MICHIGAN STATE
UNIVERSITY

Alpha Presentation
Kubernetes Cluster Inspection Tool

The Capstone Experience

Team Google

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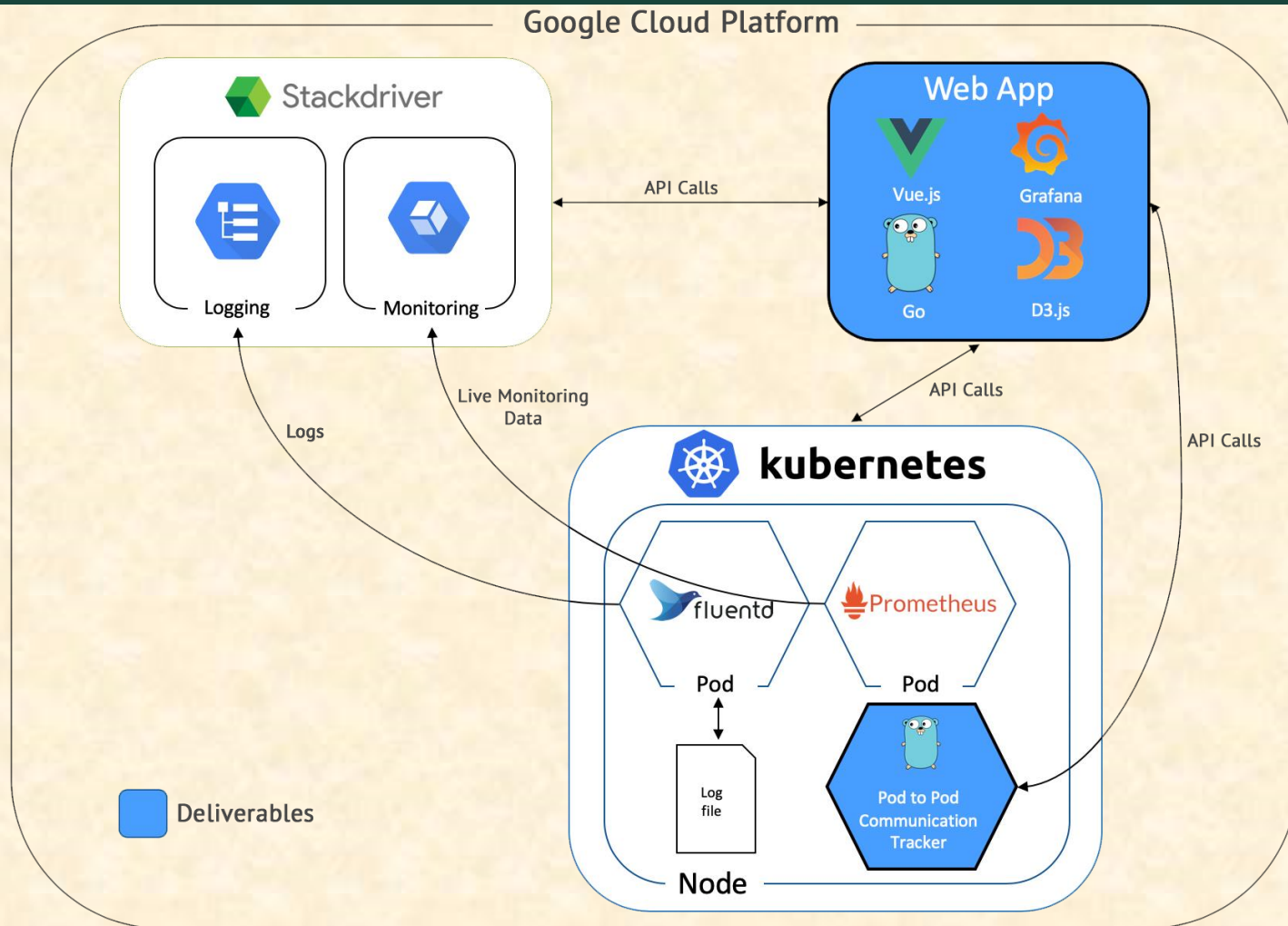Michigan State University
Spring 2019

From Students…
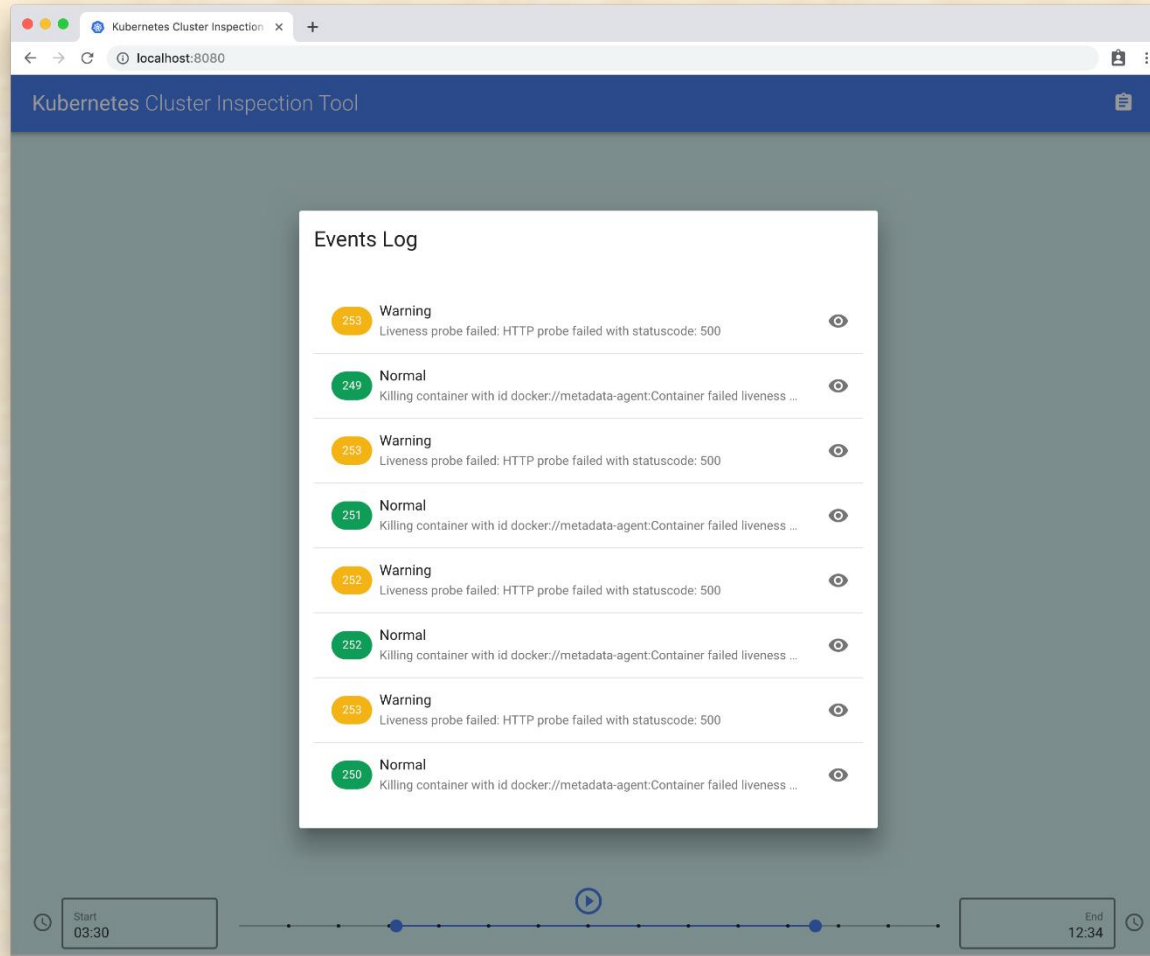*…to Professionals*

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
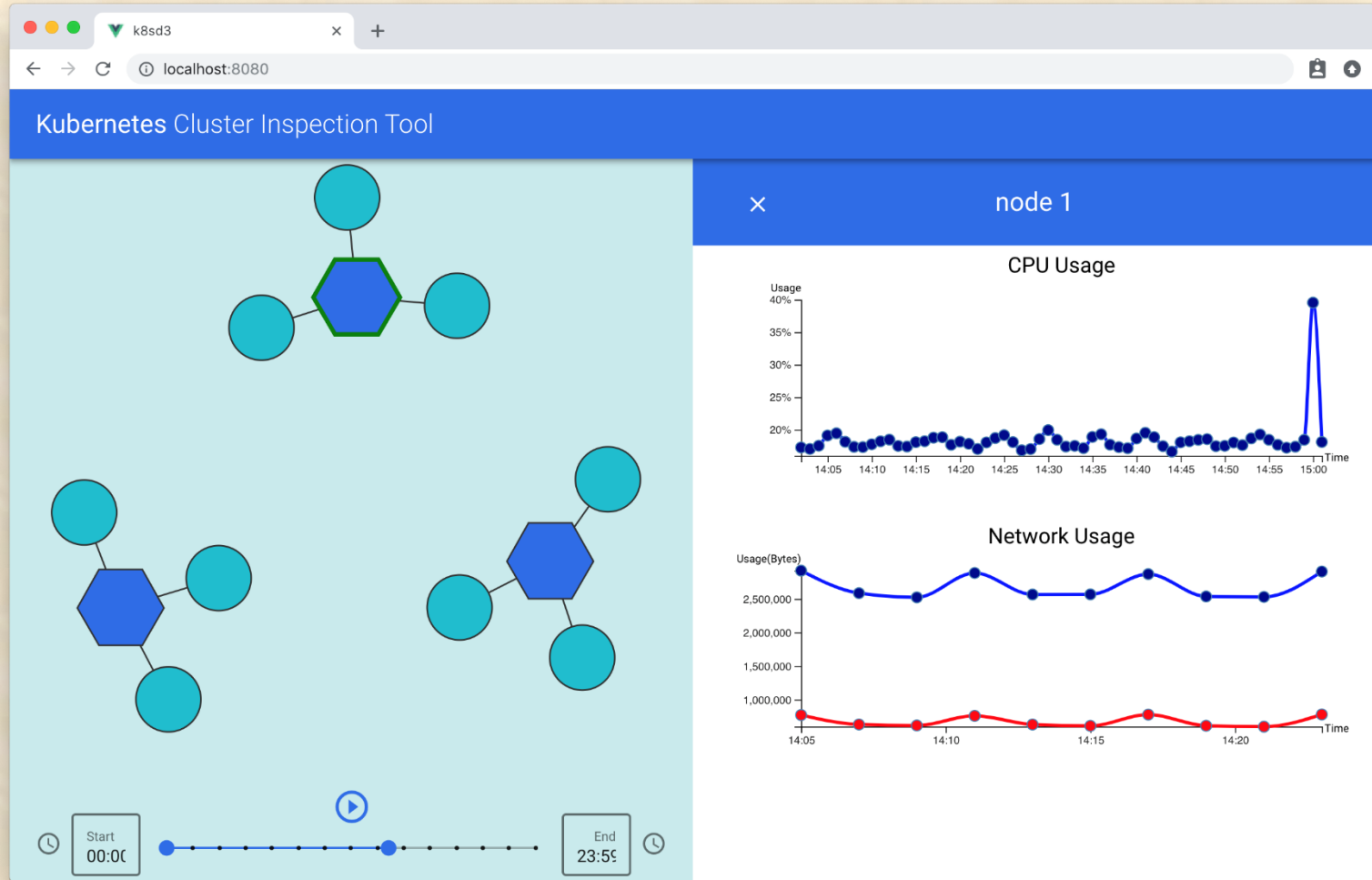- Implement Easily on Any GCP Kubernetes Cluster
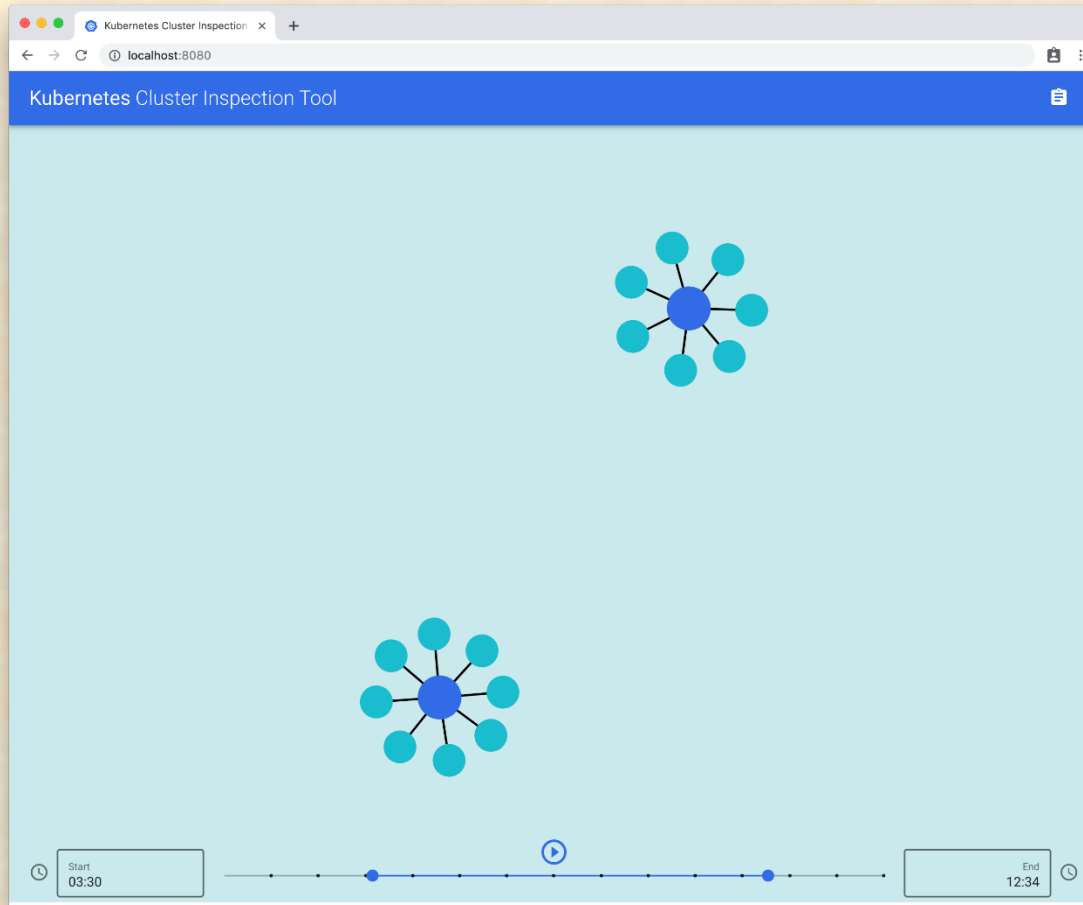
System Architecture

Event Logs

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 3875
405387 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], l
ength 135: HTTP: HTTP/1.1 200 OK
00:23:44.449279 IP 10.8.1.22.42292 > backend-cdc8f4975-vrtl4.80: Flags [.], ack 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?