AI Center of Excellence
Office of the CTO

Feedback about deployment of an intelligent app

DevConf US 2021

Francesco Murdaca
Senior Data Scientist

Red Hat

Agenda

- Project Thoth
- MLOps relation
- Why, What, When
- How to use it
- Pipeline and results

Project Thoth

Project Thoth

- Help developers in the selection of dependencies for their applications depending on their requirements
- Deliver optimized images for your applications
- Use bots to automate mundane work to offload humans work

How Thoth can help developers?

- Keep dependencies up to date.
- Maintain software stack secure avoiding CVE.
- Recommend the most performant software stacks for AI Apps.
- Integrate source metadata information related to the packages used in the software stack to give advice to users.
- Integrate Thoth in day-to-day developers/data scientists tools.
- ...

Thoth Integrations

- Command line tool thamos (developer laptop)
- Jupyter Tools (data scientist browser)
- Cyborg Kebechet (pull request/issues creator)
- Source-to-Image (container builder)
- Optimizing Deployment Pipeline

```
host: {THOTH_SERVICE_HOST}
tls_verify: true
requirements_format: {requirements_format}

runtime_environments:
  - name: '{os_name}:{os_version}'
    operating_system:
      name: {os_name}
      version: '{os_version}'
    hardware:
      cpu_family: {cpu_family}
      cpu_model: {cpu_model}
    python_version: '{python_version}'
    cuda_version: {cuda_version}
    recommendation_type: stable
    platform: '{platform}'
```

MLOps relation

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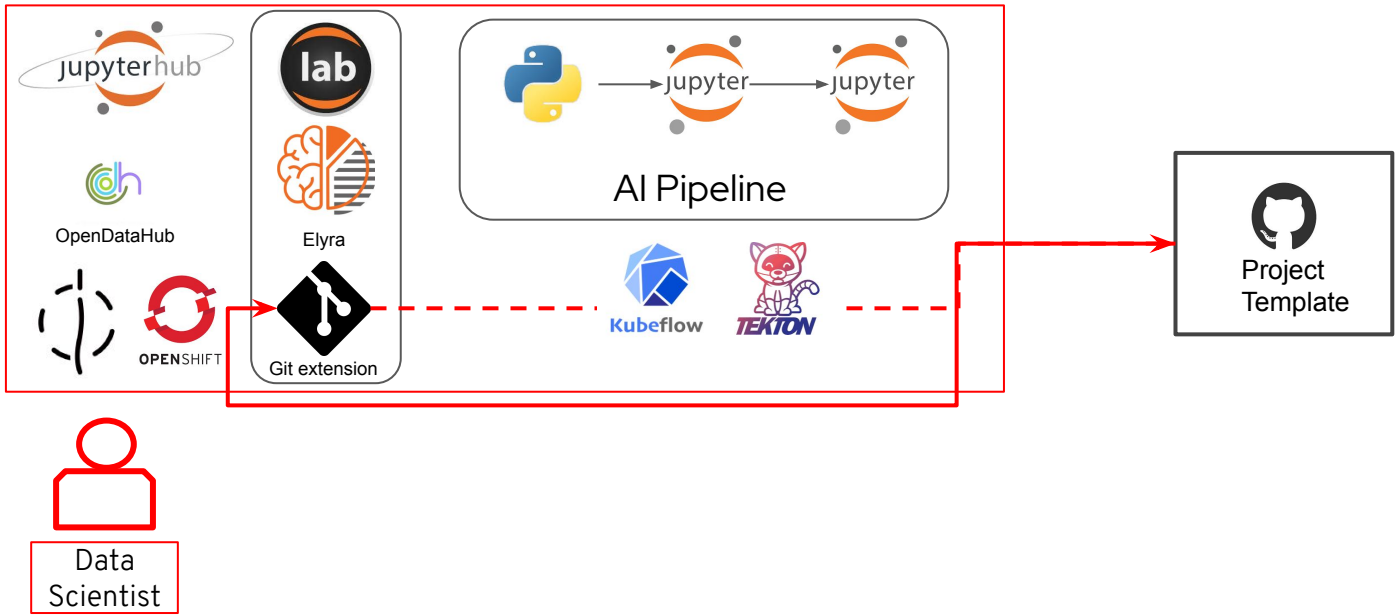

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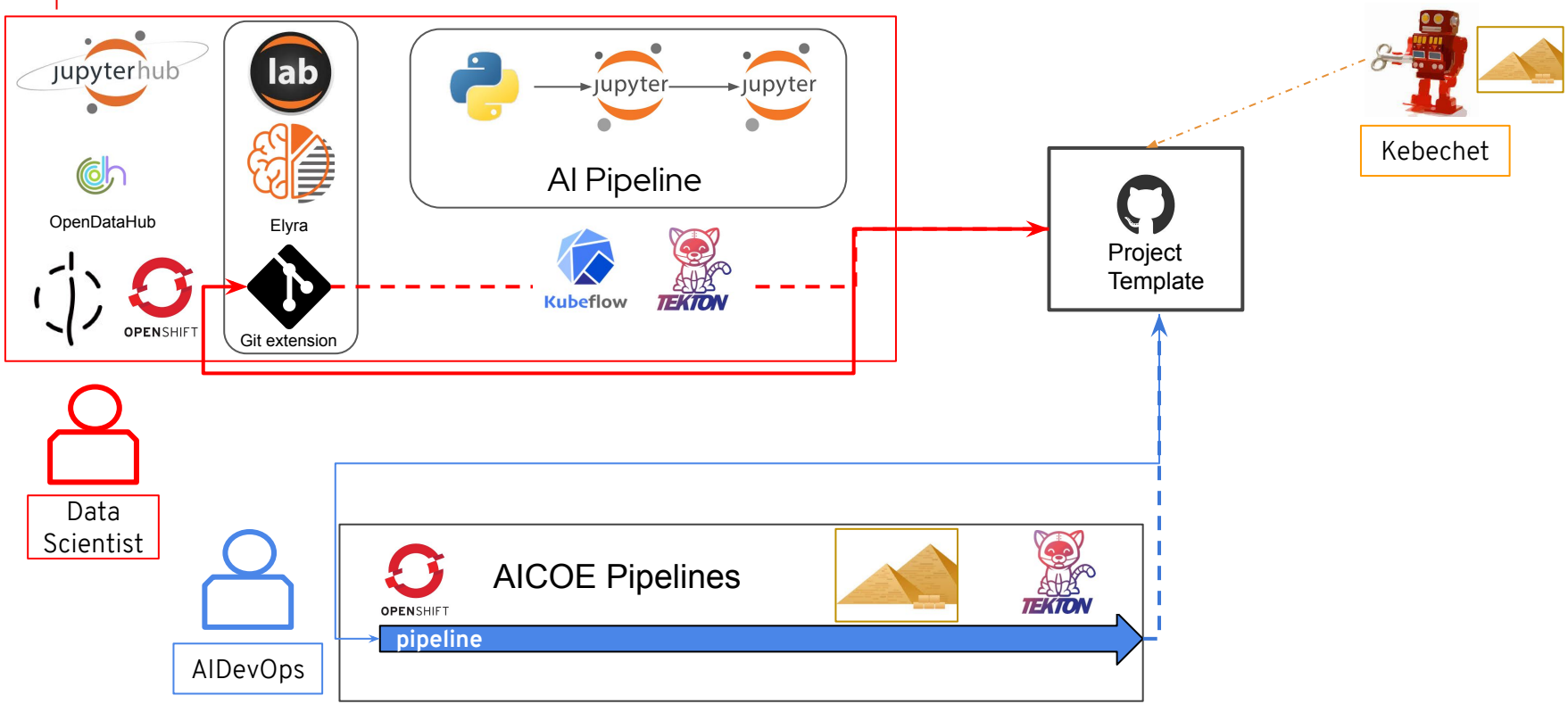

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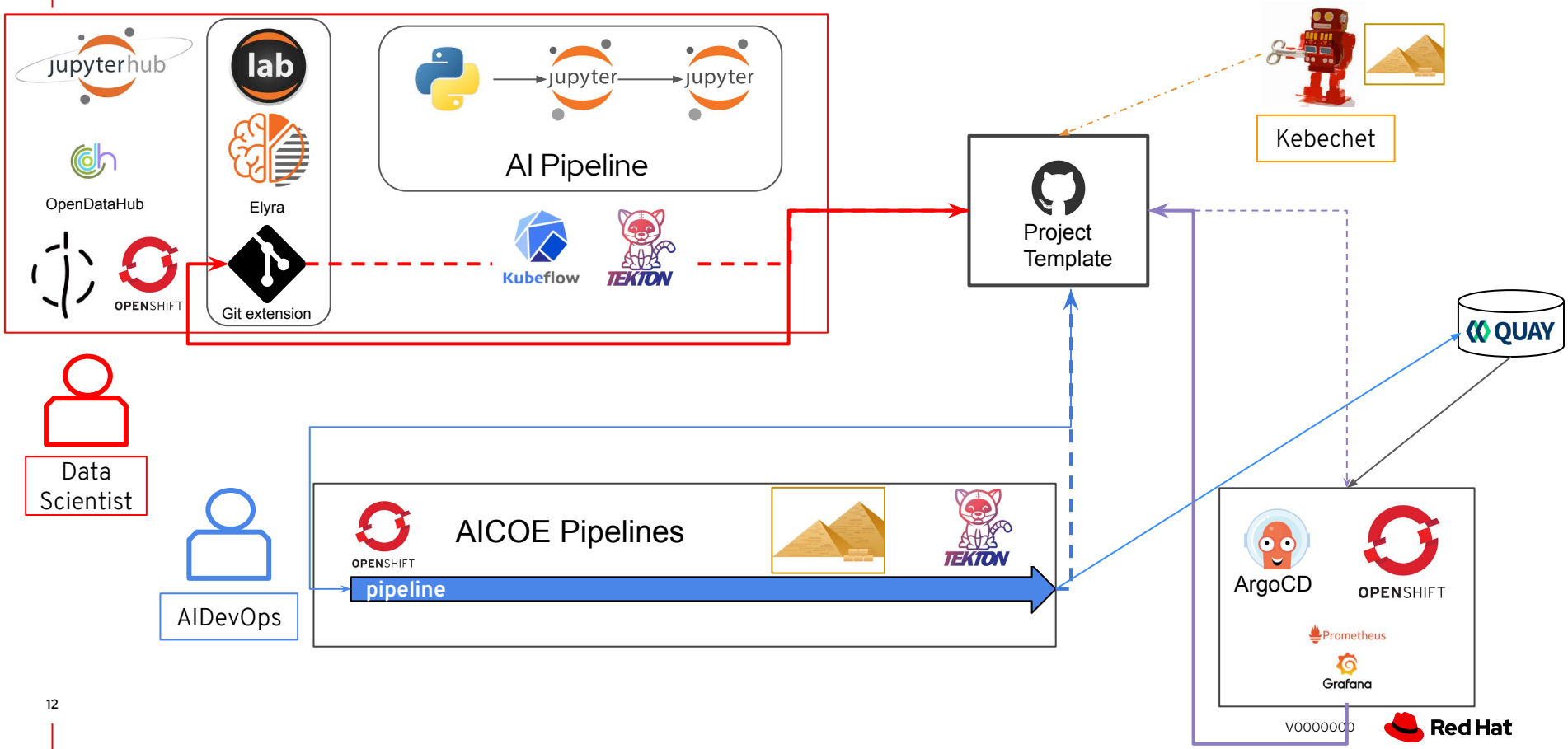

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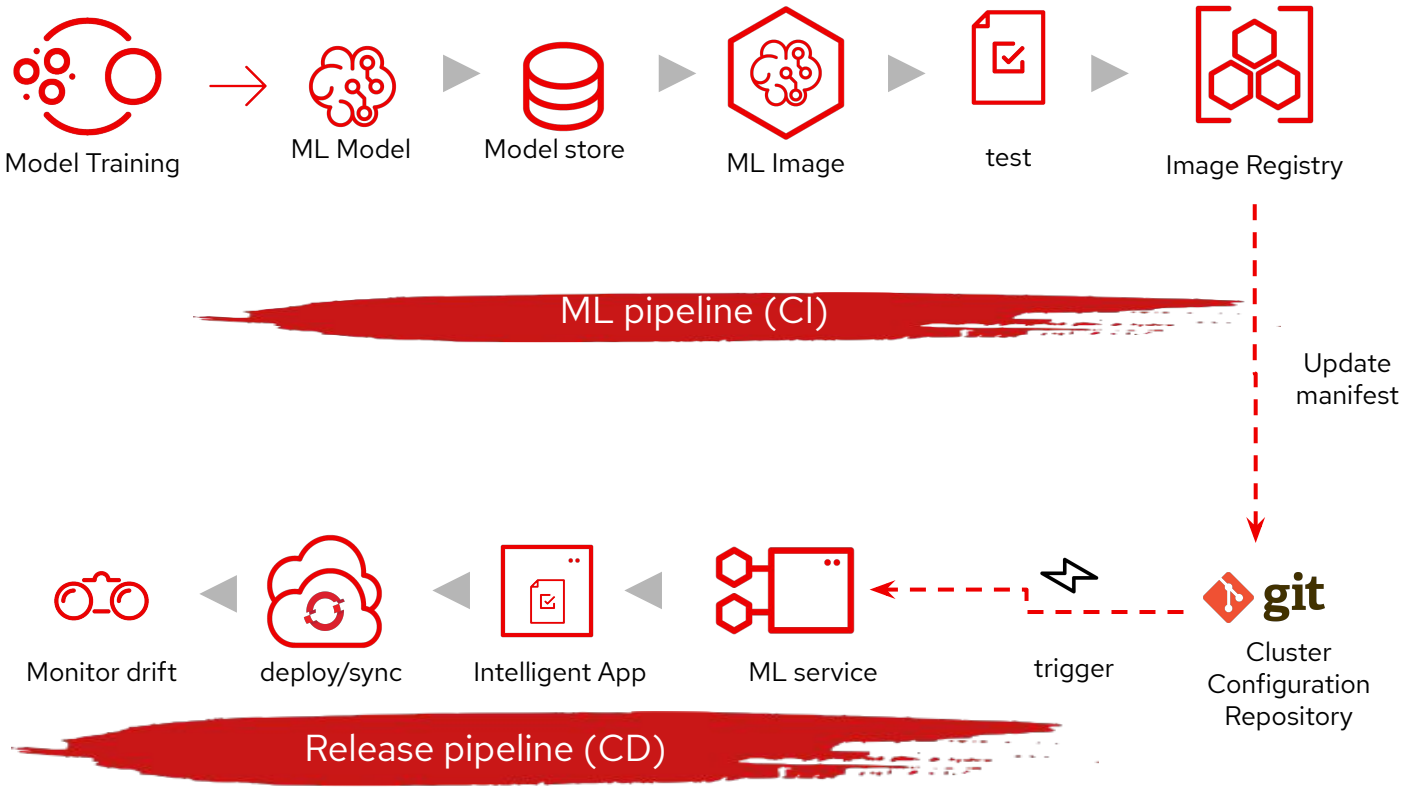

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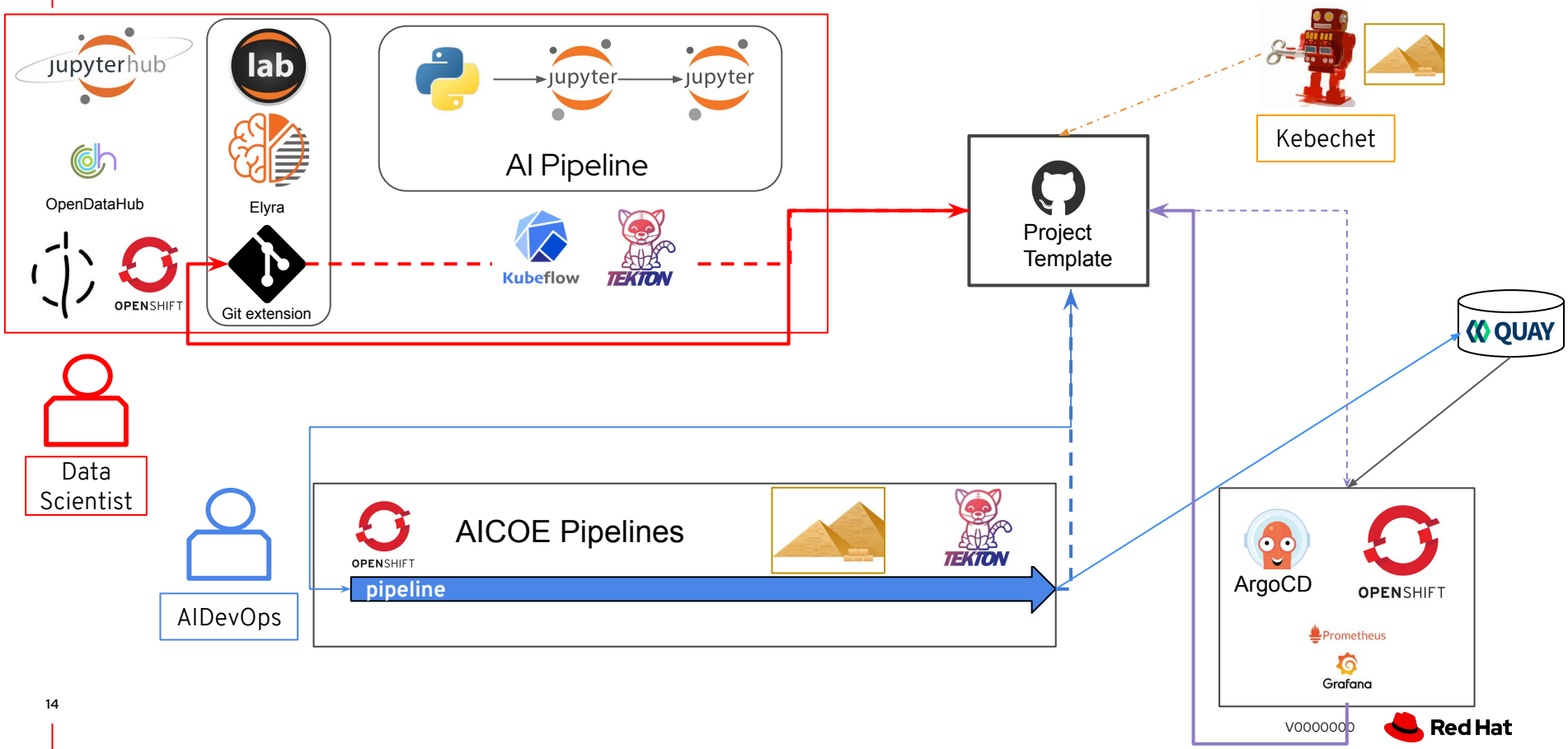

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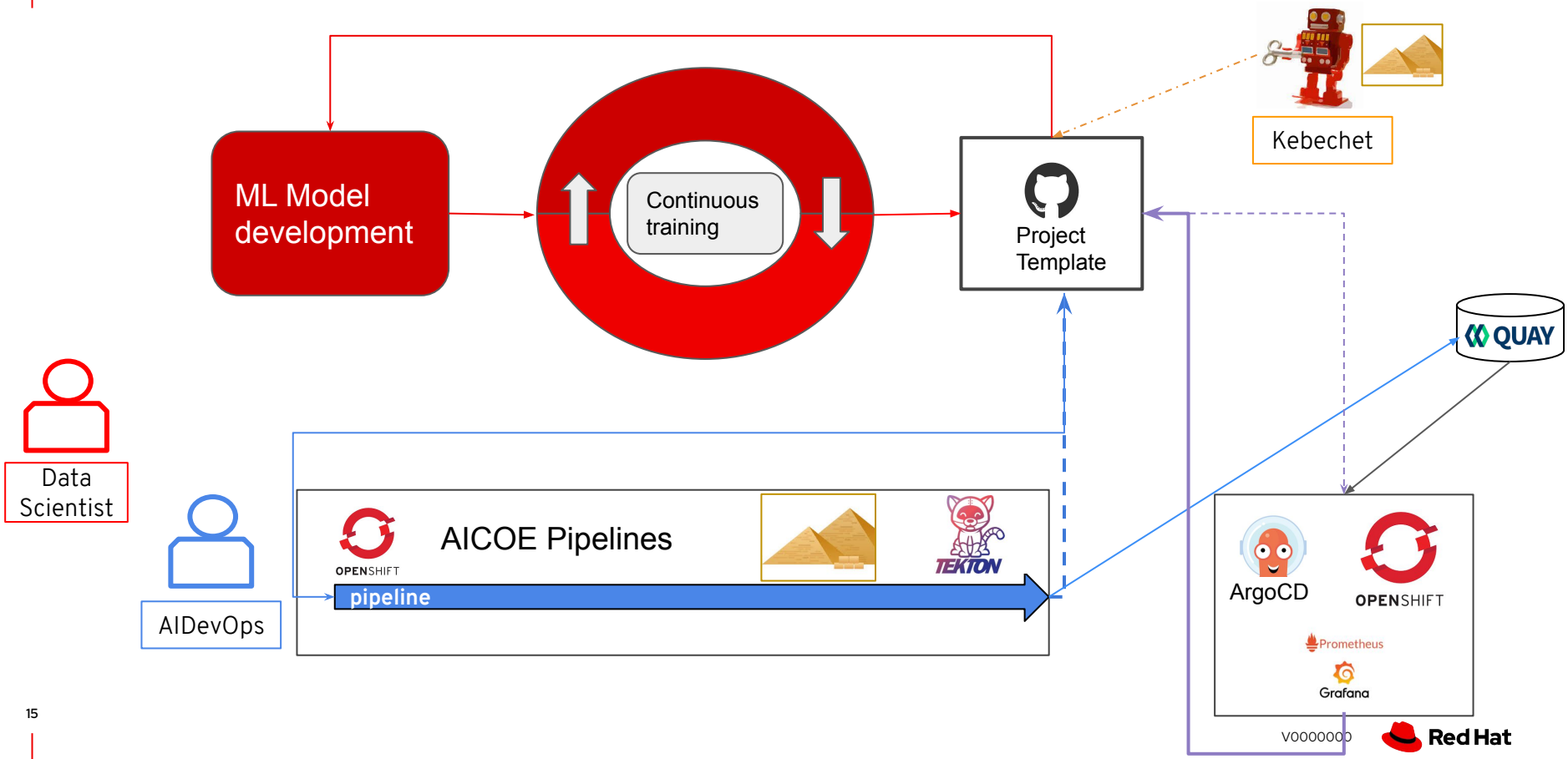

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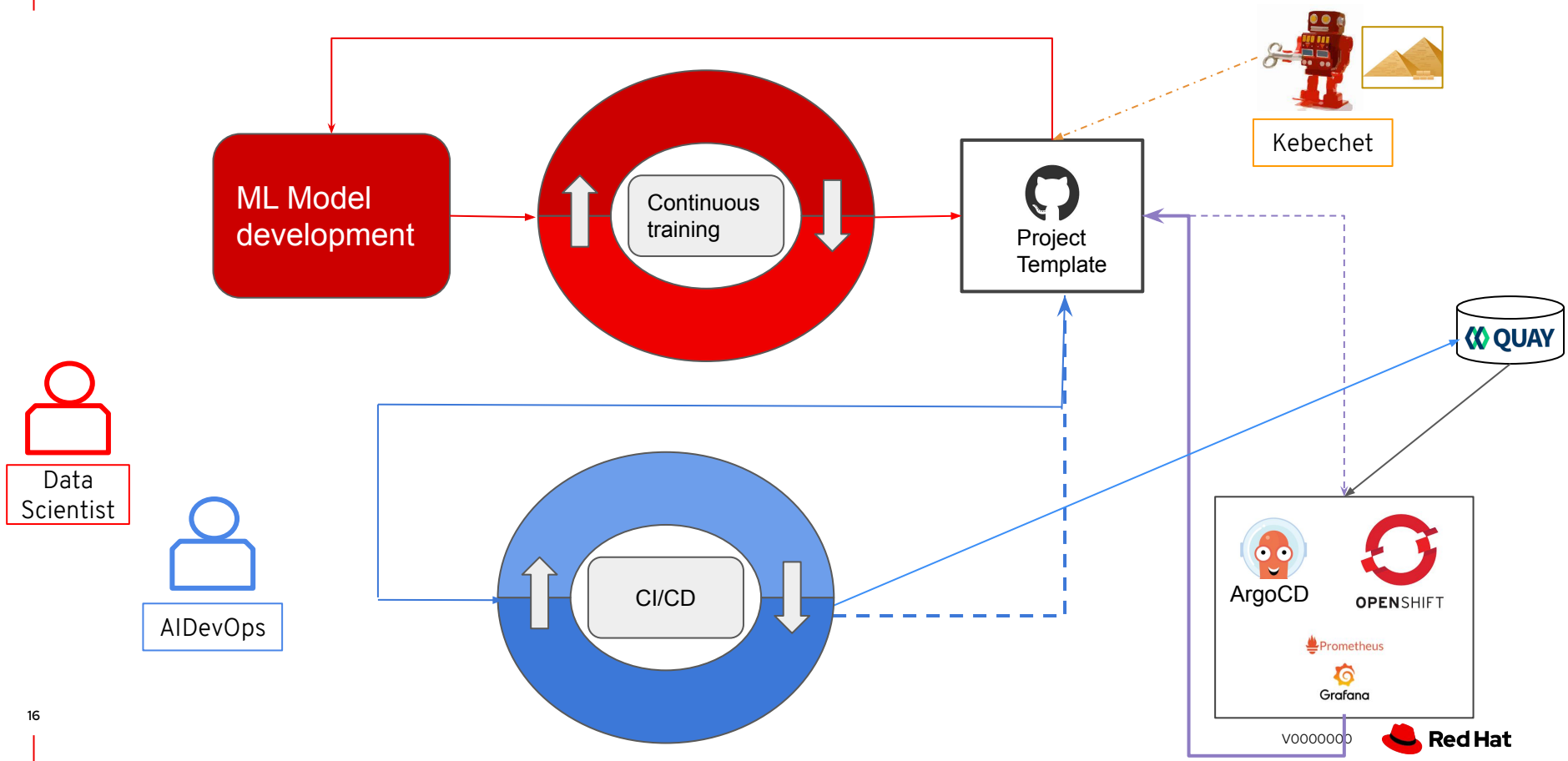

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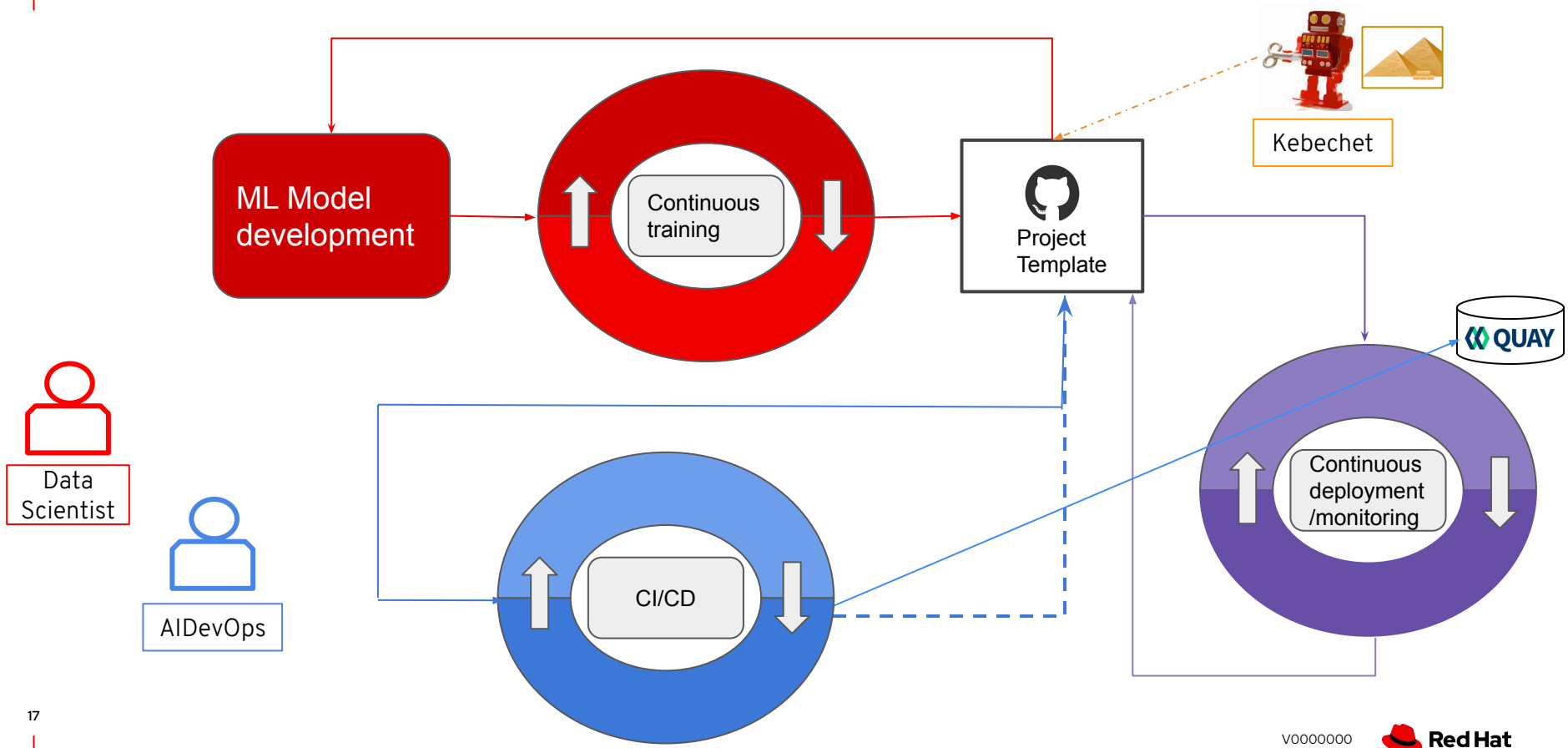

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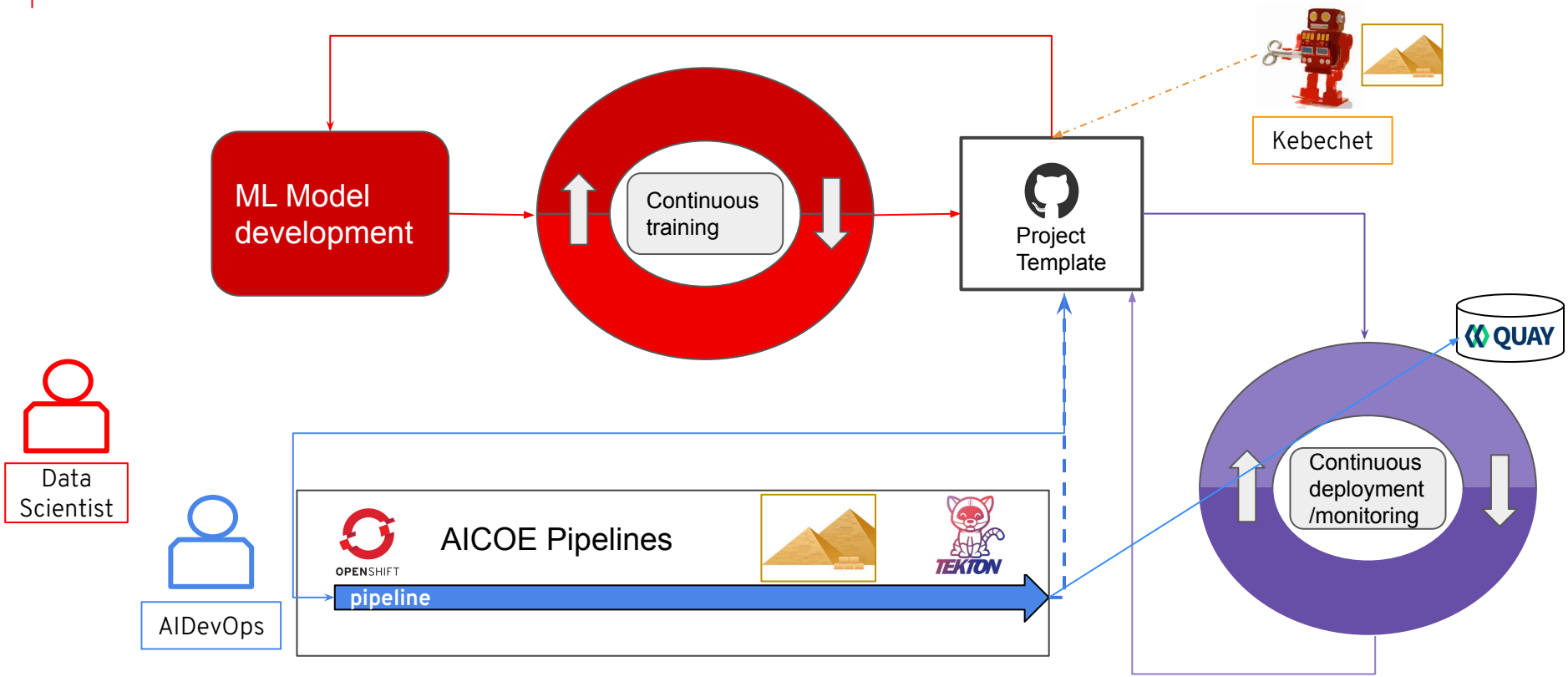

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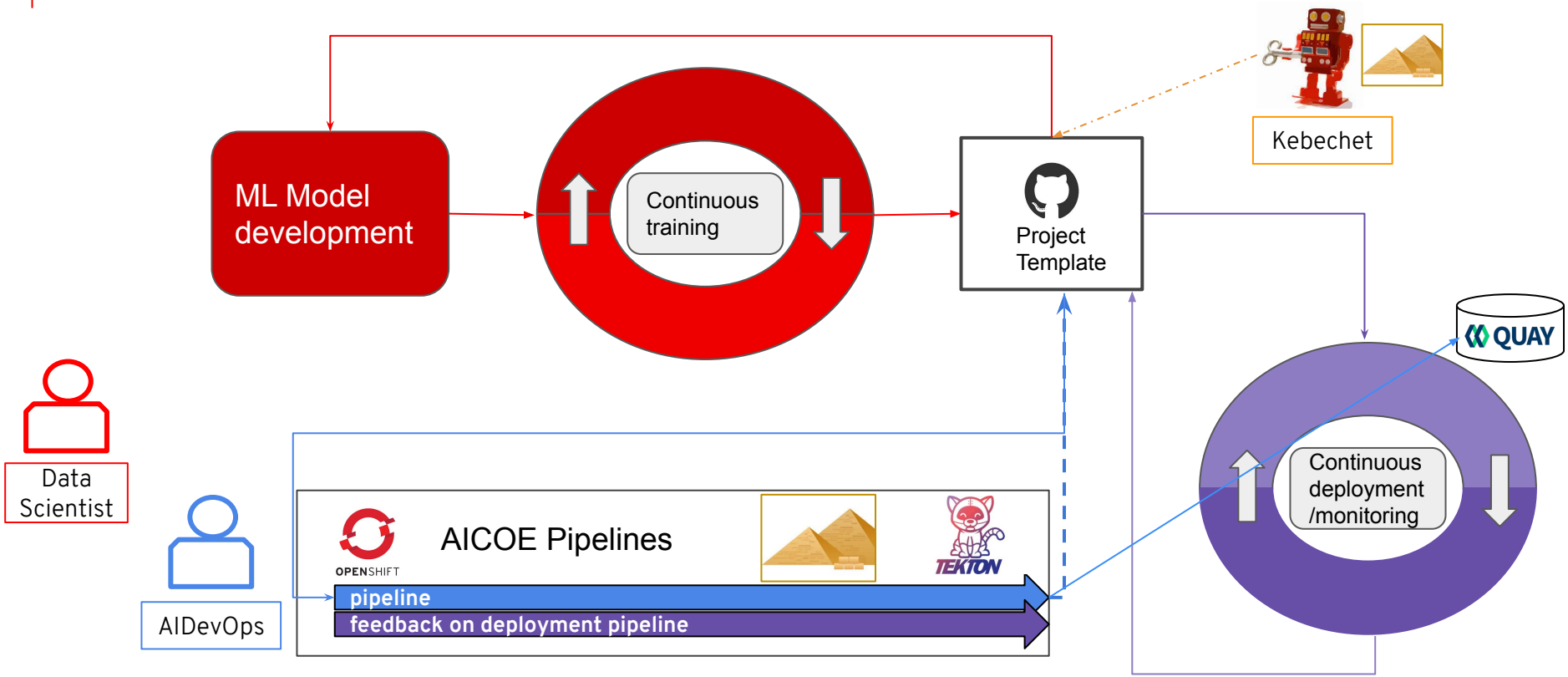

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Why, What, When

Why feedback?

- App lifecycle is not static
- Speed up process
- Focus on modeling and data
- Reduce cost

What feedback?

- Model metrics
- Application metrics
- Platform Metrics

Personas that benefit from the feedback?

- AIDevOps wants to know operational information (latency, memory consumption, CPU usage)
- Data Scientist wants to verify model created is still performing well in production environment

When giving feedback?

- When a new software stack is created
- When a new model version is created
- When a new dataset version is created

How to use it?

What do you need?

- AICoE-CI
- Khebut Bot
- Model to be deployed
- Test to collect metrics

AICoE CI

GitHub App

aicoe-ci

This is the Continuous Integration Cyborg maintained by Thoth Station.

Configure

Manage your installation settings.

Developer

AICoE

Website

aicoe-ci is provided by a third-party and is governed by separate terms of service, privacy policy, and support documentation.

Report abuse

Source: https://github.com/AICoE/elyra-aidevsecops-tutorial/blob/master/docs/source/build-images.md

AICoE CI

```
33
34    - name: inference
35      build:
36        base-image: "quay.io/thoth-station/s2i-thoth-ubi8-py38:v0.28.0"
37        build-stratergy: Source
38        registry: quay.io
39        registry-org: thoth-station
40        registry-project: elyra-aidevsecops-tutorial
41        registry-secret: thoth-station-thoth-pusher-secret
42      deploy:
43        project-org: "thoth-station"
44        project-name: "elyra-aidevsecops-tutorial"
45        image-name: "elyra-aidevsecops-tutorial"
46        overlay-contextpath: "manifests/overlays/test/imagestreamtag.yaml"
```


Source: https://github.com/AICoE/elyra-aidevsecops-tutorial/blob/master/docs/source/build-images.md

Deployments

- **Flask Application**
- KFServing
- Seldon
- TensoRT

Source: https://github.com/AICoE/elyra-aidevsecops-tutorial/blob/master/docs/source/deploy-model.md

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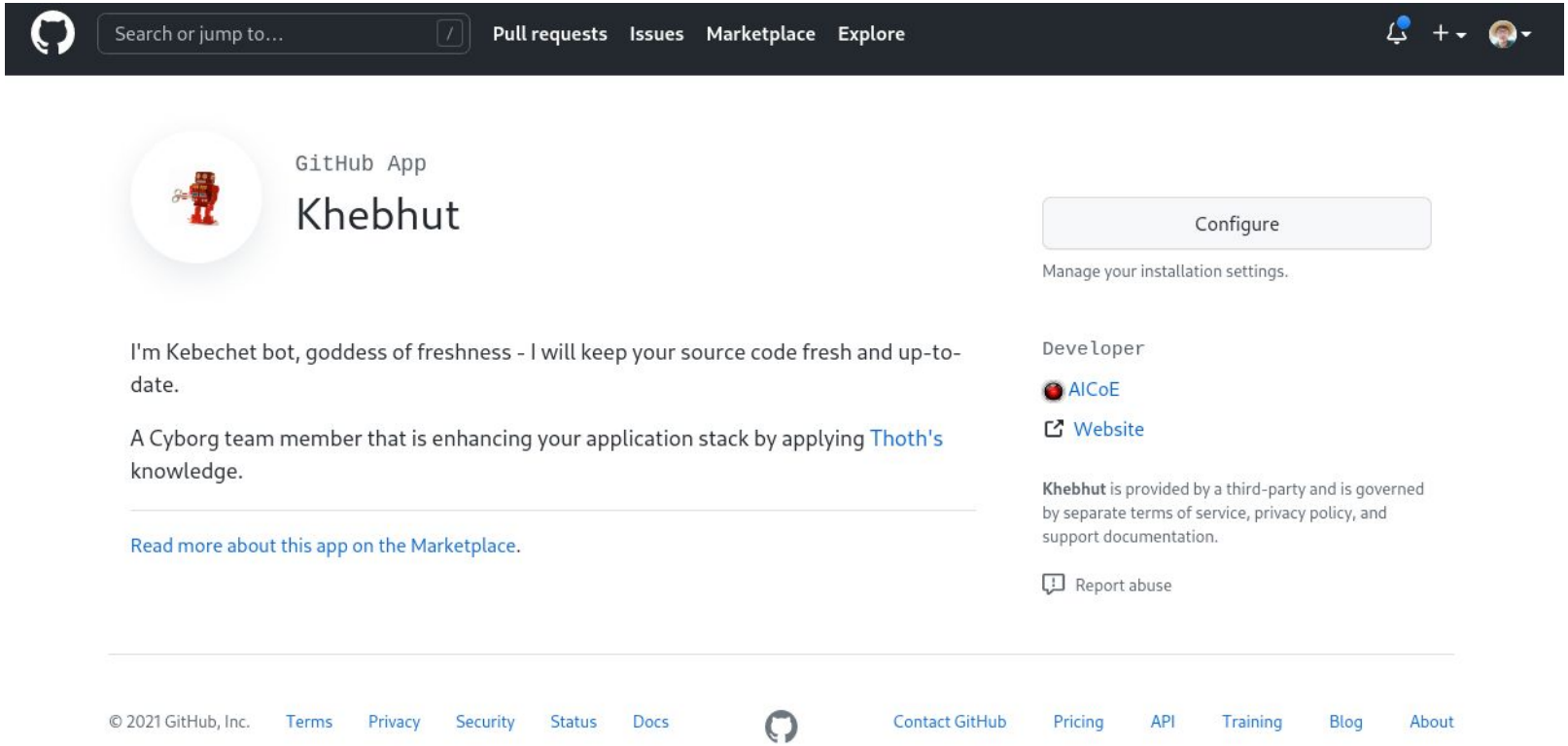

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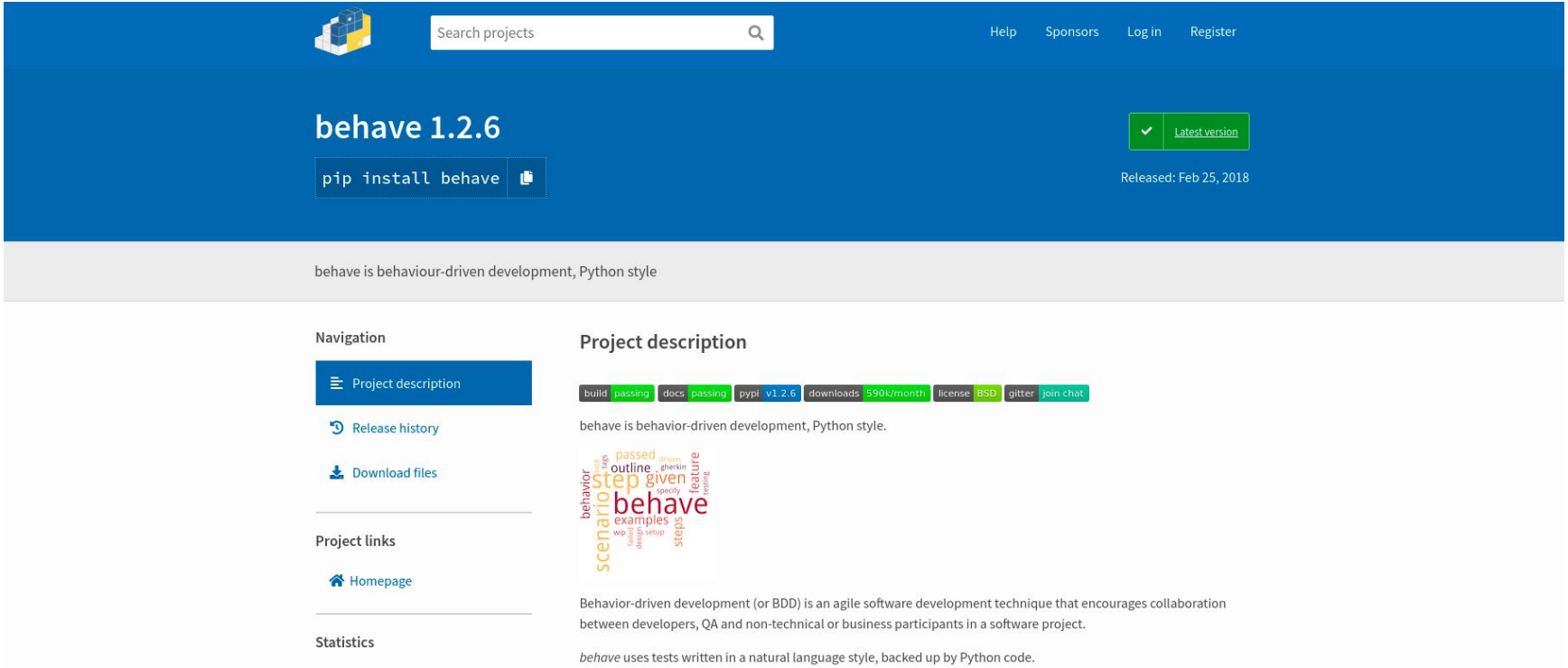
behave



behave uses tests written in a natural language style, backed up by Python code.

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6 lines (6 sloc) | 274 Bytes

```
Feature: Gather metrics deployed model
    Scenario: Deployment metrics gathering
        Given dataset is available
        Given deployment is accessible
        When I run test to gather metrics on predict endpoint
        Then I should get model and application metrics
```


Source: https://github.com/AICoE/elyra-aidevsecops-tutorial/blob/master/docs/source/test-model.md

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```python
@given("dataset is available")
def dataset_availability(context):
    """Check availability of dataset and retrieves it."""
    # Prepare MNIST data.
    _, (x_test, y_test) = tf_dataset.load_data()

    context.dataset = {
        "x_test": x_test,
        "y_test": y_test,
    }

    assert context.dataset


@given("deployment is accessible")
def deployment_accessible(context):
    """Check the deployment is accessible."""
    context.result = {}

    context.model_api_url = os.environ["DEPLOYED_MODEL_URL"]

    response = requests.get(f"{context.model_api_url}")

    assert (
        response.status_code == 200
    ), f"Invalid response when accessing {context.model_api_url}: {response.status_code!r}: {response.text}"

    assert response.text, f"Empty response from server for {context.model_api_url}"
```


Source: https://github.com/AICoE/elyra-aidevsecops-tutorial/blob/master/docs/source/test-model.md

Pipeline and results

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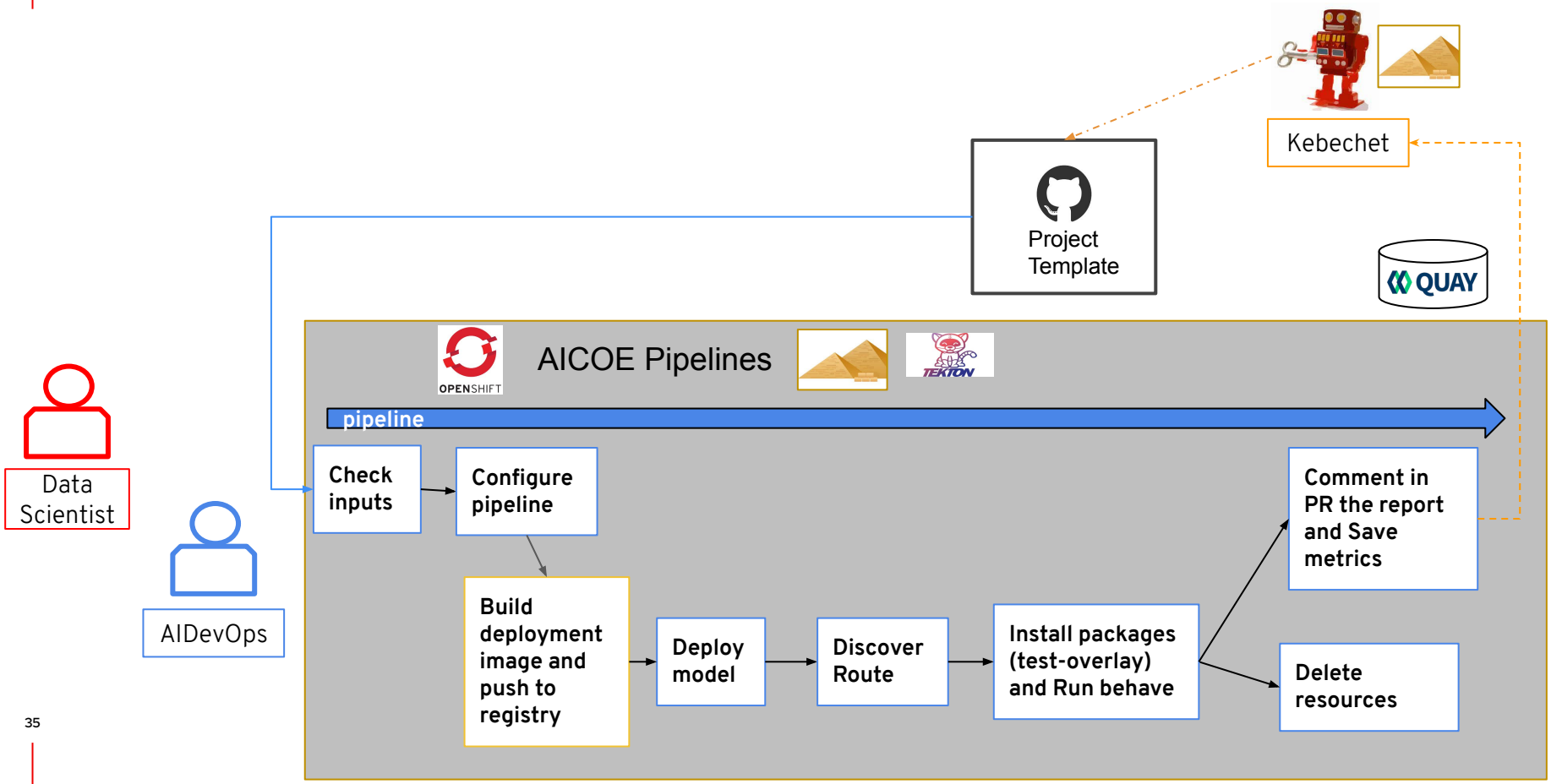

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sesheta commented 1 hour ago — Member

AICoE CI results

Test inputs

The following table shows info about test used to gather metrics.

test URL	namespace deployment
https://github.com/AICoE/elyra-aidevsecops-tutorial/blob/e882fa5d4534aa0ec1909911665d1b05dab35736/features	aicoe-ci

Model and application metrics

The following table shows gathered metrics for model and application on your deployed models.

average_latency	average_error	average_probability	number_requests	model_version
0.118086	0	0.999916	21	pr-160

Platform metrics

The following table shows gathered metrics from platform on your deployed models.

CPU max usage	Memory max usage
1	384Mi

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- **Thoth station**
  - https://thoth-station.ninja/
- **AICoE CI**
  - https://github.com/aicoe/aicoe-ci
- **Khebut**
  - https://github.com/apps/khebhut
- **Thoth YouTube**
  - https://www.youtube.com/channel/UCIUIDuq_hQ6vlzmqM59B2Lw
- **Operate First**
  - https://www.operate-first.cloud/

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