Creating Data Pipelines with Elyra, a visual DAG composer and Apache Airflow

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About me – Alan Chin

Sr. Software Engineer – Build and Infrastructure – CODAIT

- Over 4 years working with Open Source Projects
- Currently Contributing to the Elyra and Jupyter Enterprise Gateway Projects

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Overview

- Elyra, what is it?
- Creating a Notebook Based Pipeline
- Elyra Pipeline Editor
  - Airflow Pipeline Processor
  - Example: How Elyra uses Apache Airflow
  - Short Demo
- New upcoming changes in 3.0
  - Operator/component support

Elyra, what is it?

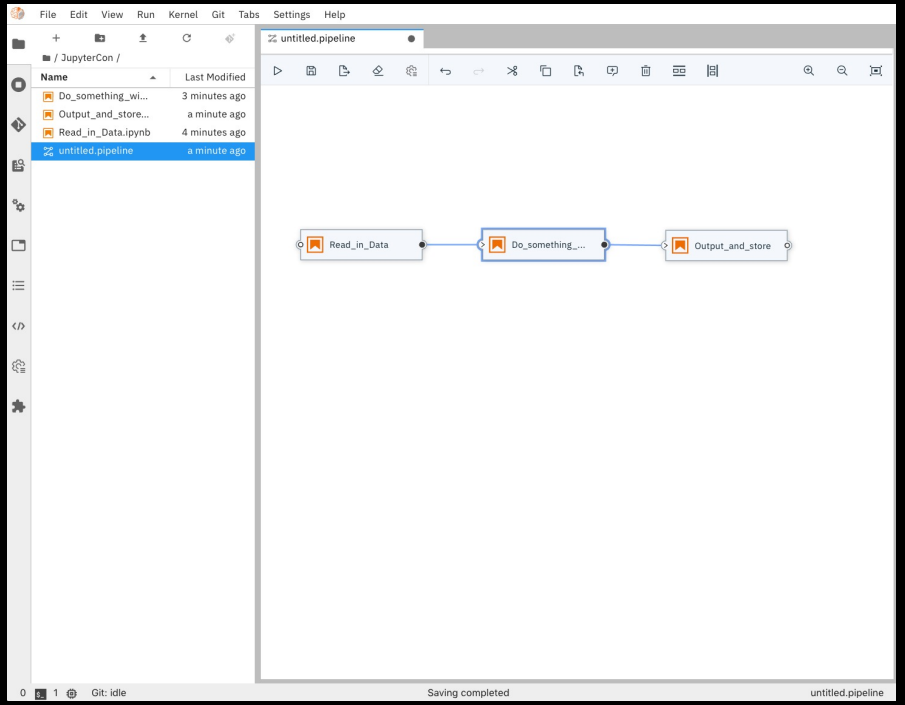
Elyra at its core, is a curated collection of JupyterLab UI and server extensions, designed to compliment each other and is completely Open Source.

Elyra, what is it?

- Language Server Protocol Integration
- Notebook and Python Script Table of Contents Navigation
- Git version control Integration
- Code Snippets
- Hybrid runtime support with Jupyter Enterprise Gateway
- Pipeline Visual Editor

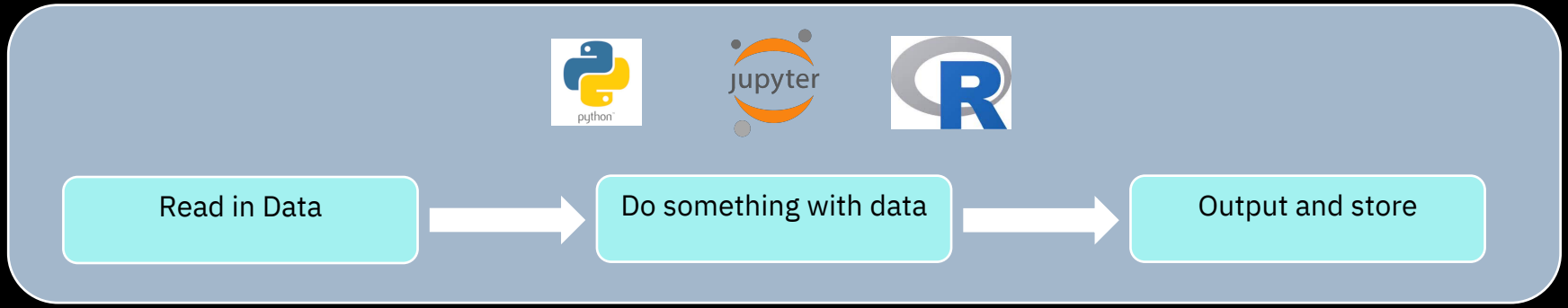
Elyra, what is it?

- Provides users with a low-code/no-code solution to creating data pipelines in Apache Airflow and Kubeflow Pipelines on Kubernetes.
- Designed around concepts and patterns common in pipeline construction and put into a familiar, easy-to-navigate interface for Data Scientists and Engineers

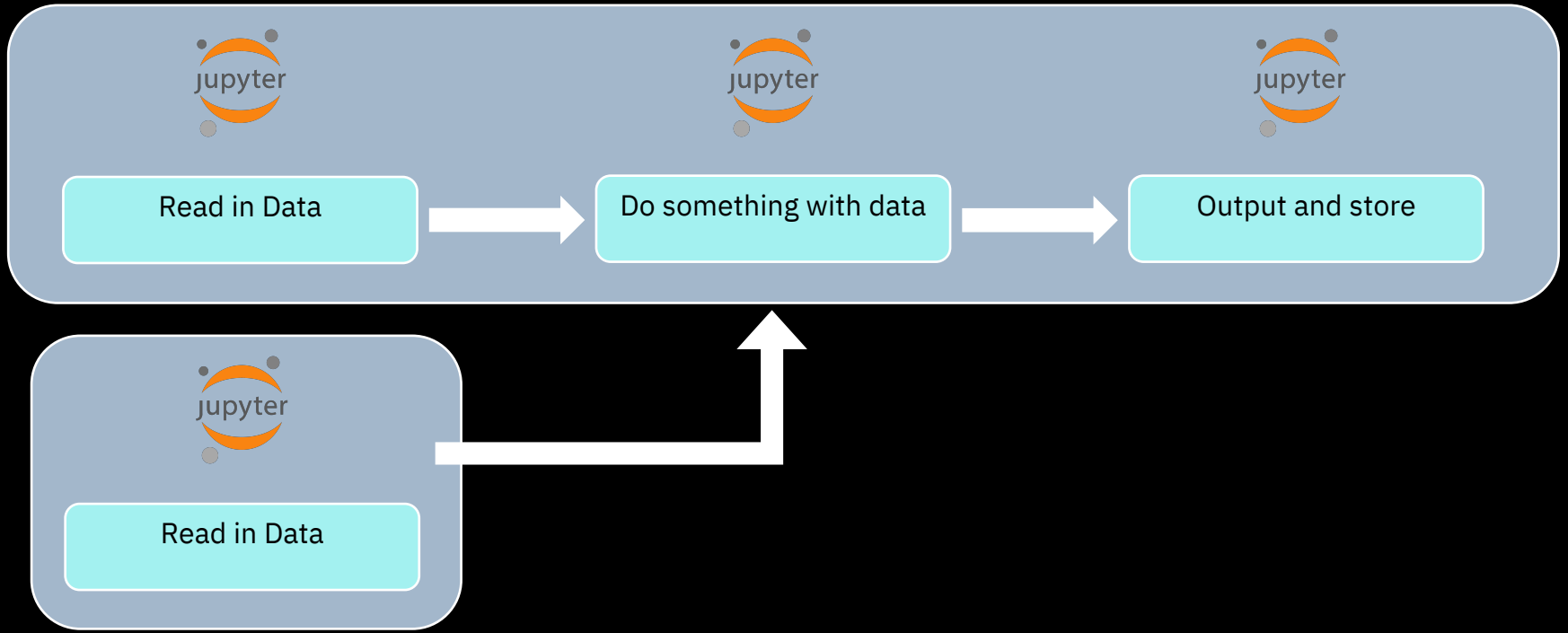


Let’s make a Pipeline !

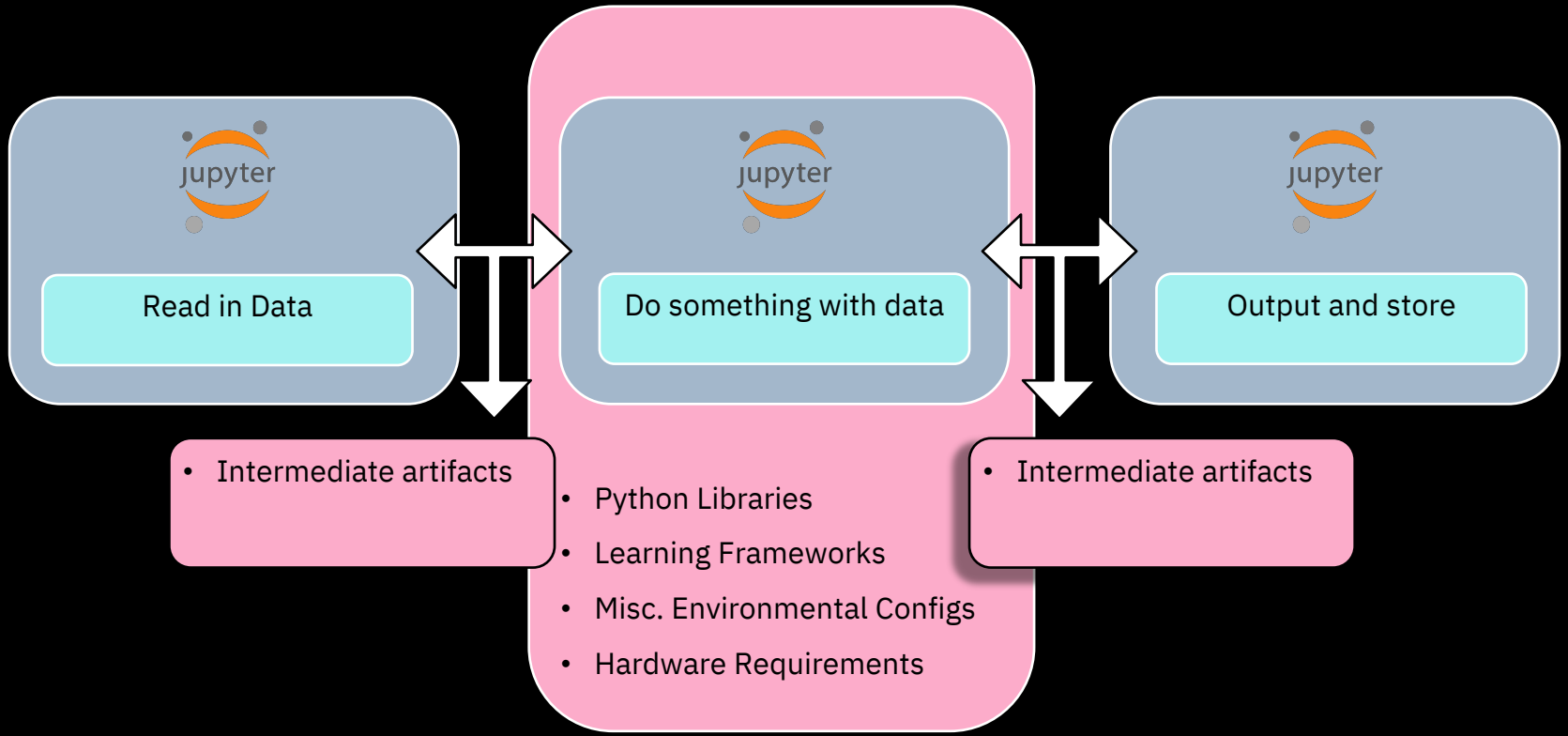
Classic Data Pipeline



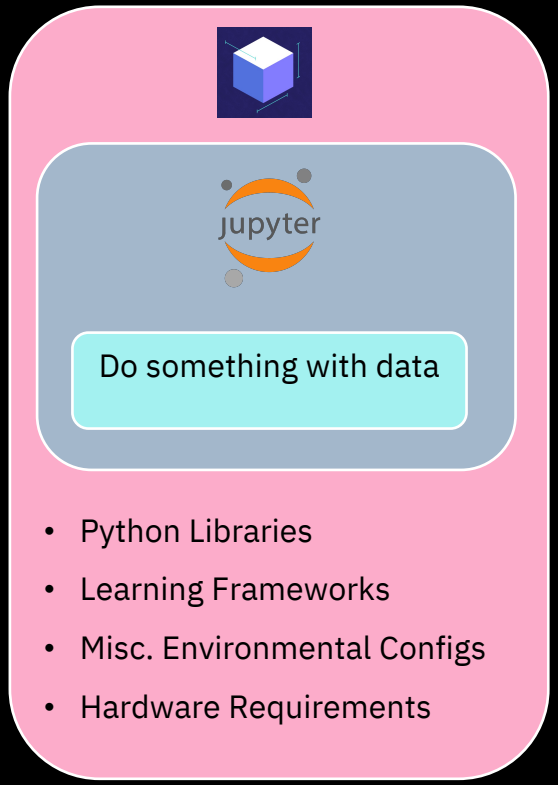
Classic Data Pipeline



The Things You Don't See



Containerization



Let’s Use Containers

- Common pattern
- Prebuilt means time savings
- Consistent and reproducible
- Isolation

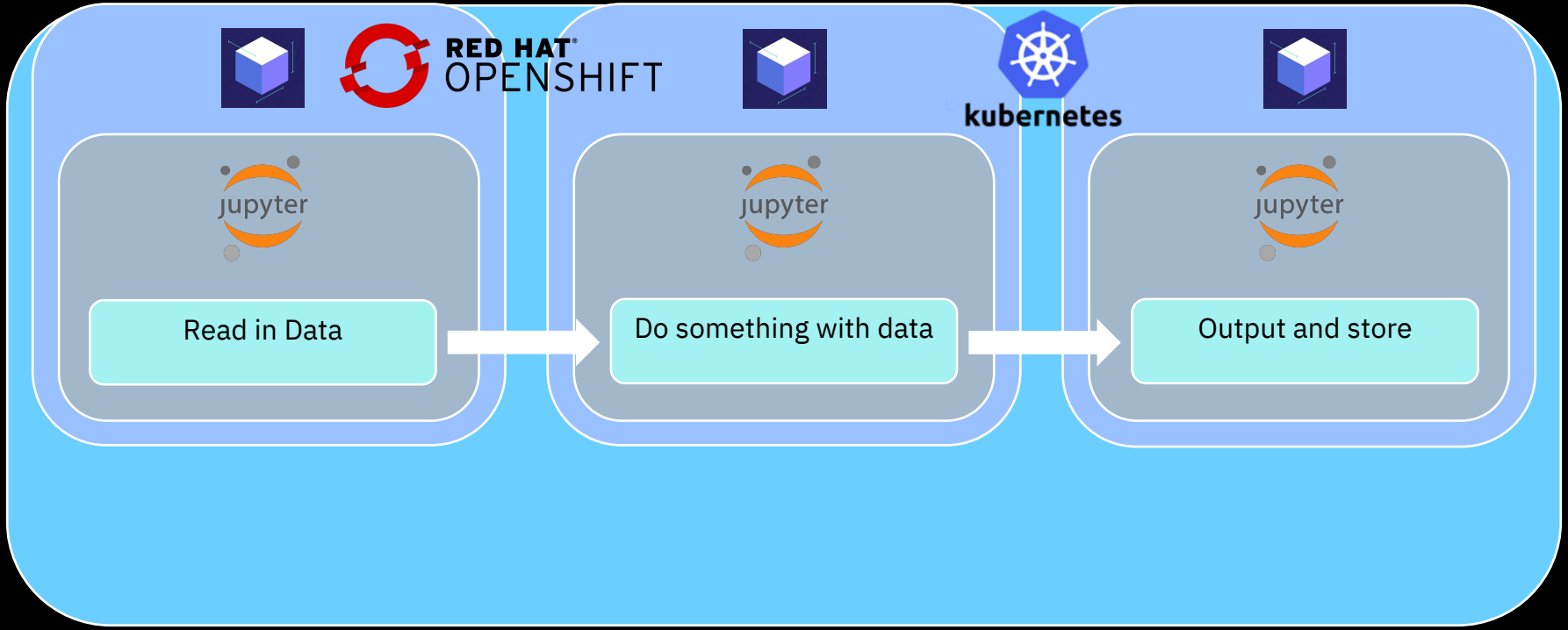
Hardware

- CPU and Memory
- Architecture
- GPUs and TPUs

Let’s use a Container Orchestrator

- OpenShift and Kubernetes
  - Workers can have different hardware configurations to accommodate various workloads
  - Cluster can scale up or down depending on your resource needs

Containerized Data Pipeline

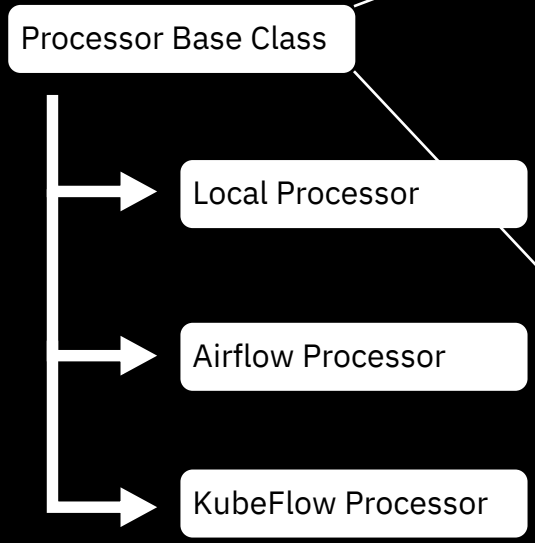


Creating the Pipeline

Expressing the pipeline as code :

- Scripts in Bash, Python, DSL
- Popular Pipeline Projects
  - Apache Airflow
  - KubeFlow Pipelines (DSL and SDK Compiler)
- Users would need to spend time learning how to compose the pipeline using the DSL / libraries

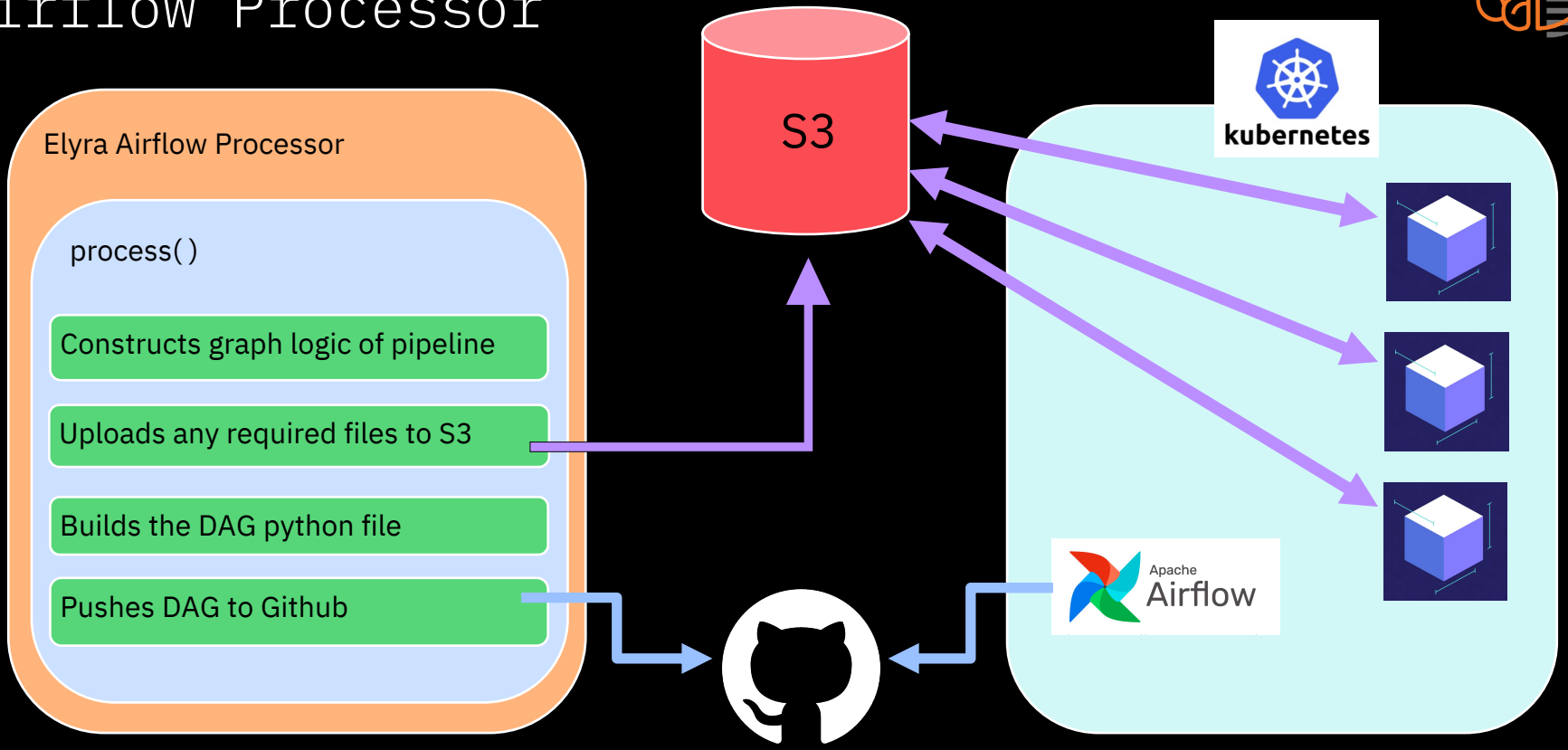
Using Processors for Runtimes



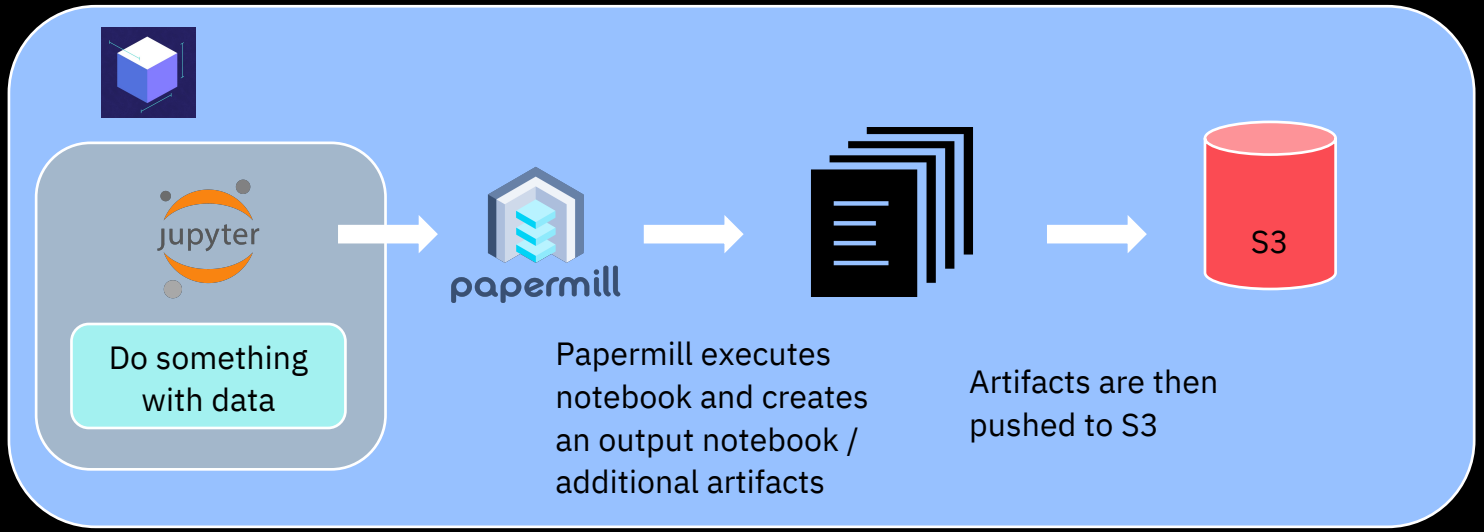

```python
class PipelineProcessor(LoggingConfigurable):  # ABC

    @property
    def root_dir(self):
        return self._root_dir

    @root_dir.setter
    def root_dir(self, value):
        self._root_dir = value

    @property
    @abstractmethod
    def type(self):
        raise NotImplementedError()

    @abstractmethod
    def process(self, pipeline) -> PipelineProcessorResponse:
        raise NotImplementedError()

    @abstractmethod
    def export(self, pipeline, pipeline_export_format, pipeline_export_path, overwrite):
        raise NotImplementedError()
```

- Processor Base Class allows users to extend Elyra's pipeline processor to use different workflow orchestrators
- Currently supports Apache Airflow, Local and Kubeflow Pipelines

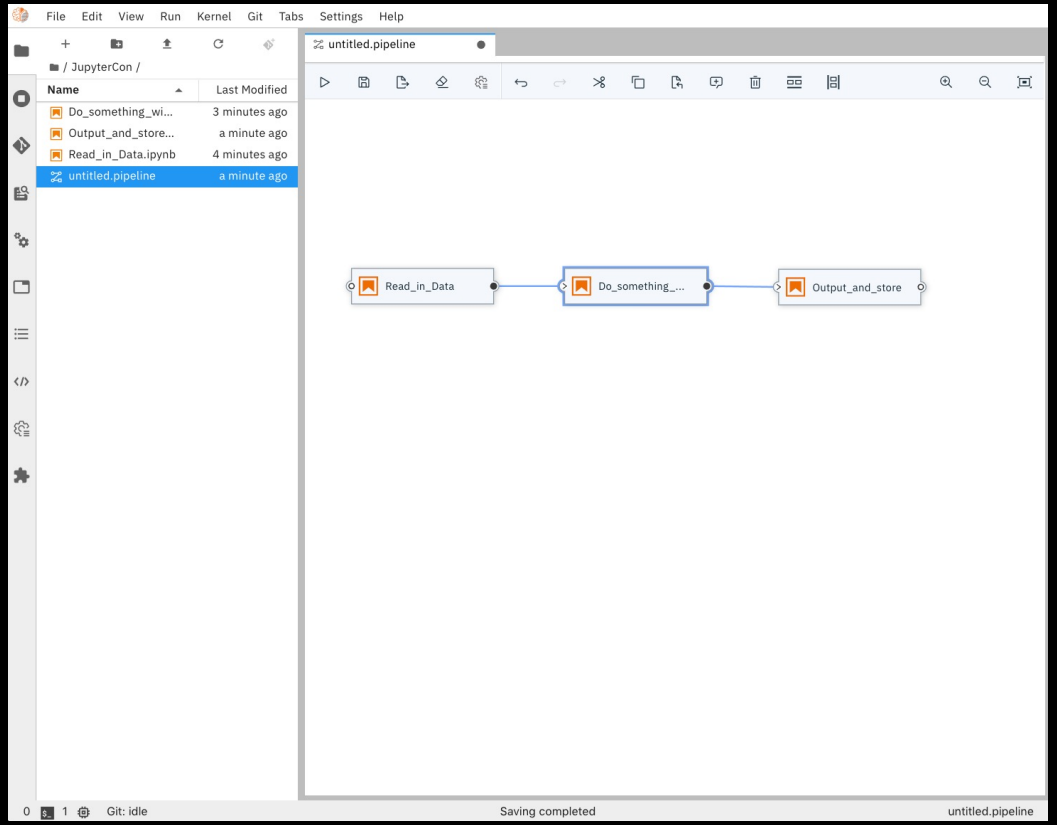
Example: Apache Airflow Processor



Example: Apache Airflow Processor

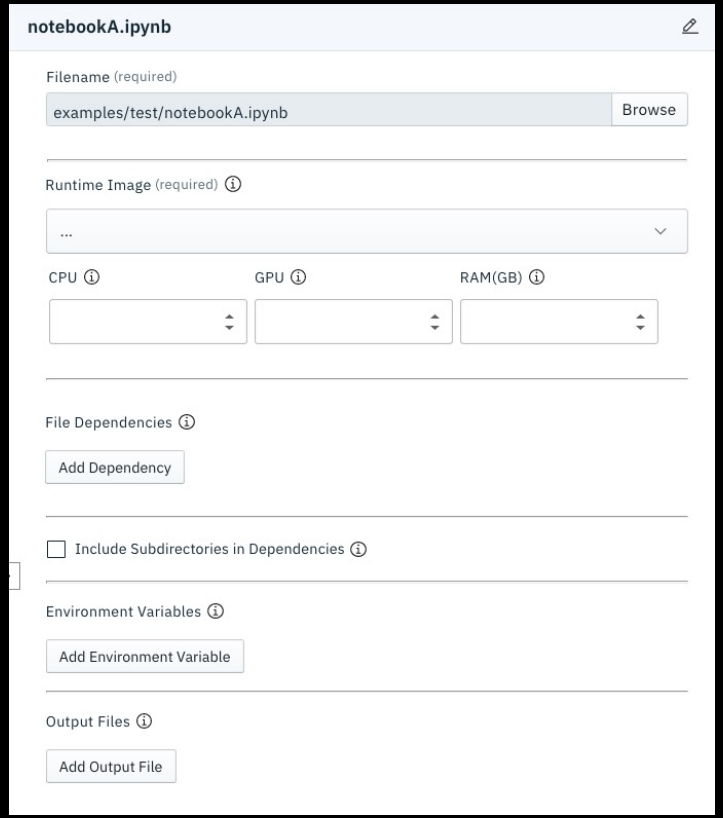


Elyra Pipeline Editor



Demo Time !

Node Properties



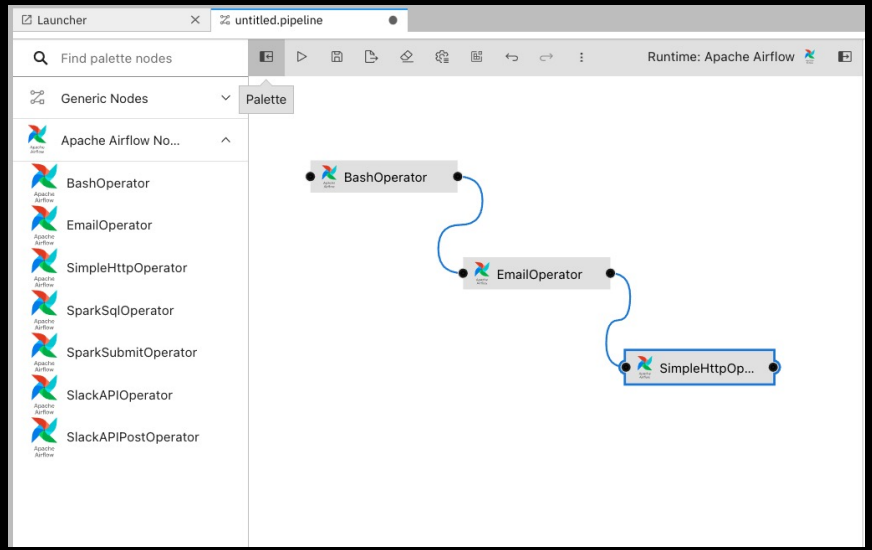
Container parameters are taken in properties config menu

- Image to be used
- Local file dependencies to be uploaded to S3
- Hardware resource requirements
- Environmental variables to be set
- Intermediate Outputs for downstream nodes

Passed to processors where they are marshalled into the correct structure for pipeline construction

Upcoming changes and new in 3.0

- Airflow Operator Support
  - Will allow users to specify and import core or contributor operators for use in Elyra's visual pipeline editor
  - Currently in pre-release/experimental phase
  - Short Demo



Wrap Up

- Deconstruct / Modularize existing pipeline(s) into Notebooks
- Determine what your pipeline resource/ environmental requirements are
- Build and run your notebook/script-based pipeline with Elyra’s pipeline editor
- If you need assistance, please don’t hesitate to open an an issue on our Github page OR just ask us on gitter !

https://gitter.im/elyra-ai/community

Check us out!

Getting started with Elyra

https://elyra.readthedocs.io/en/latest/getting_started/installation.html

Elyra's Github

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

COVID notebooks Github

https://github.com/CODAIT/covid-notebooks

Contributing to these projects

- Just star and fork!
- Bug reports
- Propose improvements
- Code reviews
- Community meetings

Questions?

Thank You for Joining!
Stay Safe and Stay Healthy!