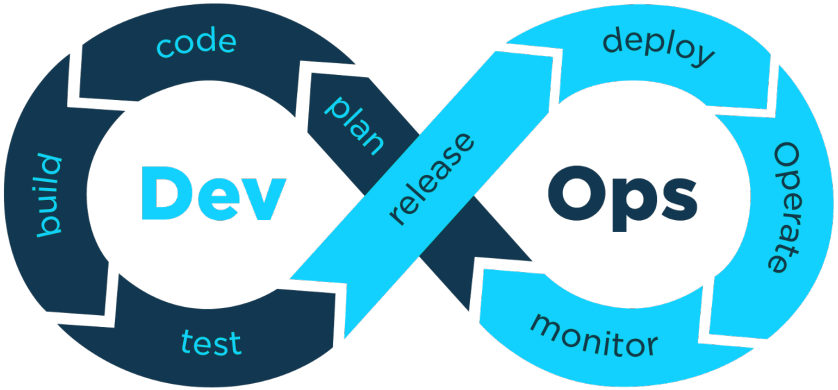
Agenda

1. Introduction to DevOps
2. CI/CD pipelines
3. Tekton
4. Hands-on workshop
5. Q&A



DevOps is the first building block of *Cloud-native*…

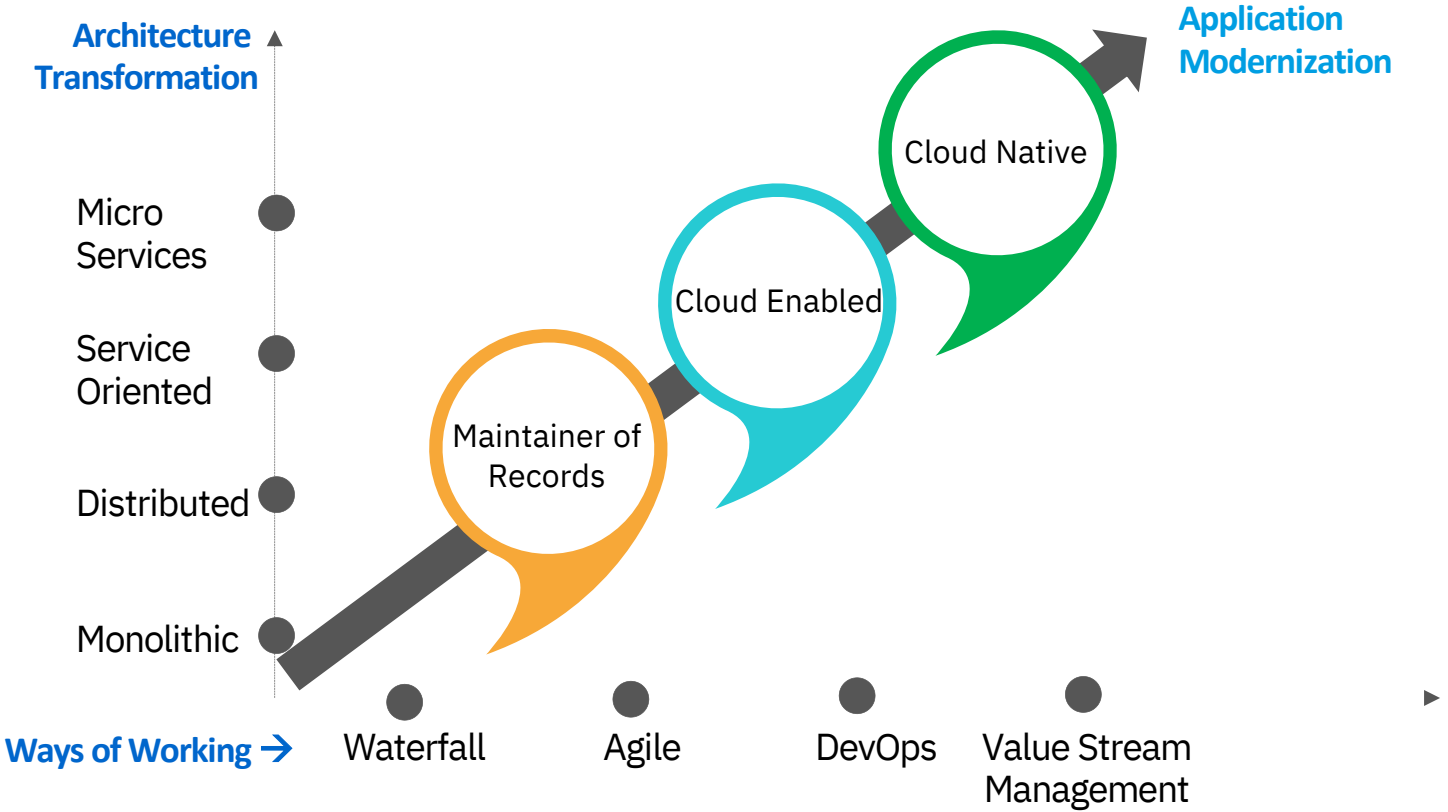
*DevOps is a **set of practices** that combines software development (Dev) and IT operations (Ops). It aims to shorten the systems development life cycle and provide continuous delivery with high software quality. DevOps is complementary with Agile software development; several DevOps aspects came from the Agile methodology.*

(Source: Wikipedia)

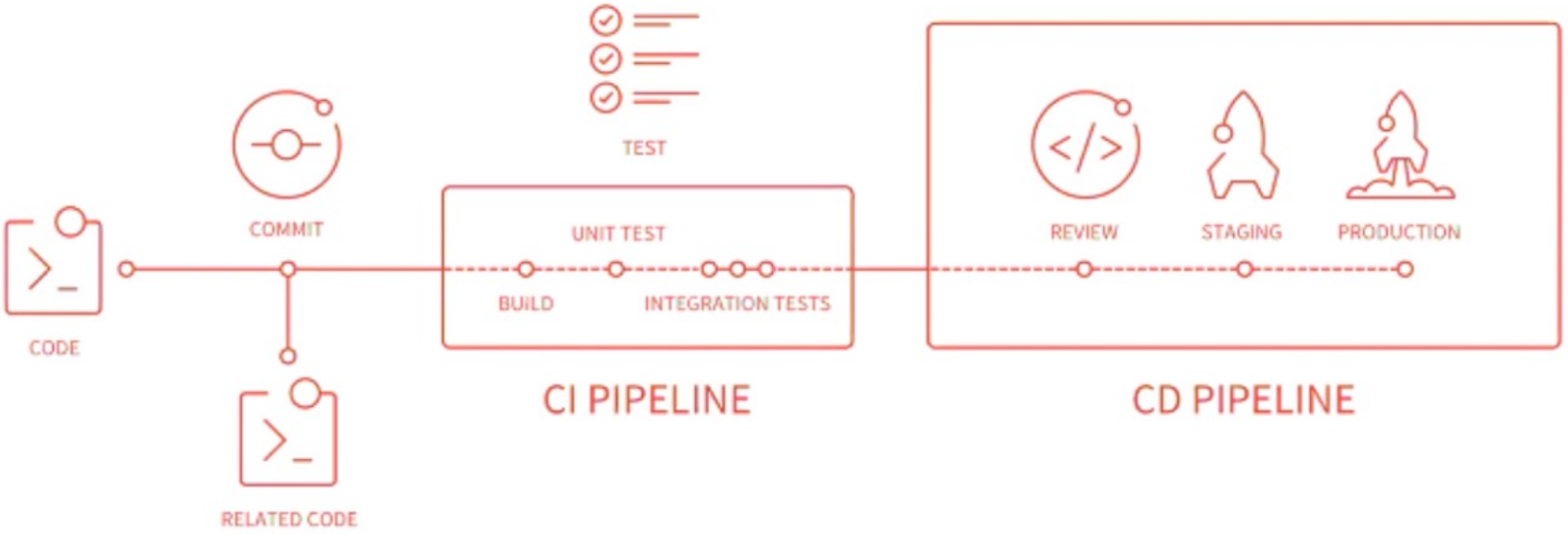
To practice DevOps effectively, software applications have to meet a set of architecturally significant requirements (ASRs), such as: deployability, modifiability, testability, and monitorability. These ASRs require a high priority and cannot be traded off lightly.

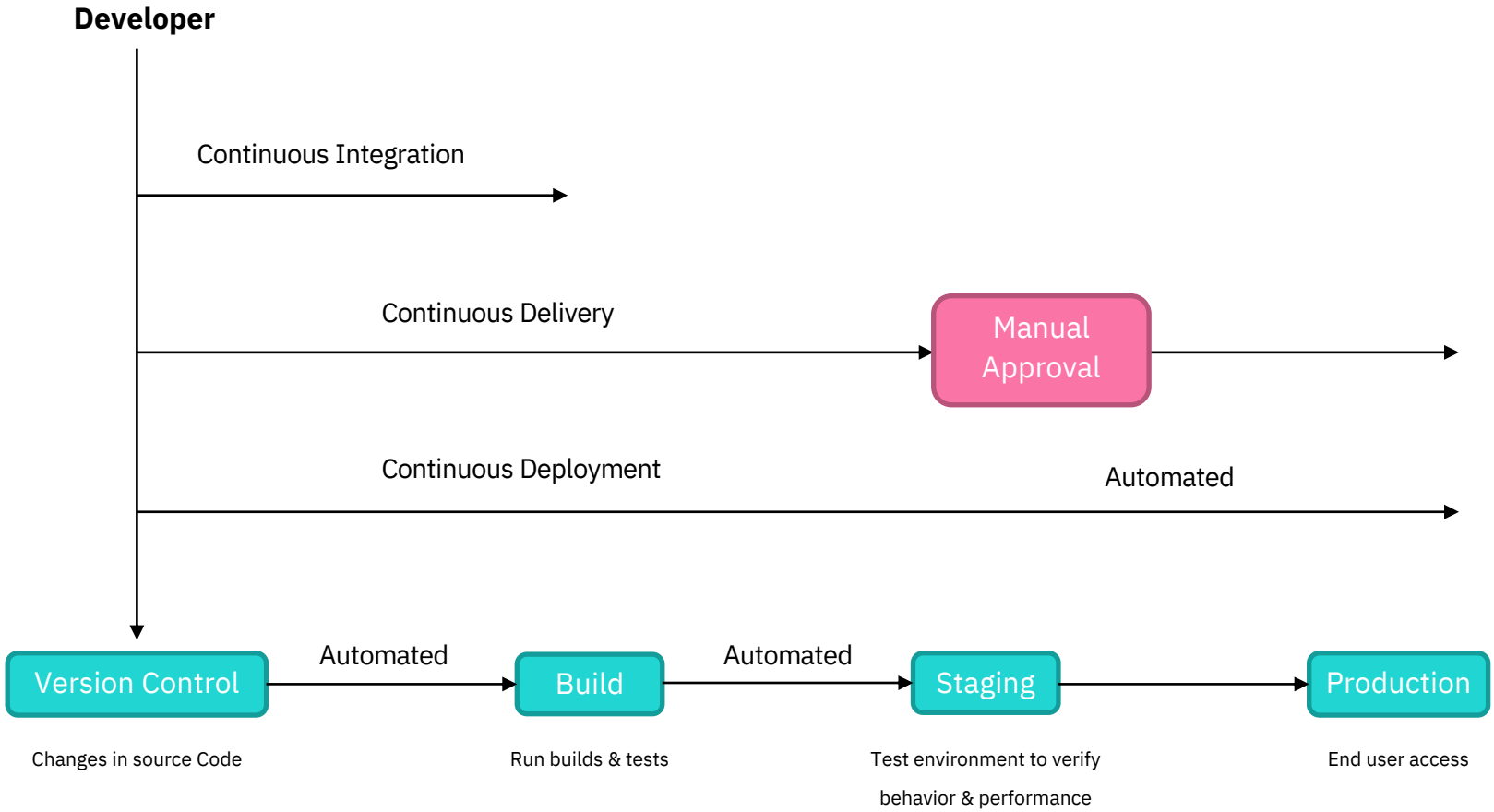
(Source: Wikipedia)

How software delivery changed



CI/CD Pipeline



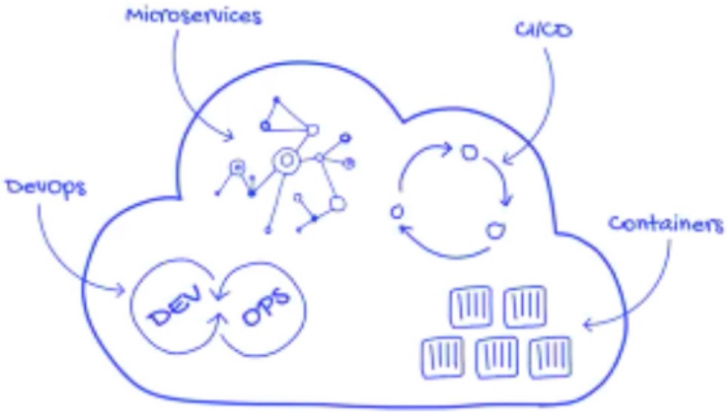

Developer
Continuous Integration
Continuous Delivery
Manual Approval
Continuous Deployment
Automated
Version Control
Automated
Build
Automated
Staging
Production
Changes in source Code
Run builds & tests
Test environment to verify behavior & performance
End user access

Benefits of DevOps

- From code to production in minutes
- Accelerate app delivery
- Deploy with confidence
- Easily confirm the application status

Cloud-Native CI/CD

- Each task in the pipeline hat its own life-cycle i.e. when executed it runs as its own container
- Built for container applications and runs on Kubernetes
- Designed with microservices and distributed team in mind



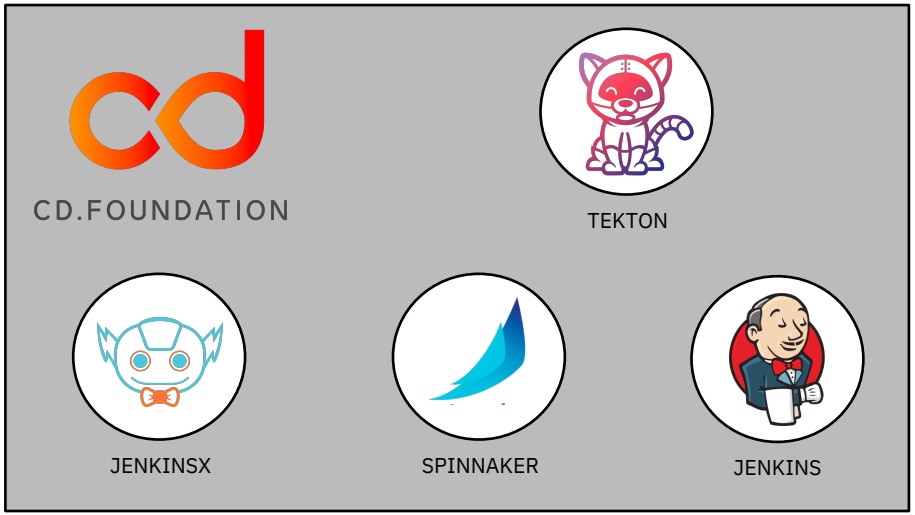
What is Tekton?

- Tekton is an opensource project that provides a framework to create cloud-native CI/CD pipelines quickly

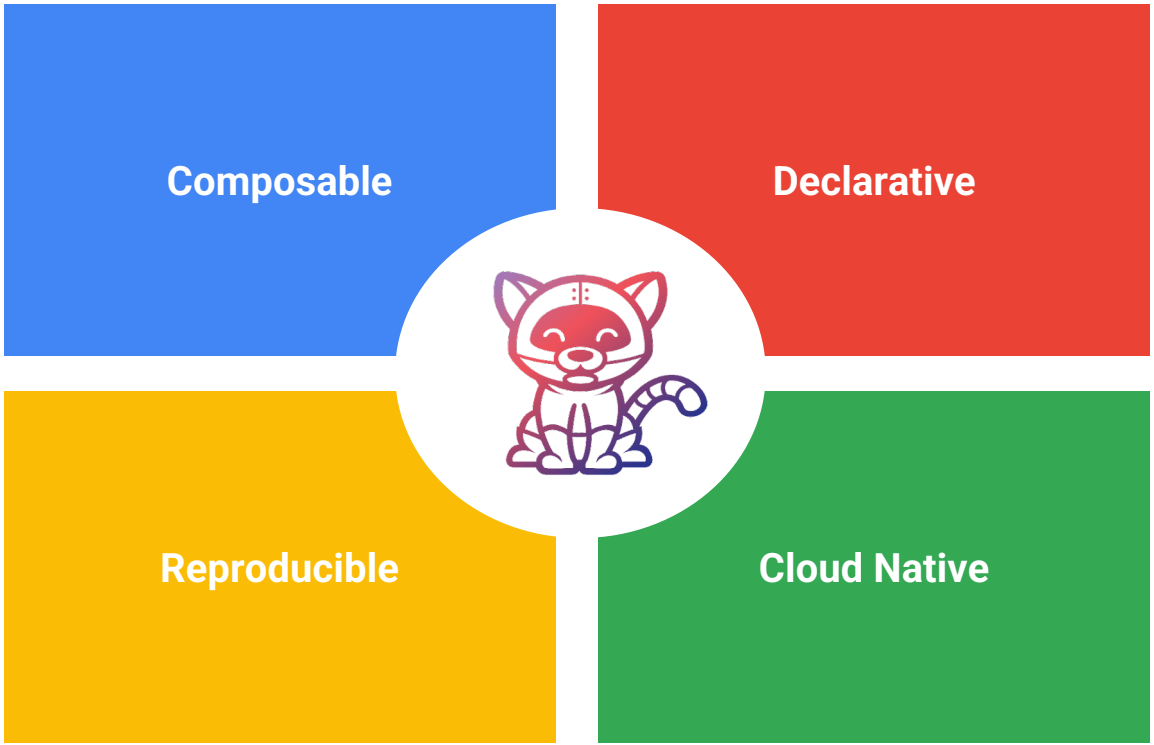
- As a Kubernetes-native framework, Tekton makes it easier to deploy across multiple cloud providers or hybrid environments

Tekton Emerges

- Spun out of the Knative build project
- Git Repo: https://github.com/tektoncd
- **Current release**: 0.29.0 (October 2021)
- **Contributors**: Google, Red Hat, Pivotal, IBM, etc.
- Part of the **CD Foundation** (under the Linux Foundation)
  - Includes other open source projects such as: JenkinsX, Jenkins, Spinnaker, Tekton
- CD Foundation announced in March 2019
  - **Goal**: To serve as the vendor-neutral home for the most important open source projects for continuous delivery



So, what is Tekton?



Tekton Concept: Step

- The smallest building block
- Specify images, commands, arguments
- Is a container

```yaml
steps:
  - name: echo
    image: ubuntu
    command:
      - echo
    args:
      - "hello world"
```

Tekton CRD: Task

- New CRD
- Sequence of **Steps**
- Run in sequential order
- Reusable
- Perform a specific task
- Runs on the same k8s node

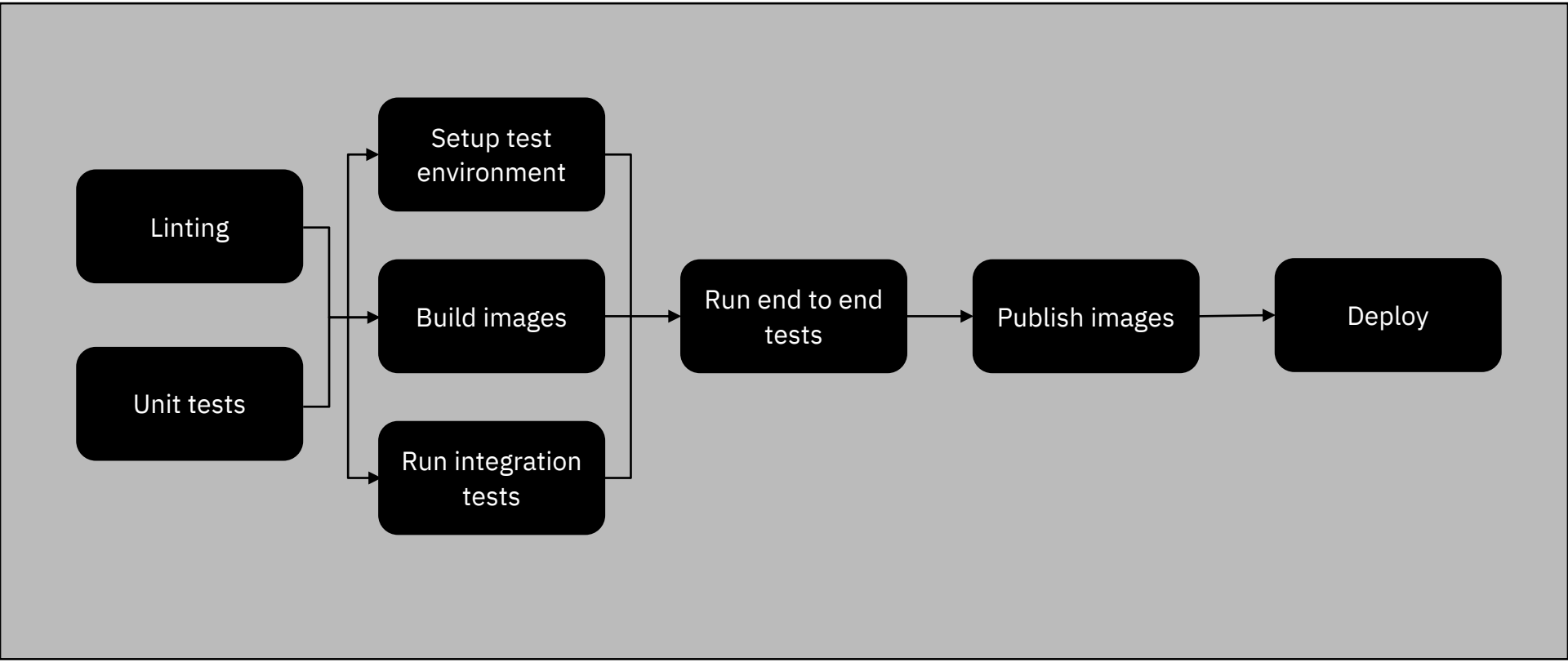
```yaml
apiVersion: tekton.dev/v1alpha1
kind: Task
metadata:
  name: echo-hello-world
spec:
  steps:
    - name: echo
      image: ubuntu
      command:
        - echo
      args:
        - "hello world"
```

Tekton CRD: Pipeline

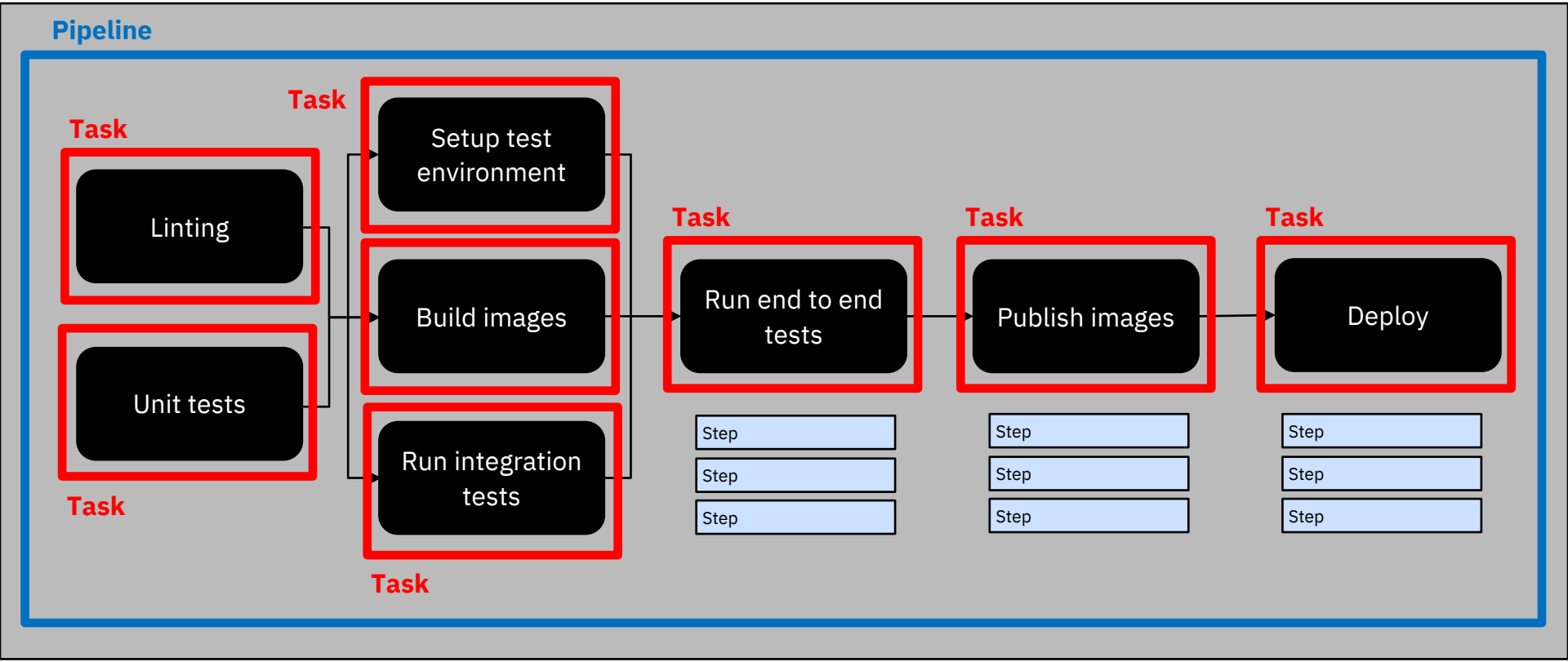
- Expresses **Tasks**
  - Sequentially
  - Concurrently
- Links input and output
- Execute **Tasks** on different nodes

```yaml
apiVersion: tekton.dev/v1alpha1
kind: Pipeline
metadata:
  name: tutorial-pipeline
spec:
  - name: build-app
    taskRef:
      name: build-push
    resources:
      outputs:
        - name: image
          resource: my-image
  - name: deploy-app
    taskRef:
      name: deploy-kubectl
    resources:
      inputs:
        - name: image
      resource: my-image
      from:
        - build-app
```

Putting it all together



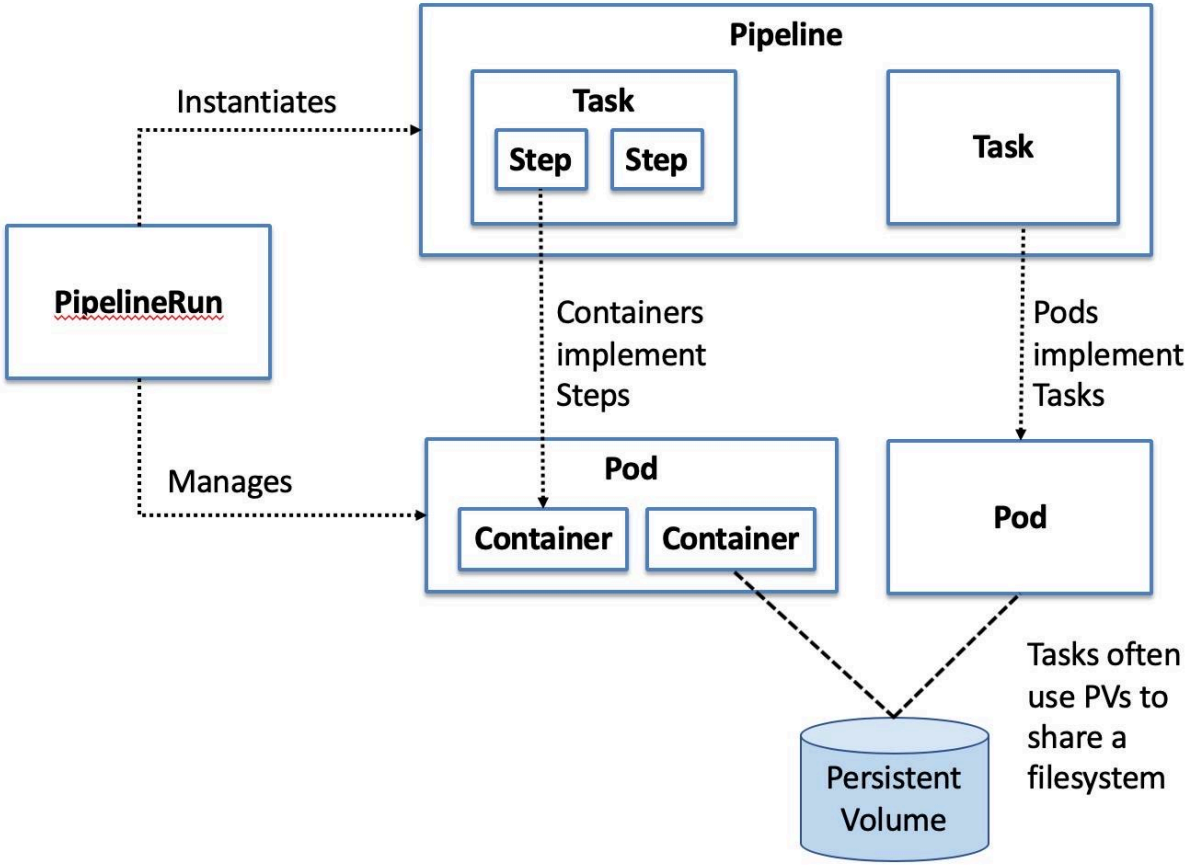
Putting it all together



Tekton Runtime CRDs

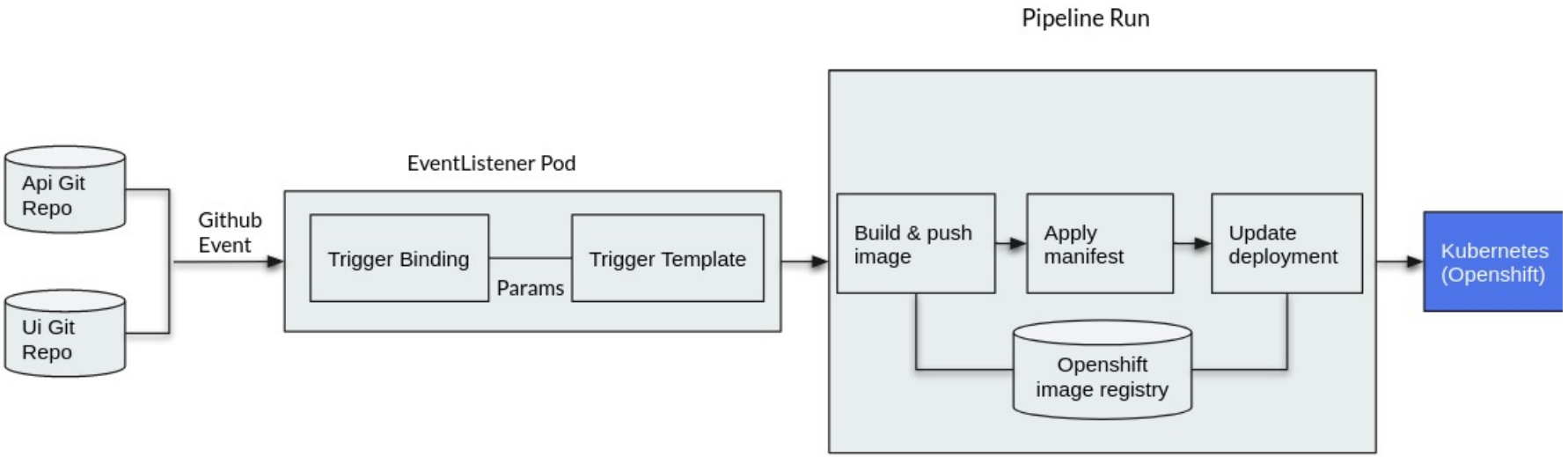
- Instances of Pipelines and Tasks:
  - PipelineRun
  - TaskRun
- Runtime info such as registry information and git repo

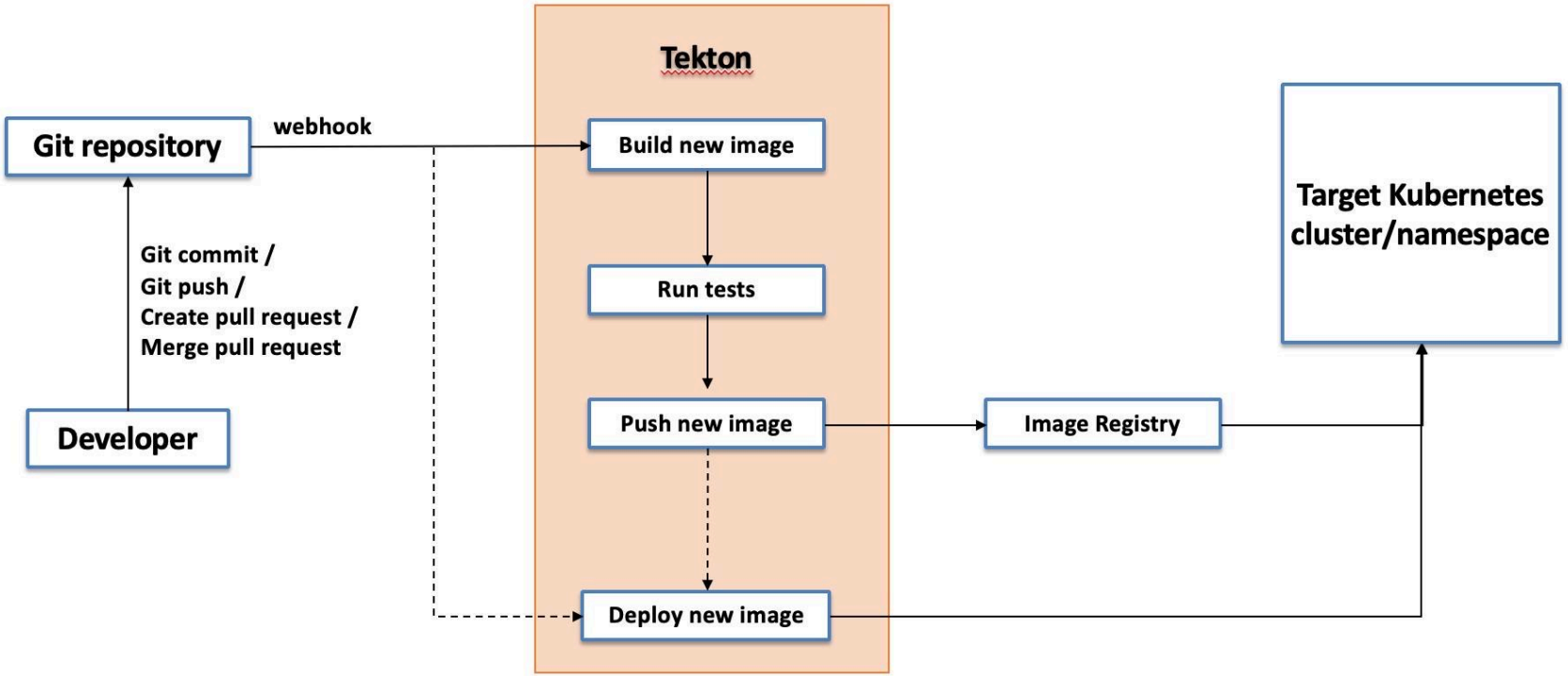
```yaml
apiVersion: tekton.dev/v1alpha1
kind: PipelineRun
metadata:
  name: tutorial-pipeline-run-1
spec:
  serviceAccountName: tutorial-service
  pipelineRef:
    name: tutorial-pipeline
  resources:
    - name: source-repo
      resourceRef:
        name: skaffold-git
    - name: web-image
      resourceRef:
        name: skaffold-image-leeroy-web
```


Pipeline
Task
Step
Step
Task
Instantiates
PipelineRun
Containers
implement
Steps
Pods
implement
Tasks
Manages
Pod
Container
Container
Pod
Tasks often
use PVs to
share a
filesystem
Persistent
Volume

Triggers

- **TriggerTemplate** – Templates resources to be created
- **TriggerBinding** – Validates events and extracts payload fields
- **EventListener** – Connects TriggerBindings and TriggerTemplates into an addressable endpoint
- **ClusterTriggerBinding** – A cluster-scoped TriggerBinding


Pipeline Run
Api Git Repo
Ui Git Repo
Github Event
EventListener Pod
Trigger Binding
Params
Trigger Template
Build & push image
Apply manifest
Update deployment
Openshift image registry
Kubernetes (Openshift)



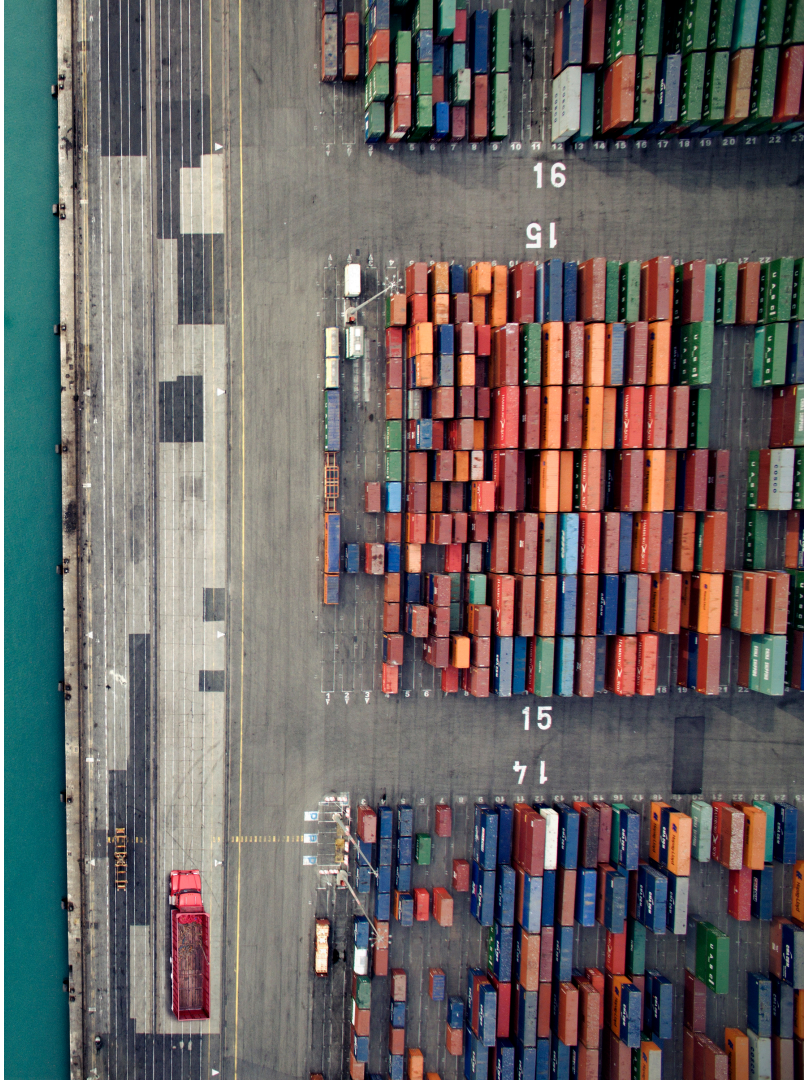
https://hub-preview.tekton.dev/

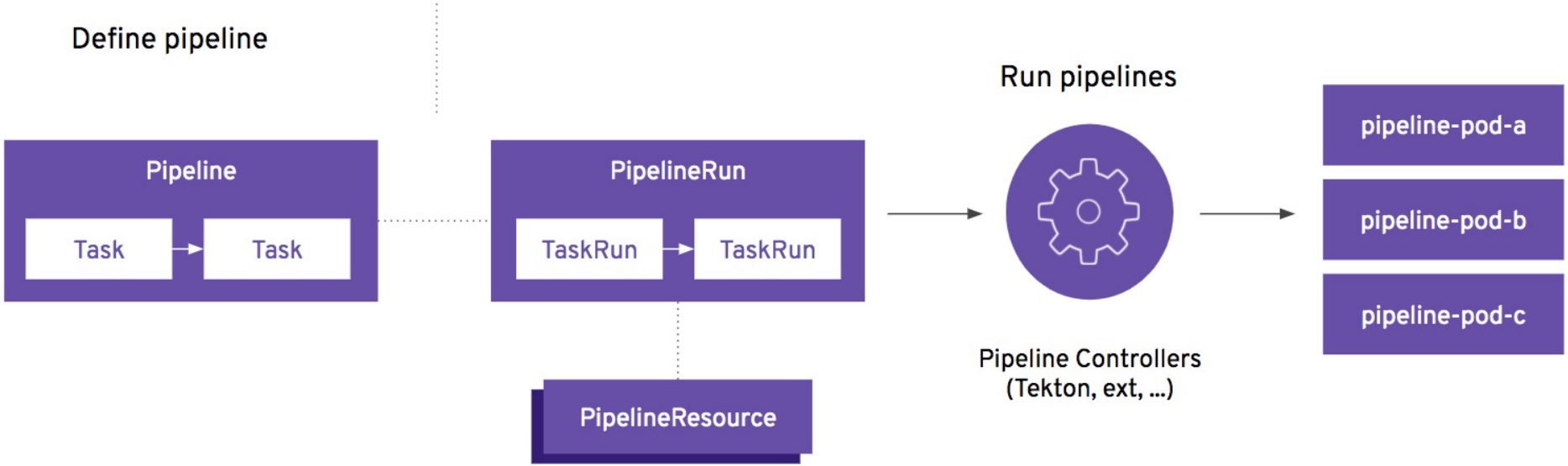
What is OpenShift Pipelines?

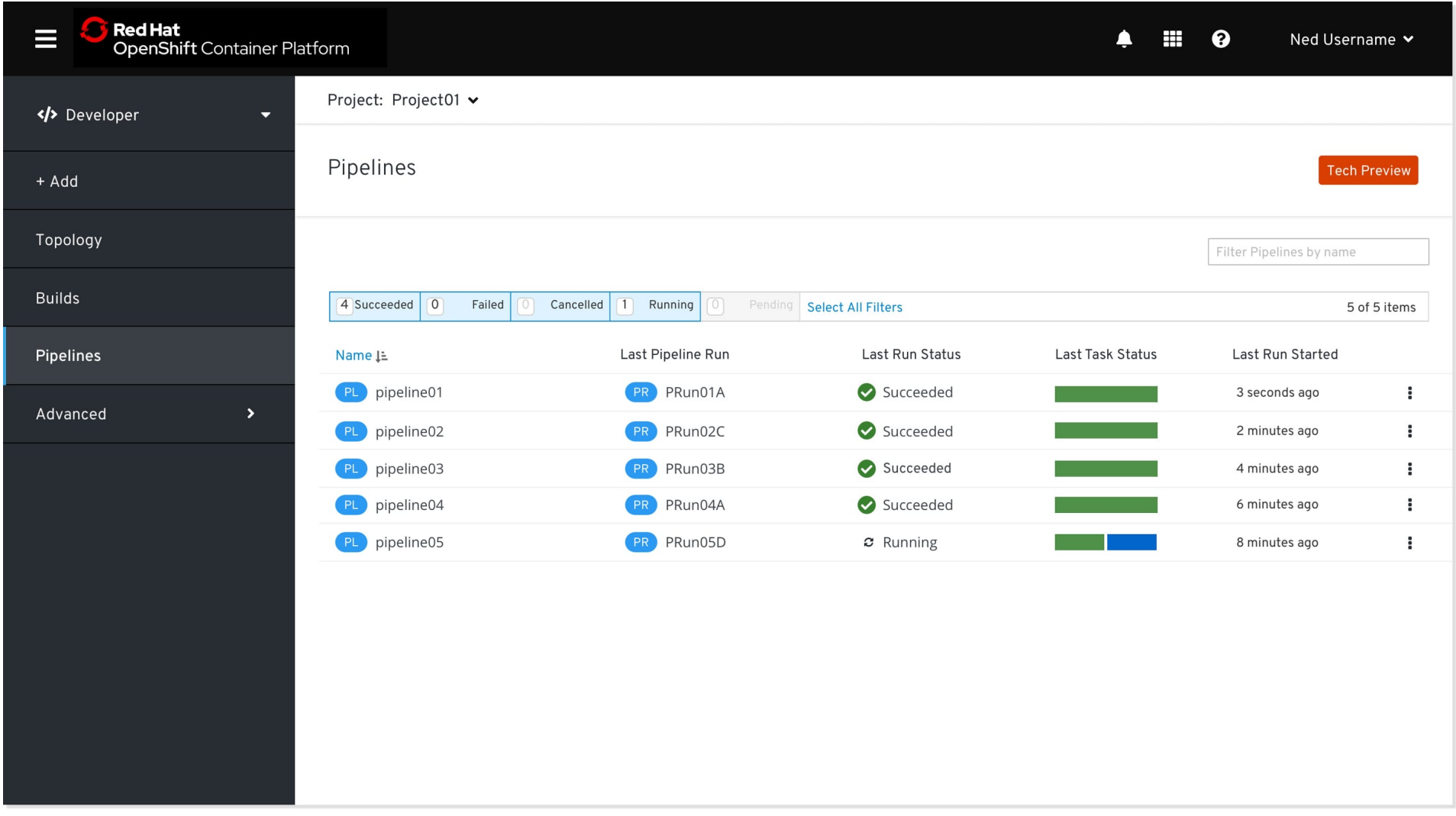
- Kubernetes-style CI/CD solution based on Tekton
- Builds on the Tekton building blocks and provides a CI/CD experience
- Designed to run each step of the CI/CD pipeline in its own container, allowing each step to scale independently to meet the demands of the pipeline

OpenShift Pipelines Features & Benefits

- Kubernetes style pipelines
- Runs serverless
- Deploy to multiple platforms
- Build images with Kubernetes tools
- Developer tools




Define pipeline
Pipeline
Task
Task
PipelineRun
TaskRun
TaskRun
PipelineResource
Run pipelines
Pipeline Controllers
(Tekton, ext, ...)
pipeline-pod-a
pipeline-pod-b
pipeline-pod-c


Red Hat
OpenShift Container Platform
Ned Username
Developer
+ Add
Topology
Builds
Pipelines
Advanced
Project: Project01
Pipelines
Tech Preview
Filter Pipelines by name
4 Succeeded
0 Failed
0 Cancelled
1 Running
0 Pending
Select All Filters
5 of 5 items
Name
Last Pipeline Run
Last Run Status
Last Task Status
Last Run Started
PL pipeline01
PR PRun01A
Succeeded
3 seconds ago
PL pipeline02
PR PRun02C
Succeeded
2 minutes ago
PL pipeline03
PR PRun03B
Succeeded
4 minutes ago
PL pipeline04
PR PRun04A
Succeeded
6 minutes ago
PL pipeline05
PR PRun05D
Running
8 minutes ago


IBM