

MICHIGAN STATE

U N I V E R S I T Y

Alpha Presentation

Kubernetes Cluster Inspection Tool

The Capstone Experience

Team Google

David Ackley

Guillermo Jimenez

Linghao Ji

Haylee Quarles

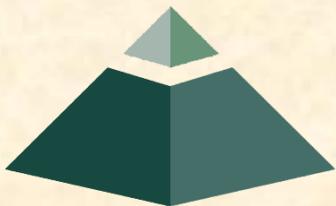
Casey Schneider

Ben Whitelaw

Department of Computer Science and Engineering

Michigan State University

Spring 2019



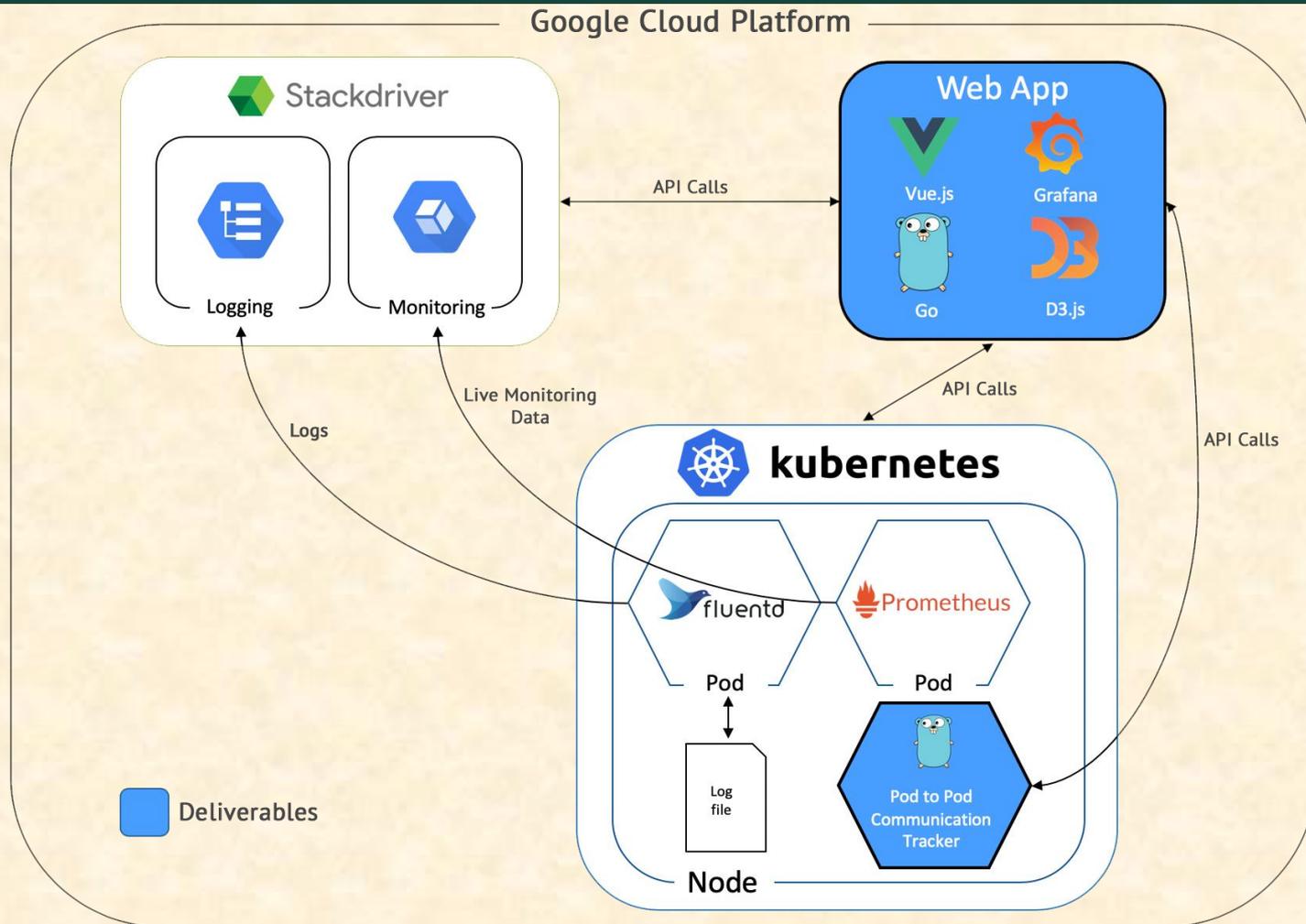
*From Students...
...to Professionals*

Project Overview

- Provide Robust Inspection Tool of Kubernetes Cluster
 - Both Current and Historical State
- Gather All Cluster Data into a Single Interactive View
 - Provide Health, Performance, and Resource Changes
 - Ingest with Native, Kubernetes Stackdiver Agent
 - Trace Lifecycle of Nodes, Pods, and Containers
- Implement Easily on Any GCP Kubernetes Cluster



System Architecture

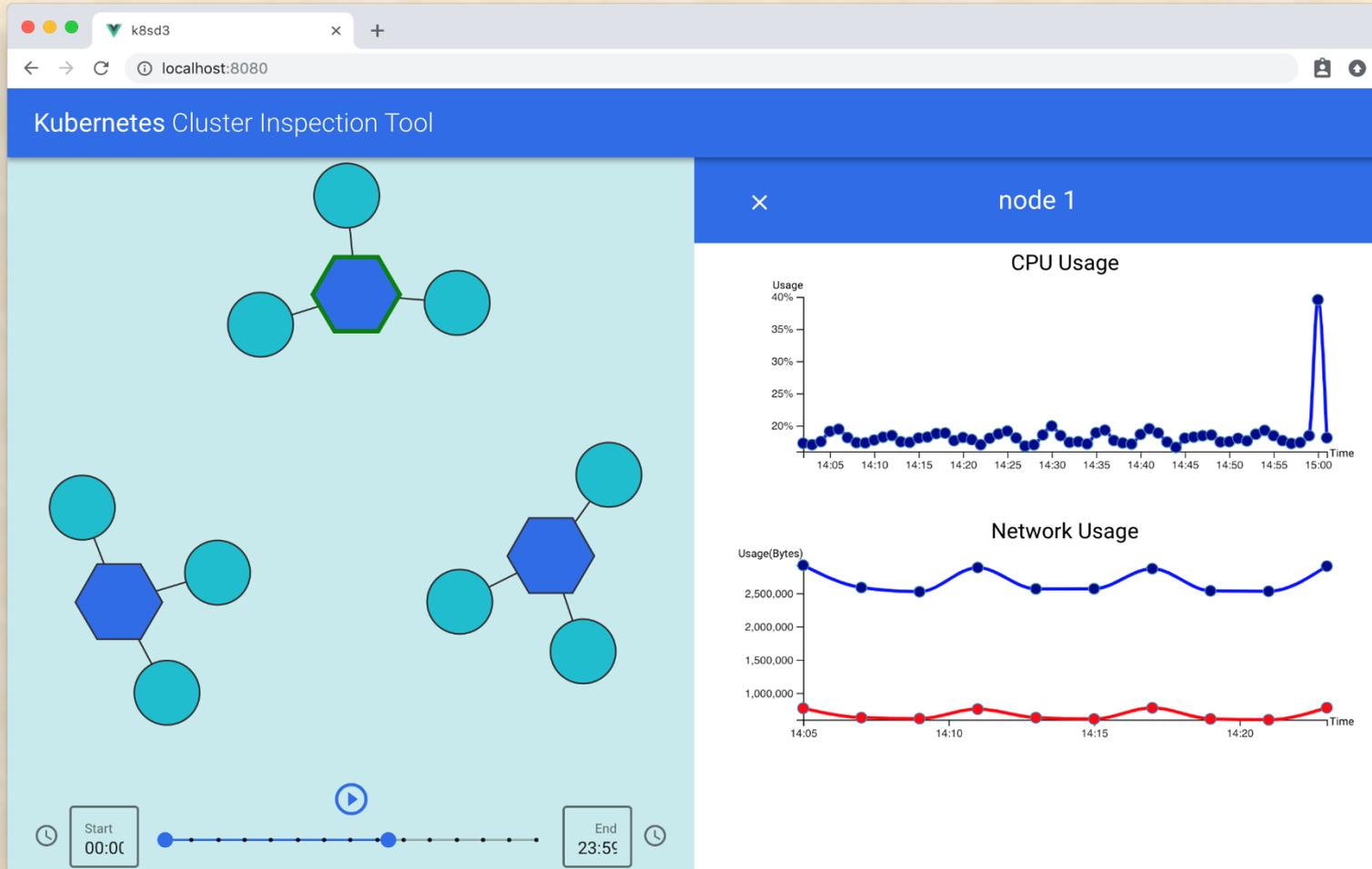


Event Logs

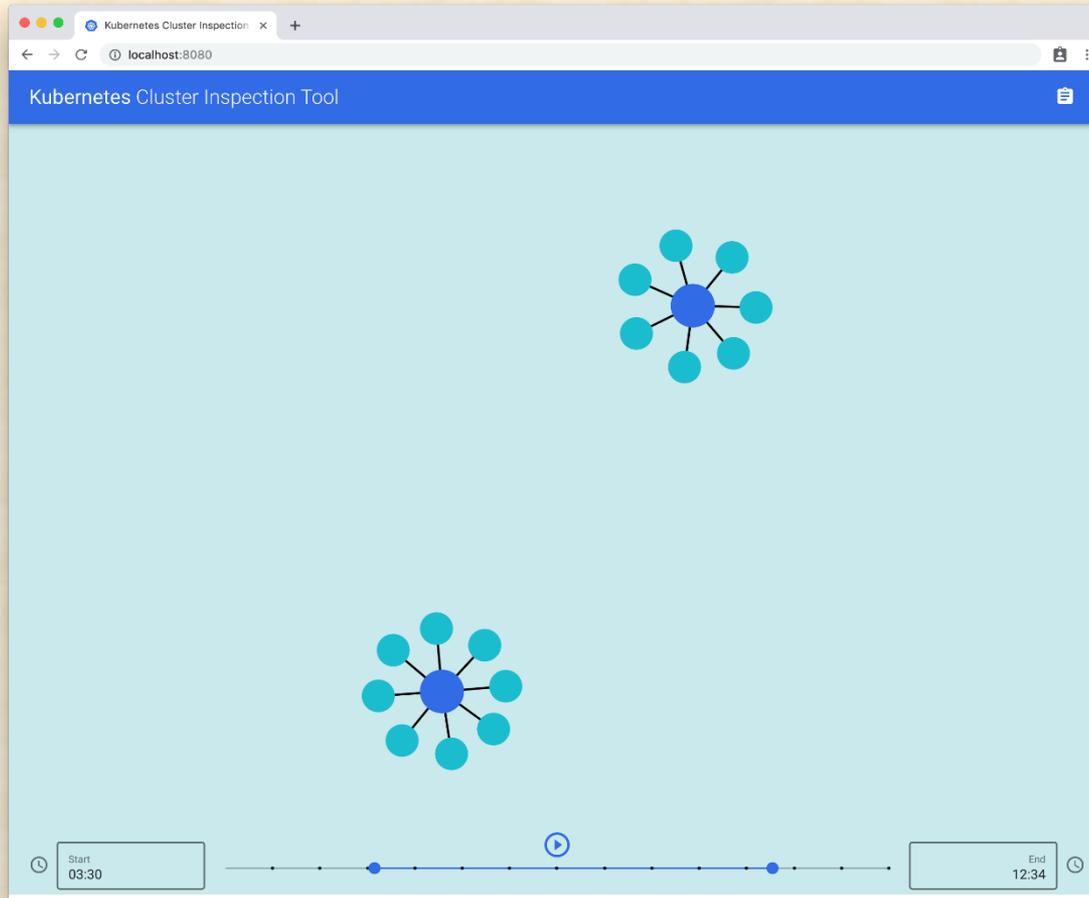
The screenshot displays the 'Kubernetes Cluster Inspection Tool' interface. At the top, the browser address bar shows 'localhost:8080'. The main content area is titled 'Events Log' and contains a list of seven events. Each event is represented by a colored circle (orange for Warning, green for Normal) followed by a timestamp and a description. The events alternate between Warning and Normal. At the bottom of the interface, there is a timeline with a play button and two boxes labeled 'Start 03:30' and 'End 12:34'.

Severity	Timestamp	Message
Warning	253	Liveness probe failed: HTTP probe failed with statuscode: 500
Normal	249	Killing container with id docker://metadata-agent.Container failed liveness ...
Warning	253	Liveness probe failed: HTTP probe failed with statuscode: 500
Normal	251	Killing container with id docker://metadata-agent.Container failed liveness ...
Warning	252	Liveness probe failed: HTTP probe failed with statuscode: 500
Normal	252	Killing container with id docker://metadata-agent.Container failed liveness ...
Warning	253	Liveness probe failed: HTTP probe failed with statuscode: 500
Normal	250	Killing container with id docker://metadata-agent.Container failed liveness ...

Node Monitoring



Cluster Playback



Pod to Pod Communication Logs

```
backend-cdc8f4975-vrtl4    1/1      Running   0         6d        10.8.1.19  gke-bens-p2p-cluster-pool-1-d72cfd8f-vmzc
frontend-fc8bbcd4b-pm7bt  1/1      Running   0         6d        10.8.1.22  gke-bens-p2p-cluster-pool-1-d72cfd8f-vmzc
schne434@cloudshell:~ (msu-spring-2019)$
schne434@cloudshell:~ (msu-spring-2019)$
schne434@cloudshell:~ (msu-spring-2019)$
schne434@cloudshell:~ (msu-spring-2019)$ kubectl exec backend-cdc8f4975-vrtl4 -it -- /bin/sh
/ #
/ #
/ #
/ # tcpdump
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 262144 bytes
00:23:44.449076 IP 10.8.1.22.42292 > backend-cdc8f4975-vrtl4.80: Flags [P.], seq 3960176463:3960176557, ack 1707461566, win 1329, options [nop,nop,TS val 3875405387 ecr 2858280586], length 94: HTTP: GET /newreq HTTP/1.1
00:23:44.449252 IP backend-cdc8f4975-vrtl4.80 > 10.8.1.22.42292: Flags [P.], seq 1:136, ack 94, win 220, options [nop,nop,TS val 2858310424 ecr 3875405387], length 135: HTTP: HTTP/1.1 200 OK
00:23:44.449279 IP 10.8.1.22.42292 > backend-cdc8f4975-vrtl4.80: Flags [P.], seq 136, win 1329, options [nop,nop,TS val 3875405387 ecr 2858310424], length 0
00:23:44.449471 IP backend-cdc8f4975-vrtl4.35910 > kube-dns.kube-system.svc.cluster.local.53: 1318+ PTR? 22.1.8.10.in-addr.arpa. (40)
00:23:44.455399 IP kube-dns.kube-system.svc.cluster.local.53 > backend-cdc8f4975-vrtl4.35910: 1318 NXDomain 0/1/0 (137)
00:23:44.455598 IP backend-cdc8f4975-vrtl4.44280 > kube-dns.kube-system.svc.cluster.local.53: 35830+ PTR? 10.240.11.10.in-addr.arpa. (43)
00:23:44.456007 IP kube-dns.kube-system.svc.cluster.local.53 > backend-cdc8f4975-vrtl4.44280: 35830 1/0/0 PTR kube-dns.kube-system.svc.cluster.local. (95)
^C
7 packets captured
7 packets received by filter
0 packets dropped by kernel
/ # █
```



What's left to do?

- Visualize Pod to Pod Communication
- Stackdriver Logging API and Front end visualization
- Meet with Kubernetes active users to get Visualization Tool feedback
- Get long term events that are not stored in Kubernetes



Questions?

?

?

?

?

?

?

?

?

?

