



Kubernetes
AI DAY
NORTH AMERICA

AI4CI

AI Ops for Continuous Integration using Kubeflow Pipelines

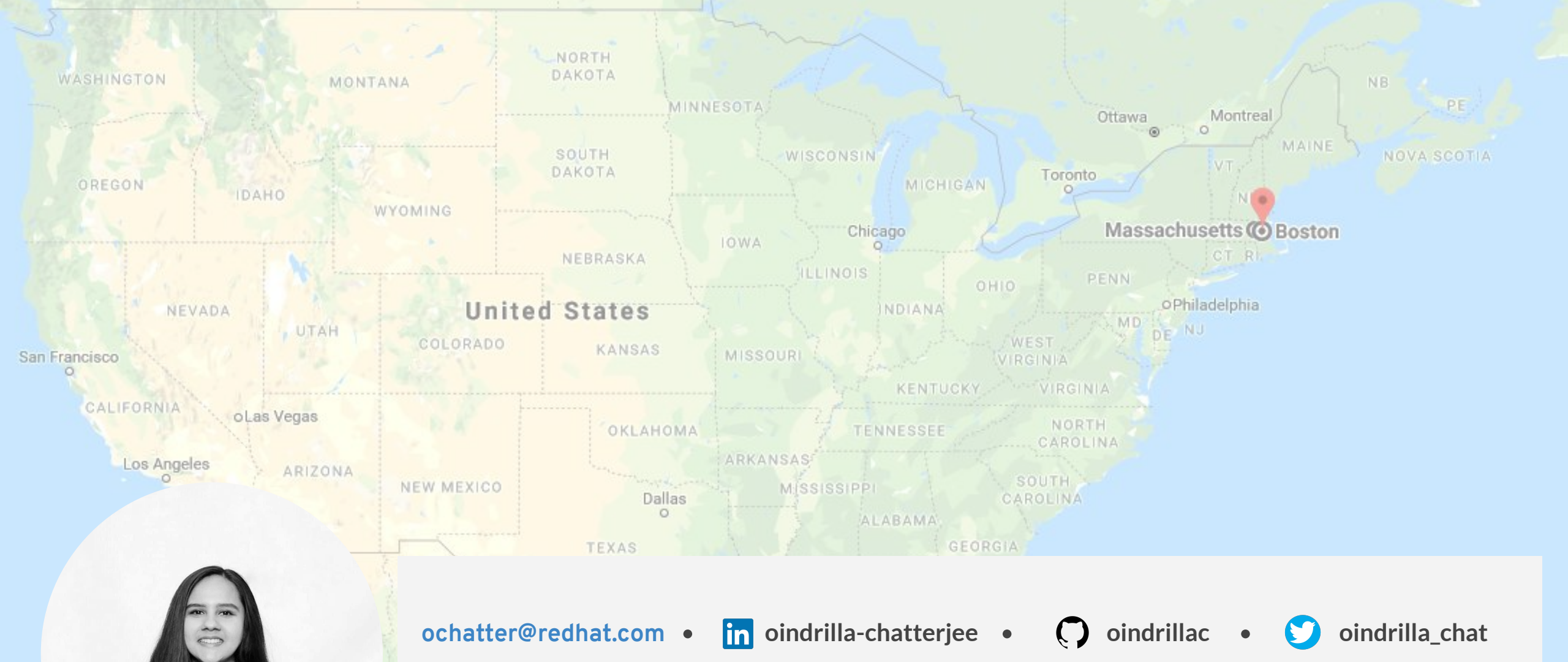
Aakanksha Duggal, **Red Hat**

Oindrilla Chatterjee, **Red Hat**



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



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

Overview



What is AI4CI?

Operate First Cloud

Dive Into Open Data Sources

Github

Prow

TestGrid

Demo

Engage

Overview



➔ **What is AI4CI?**

Operate First Cloud

Dive Into Open Data Sources

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Engage

AI Ops

AI + DevOps

Artificial Intelligence for IT
Operations

+

Dev & Ops : **DevOps**

AI Ops

AI + DevOps

CI/CD

Continuous Integration,
Continuous Delivery

Artificial Intelligence for IT
Operations

+

Dev & Ops : **DevOps**

Automating stages of
app development

AI Ops

AI + DevOps

+

=

AI4CI

AI for Continuous Integration

CI/CD

Continuous Integration,
Continuous Delivery


What is AI4CI?



Oindrilla Chatterjee

@oindrilla_chat



AI4CI = [#AI](#) for [#CI](#) = more visibility
into builds & intelligent CI/CD
monitoring 

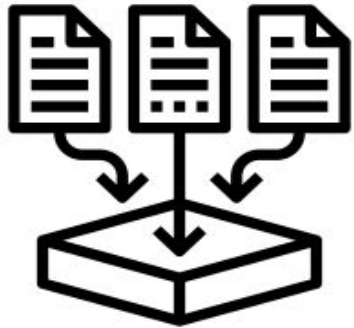
[Translate Tweet](#)

7:54 PM · 8/29/21 · [Twitter for iPhone](#)

Our current initiatives

Our current initiatives

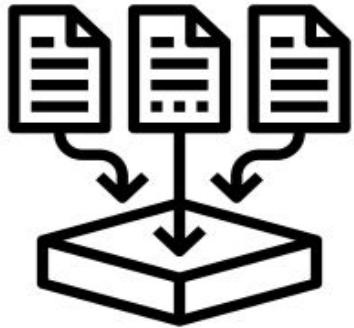
Collecting Data



Our current initiatives

Collecting Data

Metrics

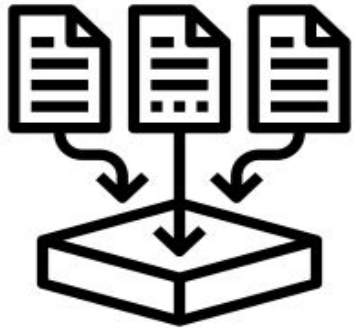


Our current initiatives

Collecting Data

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AI/ ML



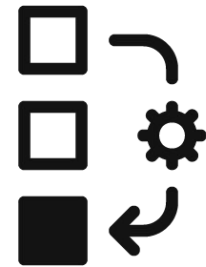
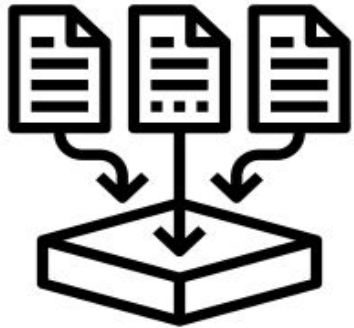
Our current initiatives

Collecting Data

Metrics

AI/ ML

E2E Workflow



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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

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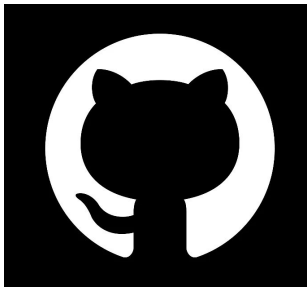
TestGrid

Demo

Engage

Open Data Sources

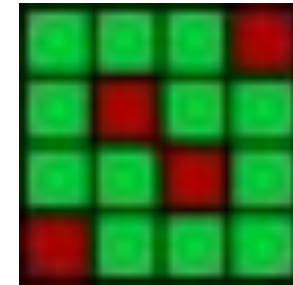
Github



Prow

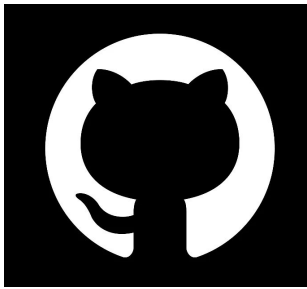


TestGrid



Open Data Sources

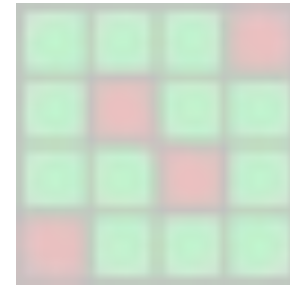
Github



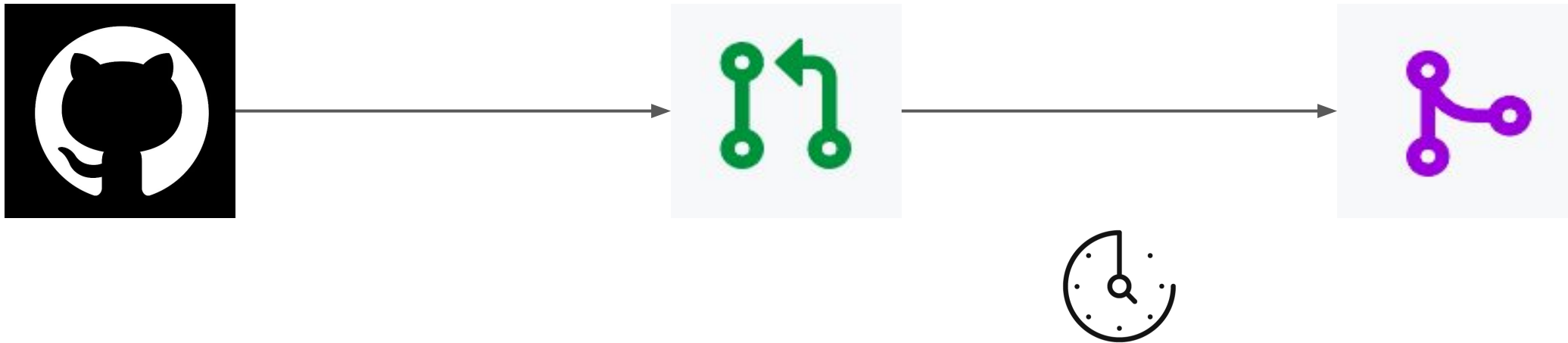
Prow



TestGrid

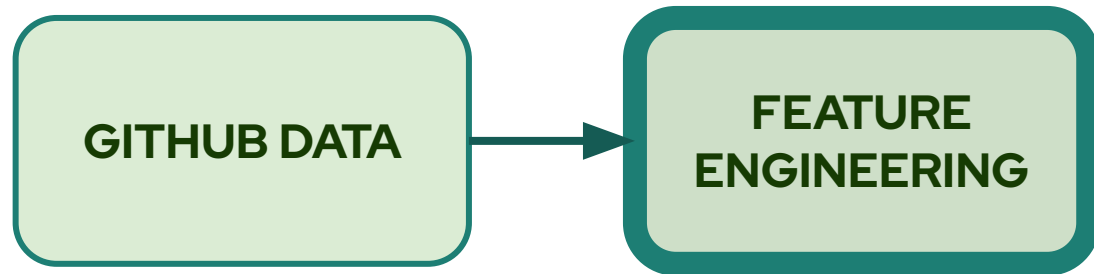


Time to Merge of a PR

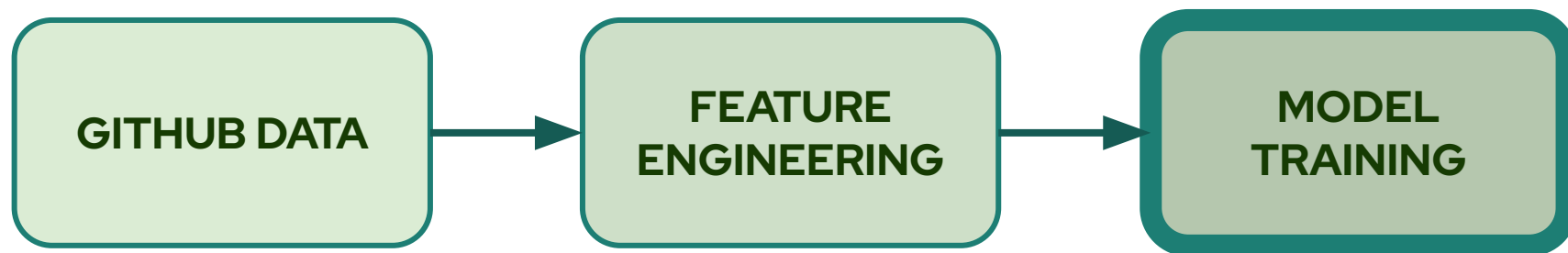


GITHUB DATA

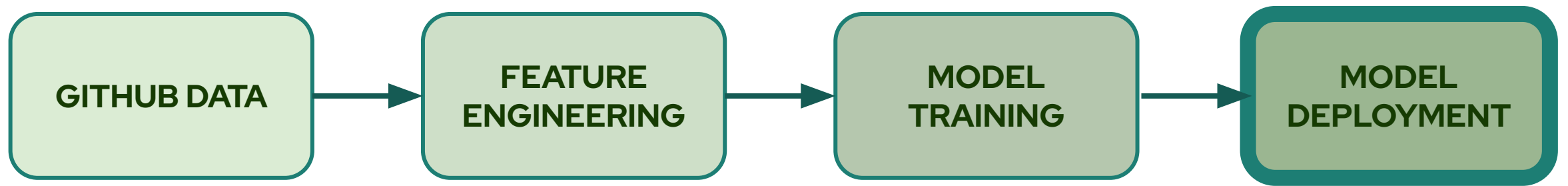
 [openshift / origin](#)



size of the PR,
types of files in the PR
description of the PR

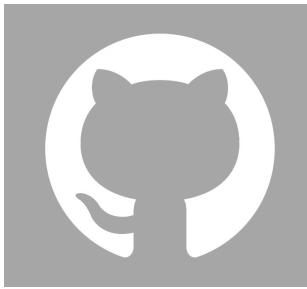


Naive Bayes
XGBoost
Random Forest
SVM



Open Data Sources

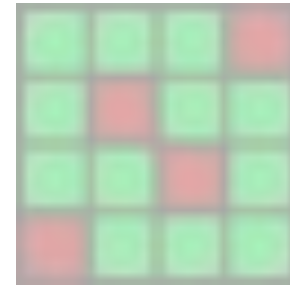
Github



Prow



TestGrid



Prow

Build Log

Show all hidden linesRaw build-log.txt

```
1 INFO[2021-08-22T14:50:43Z] ci-operator version v20210820-a155604fa-dirty
2 INFO[2021-08-22T14:50:43Z] Loading configuration from https://config.ci.openshift.org for openshift/release#master [ci-4.1]
3 INFO[2021-08-22T14:50:43Z] Resolved SBA missing for master in https://github.com/openshift/release (will prevent caching)
4 INFO[2021-08-22T14:50:43Z] resolved release latest to registry.ci.openshift.org/ocp/release:4.1.0-0.ci-2021-02-04-154232
5 INFO[2021-08-22T14:50:43Z] resolved release initial to registry.ci.openshift.org/ocp/release:4.1.0-0.ci-2021-02-02-193645
6 INFO[2021-08-22T14:50:43Z] Using namespace https://console.build01.ci.openshift.org/k8s/cluster/projects/ci-op-dt5nkrp
7 INFO[2021-08-22T14:50:43Z] Running [input:origin-centos-8], [input:ocp-4.5-upi-installer], [release:latest], [images], e2e-aws
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10 INFO[2021-08-22T14:50:44Z] Importing release image latest.
    skipped 24 lines :
35 level=info msg="Waiting up to 30m0s for the Kubernetes API at https://api.ci-op-dt5nkrp-62e46.origin-ci-int-aws.dev.rhcloud.com:6443..."
36 level=info msg="API v1.13.4+46458880 up"
37 level=info msg="Waiting up to 30m0s for bootstrapping to complete..."
38 level=info msg="Destroying the bootstrap resources..."
39 level=info msg="Waiting up to 30m0s for the cluster at https://api.ci-op-dt5nkrp-62e46.origin-ci-int-aws.dev.rhcloud.com:6443 to initialize..."
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45 ("component":"entrypoint","error":"wrapped process failed: exit status 1","file":"prow/entrypoint/run.go:80","func":"k8s.io/test-infra/prow/entrypoint.Options.Run", "level":"error","msg":"Error executing test process","severity":"error","time":"2021-08-22T15:46:49Z")
46 error= failed to execute wrapped command: exit status 1
47 INFO[2021-08-22T15:47:00Z] Step e2e-aws-ipi-install-install failed after 54m20s.
48 INFO[2021-08-22T15:47:00Z] Running step e2e-aws-gather-core-dump.
49 INFO[2021-08-22T15:47:30Z] Step e2e-aws-gather-core-dump succeeded after 30s.
50 INFO[2021-08-22T15:47:30Z] Running step e2e-aws-gather-aws-console.
51 INFO[2021-08-22T15:47:50Z] Step e2e-aws-gather-aws-console succeeded after 20s.
    skipped 25 lines :
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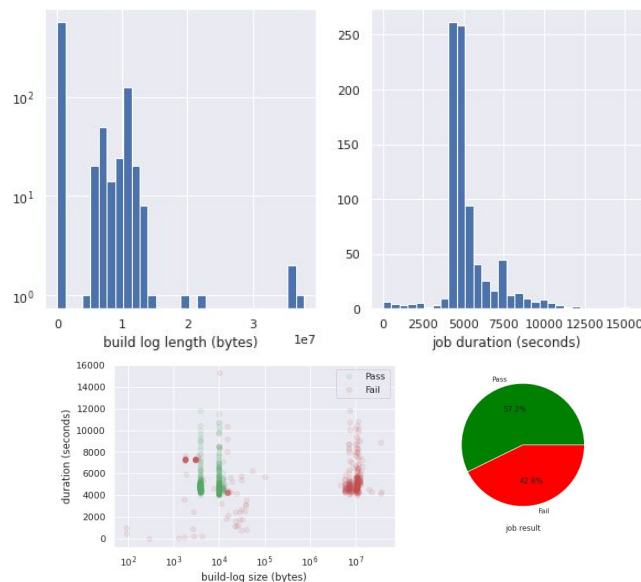
Build Logs

Prow

Build Log

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37 level=info msg="Waiting up to 30m0s for bootstrapping to complete..."
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Build Logs

Log Analyses

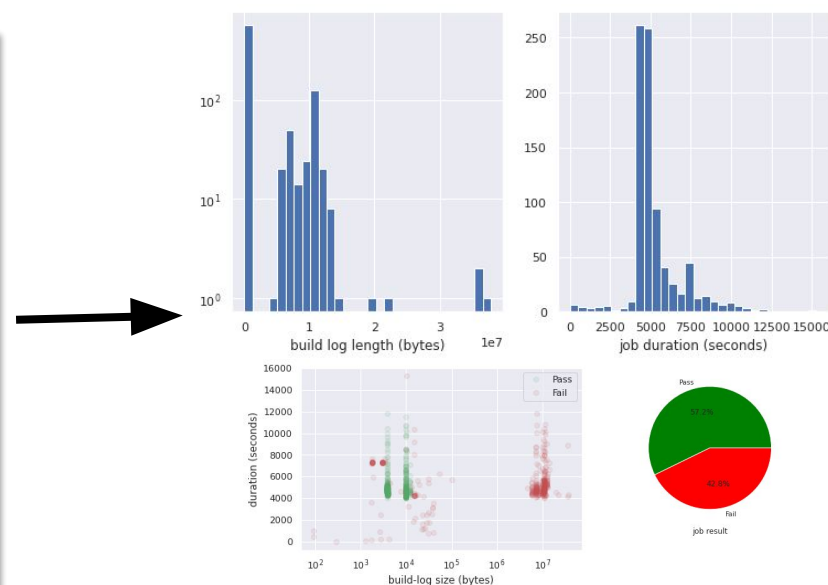
Prow

Build Log

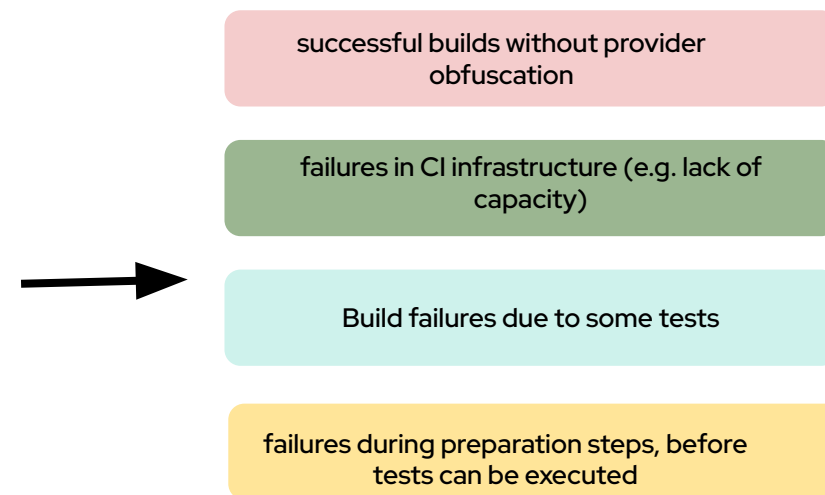
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Build Logs



Log Analyses



Log Classification

Open Data Sources

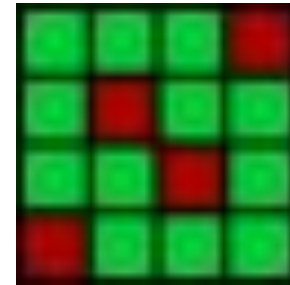
Github



Prow



TestGrid



TestGrid

projob_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
		14258622809114257414826214256206865514254998177614253790206714252582235214251373692					
		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
Kubernetes e2e suite.[sig-apps] StatefulSet Basic StatefulSet functionality [StatefulSetBasic] should perform rolling updates and		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	
Kubernetes e2e suite.[sig-storage] In-tree Volumes [Driver: local][LocalVolumeType: tmpfs] [Testpattern: Pre-provisioned PV (c		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
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 support		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-p			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 vol			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, i			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)] subPath should support			F				F

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

How?

CI DATA



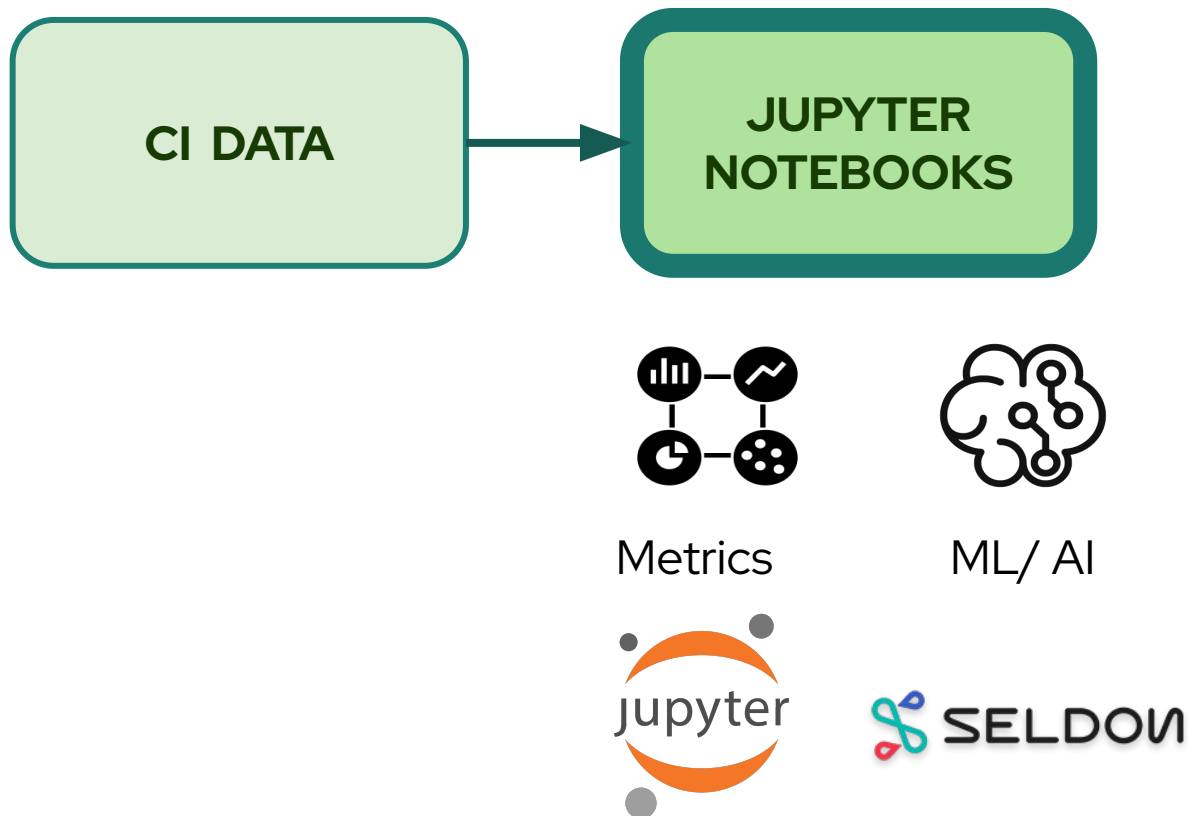
ceph



trino

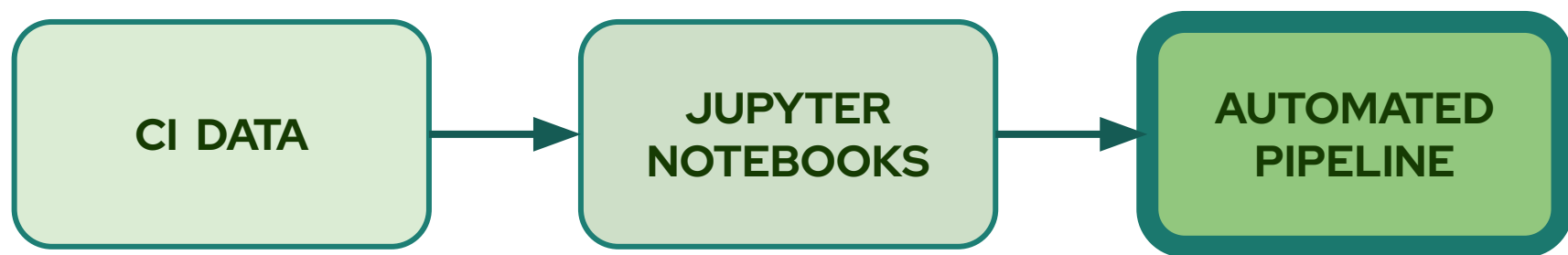
From **testgrid.k8s.io** to **dashboards**

How?



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

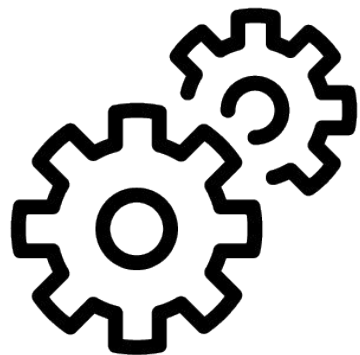
How?



Elyra and Kubeflow Pipelines



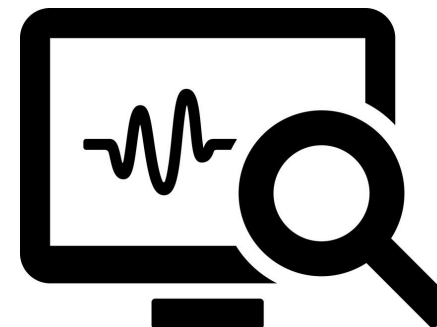
Kubeflow Pipelines



Automating Manual Tasks



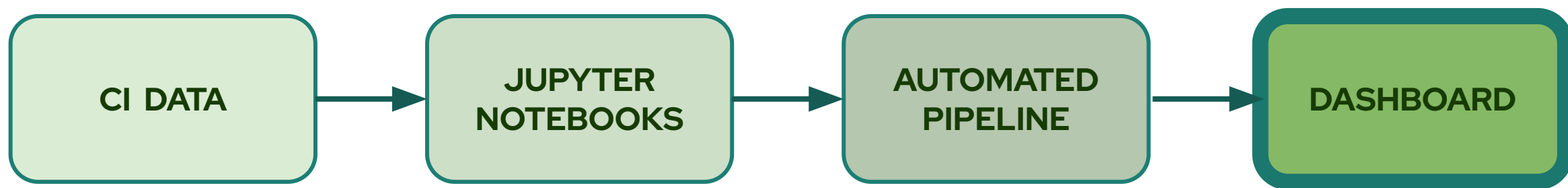
Better Reproducibility



Monitoring and Tracking

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

How?



Superset KPI Dashboard



Overview



Kubernetes
AI DAY
NORTH AMERICA

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TestGrid

➔ **Demo**

Engage

Overview



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→ Engage

Engage

Get Started

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

Open Data
Sources



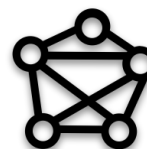
Notebooks



Dashboards



Model Endpoints



Automated
Workflows



Video Playlist



Engage

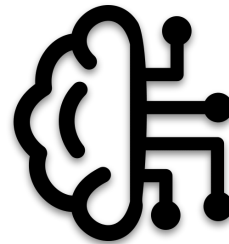
Contribute

<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/>