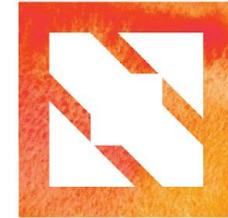




KubeCon



CloudNativeCon

Europe 2019



KubeCon



CloudNativeCon

Europe 2019

# SIG Testing Intro

Cole Wagner (Google, @cjwagner)  
Aishwarya Sundar (Google, @aishsundar)

# This Presentation



KubeCon



CloudNativeCon

Europe 2019

1. Tooling overview
2. New from SIG Testing
3. Using SIG Testing tooling internally for Anthos

# SIG-Testing Tools



KubeCon



CloudNativeCon

Europe 2019

- Prow
  - Jobs, plugins, Tide
- Slack automation
- TestGrid
- kind
- Boskos
- Gopherage
- Kubetest
- GitHub administration automation
  - Branch protector, label\_sync, Peribolos
- ...

# Prow



KubeCon

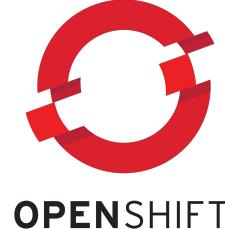
CloudNativeCon

Europe 2019

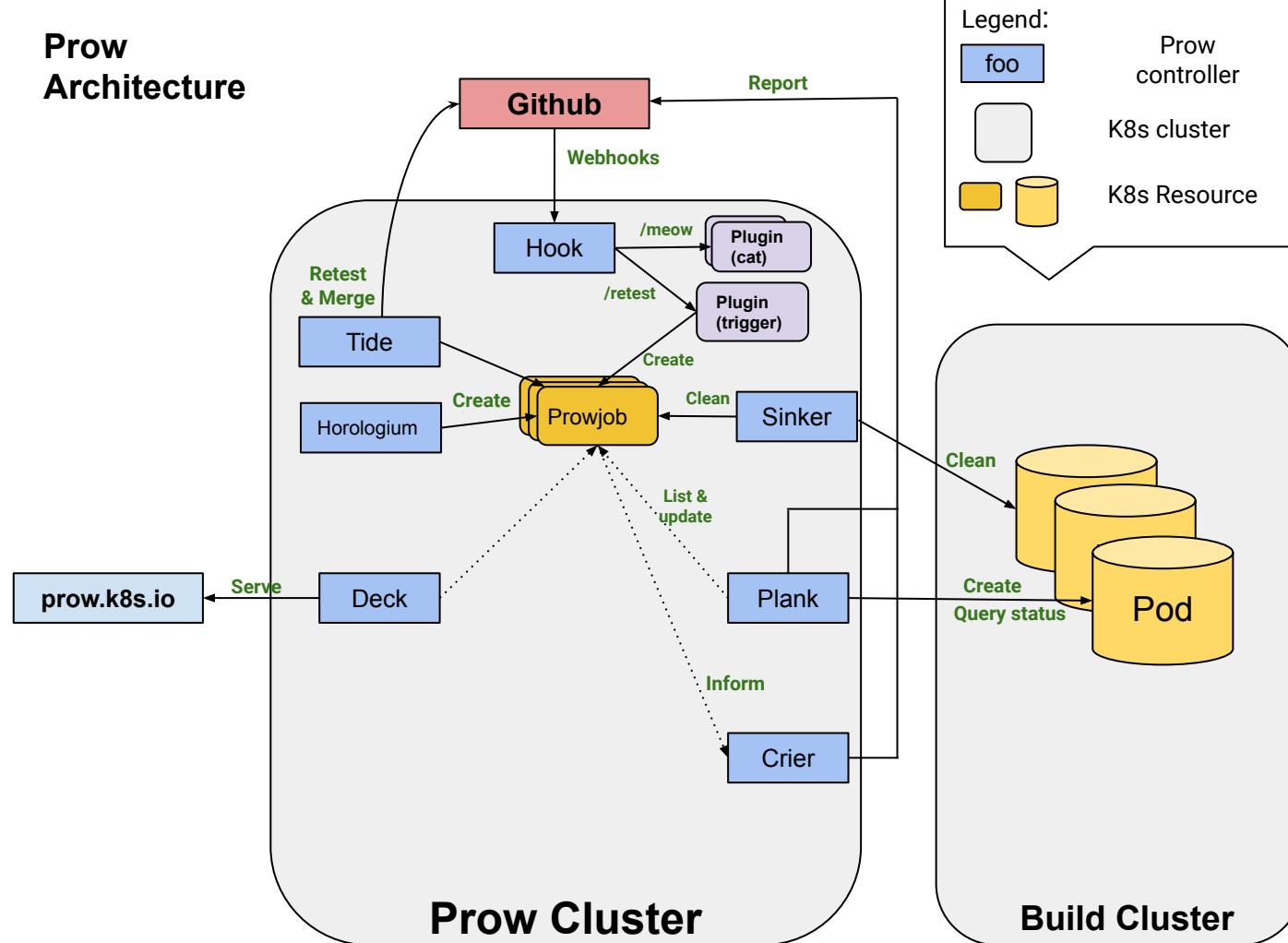
- CI/CD system built on Kubernetes for Kubernetes
- Executes jobs for building, testing, publishing, and deploying.
- Jobs can be triggered by different types of events and report their status to many different services.
- Also provides GitHub automation:
  - Policy enforcement.
  - Chat-ops via /foo style commands.
  - Automatic pull request merging.
- Used by:



Kubeflow



# Prow Architecture



# What's new?



KubeCon



CloudNativeCon

Europe 2019

- Switched job viewing from Gubernator to Spyglass
- Tide action history page
- Slack automation
- kind: lots of new features and improved support
- Automated Prow component publishing, version bumping, and deployment.
- Phaino
- Tackle
- Sub
- Tekton Pipeline controller
- Triggering commands in Gerrit comments (/test, /retest)
- Automated publishing of all variants of test images.

# ~~Gubernator~~ -> Spyglass



## kubernetes/test-infra PR #12516 pull-test-infra-bazel #1125833442571849731

[Recent runs](#) [View in Spyglass](#)

|          |  |
|----------|--|
| PR       | <a href="#">Katharine</a> : Shuffle release branch jobs and add fork annotations |
| Result   | FAILURE  |
| Tests    | 1 failed / 173 succeeded   |
| Started  | 2019-05-07 11:43 PDT   |
| Elapsed  | 6m29s  |
| Revision | <a href="#">a80ce603c1f6fec27a31f2011f9931309b929bc3</a>                         |
| Refs     | <a href="#">12516</a>  |

[artifacts](#) [build log](#)

### Test Failures

```
//testgrid/cmd/configurator:go_default_test 0.00s
Command: bazel test //testgrid/cmd/configurator:go_default_test

exec ${PAGER:-/usr/bin/less} "$0" || exit 1
Executing tests from //testgrid/cmd/configurator:go_default_test
-----
Job ci-kubernetes-build does not have a matching testgrid testgroup
Total bad job(s) - 1
--- FAIL: TestJobsTestgridEntryMatch (3.47s)
    config_test.go:440: Failed with invalid config or job entries
FAIL
```

from [junit\\_bazel.xml](#)

Filter through [log files](#) | View [test history](#) on testgrid

# ~~Gubernator~~ -> Spyglass



KubeCon

CloudNativeCon

Europe 2019

≡  pull-test-infra-bazel #1125833442571849731

Job History PR History Artifacts Testgrid

Test started today at 11:43 AM failed after 6m29s. ([more info](#))

JUnit

1/174 Tests Failed.

//testgrid/cmd/configurator:go\_default\_test ▾ 0s

173/174 Tests Passed! ▾

Build Log

Show all hidden lines [Raw build-log.txt](#) ↗

```
skipped 61 lines :  
62 [8,103 / 9,958] 48 / 176 tests; GUNZIP external/gcloud-base/image/004.tar.gz.nogz; 80s remote ... (55 actions running)  
63 Slow read: a 9318156-byte read from /bazel-scratch/.cache/bazel/_bazel_root/05618a594cb3499a4b912817865867cd/execroot/io_k8s_test_infra/bazel-out/k8s-fastbuild/bin/ghproxy/linux_amd64_pure_stripped/app.binary took 5037 ms.  
64 [9,118 / 9,987] 78 / 176 tests; GUNZIP external/gcloud-base/image/004.tar.gz.nogz; 111s remote ... (109 actions running)  
65 [9,621 / 10,004] 96 / 176 tests; GUNZIP external/gcloud-base/image/004.tar.gz.nogz; 147s remote ... (149 actions running)  
66 [9,778 / 10,043] 135 / 176 tests; GUNZIP external/gcloud-base/image/004.tar.gz.nogz; 188s remote ... (89 actions running)  
67 [9,835 / 10,043] 154 / 176 tests; GUNZIP external/gcloud-base/image/004.tar.gz.nogz; 218s remote ... (109 actions running)
```

# Prow: Self Automated Deployment



KubeCon



CloudNativeCon

Europe 2019

1. PR some changes to Prow.
2. PR passes tests, checks, and review.
3. Tide automatically merges the PR.
4. Post-submit job builds and publishes new Prow images.  
    ↻
5. Daily periodic job creates a PR to update the checked-in Prow component versions.
6. Current on-call approves the version bump PR.
7. Post-submit job deploys changes to cluster resources.

# Slack Automation



KubeCon



CloudNativeCon

Europe 2019

Report Message

Why are you reporting this message?

Moderators will see whatever you write here, along with the message being reported.

Would you like to report anonymously?

No, report with my username

Cancel Submit

Learn more about Reporter

1:58 PM

Reporter APP 2:07 PM  
@Katharine Berry reported a message in #random:  
They said:  
Some compelling justification goes here.  
The message they reported was:  
@Katharine Berry  
This is a *mean* message!  
Yesterday at 3:44 PM

# Slack Automation



KubeCon



CloudNativeCon

Europe 2019

Loading history

**Moderate User**

Deactivate mrbobbytables (U511ZSKHD)?

No

How much content would you like to remove?

10 minutes

② Learn more about Reporter

Cancel

Submit

# Slack Automation



KubeCon



CloudNativeCon

Europe 2019



**Event Log** APP 2:44 PM

Channel #unknown-channel was **deleted**

Channel **#asdfhdfg** was **archived** by **@Katharine Berry**

Channel **#asdfhdfg** was **unarchived** by **@Katharine Berry**

A user was deactivated: **@Surfing** (this is heuristic: they are definitely deleted now, but may also have been before)

The Slack team was renamed to "sig-testing party"

The Slack team moved to <https://sig-testing-party.slack.com>

The Slack team was renamed to "sig-testing"

A new emoji was added: **:facepalm:** :facepalm:

A new emoji alias was added: **:oops:**. It's an alias for **:facepalm:**. :oops:

An emoji was deleted. It had several names: **:oops:**, **:facepalm:**

# Tide History

Tide History

Filter kubernetes/kubernetes master >> all pull requests all authors all actions all states Showing 500/1000 records

| Pool                           | Base Commit | Action        | Target  | Time            | Error |
|--------------------------------|-------------|---------------|---|-----------------|-------|
| ✓ kubernetes/kubernetes master | 43284ec     | TRIGGER       | #77478 (6382595) by draveness   | 00:25:42        |       |
| ✓ kubernetes/kubernetes master | 8ea9edb     | MERGE_BATCH   | #74705 (d59c678) by johscheuer<br>#77381 (21e4f00) by JieJihh<br>#77442 (4abd730) by cofyc  | 00:24:09        |       |
|                                |             | TRIGGER       | #74705 (d59c678) by johscheuer  | May 06 22:57:40 |       |
|                                |             | TRIGGER_BATCH | #74705 (d59c678) by johscheuer<br>#77381 (21e4f00) by JieJihh<br>#77442 (4abd730) by cofyc  | May 06 22:56:05 |       |
| ✓ kubernetes/kubernetes master | b3a73f7     | MERGE_BATCH   | #75993 (d001a0f) by caesarxuchao<br>#77443 (2d0d226) by cofyc<br>#77495 (37cb774) by wanghaoran1988   | May 06 22:54:07 |       |
|                                |             | TRIGGER       | #75993 (d001a0f) by caesarxuchao  | May 06 21:35:40 |       |
|                                |             | TRIGGER_BATCH | #75993 (d001a0f) by caesarxuchao<br>#77443 (2d0d226) by cofyc<br>#77495 (37cb774) by wanghaoran1988   | May 06 21:34:04 |       |
| ✓ kubernetes/kubernetes master | 9f1b04f     | MERGE_BATCH   | #76396 (b8a8bdb) by yuwenma<br>#76927 (f8e8133) by mrkm4ntr<br>#76966 (6b73b50) by figo<br>#77335 (0069a6c) by loquatus<br>#77362 (eaafa59) by cblecker | May 06 21:32:34 |       |
|                                |             | TRIGGER_BATCH | #75993 (d001a0f) by caesarxuchao<br>#76927 (f8e8133) by mrkm4ntr<br>#76966 (6b73b50) by figo<br>#77335 (0069a6c) by loquatus                            | May 06 20:48:05 |       |

# kind - Kubernetes in Docker



KubeCon



CloudNativeCon

Europe 2019

New since Kubecon Seattle:

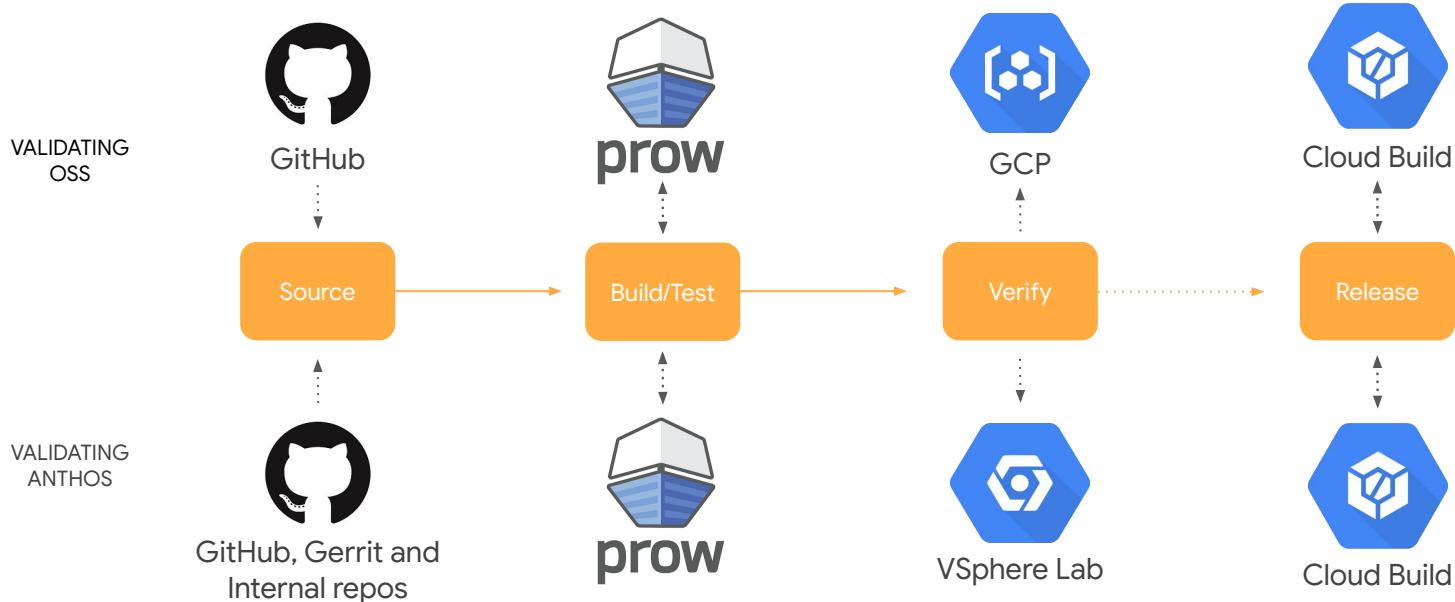
- Proxy support
- Fully offline clusters & development
- Image side loading (`kind load docker-image` and `kind load image-archive`)
- Conformance certified
- Limited ARM64 & PPC64LE support
- Improved windows (host) support
- Significantly faster cluster startup
- <https://kind.sigs.k8s.io/> docs site
- Configurable API Server address & port
- Support for additional node mounts



# What we're up to now

- Prow
  - Supporting more git providers and code review platforms
  - Improving metrics and alerting
  - OSS management of `prow.k8s.io`
  - Improve self service of config
  - GitHub Enterprise support
- kind
  - Even faster startup and smaller images with containerd
  - Networking revamp: lightweight CNI config, exposing ports on the fly
  - Restart support
  - Building from Kubernetes release tarballs

# ANTHOS - A Hybrid Cloud Case Study



# Success criteria for CI Pipeline

- Move fast without breaking things - Developer Productivity and Quality !
- Easy to adopt - Seamless integration into developer workflow
- Less learning curve for contributors
- Highly reliable
- Great support
- Good reporting solution to publish test results and relevant metrics

SIG Testing to the rescue !!

# Prow - CI framework

- Internal instance of Prow inside vSphere test lab
- Testing Anthos on Anthos !
  - Dogfood product
  - Snapshot Prow cluster every release
- Extending OSS Prow
  - Capability to post test results back to Gerrit CLs
  - Comment based triggering in Gerrit
  - Postsubmit test hook
- Adopt OSS qualification model
  - Run tests on k8s container
  - Conformance tests to validate cluster functionality and health



# Contributor Productivity



KubeCon



CloudNativeCon

Europe 2019

- PR management
  - automated tests
  - test results/logs in PR
  - PR approval
  - automated image uploads

Aish Sundar Uploaded patch set 2.

---

Aish Sundar  
Patch Set 2:  
/test e2e-create  
[REPLY](#)

---

Prow\_Bot\_V2 Patch Set 2: Triggered 9 prow jobs: \* Name: pull-[REDACTED]

---

Prow\_Bot\_OnPrem Patch Set 2: Triggered 1 prow jobs: \* Name: [REDACTED]

---

Prow\_Bot\_V2 Verified +1 Patch Set 2: Verified+1 9 out of 9 jobs passed! ✓

---

Prow\_Bot\_OnPrem E2EPresubmit -1  
Patch Set 2: E2EPresubmit-1  
0 out of 1 jobs passed!  
✗ [REDACTED] -e2e-presubmit FAILURE - <http://go/vsphere>



# Boskos - Resource management tool



KubeCon

CloudNativeCon

Europe 2019

- Resource management tool
- Clusters and IPs
- Janitor

| Now | Success rate over time: 3h: 100%, 12h: 100%, 48h: 100% |          |                                 |                 | 12h ago  |
|-----|--|----------|---------------------------------|-----------------|----------|
|     | Repository   | Revision | Job                             | Started         | Duration |
|     |  |          | periodic-onprem-aborted-cleanup | 10:09:59        | 3m10s    |
|     |  |          | periodic-onprem-aborted-cleanup | 09:20:42        | 3m57s    |
|     |  |          | periodic-onprem-aborted-cleanup | 07:50:42        | 3m27s    |
|     |  |          | periodic-onprem-aborted-cleanup | 06:20:42        | 3m57s    |
|     |  |          | periodic-onprem-aborted-cleanup | 04:50:42        | 3m57s    |
|     |  |          | periodic-onprem-aborted-cleanup | 03:20:42        | 3m27s    |
|     |  |          | periodic-onprem-aborted-cleanup | 01:50:42        | 3m57s    |
|     |  |          | periodic-onprem-aborted-cleanup | 00:20:42        | 3m57s    |
|     |  |          | periodic-onprem-aborted-cleanup | May 03 22:50:42 | 3m57s    |
|     |  |          | periodic-onprem-aborted-cleanup | May 03 21:20:42 | 3m57s    |

```
{"type": "ip", "current": {"busy": 5, "free": 55}, "owner": {"": 55, "83ff28d6-6ec6-11e9-9bc1-5e42022215de": 5}}
```



# Spyglass - Test Log Viewer



KubeCon

CloudNativeCon

Europe 2019

[Job History](#)

[Artifacts](#)

Test started today at 1:02 PM **failed** after 1h45m31s. ([more info](#))

## Build Log

[Show all hidden lines](#)

[Raw build-log.txt](#)

```
skipped 16456 lines :  
16457 I0504 21:00:34.171903 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16458 I0504 21:00:44.171897 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16459 I0504 21:00:54.171855 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16460 I0504 21:01:04.171892 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16461 I0504 21:01:04.175720 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16462 I0504 21:01:04.178650 18199 clusterdeployer.go:318] removing old admin machines in internal cluster: deleting machine default/gke-admin-master-czk75: error  
waiting for machine(s) deletion to complete: timed out waiting for the condition  
16463 I0504 21:01:14.183650 18199 clusterdeployer.go:901] deleting machine default/gke-admin-master-czk75  
16464 I0504 21:01:14.190989 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16465 I0504 21:01:24.193998 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16466 I0504 21:01:34.194019 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16467 I0504 21:01:44.194041 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
skipped 83 lines :  
16551 I0504 21:15:44.194058 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16552 I0504 21:15:54.194025 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16553 I0504 21:16:04.194007 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16554 I0504 21:16:14.194063 18199 clusterclient.go:561] Waiting for machine objects to be deleted...  
16555 I0504 21:16:14.197768 18199 clusterclient.go:561] Waiting for machine objects to be deleted...
```



# TestGrid - Test Results and Metrics Reporting



CloudNativeCon  
Europe 2019

- Presubmit and Periodic Test Results
- Test Metadata
- Code coverage
- Test flakiness
- Test duration
- Automated failure alerts
- Automated issue management

| 05-04 06:02 PDT @1124660486214782977 -- 04-03 12:02 PDT @1113517086446981121; Served 14155 results in 0.16 seconds      |  |                |  |           |       |
|---|--|----------------|--|-----------|-------|
| About   |  | Size           |  | Options   |       |
| Graph   |  | Local Time: ON |  |           |       |
| 05-04   |  | 05-03          |  |           |       |
| 06:02 PDT   |  | 21:02 PDT      |  | 17:02 PDT |       |
| 112466048621112452459074112446419277112438869538112429809833  |  | f5e06cf3f      |  | 970b22342 |       |
|   |  | b1bcc942       |  |           | 75f6a |
| Hide 2 stale tests (no results in last 5+ runs)   |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus scrapes metrics from annotated workloads                              |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus reports only expected alerts <a href="#">Changes</a>                  |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus returns not empty results for all federation queries                  |  |                |  |           |       |
| Overall   |  |                |  |           |       |
| BeforeSuite   |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus active targets are healthy  |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Alertmanager cluster has discovered all its peers                                |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Alertmanager is running on different nodes                                       |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Monitoring installs correctly  |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus detects all alertmanager instances                                    |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus is running on different nodes   |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus returns not empty results for all queries in dashboards               |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus scrapes container metrics from all nodes                              |  |                |  |           |       |
| [Monitoring Addon] [Monitoring v0.4.0] Prometheus scrapes metrics from user pod   |  |                |  |           |       |
| [Nomos Addon],All foo-corp created  |  |                |  |           |       |
| [k8s.io] Docker Containers should be able to override the image's default arguments (docker cmd) [NodeConformance]      |  |                |  |           |       |
| [k8s.io] Docker Containers should be able to override the image's default command (docker entrypoint) [NodeConformance] |  |                |  |           |       |
| [k8s.io] Docker Containers should be able to override the image's default command and arguments [NodeConformance]       |  |                |  |           |       |
| [k8s.io] Docker Containers should use the image defaults if command and args are blank [NodeConformance] [Conformance]  |  |                |  |           |       |
| [k8s.io] KubeletManagedEtcHosts should test kubelet managed /etc/hosts file [NodeConformance] [Conformance]             |  |                |  |           |       |
| [k8s.io] Pods should allow activeDeadlineSeconds to be updated [NodeConformance] [Conformance]                          |  |                |  |           |       |
| [k8s.io] Pods should be submitted and removed [NodeConformance] [Conformance]   |  |                |  |           |       |
| [k8s.io] Pods should be updated [NodeConformance] [Conformance]   |  |                |  |           |       |
| [k8s.io] Pods should contain environment variables for services [NodeConformance] [Conformance]                         |  |                |  |           |       |

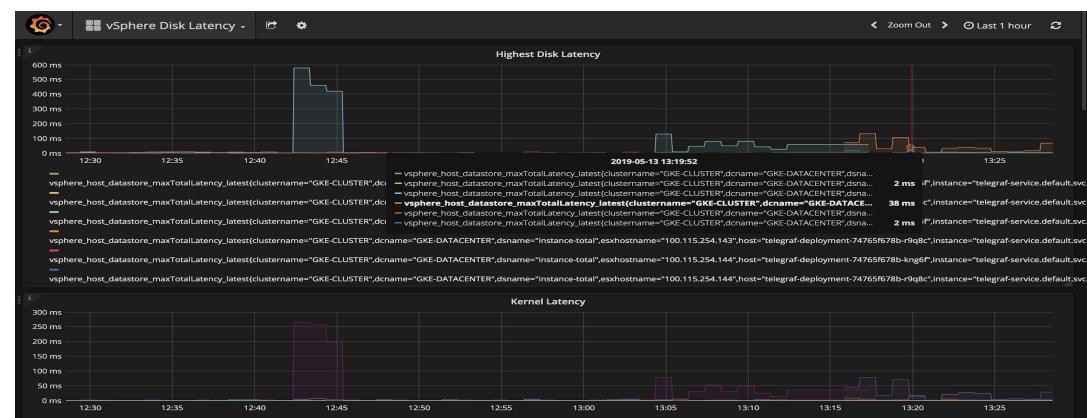
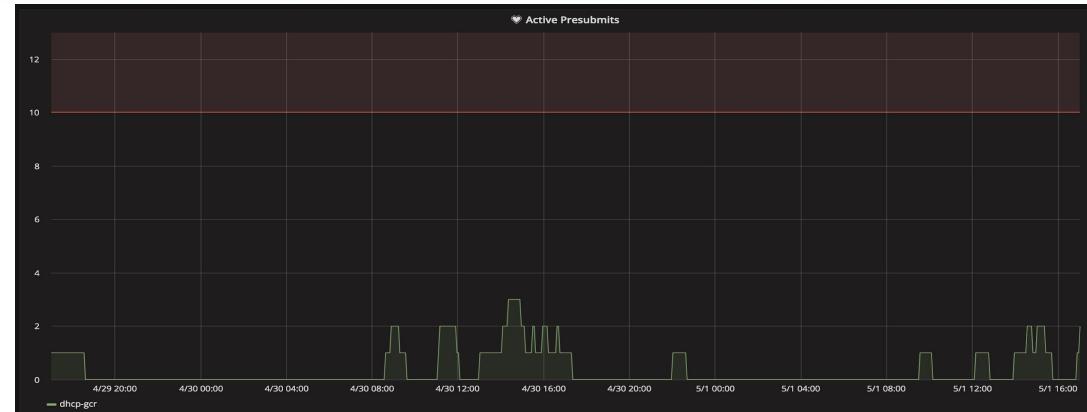


# Velodrome - CI and Lab Metrics Dashboard



CloudNativeCon  
Europe 2019

- Presubmit load
- Presubmit failure rate
- Boskos IP usage
- Test lab metrics
- F5 metrics



# Qualification Pipeline

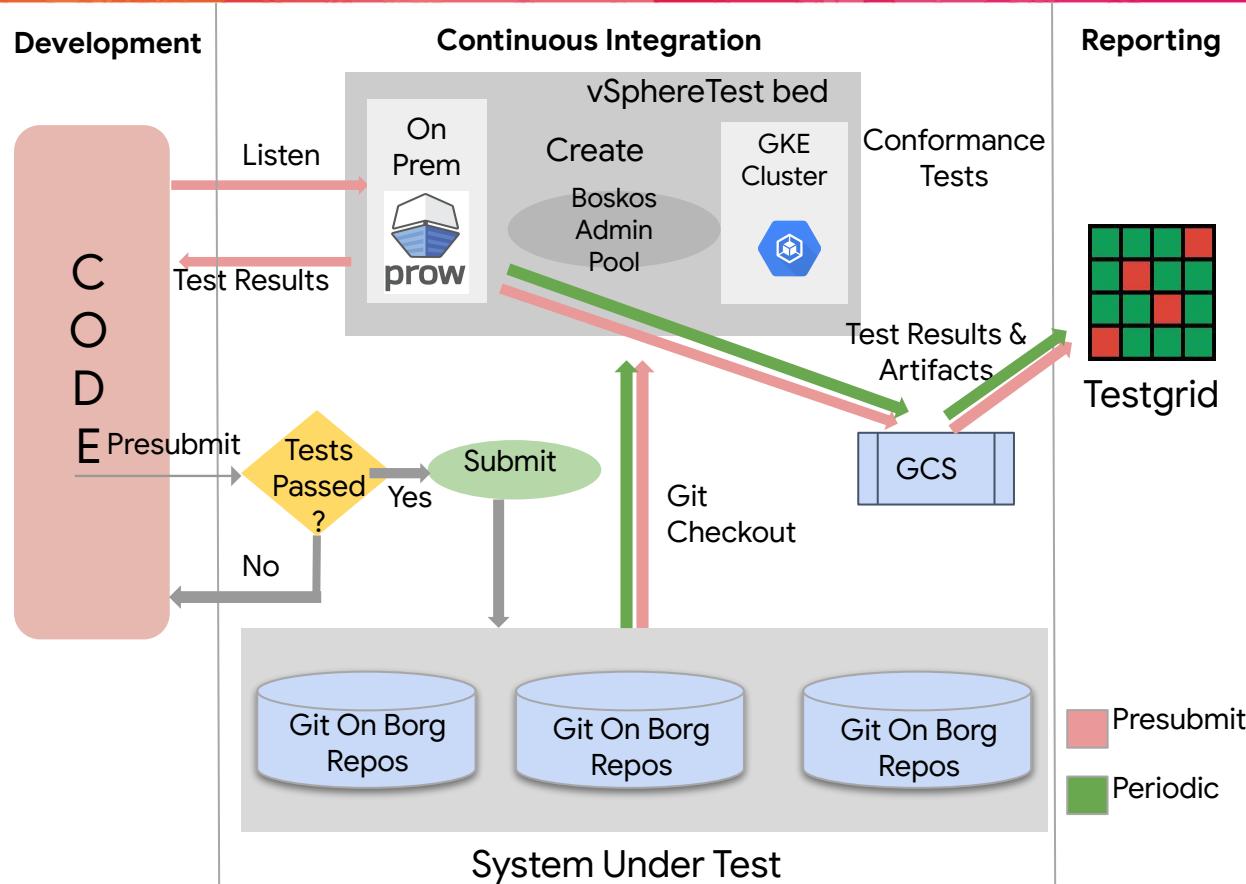


KubeCon

CloudNativeCon

Europe 2019

- Continuously and reliably validate Anthos binaries
- Enable teams to integrate easily
- Provide release readiness signals



System Under Test

# Where to find us?

SIG Testing [Community README](#)

[Weekly meetings](#) - Tuesdays 1pm PT ([timezone converter](#))

[kubernetes-sig-testing mailing list](#) (join to view calendar and documents)

[Slack channel](#) (get an [invite](#))

- See #prow, #kind, and #testing-ops too.

Repos:

[kubernetes/test-infra](#)

[kubernetes-sigs/kind](#)

[kubernetes-sigs/slack-infra](#)



KubeCon



CloudNativeCon

---

Europe 2019

---

# THANKS