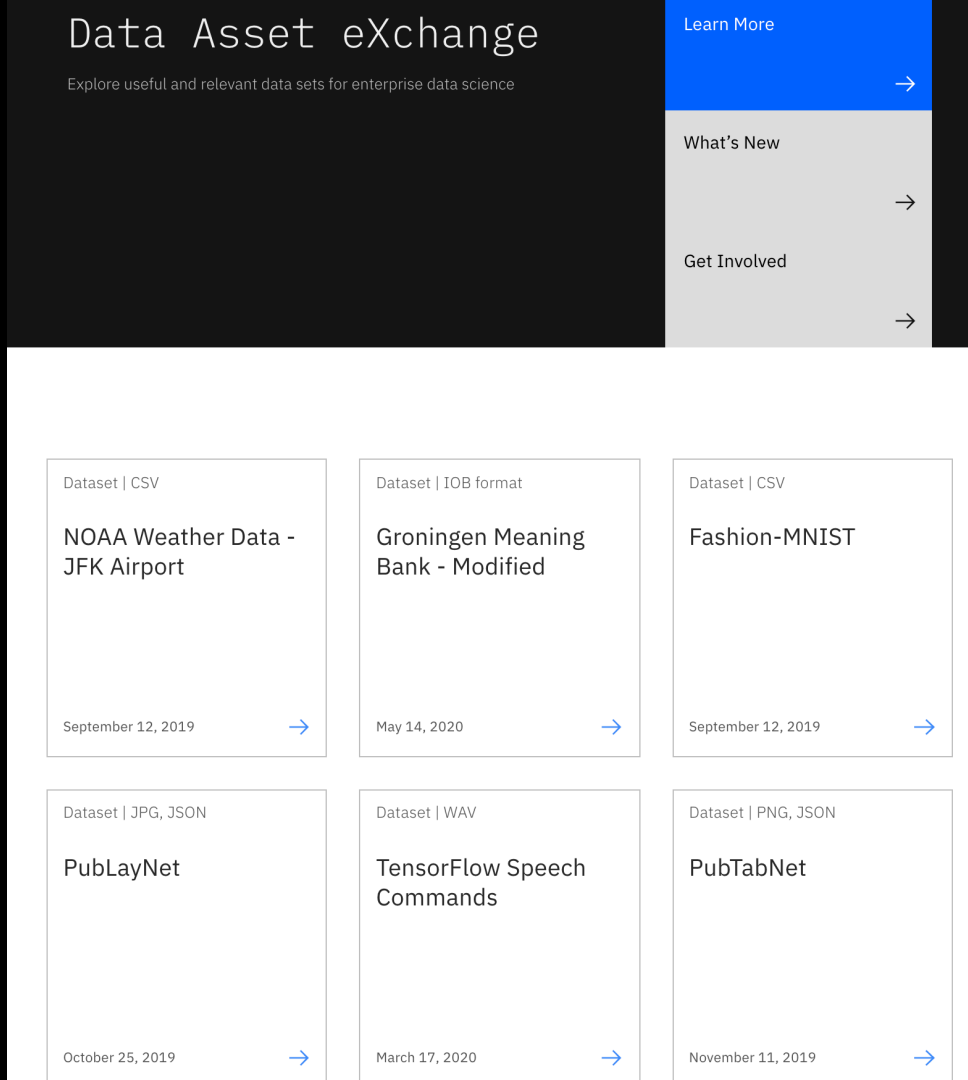
IBM **Developer**

Data Asset eXchange

A place to find curated **free** and **open** datasets under *open data licenses*

ibm.biz/data-exchange



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Data Asset eXchange

Standardized dataset formats and metadata
Ready for use in enterprise AI applications
Many data sets include starter notebooks (cleansing, data exploration, analysis)

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ibm.biz/data-exchange

Let me show you around ...

ibm.biz/data-exchange

Sign up for IBM cloud: ibm.biz/BdqVxW

Data Science Pipeline

Creating notebook pipelines using Elyra and KubeFlow pipelines

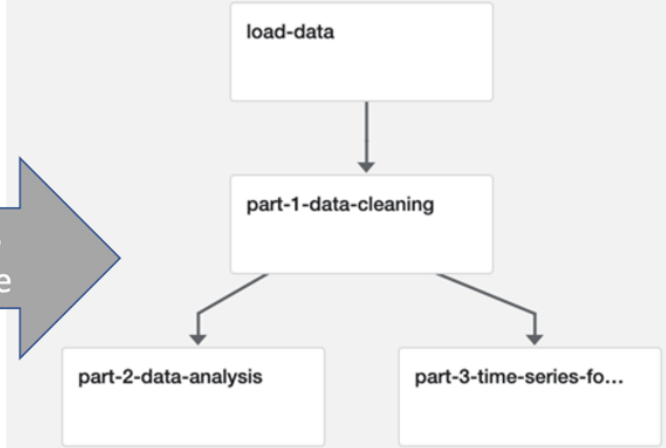
load_data.ipynb | Part 1 - Data Cleaning.ipynb | Part 2 - Data Analysis.ipynb | Part 3 - Time Ser

Markdown | git | Submit Notebook ... | Python 3

First, we select only the subset of data columns of interest and inspect the column types.

```
[ ]: # Choose what columns to import from raw data
column_subset = [
    'DATE',
    'HOURLYVISIBILITY',
    'HOURLYDRYBULBTEMPF',
    'HOURLYWETBULBTEMPF',
    'HOURLYDewPointTempF',
    'HOURLYRelativeHumidity',
    'HOURLYWindSpeed',
    'HOURLYWindDirection',
    'HOURLYStationPressure',
```

Run as pipeline



Getting Started

What are the pre-requisites to run?

1. NodeJS 12+
2. Python 3.X
3. Anaconda (optional)
4. KubeFlow installation (optional)

Install Elyra

To install Elyra:

$ pip install elyra==1.1.0 && jupyter lab build

Or:

$ pip install --upgrade elyra && jupyter lab build

To verify installation:

$ jupyter serverextension list

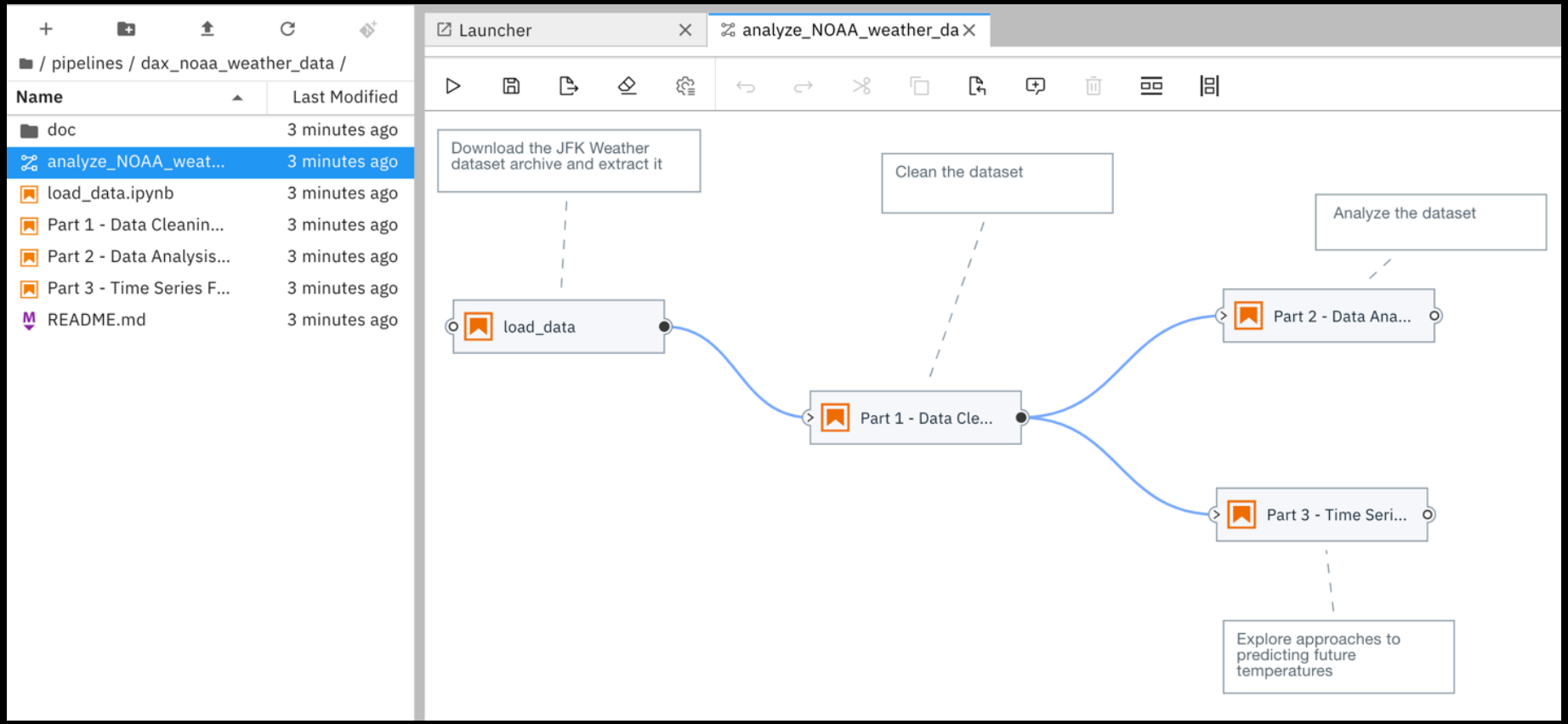
And

$ jupyter labextension list

Starting Elyra:

$ jupyter lab

Running notebooks as a pipeline



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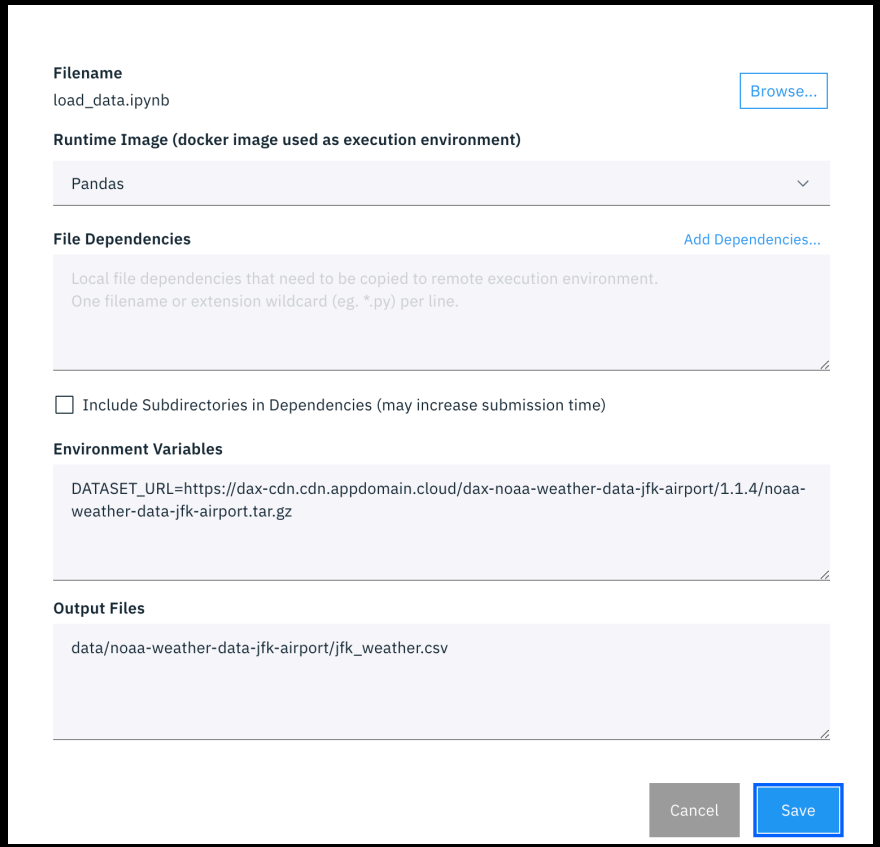
Let’s run a pipeline locally and check out the notebooks!

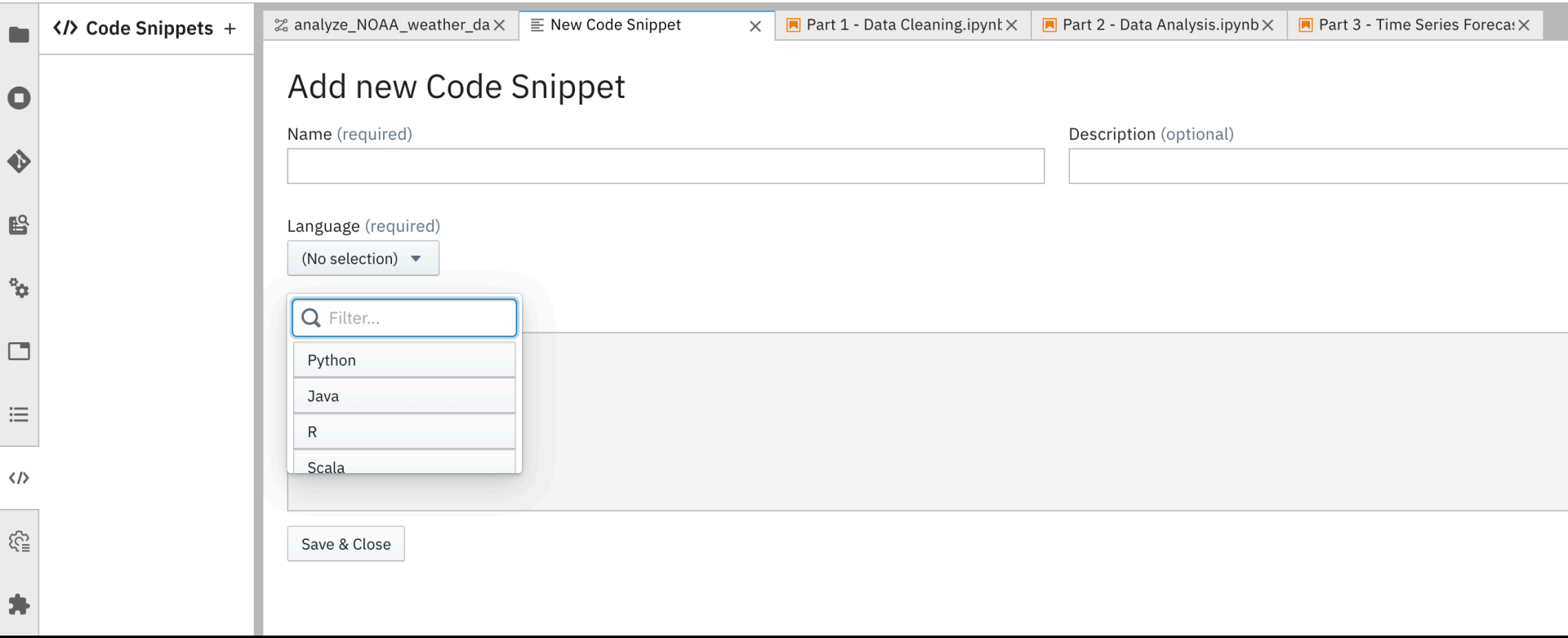
Define Run Variables



Several variables need to define:

- Docker runtime Image, such as Pandas image, TensorFlow image (w/ GPU support), Anaconda, or PyTorch (with CUDA-devel or with CUDA-runtime)
- File Dependencies
- Environment Variables
- Output files

Quickly add code snippet



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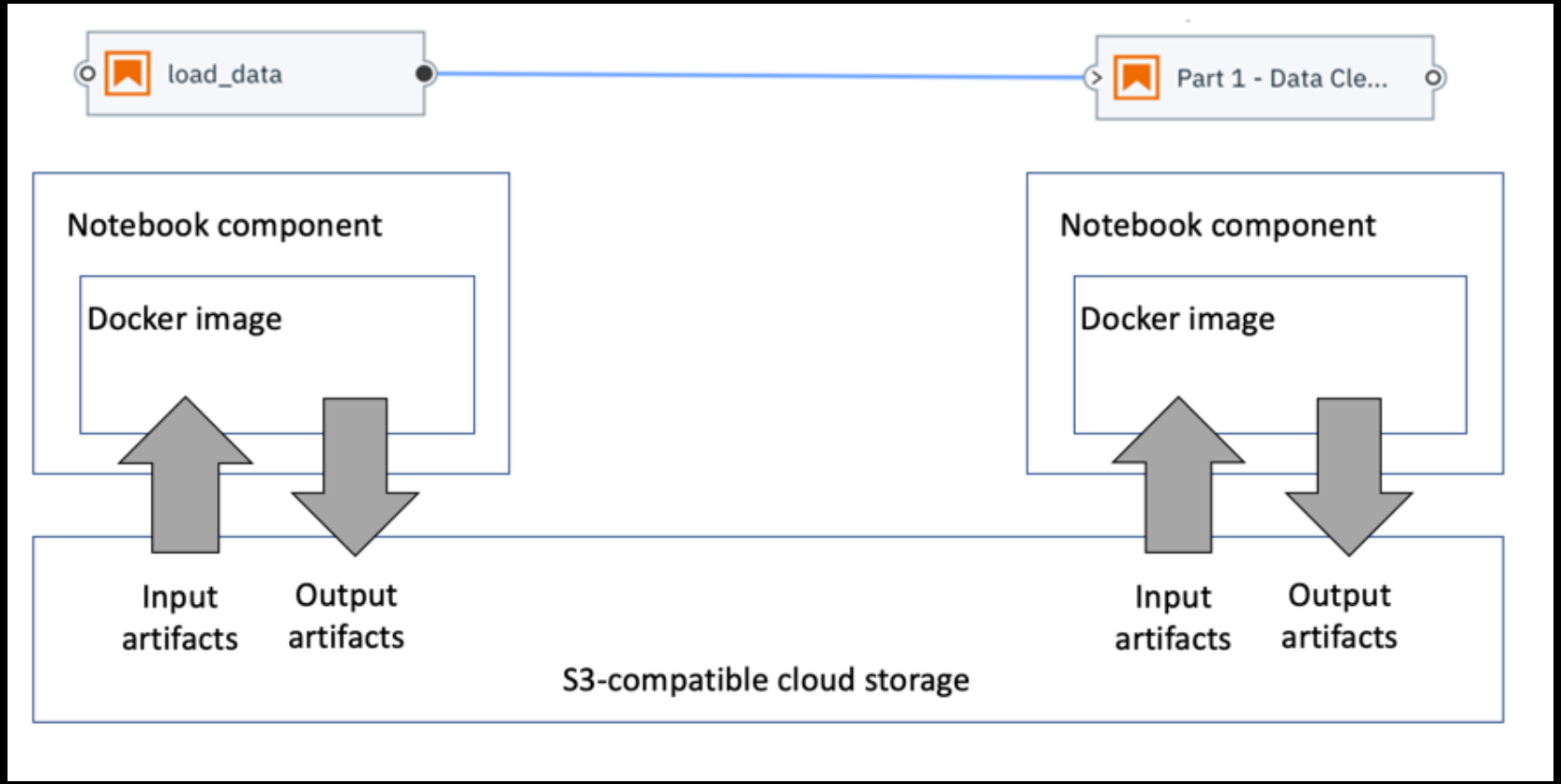
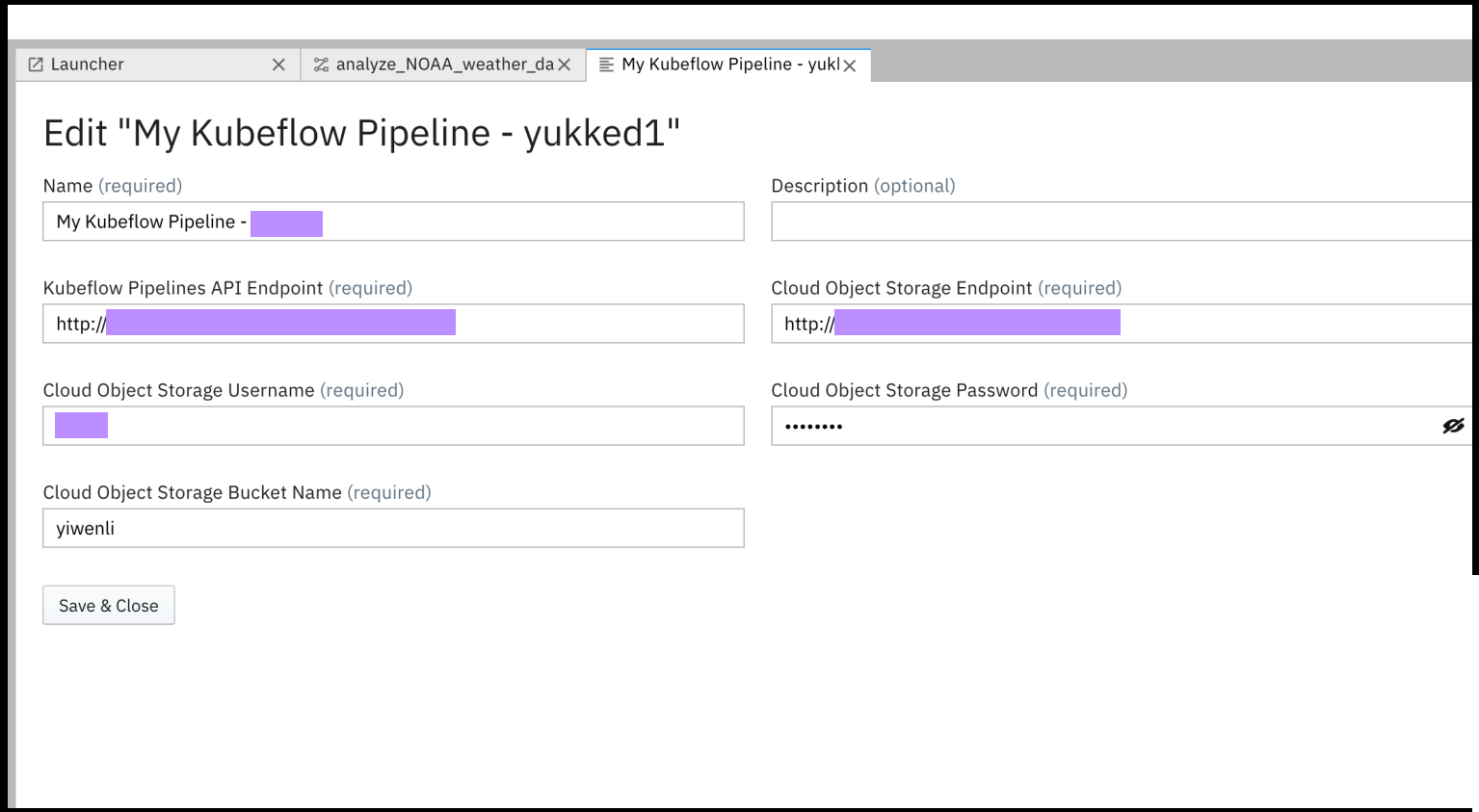
Configuring notebook nodes



If you want to run your pipeline on KubeFlow…

Configure a Kubeflow Pipeline runtime



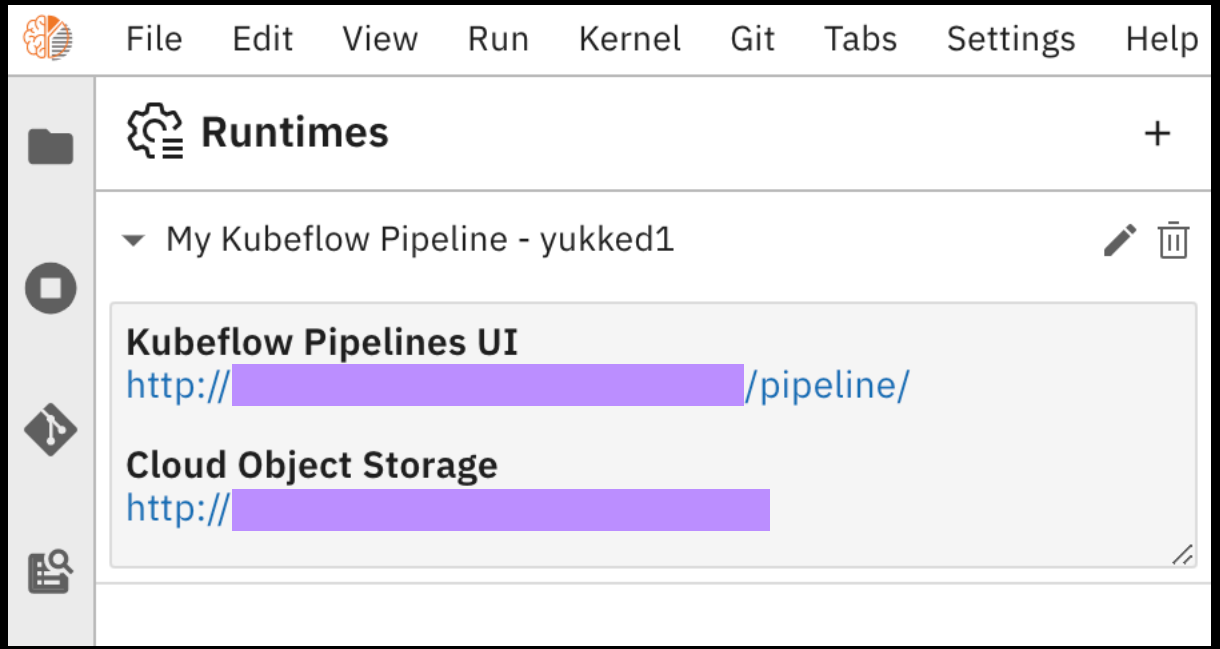
Kubeflow

Manage runtime config using CLI

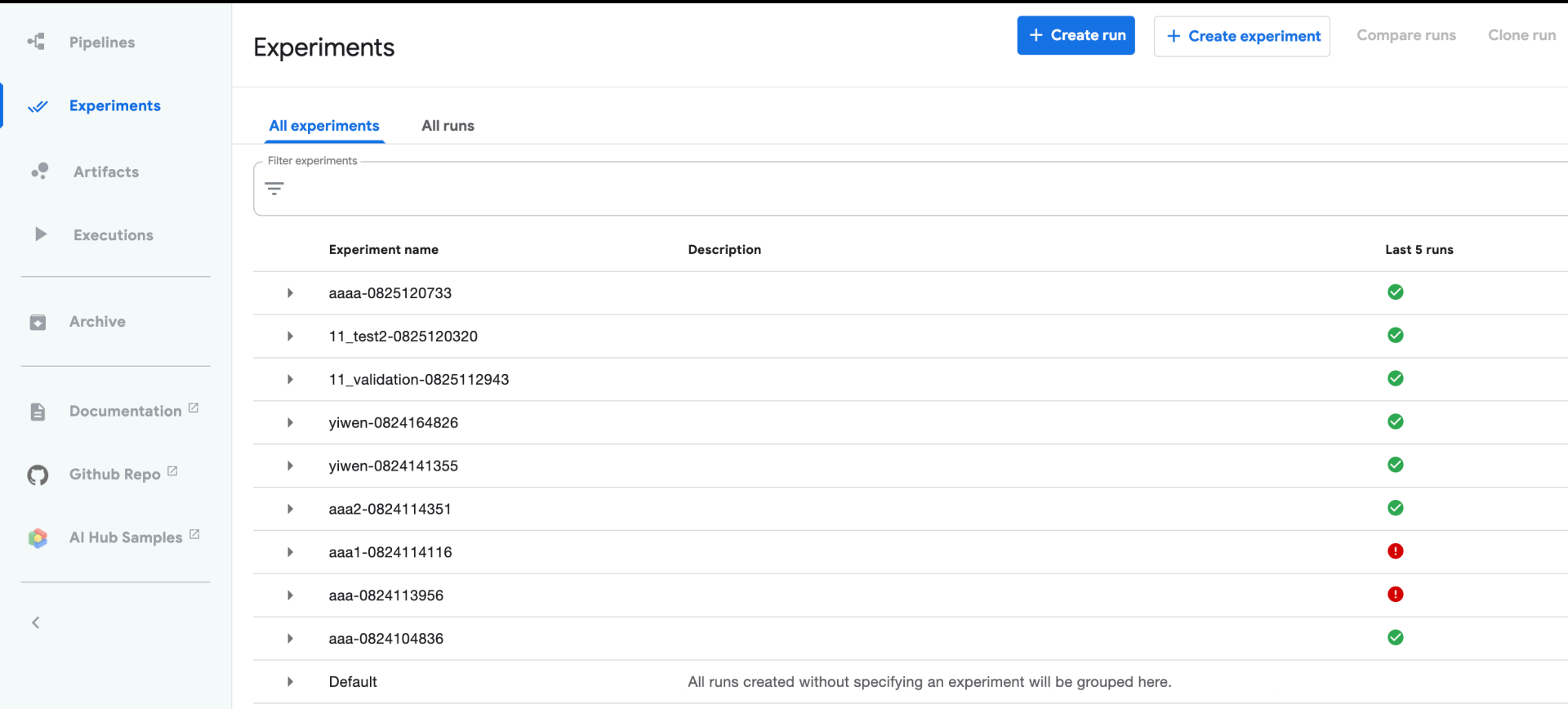
```
$ elyra-metadata install runtimes --schema_name=kfp  \
 --name=kfp_dev_instance \
 --display_name="KFP dev instance" \
 --api_endpoint=http://.../pipeline \
 --cos_endpoint=http://... \
 --cos_username=... \
 --cos_password=... \
 —cos_bucket=...

$ elyra-metadata list runtimes
Available metadata instances for runtimes (includes invalid):
Schema   Instance       Resource
------   --------       --------
kfp      kfp_dev_instance /Users/.../kfp_dev_instance.json
```

```
$ elyra-metadata list runtimes --json
[
 {
  "name": "kfp_dev_instance",
  "display_name": "KFP dev instance",
  "metadata": {
    "api_endpoint": "http://.../pipeline",
    "cos_endpoint": "http://...",
    "description": "...",
    "cos_username": "...",
    "cos_password": "...",
    "cos_bucket": "..."
  },
  "schema_name": "kfp",
  "resource": "/Users/.../kfp_dev_instance.json"
 }
]
$ elyra-metadata remove runtimes --name=kfp_dev_instance
 Metadata instance '...' removed from namespace 'runtimes'.
```

Monitor a notebook run



Let’s view the results on KubeFlow!



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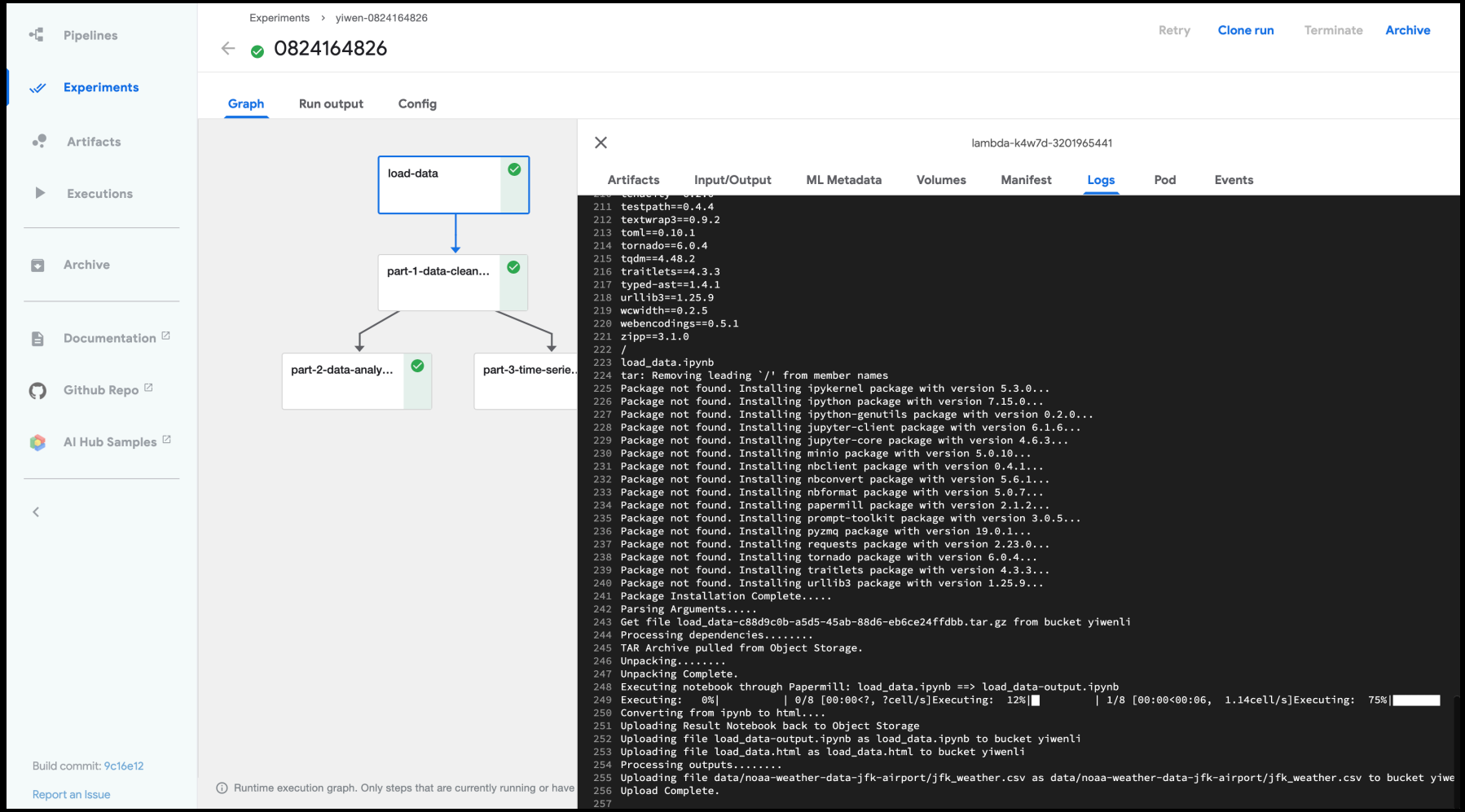

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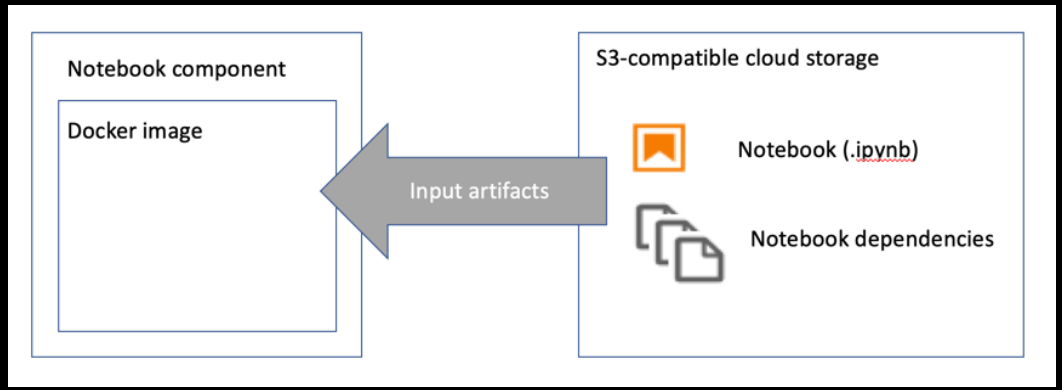
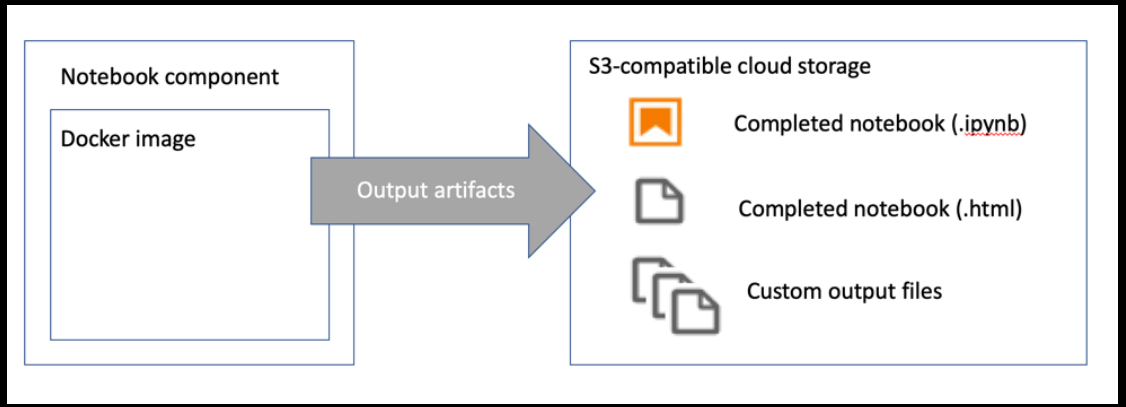
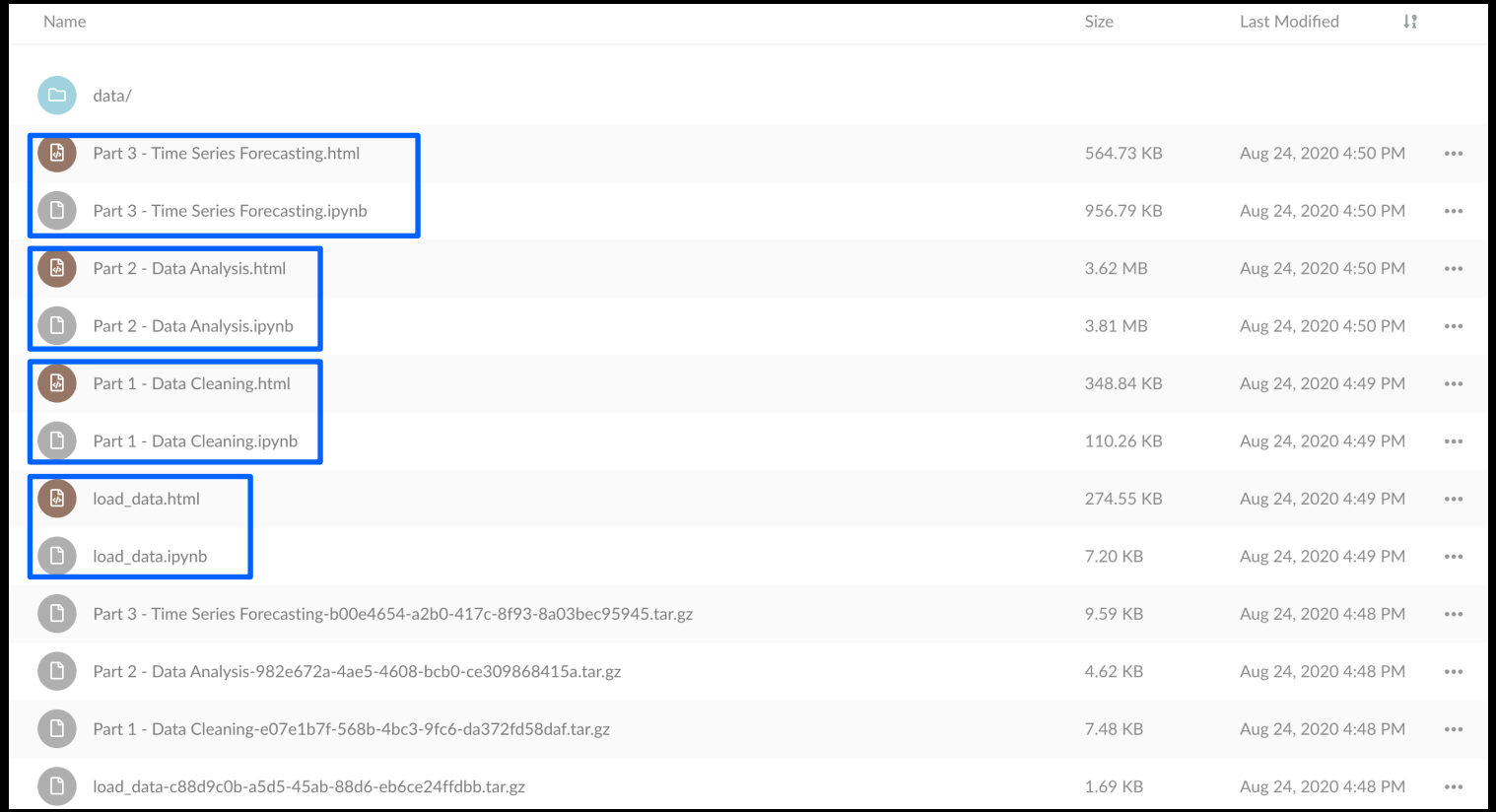
How KubeFlow pipeline works?





Pipeline outputs



Name	Size	Last Modified
data/		
Part 3 - Time Series Forecasting.html	564.73 KB	Aug 24, 2020 4:50 PM
Part 3 - Time Series Forecasting.ipynb	956.79 KB	Aug 24, 2020 4:50 PM
Part 2 - Data Analysis.html	3.62 MB	Aug 24, 2020 4:50 PM
Part 2 - Data Analysis.ipynb	3.81 MB	Aug 24, 2020 4:50 PM
Part 1 - Data Cleaning.html	348.84 KB	Aug 24, 2020 4:49 PM
Part 1 - Data Cleaning.ipynb	110.26 KB	Aug 24, 2020 4:49 PM
load_data.html	274.55 KB	Aug 24, 2020 4:49 PM
load_data.ipynb	7.20 KB	Aug 24, 2020 4:49 PM
Part 3 - Time Series Forecasting-b00e4654-a2b0-417c-8f93-8a03bec95945.tar.gz	9.59 KB	Aug 24, 2020 4:48 PM
Part 2 - Data Analysis-982e672a-4ae5-4608-bcb0-ce309868415a.tar.gz	4.62 KB	Aug 24, 2020 4:48 PM
Part 1 - Data Cleaning-e07e1b7f-568b-4bc3-9fc6-da372fd58daf.tar.gz	7.48 KB	Aug 24, 2020 4:48 PM
load_data-c88d9c0b-a5d5-45ab-88d6-eb6ce24ffdbb.tar.gz	1.69 KB	Aug 24, 2020 4:48 PM

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Get your KubeFlow

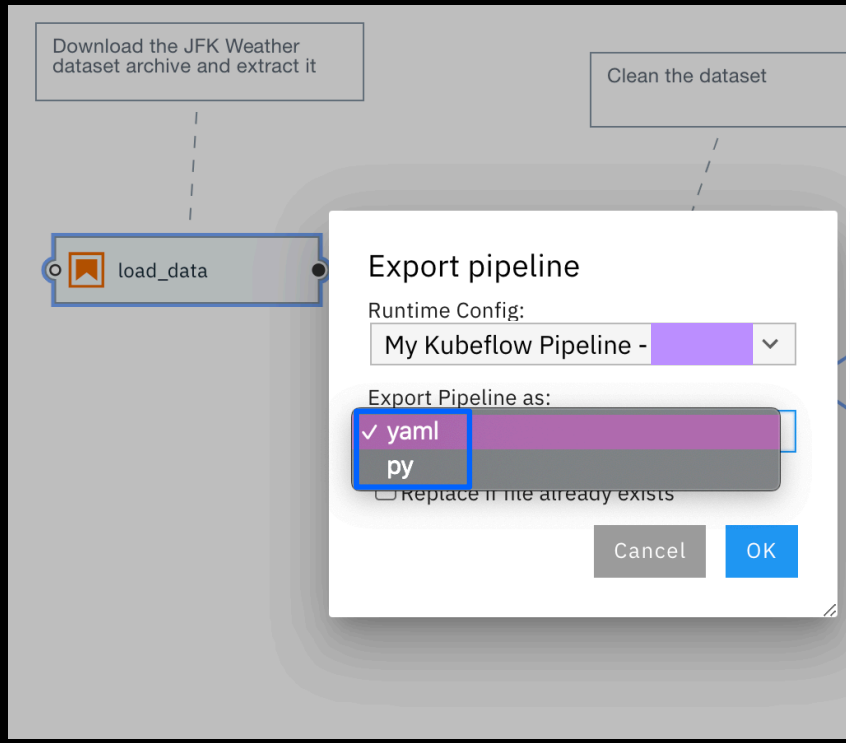
Run KubeFlow on IBM Cloud

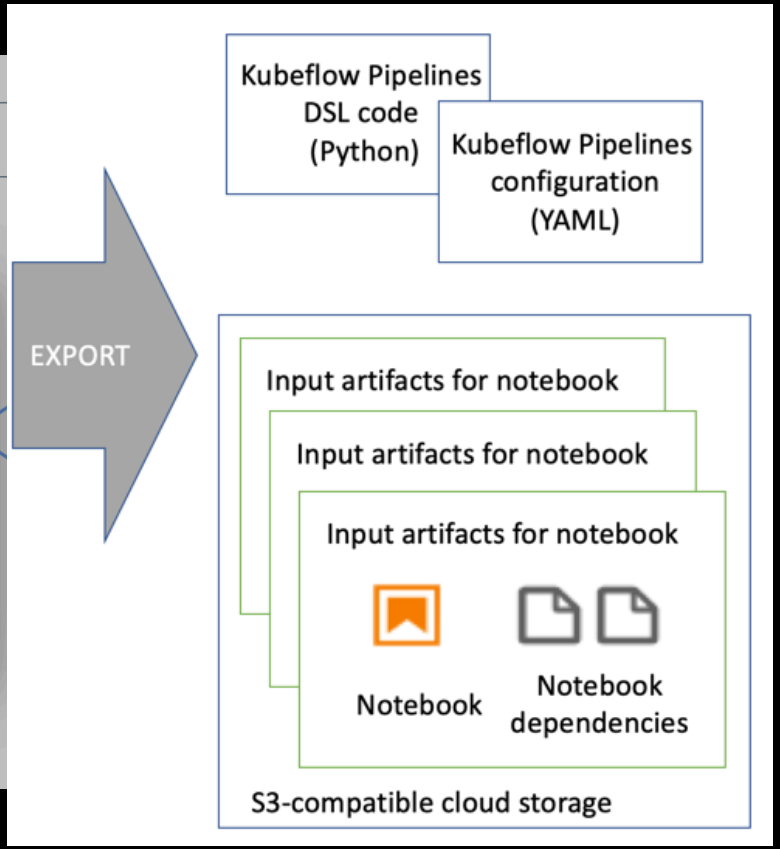
https://www.kubeflow.org/docs/ibm/

See this tutorial to run with KubeFlow

https://github.com/elyra-ai/examples/tree/master/pipelines/hello_world

Export a pipeline





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Ways to run pipelines

Try JupyterLab and Elyra on pre-built docker image:

```
$ docker run -it -p 8888:8888 elyra/elyra:1.0.0 jupyter lab --debug
```

Or you can use Binder:

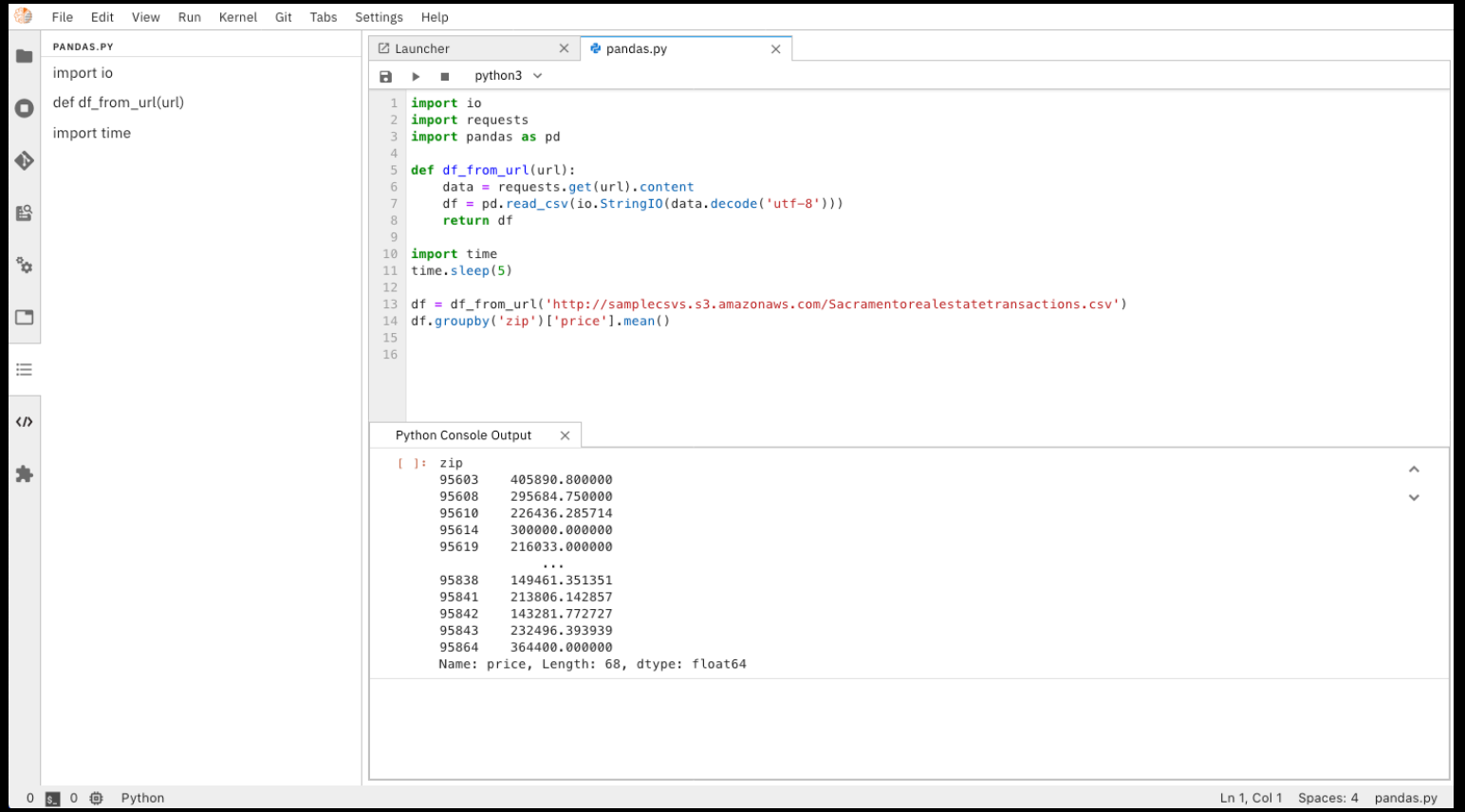
https://mybinder.org/v2/gh/elyra-ai/elyra/v1.0.0?urlpath=lab/tree/binder-demo

Or you can install Elyra:

https://github.com/elyra-ai/elyra#installation

ELYRA & PYTHON SUPPORT

Fork me at: github.com/elyra-ai/elyra



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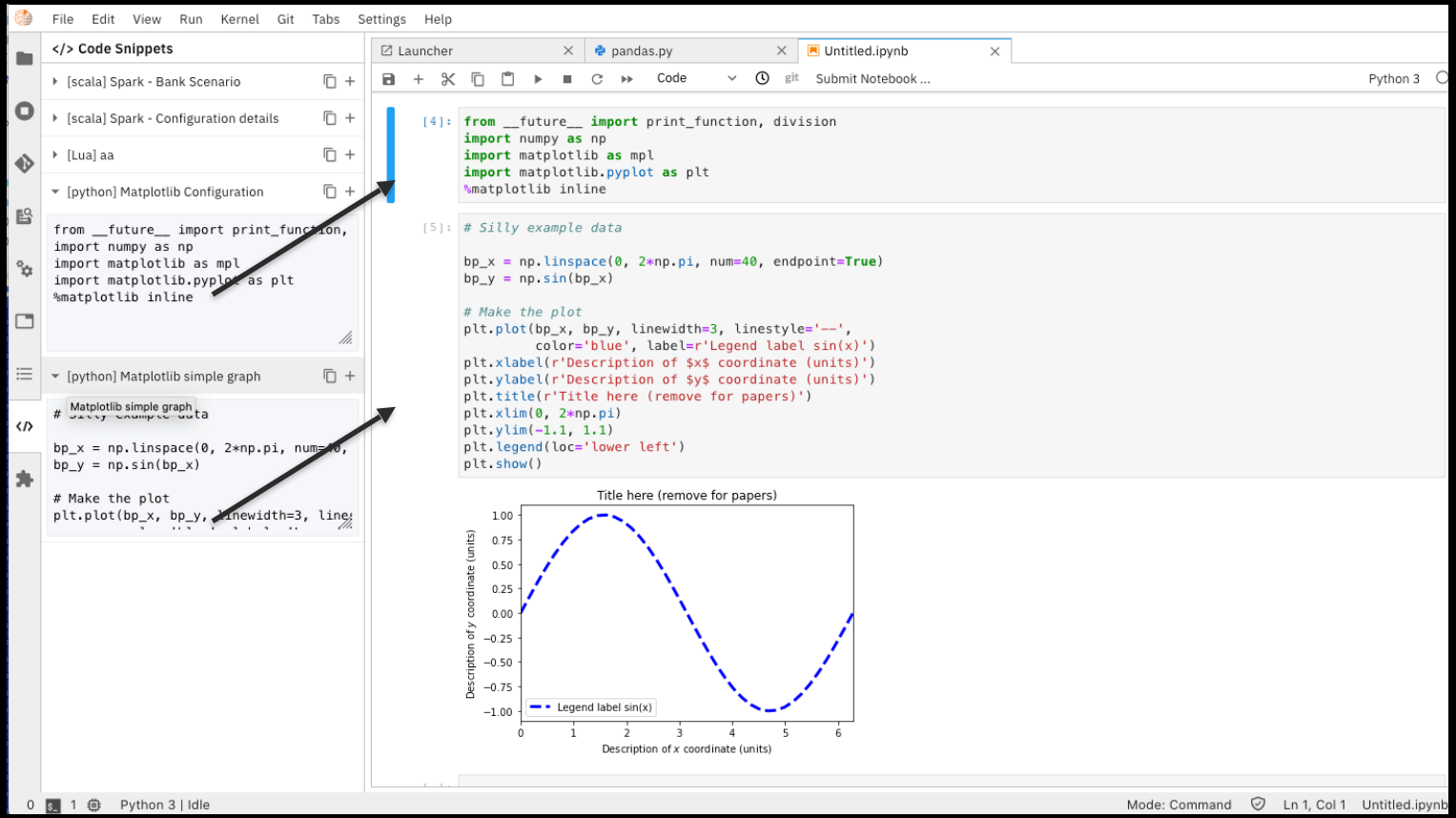
ELYRA & CODE-SNIPPETS

Fork me at: github.com/elyra-ai/elyra



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Get involved with Elyra!

- Open an enhancement request

- Open an issue

- Contributing to Elyra!

bit.ly/0901-ELYRA

Related Links

Slides: bit.ly/0901-ELYRA

Elyra Github: https://github.com/elyra-ai/elyra

Elyra Examples: https://github.com/elyra-ai/examples

Elyra Tutorial: https://github.com/elyra-ai/examples/tree/master/pipelines/hello_world

DAX Asset eXchange: http://ibm.biz/data-exchange

Elyra demo Github: https://github.com/elyra-ai/examples/tree/master/pipelines/dax_noaa_weather_data

Sign up for IBM Cloud: https://ibm.biz/BdqVxW

Model Asset eXchange: http://ibm.biz/model-exchange

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Linkedin: https://www.linkedin.com/in/yiwen-li-47a019119/

GitHub: yil532

THANK YOU!

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