

# Scaling Pipelines with Tekton

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Scaling Continuous Delivery (Virtual)



# Scaling Tekton



Introduction  
Authoring  
Running  
Bottlenecks  
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# Introduction



Photo by Mike Benna, CC0



# Tekton is an open-source framework for creating CI/CD systems

Cloud Native  
Serverless,  
Scalable  
Pipelines



Standardization  
Built In Best  
Practices  
  
Maximum  
Flexibility

Core Projects  
➤ Pipeline  
➤ Triggers  
  
Tooling:  
➤ CLI *tkn*  
➤ Dashboard  
➤ Operator

Discovery:  
➤ Catalog  
➤ Hub  
  
Add-ons:  
➤ Results  
➤ Chain  
➤ Experiments

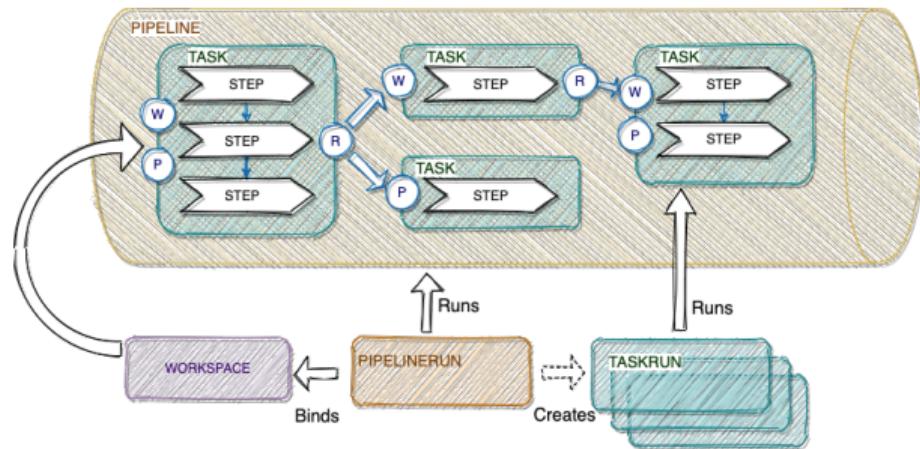


# A bit of history

- › From Knative Built, to Pipeline
- › Extend the k8s API with CRDs
- › Tekton and the CDF



- › Definitions: Step, Task, Pipeline
- › Bindings: Workspaces, Parameters, Results
- › Execution: TaskRun, PipelineRun



# Authoring



# Building Blocks



## Steps:

- Off the Shelves containers
- Small scripts

## Tasks:

- Solve one specific problem
- Owned by a team
- Distributed maintenance

## Reusability:

- Discovery
- Versioning
- Execution efficiency

# Catalog and Hub

## Discovery:

- › Kubernetes cluster
- › Tekton Catalog
- › Tekton Hub & API

## Versioning:

- › Tekton Bundles
- › Bundles CLI

## Execution efficiency:

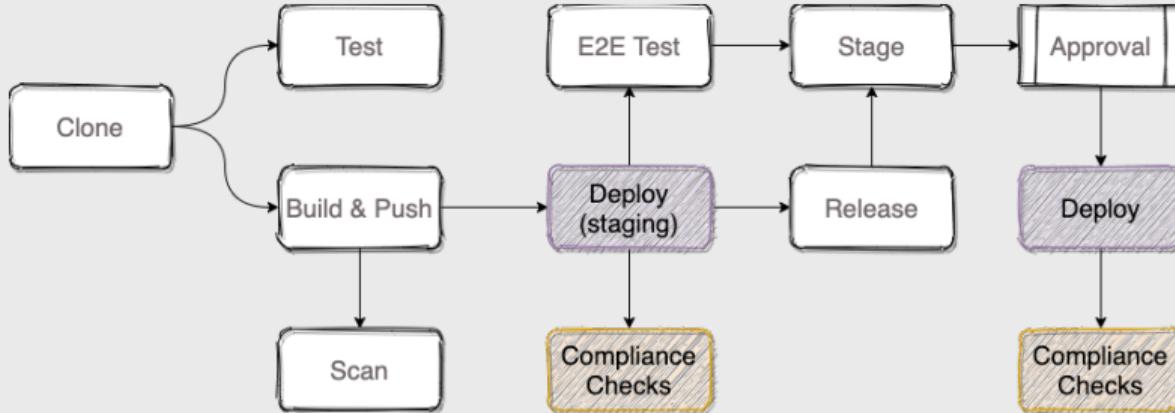
- › Task Specialization
- › Multiple Tasks in a Pod/Node

The screenshot shows the Tekton Hub interface. At the top, there's a search bar with 'build' and a 'Login' button. Below it, a banner says 'Welcome to Tekton Hub' and 'Discover, search and share reusable Tasks and Pipelines'. The main area has a sidebar with filters for 'Kind' (Task), 'Catalog' (Tekton), and 'Category' (Automation, Build Tools, CLI, Cloud, Deploy, Editor, Go, Image Build, Language, Messaging, Monitoring, Notification, Others, Security, Storage). A 'Sort By' dropdown is also present. The main content area lists tasks: 'buildid' (v0.1, updated 3 months ago, build-tools category), 'buildah' (v0.2, updated 3 months ago, build-tools category), 'buildkit' (v0.1, updated 3 months ago, build-tools category), 'buildpacks' (v0.2, updated 3 months ago, build-tools category), and 'golang build' (v0.1, updated 3 months ago, build-tools category). Each task card includes a brief description and a detailed JSON snippet below it.

```
buildid: { "id": 3, "name": "git-clt", "catalog": { "id": 1, "name": "tekton", "type": "community" }, "kind": "Task", "latestVersion": { "version": "v0.1" } }, "buildah: { "id": 4, "name": "buildah", "catalog": { "id": 1, "name": "tekton", "type": "community" }, "kind": "Task", "latestVersion": { "version": "v0.2" } }, "buildkit: { "id": 5, "name": "buildkit", "catalog": { "id": 1, "name": "tekton", "type": "community" }, "kind": "Task", "latestVersion": { "version": "v0.1" } }, "buildpacks: { "id": 6, "name": "buildpacks", "catalog": { "id": 1, "name": "tekton", "type": "community" }, "kind": "Task", "latestVersion": { "version": "v0.2" } }, "golang build: { "id": 7, "name": "golang-build", "catalog": { "id": 1, "name": "tekton", "type": "community" }, "kind": "Task", "latestVersion": { "version": "v0.1" } }
```



# Pipelines



Building block?  
Supported by  
the catalog

Swap a block  
Add a branch

Different:  
➤ Team  
➤ Access  
➤ Namespace  
➤ Cluster

One workflow.  
How can we  
connect the  
parts?



# Running



Photo by Ray Bilcliff, CC0



# Triggers

Run Tasks and Pipelines as a reaction to events. Intro to triggers Events can be external (PR, CR, OS) Or Internal -> Pipeline triggers a pipeline Execution across clusters



# Events

- › Receiving and sending events
- › Overall workflow made of separate pipelines
- › Add branches of pipeline on demand
- › Orchestration?
- › Interop and event SIG



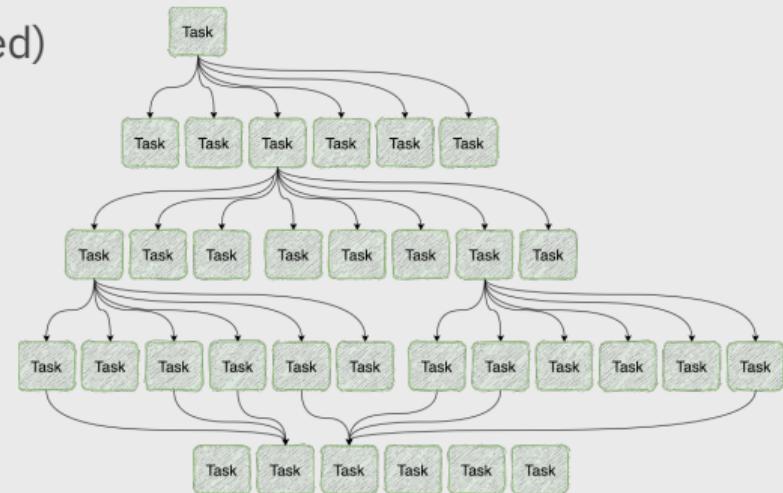


# Bottlenecks



# Growing pipelines

- › Directed Acyclic Graphs
- › Large Pipelines (100 nodes, densely connected)
- › Scale Issues?
- › DAG build on every reconcile
- › Suboptimal code in the DAG computation
- › Hundreds of nodes and connections



# Under Pressure

## Concurrent execution

- › Cluster Resources: K8s scheduler
- › K8s API: Informers
- › Tekton Controllers: LeaderElection

## In real life

- › Thousands Tasks/month upstream
- › Millions containers/month @IBM
- › Throttling (for security too)
- › Cluster pollution

## Potential enhancements:

- › Throttling pipeline execution
- › Tekton custom scheduler

## Upcoming features:

- › Tekton Results
- › Performance testing
- › Metric improvements



# Data and I/O

## *Reusability vs. Efficiency*

Common Tasks (→Pods):

- › Clone a git repository
- › Build a container image
- › Download content from storage
- › Run tests

## *Pods scheduled independently*

- › Shared storage required (PVC)
- › Extra I/O
- › Extra execution time
- › Multi-region clusters

## *Data in Pipelines*

Meta: "Results", Large: "Workspaces"

Alternatives:

- › Multiple Tasks in a Pod
- › Re-usable Steps
- › Custom scheduler



A photograph of a fast-moving stream flowing through a dense forest. The water is blurred, indicating motion, and the surrounding trees are bare, suggesting a winter or early spring setting. Mossy rocks are visible in the water.

# Thank You! Questions?

# References

- › Come and Join Us at Tekton!
- › Tekton community: [github.com/tektoncd/community](https://github.com/tektoncd/community)
- › Slides: [github.com/afrittoli/scaling\\_pipelines\\_with\\_tekton](https://github.com/afrittoli/scaling_pipelines_with_tekton)
- › Tekton: [tekton.dev](https://tekton.dev)
- › Tekton on GitHub: [github.com/tektoncd](https://github.com/tektoncd)
- › Performance TEP: [TEP-0036](#)
- › Metrics TEP: [TEP-0006](#)
- › Tekton Results: [github.com/tektoncd/results](https://github.com/tektoncd/results)

