Dev Conf US 2020

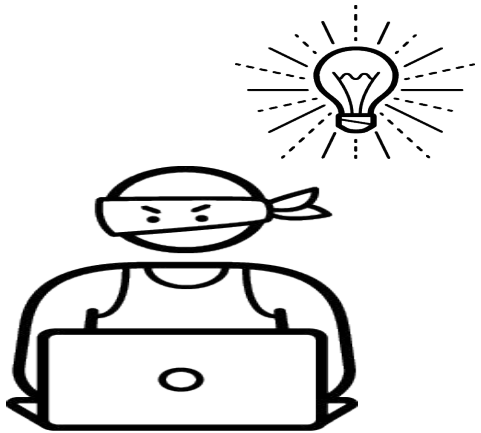
Kubernetes styled CI/CD system

Harshad Reddy Nalla
Software Engineer
AI DevSecOps,
Red Hat Boston

Red Hat

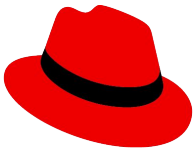
Agenda

- Introduction
- Goal
- Why do we care?
- Tekton
- Terminologies
- Design
- Implementation Demo
- Challenges
- Insights
- References

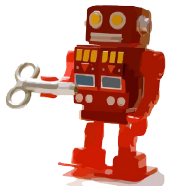


Introduction

- Software Engineer, AI Centre of Excellence, Red Hat Boston.
- Primarily part of AI DevSecOps team,
  working on Project Thoth: AI Stacks recommendation system
- Currently focusing on AICoE-CI: Kubernetes styled CI/CD



Thoth-Station



Goal

- Share the finding and learning of building own CI/CD with Tekton/OpenShift pipelines and Triggers.

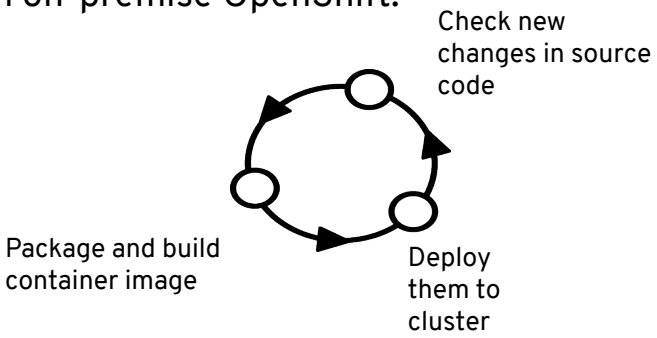
Why we care about CI/CD

Automation | Continuous Validation | Secure Delivery

- Automate test checks on new changes for source code.
- Validation checks to ensure changes are fit for source code.
- Constant packaging and delivery of the container image to deployment.
- Cloud native CI/CD system which could run on-premise OpenShift.

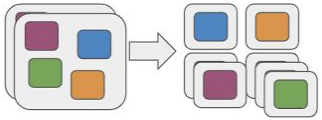
Challenges with the CI/CD system available:

- **No one size fits all**

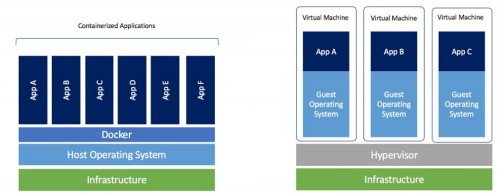


Change in Cloud Native Apps

- Applications have changed to **Microservices** from **Monolithic.**



- Deployment Infrastructures have change to **Containers** from **VMs.**



Tekton

- Tekton is a flexible open-source framework for creating CI/CD systems.
- Allows developers to build, test, and deploy across cloud providers and on-premise systems.
- Now part of CD Foundations .

Terminologies

Steps
Reference to a container image that executes a specific tool.

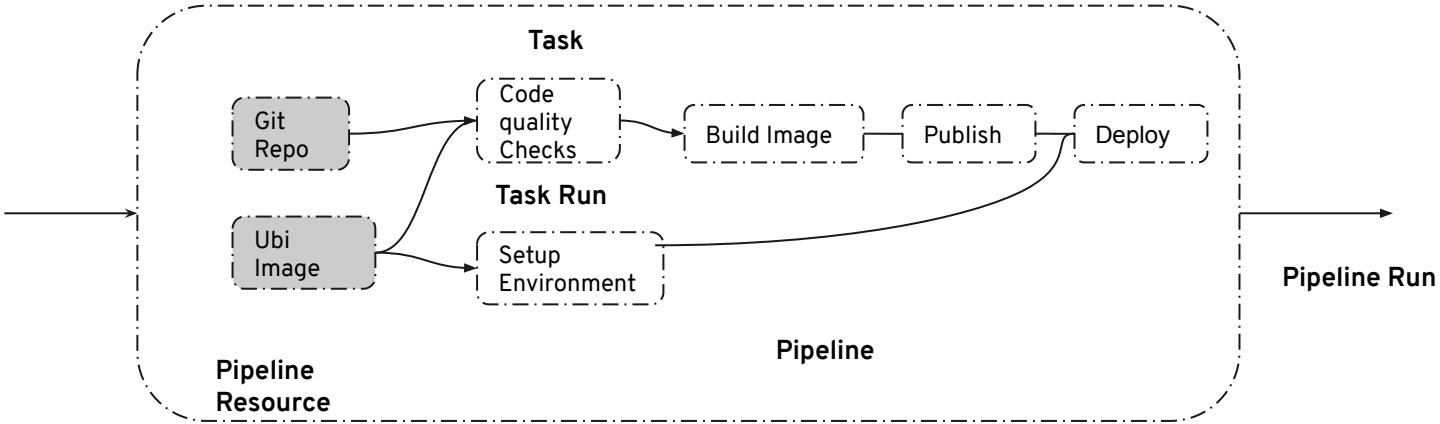
Task
A series of steps which launch specific build or delivery tools.

TaskRun
Instantiates a `Task` for execution with specific inputs, outputs, and execution parameters.

Pipeline Resource
Locations for inputs ingested like Images, Git Resources etc and outputs produced by the steps in Tasks.

Pipeline
A series of Tasks that accomplish a specific build or delivery goal.

PipelineRun
Instantiates a Pipeline for execution with specific inputs, outputs, and execution parameters.



Tekton Trigger

Triggers enables users to map fields from an event payload into resource templates.

Event Listener

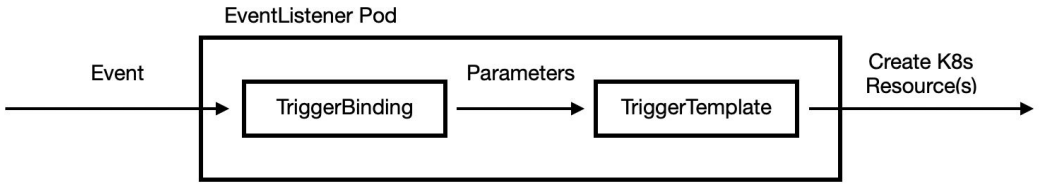
Kubernetes custom resource that allows users a declarative way to process incoming HTTP based events with JSON payloads

TriggerBindings

Enable user to capture fields from an event and store them as parameters.

TriggerTemplate

TriggerTemplates have parameters that can be substituted anywhere within the resource template.

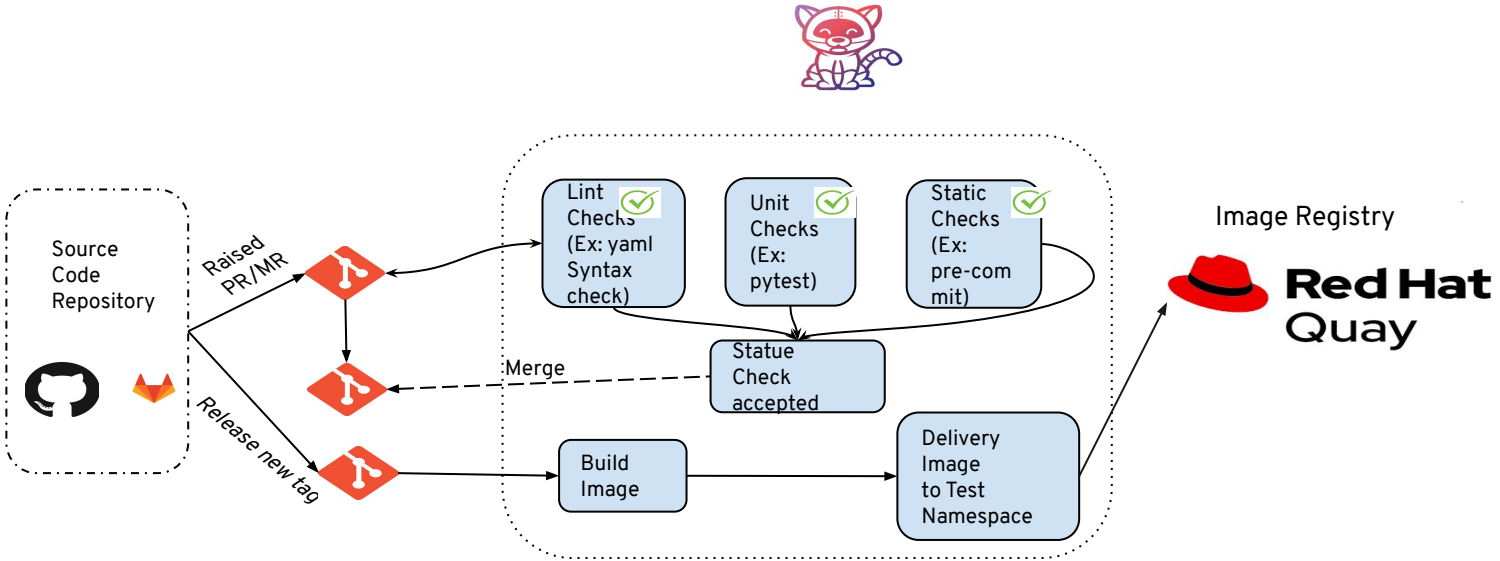


Design

- Our Projects are mainly AI and ML oriented.
- CI/CD pipeline were focused on :
  - Code Checks with **static** checks, **Linting** checks and **styling** checks
  - Packaging and release them either as **Modules** or **Application Images**
  - Delivering the images to **Openshift environment**.

- CI/CD system are designed to operate on:
  - Pull Request /Merge Request
    - On each pull request of the repository, CI service triggers a PR-pipeline.
    - PR-pipeline runs statues checks and build checks
  - Tag Release
    - On each tag release of the application, CI service triggers a Tag-release-pipeline
    - Tag-release-pipeline runs image build task or pypi release task based on application
    - Update Kustomize manifest with the new tag of imagestream to be deployed.

Implementation



Implementation DEMO

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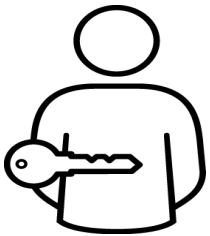
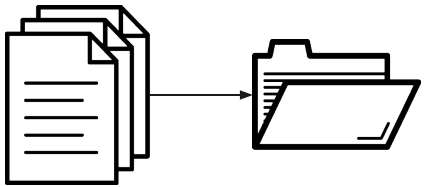
Challenges



CI/CD interaction with Private Repositories

- SSH connection
- OpenShift secret with kubernetes/ssh-auth



Use result of one task in another

- Tekton result resource lets user store result in files and use them as params

Maintain connection between running pipeline and github status

- PipelineRun url can be set as github status url through params

Insights

- Tekton based CI/CD pipeline can be plugged into other CI tools like Prow.
- Tekton based CI/CD pipeline can work along with tools like Zuul and Argo
  - As all of these application work based on yaml arguments and manifest files
- Tekton Pipeline are constructed based on kubernetes version
  - Tekton Pipeline V0.10.2 is last version which support Kubernetes v1.11.0 i.e Openshift version v3.11
- Cluster admin privilege required for setup of Pipeline architecture.

References

- https://github.com/AICoE/aicoe-ci
- https://github.com/AICoE/aicoe-ci#want-to-step-up-an-instance

- https://www.openshift.com/learn/topics/pipelines
- https://github.com/tektoncd/catalog
- https://github.com/tektoncd/pipeline
- https://github.com/tektoncd/triggers#tekton-triggers

Thank You

Harshad Reddy Nalla

Email: hnalla@redhat.com

GitHub: https://github.com/harshad16

LinkedIn: Harshad Reddy Nalla - Software Engineer - Red Hat

More Information on Project **Thoth**

Email: aicoe-thoth@redhat.com

Website: https://thoth-station.ninja/

Twitter: https://twitter.com/thothstation

GitHub: https://github.com/thoth-station

Youtube: Thoth Station

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