When To Stop: Optimize Test Runtimes Using AI4CI

DevConf US 2022

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Overview

- What is AI4CI?
- Operate First Community Cloud
- Open Operations Data
- Testgrid
- Optimal Stopping Point
- Demo
    - Visualization Dashboard
    - Architecture Diagram
    - Optimal Stopping Point Model

What is AI4CI?

AI + Ops

Using AI tools to support Operations

AIOps + CI

Supporting CI/CD by using AI capabilities

AI4CI

Artificial Intelligence for Continuous Integration

An collection of open source data science tools to collect and analyze CI data built using open operations data.

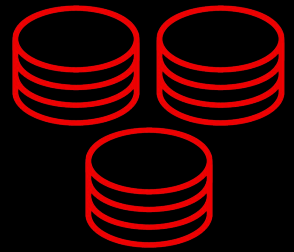
Operate First Community Cloud

- Operate First makes **operations open source**.
- An initiative centered around learning and developing code and practices in an open **production community cloud**.
- Deploy and maintain apps in an open environment leading to **open operations data** which include logs, issues,metrics.

www.operate-first.cloud/

Open Operations Data

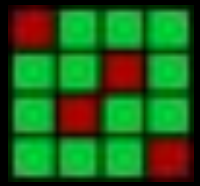
- Data originating from **real world production systems.**
- Data made only available by **operating softwares and apps** in production.
- Eg: CI/CD data, Telemetry, Logs, Operational Dashboards, Prometheus Metrics.



Data Sources

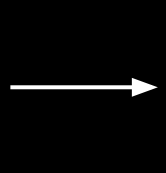
GitHub - GitHub is a distributed version-control platform where users can collaborate on or adopt open source code projects, fork code, share ideas and more.

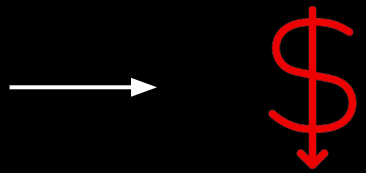
Prow - It is a kubernetes-based CI/CD system. The Kubernetes Testing group defines Prow as “a CI/CD system built on Kubernetes for Kubernetes that executes jobs for building, testing, publishing and deploying.”



TestGrid - It is an open source project developed by Google to help people visualize their CI processes in a grid. It is used by a number of communities to track the status of their tests and build in a visually friendly format.

ML Service: Optimal Stopping Point Model





Sometimes tests/builds take longer than expected to run

Find an Optimal Stopping Point after which the test will fail.

We can better allocate and save resources.

Optimal Stopping Point: Overview

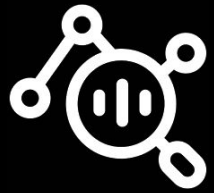
Problem to Address

Every new Pull Request to a repository with new code changes is subjected to an automated set of builds and tests before being merged. Some tests may run for longer durations than expected. Longer running tests are often painful as they can block the CI/CD process for longer periods of time. How can we optimize the running time of our tests and prevent bottlenecks?

Solution

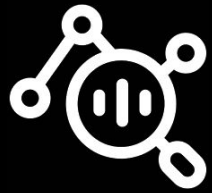
By predicting the optimal stopping point for a test, we can better allocate development resources.

Solution Approach



Data Collection

Solution Approach



Data Collection

Feature Engineering

Find the **distribution type for passing and failing tests**. Probability density plots are used to find the probabilities of test duration

Solution Approach

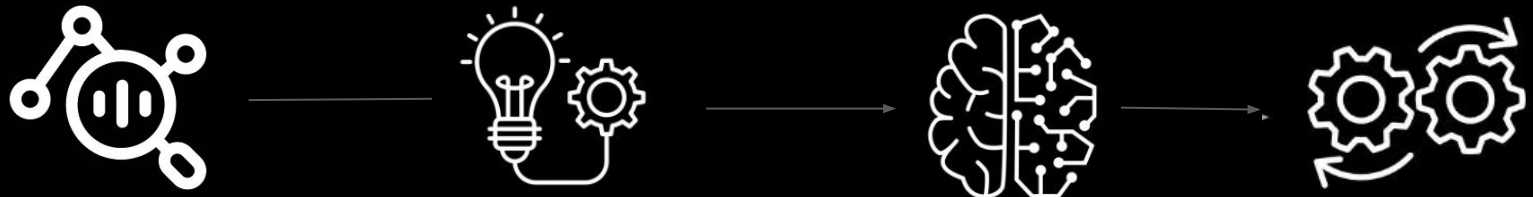
Data Collection

Feature Engineering

Model Training

Predict optimal stopping point by finding the point where:
probability of failure > probability of passing

Solution Approach



Data Collection

Feature Engineering

Model Training

Model Deployment

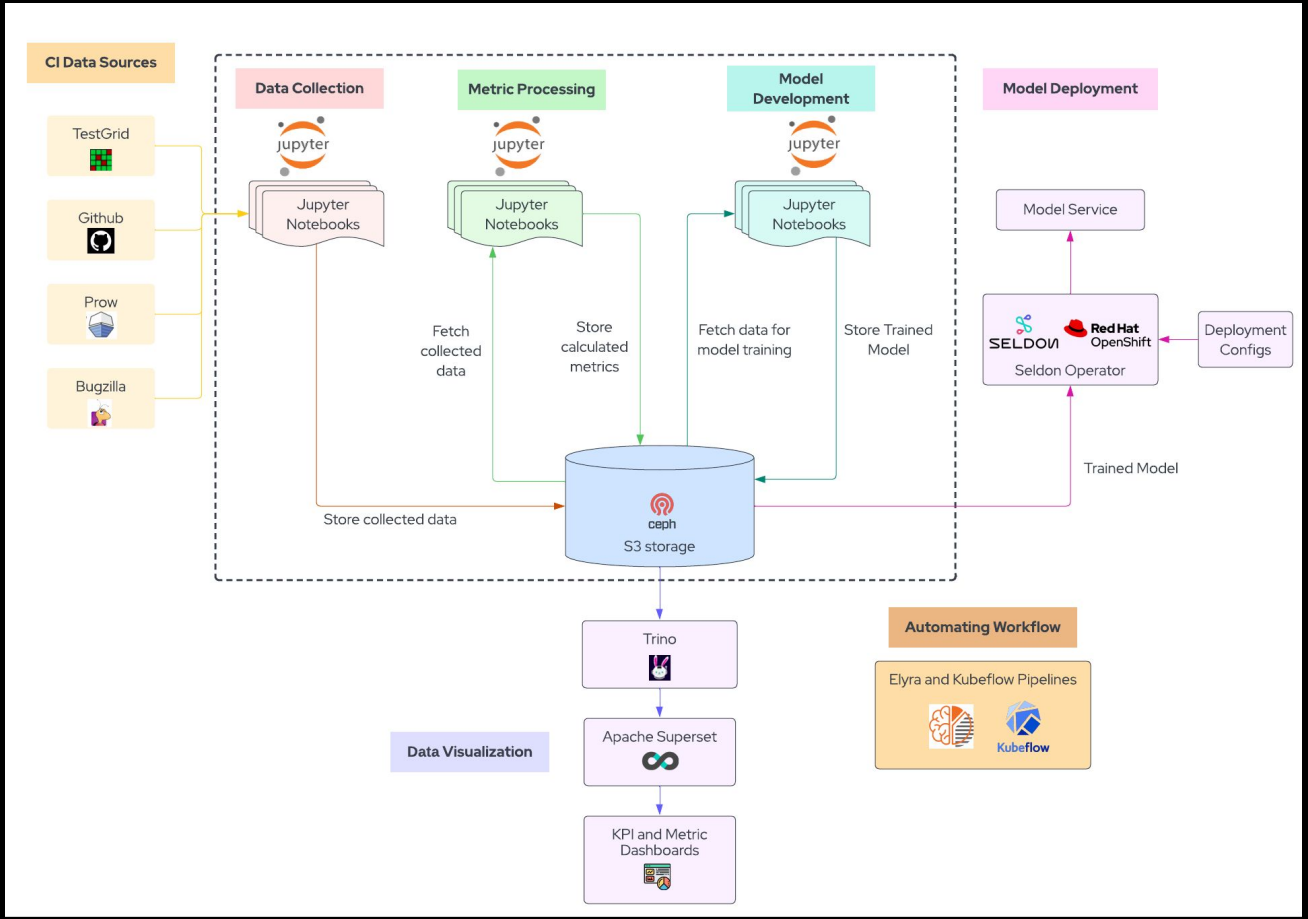
SELDON

RED HAT OPENSHIFT.io

Red Hat

DEMO

Architecture



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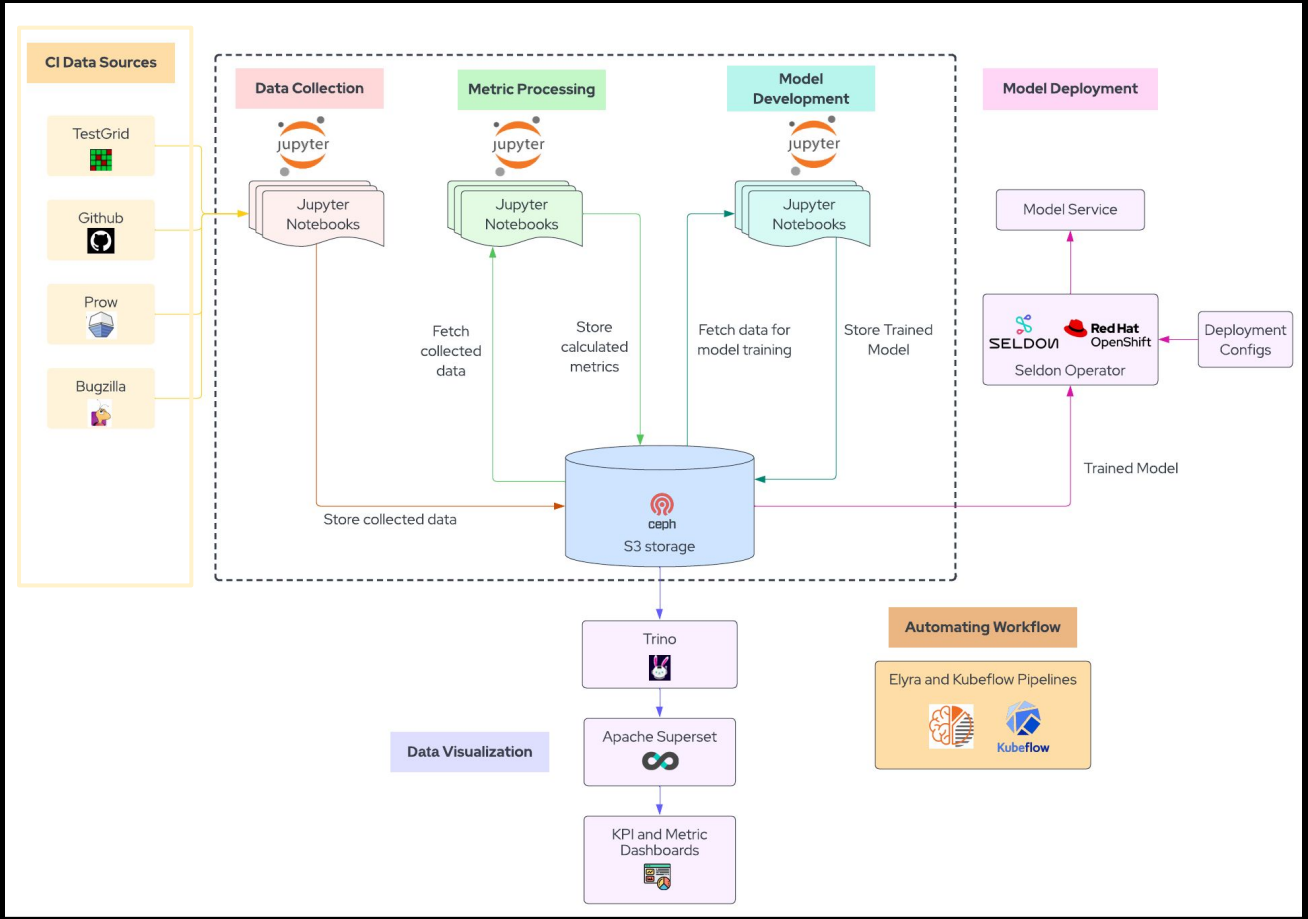

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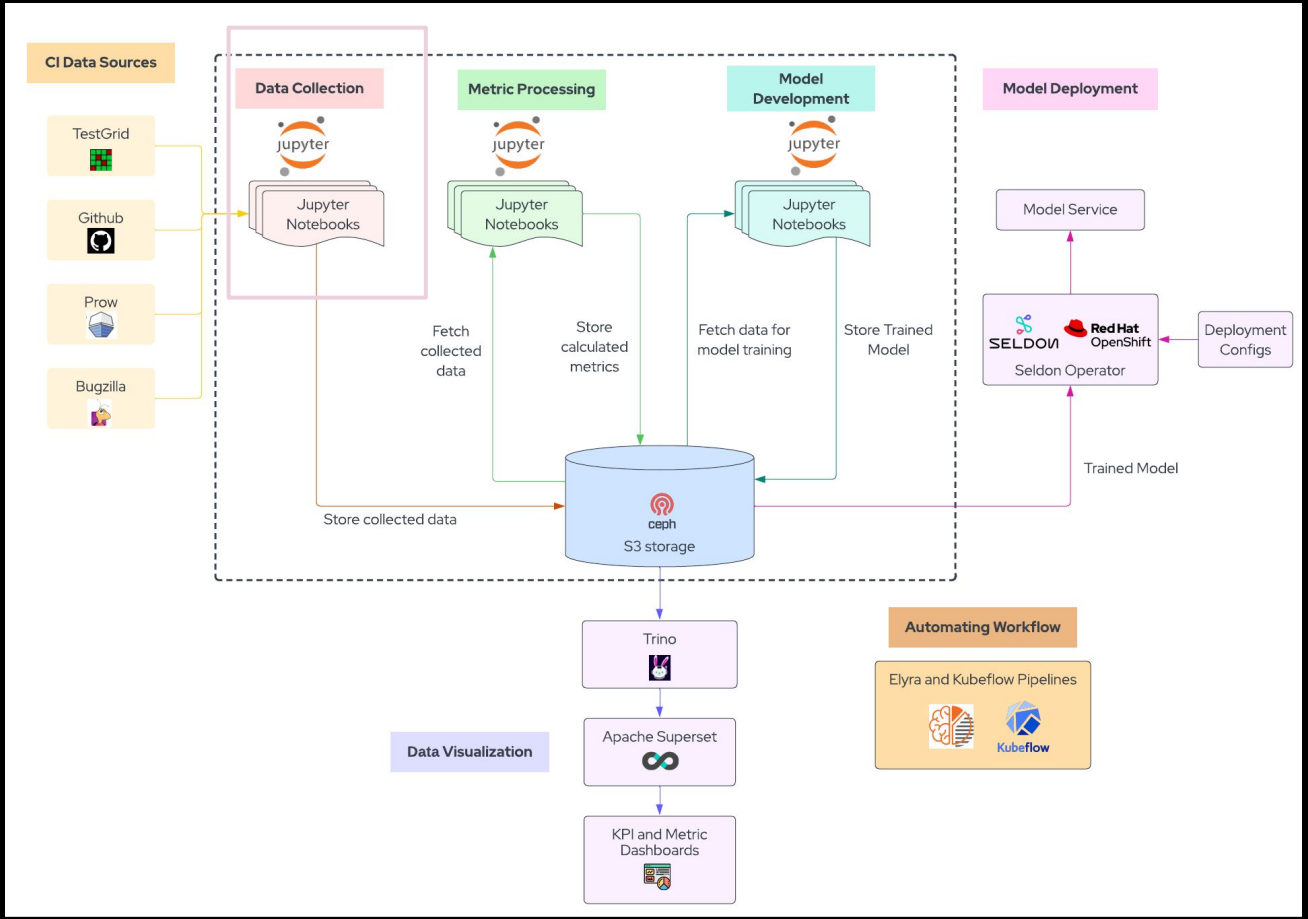

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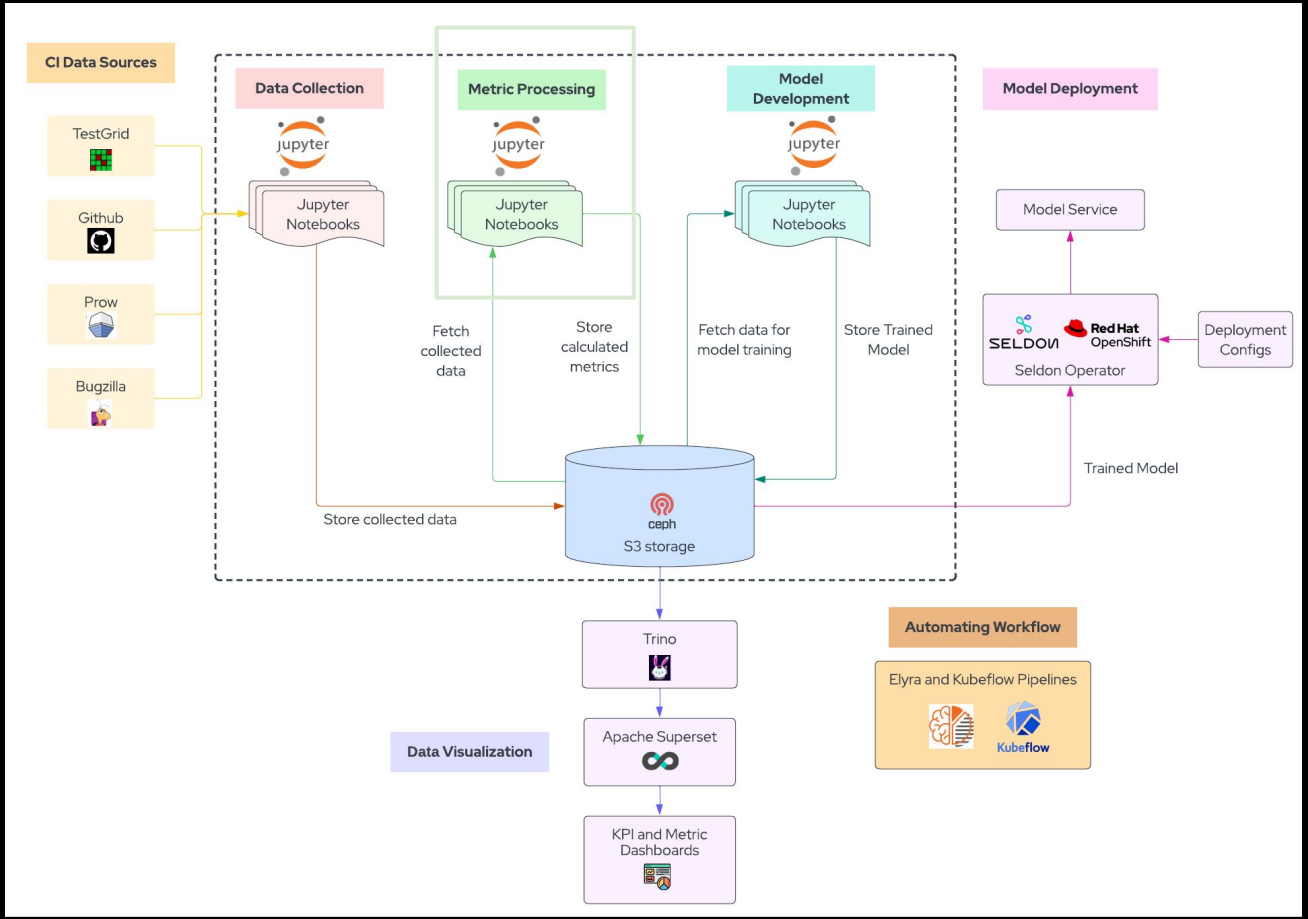

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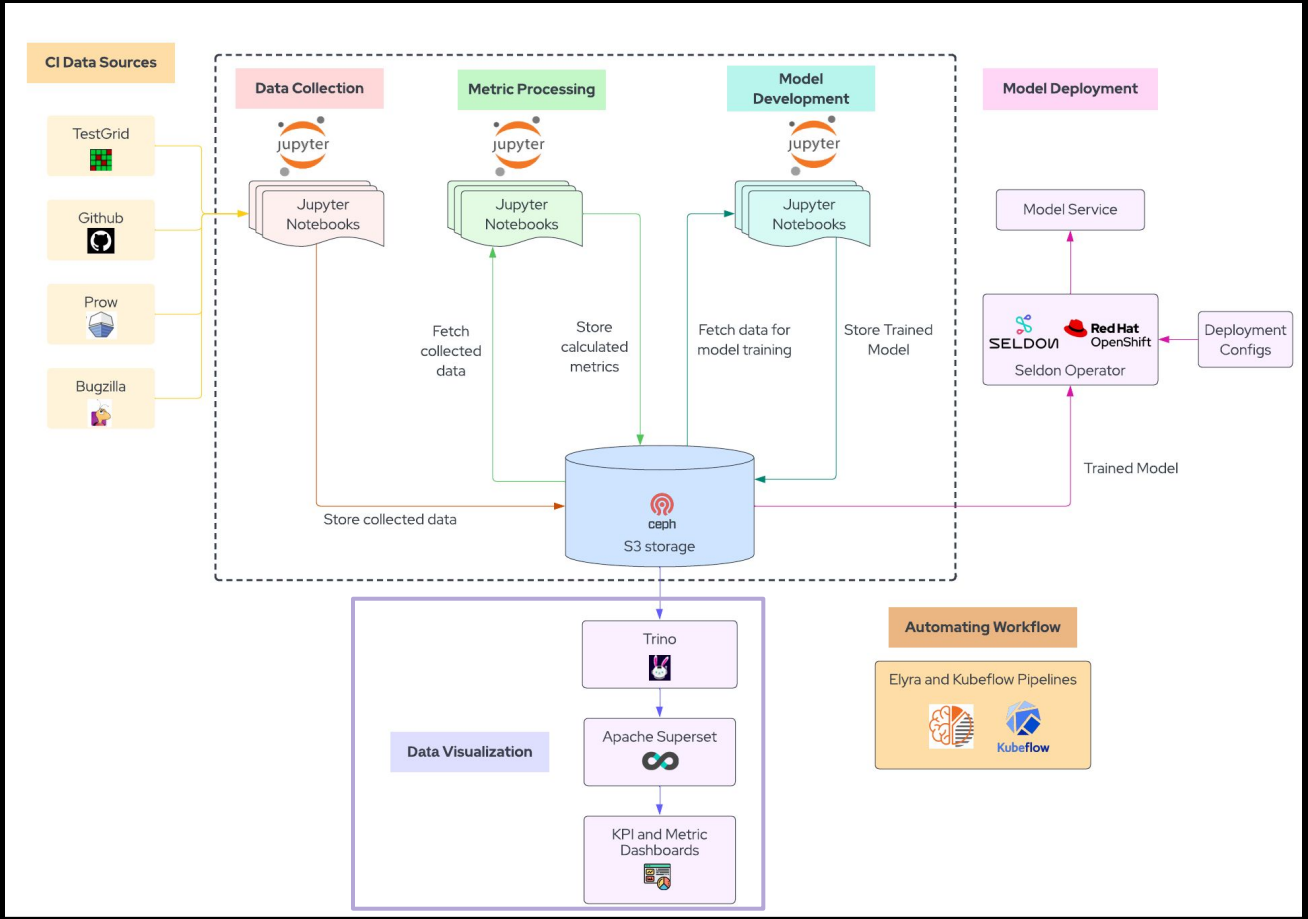

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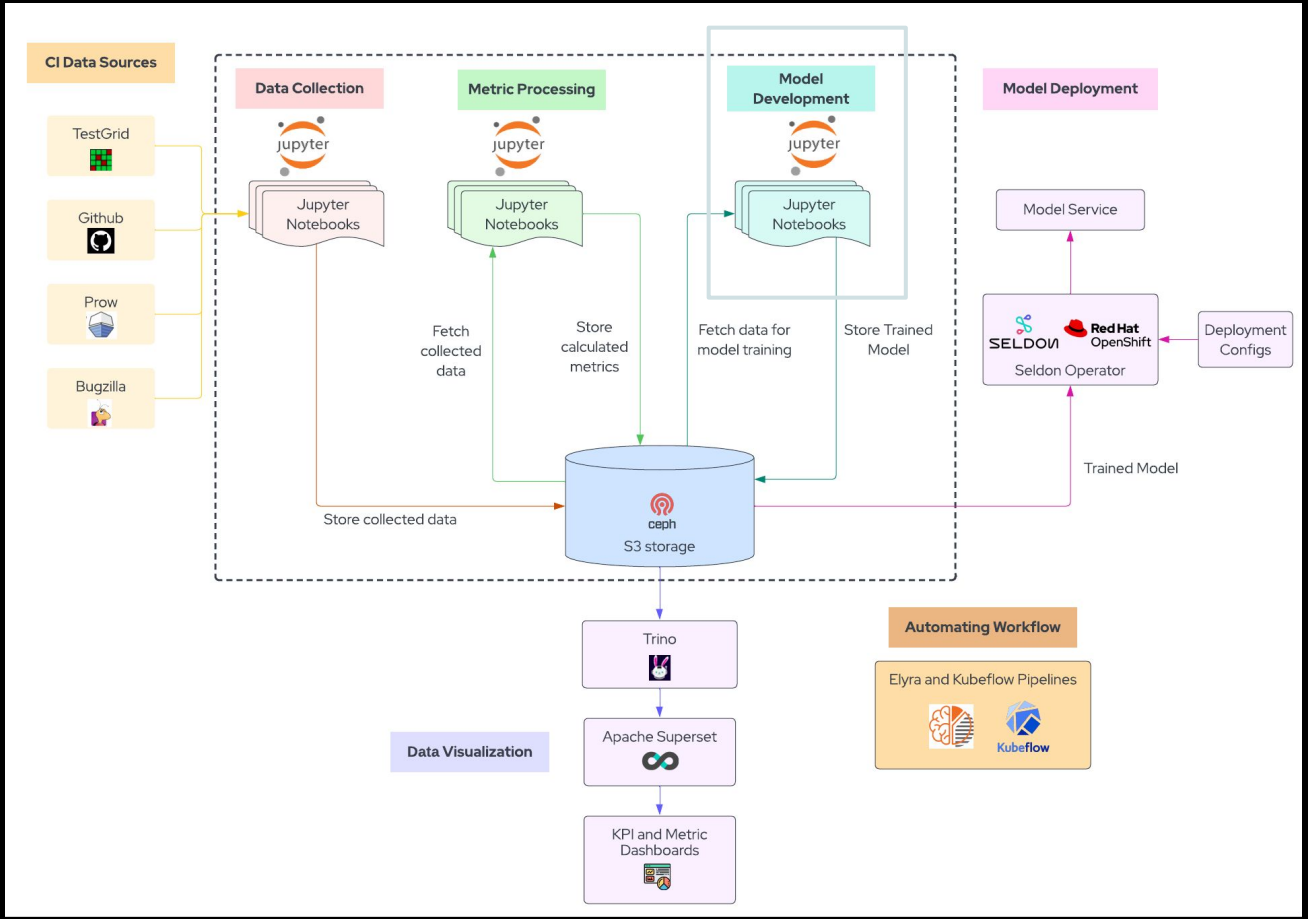

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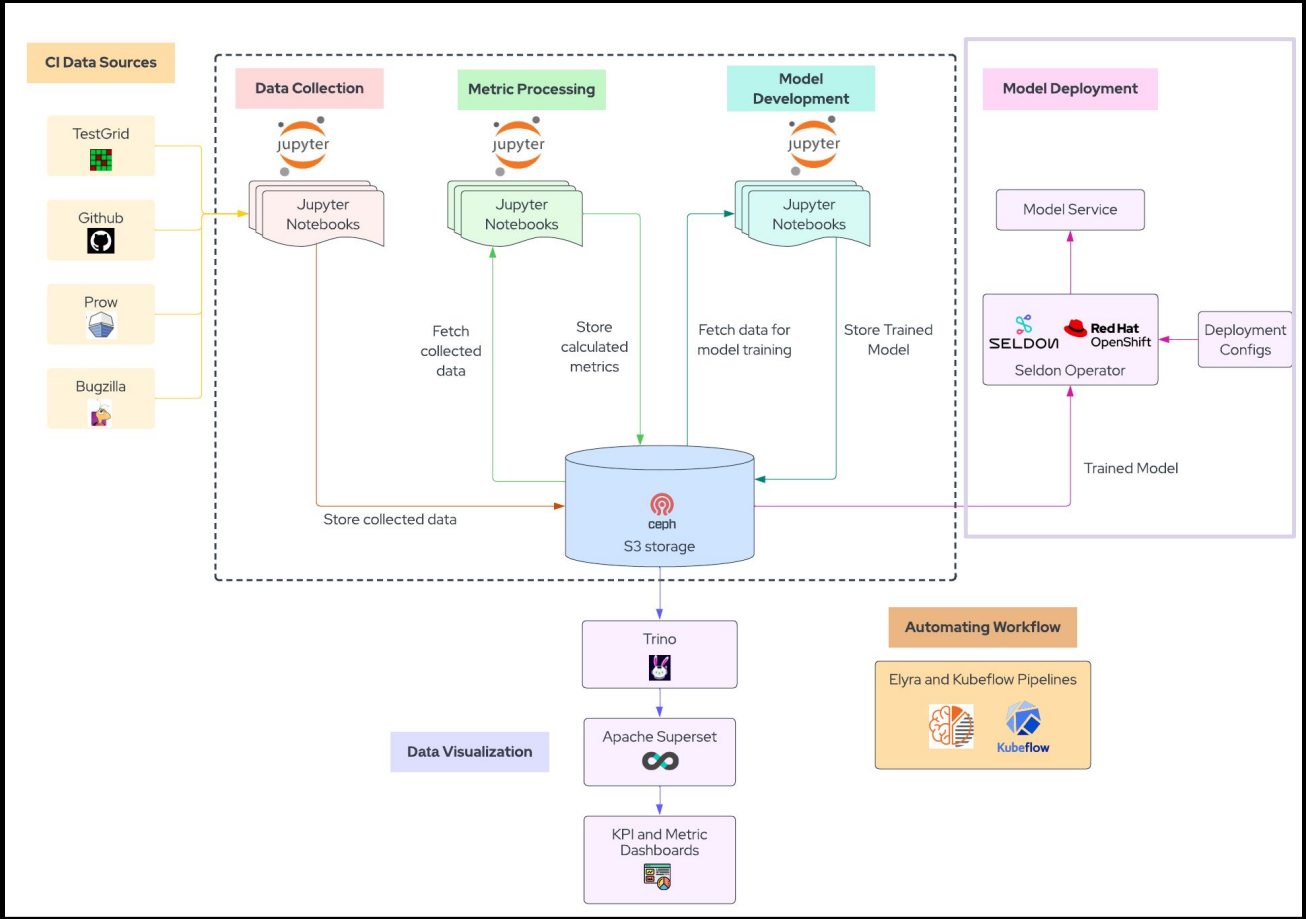

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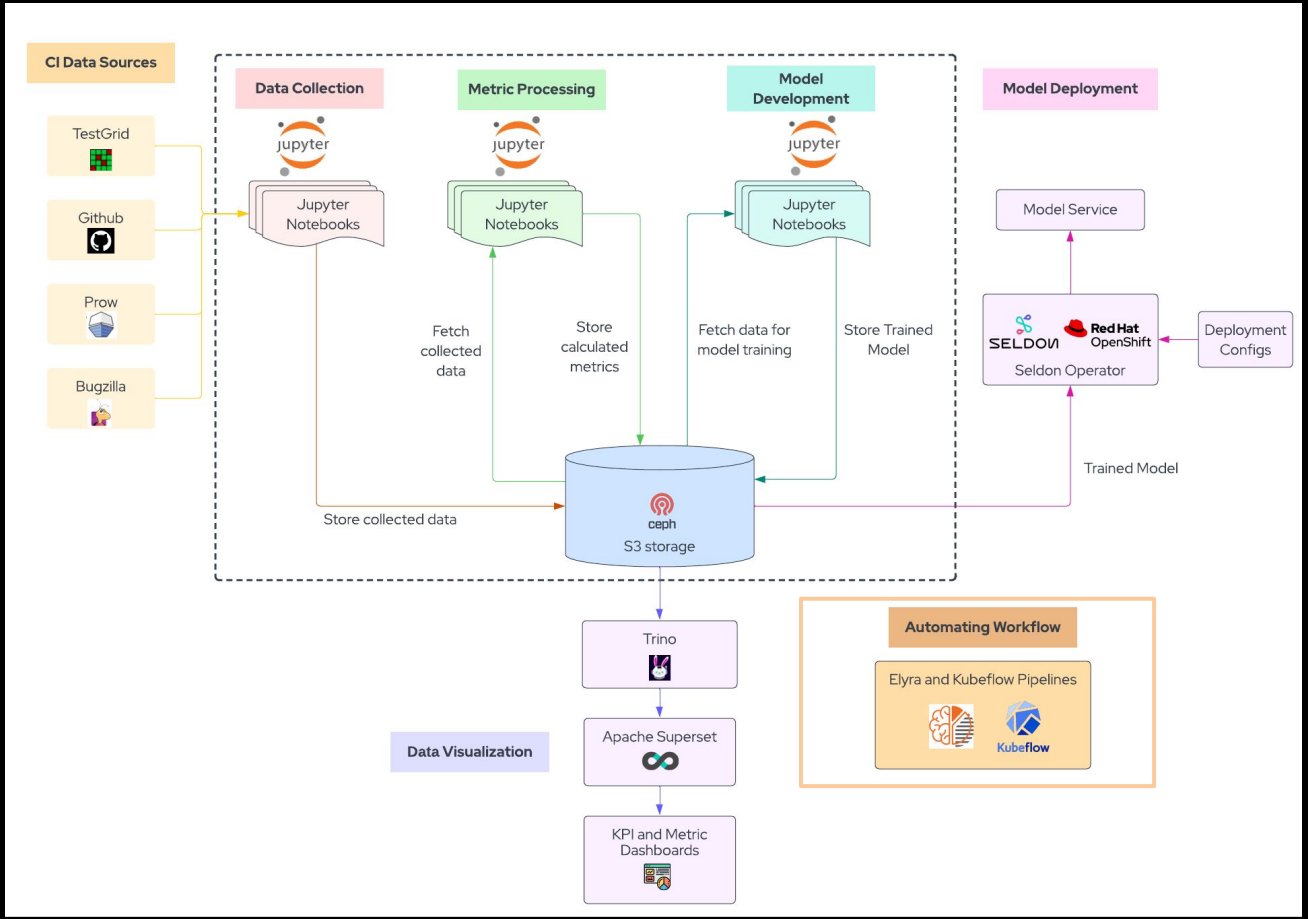

Engage

Get Started

https://github.com/aicoe-aiops/ocp-ci-analysis/blob/master/docs/get-started.md

Open Data Sources | Notebooks | Dashboards | Model Endpoints | Automated Workflows | Video Playlist

https://tinyurl.com/aiforci

Model Interactions

- Feature Engineering notebook: https://www.operate-first.cloud/data-science/ai4ci/notebooks/data-sources/TestGrid/metrics/probability_to_fail.ipynb
- Model training notebook: https://www.operate-first.cloud/data-science/ai4ci/notebooks/optimal-stopping-point/osp_model.ipynb
- Model service deployed as a custom Seldon inference server: http://optimal-stopping-point-ds-ml-workflows-ws.apps.smaug.na.operate-first.cloud/predict
- Model inference notebook: https://www.operate-first.cloud/data-science/ai4ci/notebooks/optimal-stopping-point/model_inference.ipynb

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