AI4CI
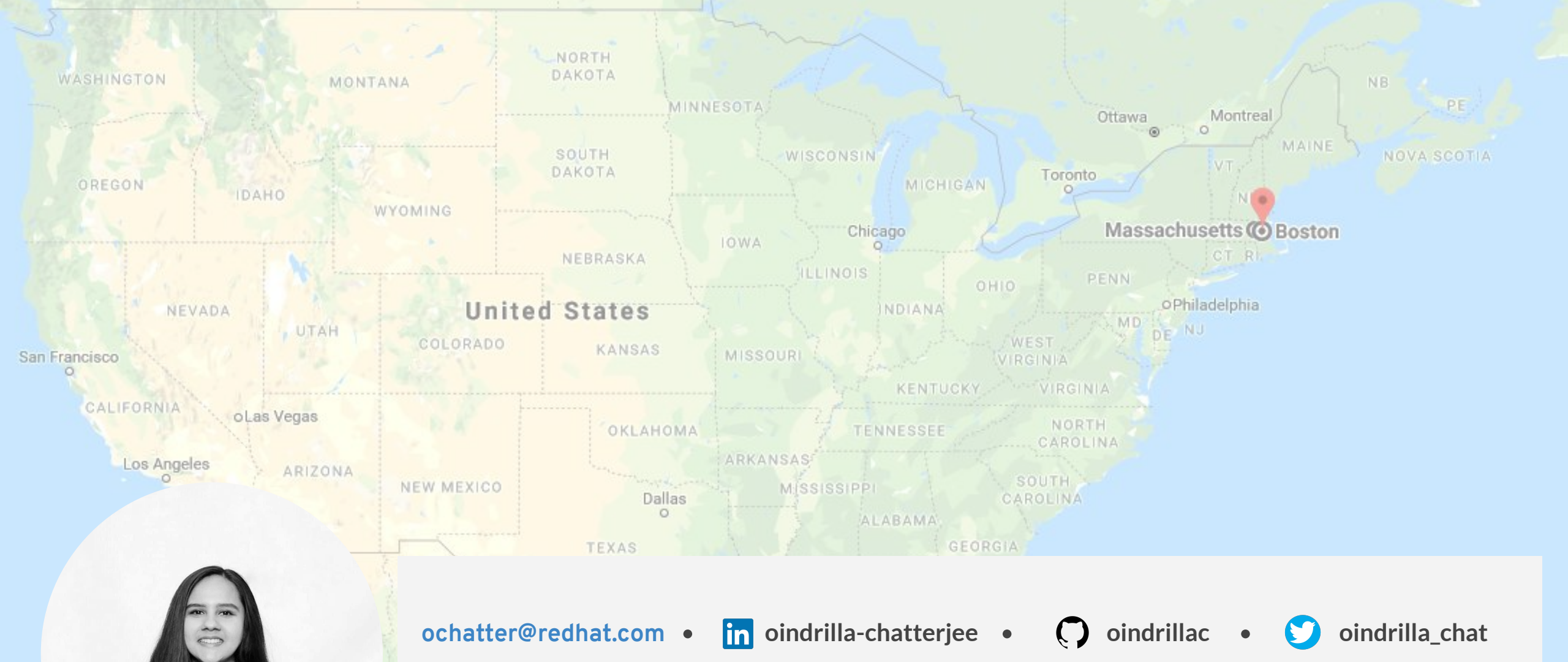
AI for Continuous Integration

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Data Scientist at **Office of the CTO** | **AI Center of Excellence** | 🔴 **Red Hat** 📍 **Boston, United States**

Overview

Overview

➡ **What is AI4CI?**

Operate First Cloud

Dive Into Open Data Sources

      GitHub

      Prow

      TestGrid

Demo

Engage

AIOps

AI + DevOps

Artificial Intelligence for IT Operations

+

Dev & Ops : **DevOps**

AIOps
AI + DevOps

Artificial Intelligence for IT Operations

+

Dev & Ops : **DevOps**

CI/CD
Continuous Integration, Continuous Delivery

Automating stages of app development

AIOps
AI + DevOps

+

CI/CD
Continuous Integration,
Continuous Delivery

=

AI4CI

AI for Continuous Integration

What is AI4CI?

> **Oindrilla Chatterjee** · · ·
> @oindrilla_chat
>
> AI4CI = #AI for #CI = more visibility into builds & intelligent CI/CD monitoring ✅
>
> Translate Tweet
>
> 7:54 PM · 8/29/21 · Twitter for iPhone

Our current initiatives

Our current initiatives
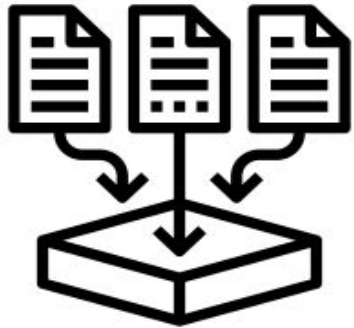
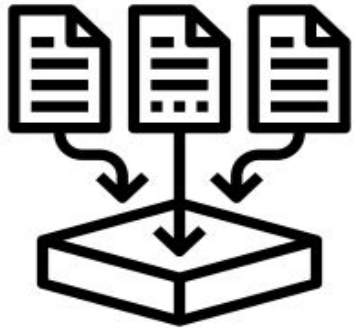Collecting Data

Our current initiatives

Collecting Data **Metrics**

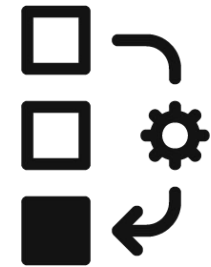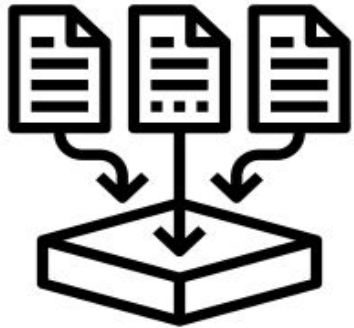# Our current initiatives

| Collecting Data | Metrics | AI/ ML |

Our current initiatives

| Collecting Data | Metrics | AI/ ML | E2E Workflow |

Overview

What is AI4CI?

➡ **Operate First Cloud**

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Operate First

"A concept to incorporate operational experience into software projects."

www.operate-first.cloud

Overview

What is AI4CI?

Operate First Cloud

➡ **Dive Into Open Data Sources**

       GitHub

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Engage
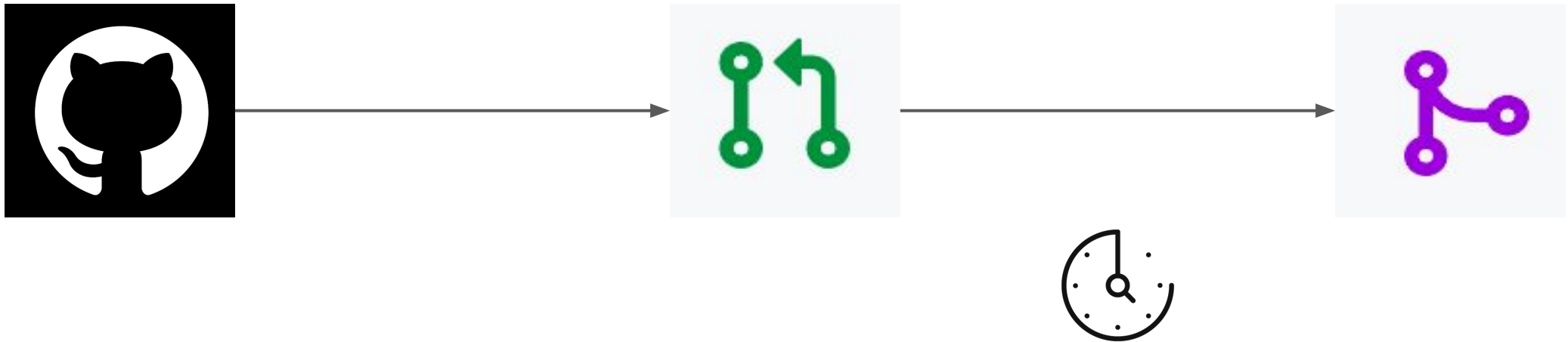
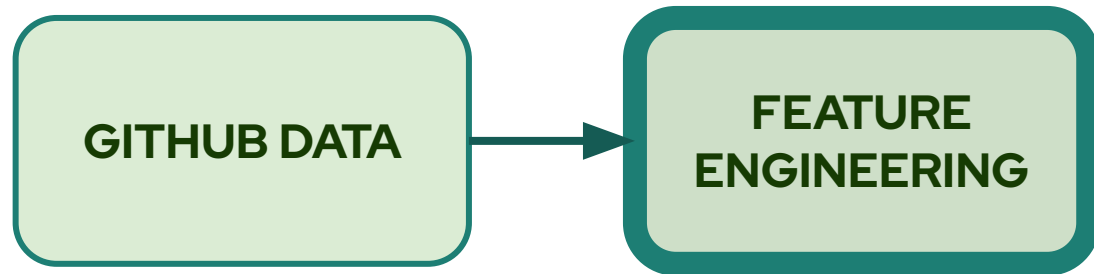# Open Data Sources
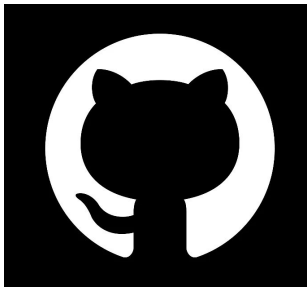
Github

Prow

TestGrid
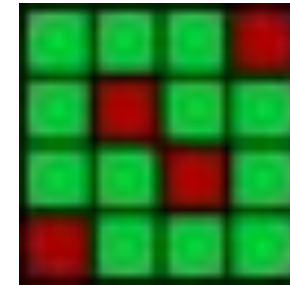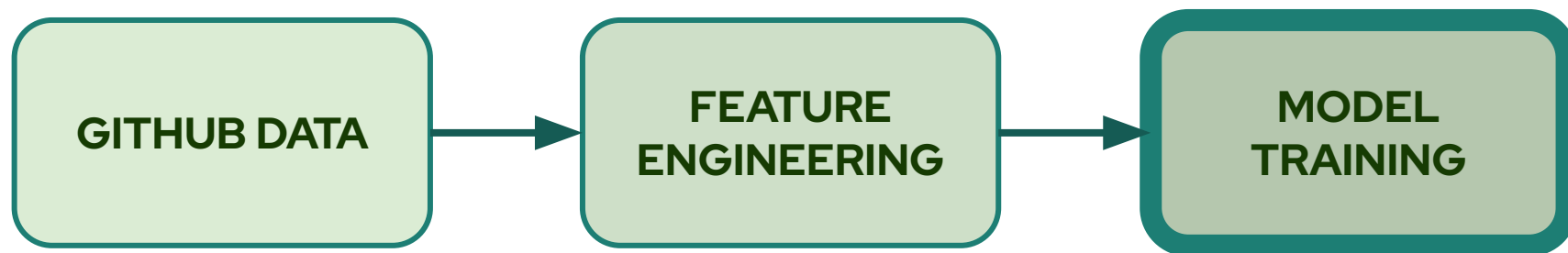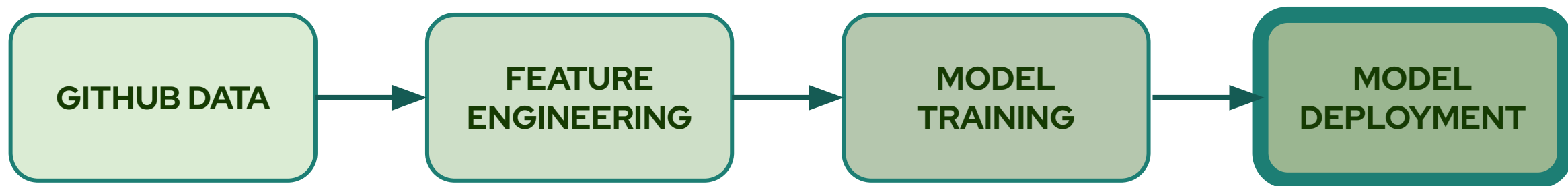
Open Data Sources
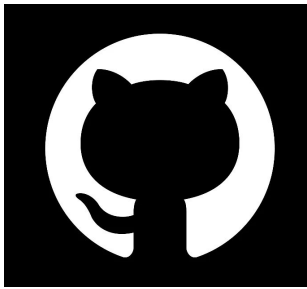
Github

Time to Merge of a PR

GITHUB DATA

openshift / **origin**

```
GITHUB DATA  →  FEATURE
                ENGINEERING

                size of the PR,

                types of files in the PR

                description of the PR
```

GITHUB DATA → FEATURE ENGINEERING → MODEL TRAINING

Naive Bayes

XGBoost

Random Forest

SVM

GITHUB DATA → FEATURE ENGINEERING → MODEL TRAINING → MODEL DEPLOYMENT

SELDON

Open Data Sources

Github

Prow

Prow

Build Logs

Prow

Build Logs

Log Analyses

Prow

Build Logs

Log Analyses

successful builds without provider obfuscation

failures in CI infrastructure (e.g. lack of capacity)

Build failures due to some tests

failures during preparation steps, before tests can be executed

Log Classification

Open Data Sources

Github

Prow

TestGrid

TestGrid

prowjob_name: e2e-kops-aws-distro-imagecentos7 prowjob_config_url: https://git.k8s.io/test-infra/config/jobs/kubernetes/kops/kops-periodics-distros.yaml

08-12 09:51 PDT @1425862280918077440 -- 05-14 17:50 PDT @1393368069975314432; Served 223344 results in 2.74 seconds

| About ▾ | Size ▾ | Options ▾ | Graph ▾ | Local Time: OFF | Display Clustered Failures List |

	08-12			08-11			08-10
	09:51 PDT	01:51 PDT	17:51 PDT	09:50 PDT	01:50 PDT	17:50 PDT	09:50 PDT
	1425862280911	1425741482621	1425620686551	1425499817761	1425379020671	1425258223521	1425137369211
	1dae5cda1	adc21d1dd	a4af85bd9	0e01893de	6eab49e05	4a0fa2d10	c2ff89a4a

Show 29 stale tests (no results in last 10+ runs)

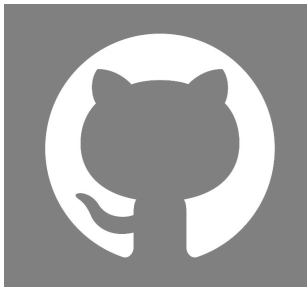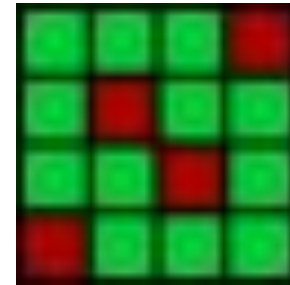|							
Overall Changes							
kubetest2.Test Changes	F	F	F	F	F	F	F
Kubernetes e2e suite.[sig-apps] StatefulSet Basic StatefulSet functionality [StatefulSetBasic] should perform rolling updates and	F	F	F	F	F	F	F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: dir-bindmounted] [Testpattern: Pre-provis	F	F	F	F	F	F	
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: tmpfs] [Testpattern: Pre-provisioned PV (d	F	F	F	F			F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: dir-bindmounted] [Testpattern: Pre-provis	F	F				F	
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: dir-bindmounted] [Testpattern: Pre-provis	F	F					
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: dir-bindmounted] [Testpattern: Pre-provis	F	F			F		F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: tmpfs] [Testpattern: Pre-provisioned PV (f	F	F				F	
Kubernetes e2e suite.[sig-apps] StatefulSet Basic StatefulSet functionality [StatefulSetBasic] should provide basic identity	F		F	F	F	F	F
Kubernetes e2e suite.[sig-network] Networking Granular Checks: Pods should function for node-pod communication: udp [Linux	F						
Kubernetes e2e suite.[sig-network] Services should have session affinity timeout work for NodePort service [LinuxOnly] [Conform	F						
Kubernetes e2e suite.[sig-node] Pods Extended Pod Container Status should never report success for a pending container	F						
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: aws] [Testpattern: Dynamic PV (default fs)] subPath should suppor	F						F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: aws] [Testpattern: Dynamic PV (delayed binding)] topology should	F						
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: aws] [Testpattern: Dynamic PV (ext4)] volumes should store data	F						F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: blockfs] [Testpattern: Pre-provisioned PV (	F		F	F			
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: blockfs] [Testpattern: Pre-provisioned PV (	F						
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: tmpfs] [Testpattern: Pre-provisioned PV (c	F		F				F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: dir-link-bindmounted] [Testpattern: Pre-pr		F	F			F	F
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: tmpfs] [Testpattern: Pre-provisioned PV (c		F	F			F	
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: tmpfs] [Testpattern: Pre-provisioned PV (c		F	F				F
Kubernetes e2e suite.[sig-storage] PersistentVolumes-local [Volume type: dir-link-bindmounted] Two pods mounting a local volu		F	F			F	F
Kubernetes e2e suite.[sig-apps] Deployment should not disrupt a cloud load-balancer's connectivity during rollout		F					
Kubernetes e2e suite.[sig-apps] StatefulSet Basic StatefulSet functionality [StatefulSetBasic] should not deadlock when a pod's		F					F
Kubernetes e2e suite.[sig-cli] Kubectl Port forwarding With a server listening on 0.0.0.0 should support forwarding over websock		F					
Kubernetes e2e suite.[sig-storage] CSI mock volume CSI Volume expansion should not expand volume if resizingOnDriver=off,		F				F	
Kubernetes e2e suite.[sig-storage] ConfigMap updates should be reflected in volume [NodeConformance] [Conformance]		F					
Kubernetes e2e suite.[sig-storage] Ephemeralstorage When pod refers to non-existent ephemeral storage should allow deletion		F					
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: aws] [Testpattern: Dynamic PV (default fs)(allowExpansion)] volum		F					F

From **testgrid.k8s.io** to **dashboards**
How?

CI DATA

From **testgrid.k8s.io** to **dashboards**
How?

From **testgrid.k8s.io** to **dashboards**
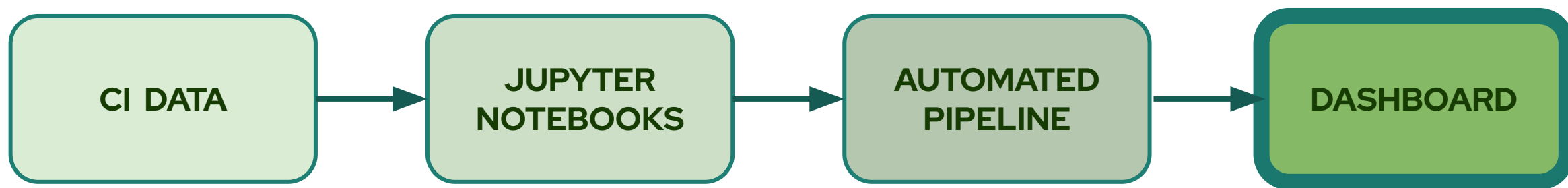## How?

CI DATA → JUPYTER NOTEBOOKS → AUTOMATED PIPELINE
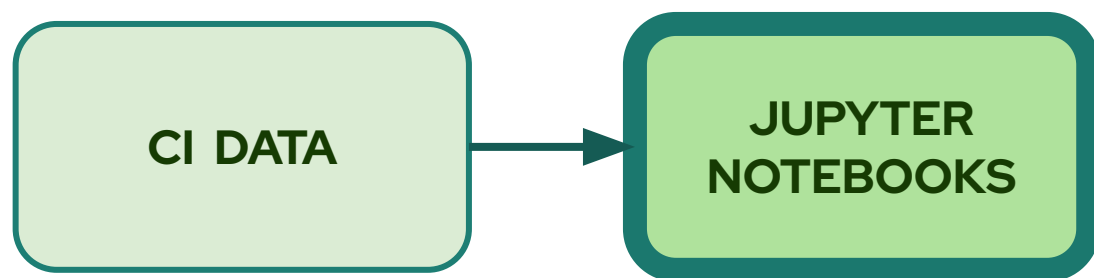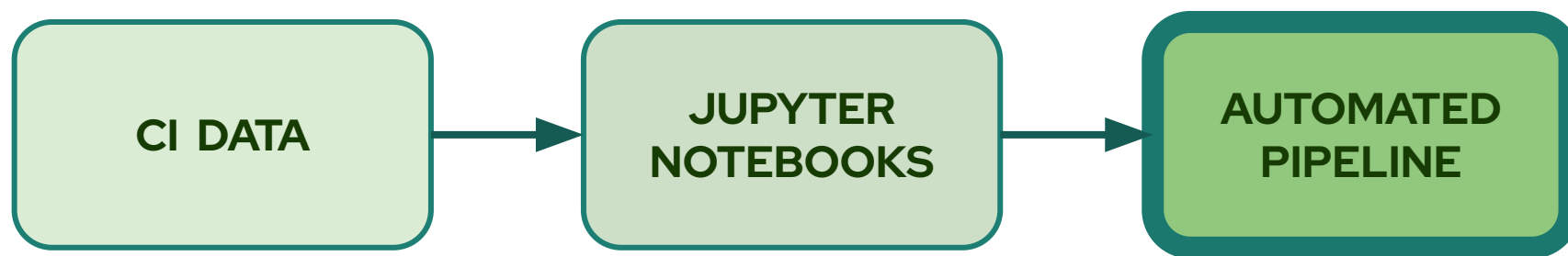
Elyra and Kubeflow Pipelines

From **testgrid.k8s.io** to **dashboards**
How?

```
CI DATA  →  JUPYTER NOTEBOOKS  →  AUTOMATED PIPELINE  →  DASHBOARD
```

Superset KPI
Dashboard

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➡ Demo

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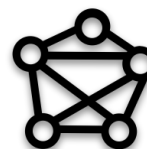   TestGrid

Demo

➡ Engage

Engage

Get Started

https://www.operate-first.cloud/data-science/ai4ci/docs/get-started.md

Open Data Sources	Notebooks	Dashboards	Model Endpoints	Automated Workflows	Video Playlist

Engage

Contribute

https://www.operate-first.cloud/data-science/ai4ci/docs/how-to-contribute.md
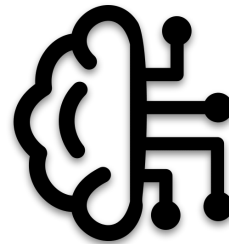

KPI Metric

ML Analysis

Thank you, questions?

https://github.com/aicoe-aiops/ocp-ci-analysis

@OperateFirst

https://tinyurl.com/aiforci
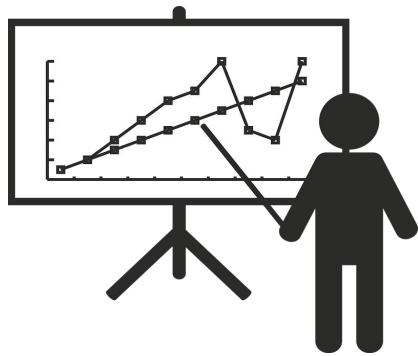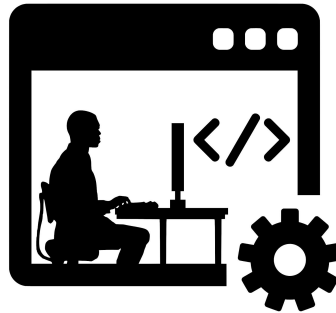
https://www.operate-first.cloud/data-science/ai4ci/

Engage!

Data Science Enthusiast

Developer

Kubernetes Contributor