TEL4VN

Logging, Monitoring and Troubleshooting

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Logging in Kubernetes

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Logging in Docker

```
[root@localhost ~]# docker run -d kodekloud/event-simulator
e85f401c755c00e4d2d0b01523002ca8ed16b246deb6a6dbe6cc74b1439f8fa5
[root@localhost ~]# ^C
[root@localhost ~]# ^C
[root@localhost ~]# docker logs -f e85f401c755c00e4d2d0b01523002ca8ed16b246deb6a6dbe6cc74b1439f8fa5
[2020-09-01 13:52:43,501] INFO in event-simulator: USER2 logged in
[2020-09-01 13:52:44,501] INFO in event-simulator: USER1 is viewing page1
[2020-09-01 13:52:45,506] INFO in event-simulator: USER2 is viewing page3
[2020-09-01 13:52:46,508] INFO in event-simulator: USER1 logged out
[2020-09-01 13:52:47,510] INFO in event-simulator: USER2 is viewing page2
[2020-09-01 13:52:48,512] WARNING in event-simulator: USER5 Failed to Login as the account is locked due to MANY FAILED ATTEMPTS.
[2020-09-01 13:52:48,512] INFO in event-simulator: USER4 logged out
[2020-09-01 13:52:49,514] INFO in event-simulator: USER4 logged in
[2020-09-01 13:52:50,516] INFO in event-simulator: USER2 logged in
[2020-09-01 13:52:51,517] WARNING in event-simulator: USER7 Order failed as the item is OUT OF STOCK.
[2020-09-01 13:52:51,518] INFO in event-simulator: USER1 is viewing page2
[2020-09-01 13:52:52,519] INFO in event-simulator: USER3 is viewing page1
[2020-09-01 13:52:53,520] WARNING in event-simulator: USER5 Failed to Login as the account is locked due to MANY FAILED ATTEMPTS.
[2020-09-01 13:52:53,521] INFO in event-simulator: USER3 is viewing page3
[2020-09-01 13:52:54,522] INFO in event-simulator: USER2 is viewing page3
[2020-09-01 13:52:55,524] INFO in event-simulator: USER1 is viewing page2
[2020-09-01 13:52:56,528] INFO in event-simulator: USER1 logged out
[2020-09-01 13:52:57,530] INFO in event-simulator: USER1 logged in
[2020-09-01 13:52:58,542] WARNING in event-simulator: USER5 Failed to Login as the account is locked due to MANY FAILED ATTEMPTS.
[2020-09-01 13:52:58,543] INFO in event-simulator: USER4 logged out
[2020-09-01 13:52:59,545] WARNING in event-simulator: USER7 Order failed as the item is OUT OF STOCK.
[2020-09-01 13:52:59,545] INFO in event-simulator: USER4 is viewing page1
```

Logging in Kubernetes

```
kubectl logs -f event-simulator-pod event-simulator
```

```
2018-10-06 15:57:15,937 - root - INFO - USER1 logged in
2018-10-06 15:57:16,943 - root - INFO - USER2 logged out
2018-10-06 15:57:17,944 - root - INFO - USER2 is viewing page2
2018-10-06 15:57:18,951 - root - INFO - USER3 is viewing page3
2018-10-06 15:57:19,954 - root - INFO - USER4 is viewing page1
2018-10-06 15:57:20,955 - root - INFO - USER2 logged out
2018-10-06 15:57:21,956 - root - INFO - USER1 logged in
2018-10-06 15:57:22,957 - root - INFO - USER3 is viewing page2
2018-10-06 15:57:23,959 - root - INFO - USER1 logged out
2018-10-06 15:57:24,959 - root - INFO - USER2 is viewing page2
2018-10-06 15:57:25,961 - root - INFO - USER1 logged in
2018-10-06 15:57:26,965 - root - INFO - USER4 is viewing page3
2018-10-06 15:57:27,965 - root - INFO - USER4 is viewing page3
2018-10-06 15:57:28,967 - root - INFO - USER2 is viewing page1
2018-10-06 15:57:29,967 - root - INFO - USER3 logged out
2018-10-06 15:57:30,972 - root - INFO - USER1 is viewing page2
2018-10-06 15:57:31,972 - root - INFO - USER4 logged out
2018-10-06 15:57:32,973 - root - INFO - USER1 logged in
2018-10-06 15:57:33,974 - root - INFO - USER1 is viewing page3
```

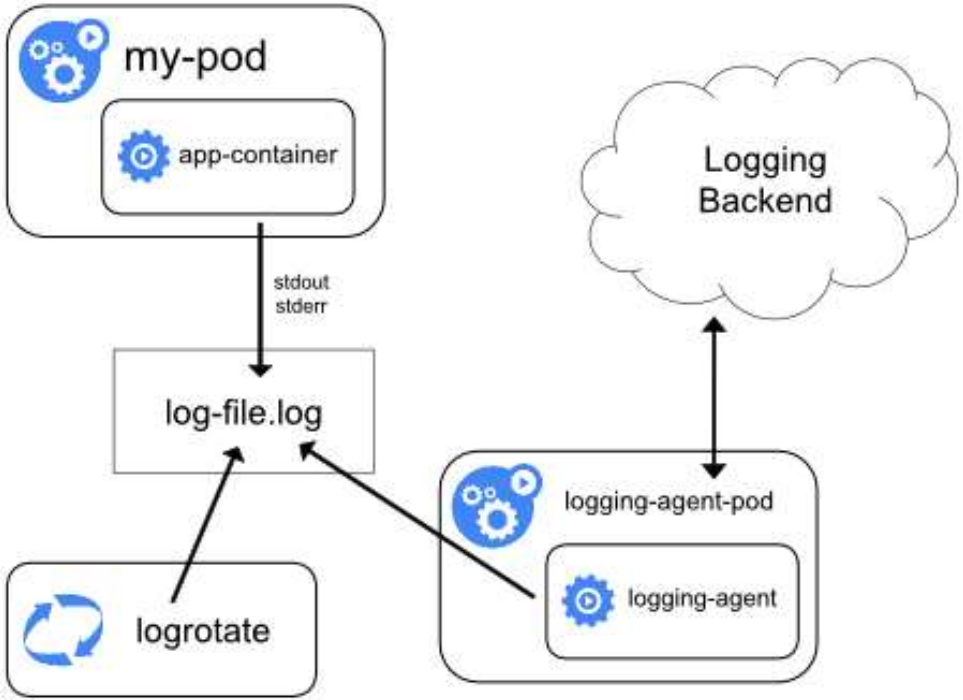
event-simulator.yaml

```yaml
apiVersion: v1
kind: Pod
metadata:
  name: event-simulator-pod
spec:
  containers:
  - name: event-simulator
    image: kodekloud/event-simulator
  - name: image-processor
    image: some-image-processor
```

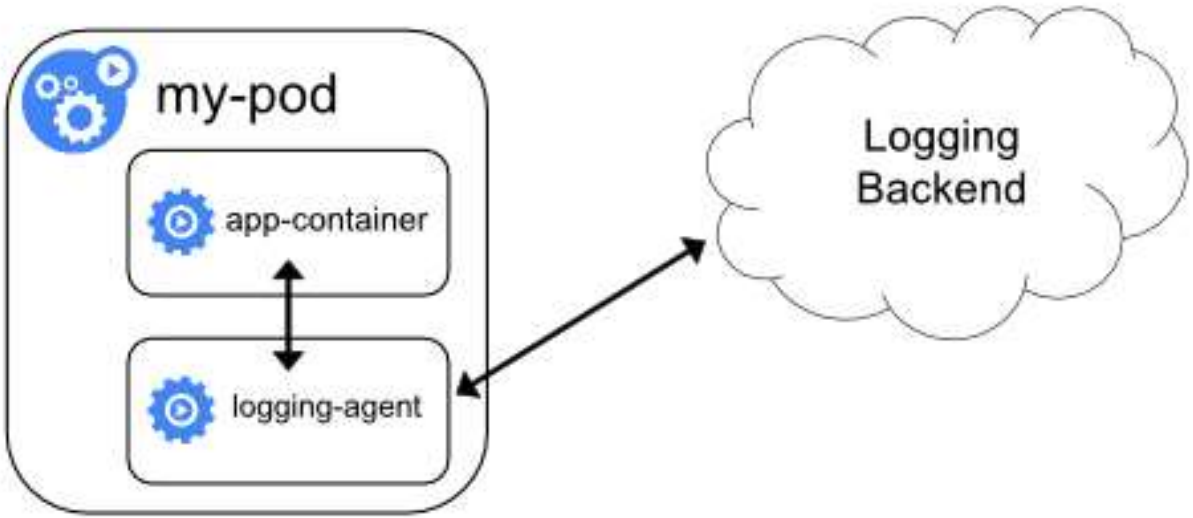
Access Log data

- docker logs $CONTAINER_NAME
- kubectl logs $POD_NAME
- kubectl logs $POD_NAME –c $CONTAINER_NAME
- tail /var/log/containers/$CONTAINER_NAME_$CONTAINER_ID

Cluster-level logging architectures



Cluster-level logging architectures



Logging Architecture - Nodes

kubelet	kube-proxy
systemd service	Pod
journald	kubectl logs
journalctl kubelet.service	/var/log/containers
/var/log/kubelet.log	/var/log/kube-proxy
Local operating system logs	

Logging Architecture - Control Planes

Run as Pods

```
kubectl logs -n kube-system $PODNAME
docker logs $CONTAINERNAME
/var/log/containers
```

systemd based system logs to journald

Everywhere else...

```
/var/log/kube-apiserver.log
/var/log/kube-scheduler.log
/var/log/kube-controller-manager.log
```

Kubernetes Events

Logs for resources defined in the cluster

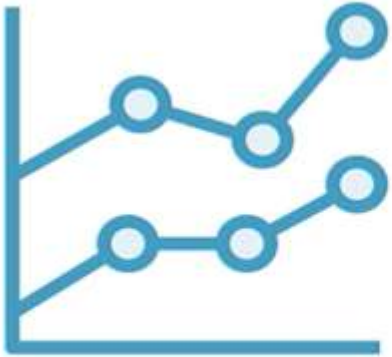
Changes in resource state

Go to log for when something goes wrong

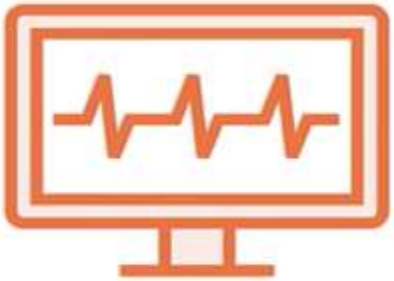
```
kubectl get events

kubectl describe $TYPE $NAME
```

One hour retention

Monitoring in Kubernetes



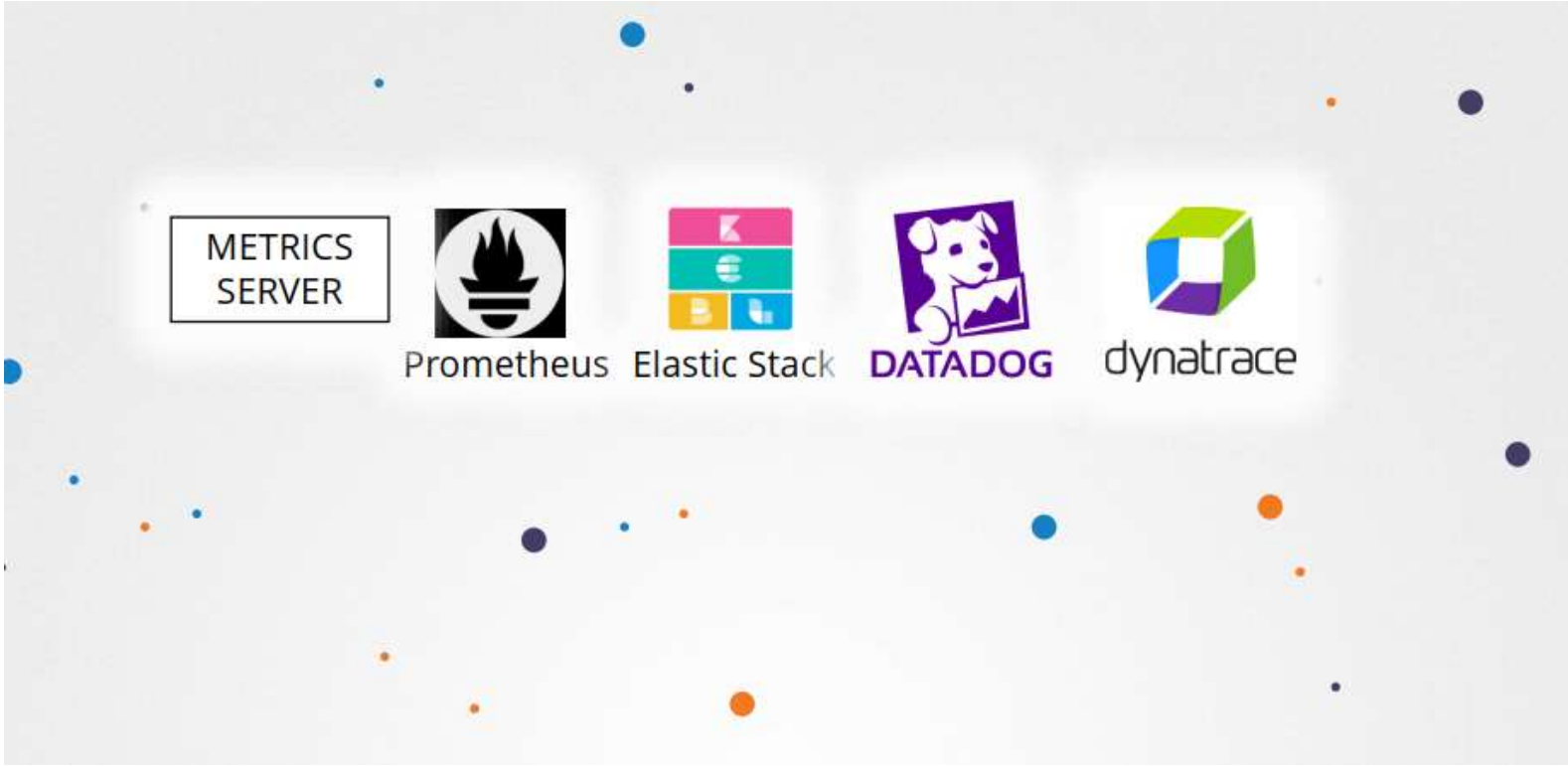
Observe



Measure changes

Resource limits

Monitoring in Kubernetes



Kubernetes Metrics Server

Provides resources metrics Pods and Nodes

- Point in time

Collects resource metrics from kubelets

CPU and Memory

```
kubectl top pods
kubectl top nodes
```

Troubleshooting

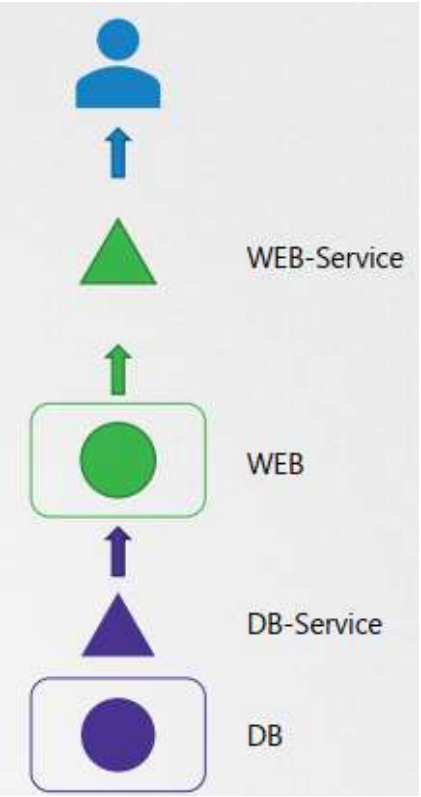
- Troubleshooting tool
- Cluster troubleshooting
  - Workflow troubleshoot
  - Node troubleshoot
  - Control plane

Troubleshooting tools

- Kubectl command
- Systemctl
- System log
- Journalctl

Workflow troubleshoot

- Check the web service
- Check the web pod
- Check the db service
- Check the db pod



Troubleshooting - Nodes

```
kubectl get nodes
NAME       STATUS   ROLES    AGE   VERSION
worker-1   Ready    <none>   8d    v1.13.0
worker-2   Ready    <none>   8d    v1.13.0
```

```
kubectl get pods
NAME           READY   STATUS    RESTARTS   AGE
mysql          1/1     Running   0          113m
webapp-mysql   1/1     Running   0          113m
```

Troubleshooting - Nodes

- kube-proxy
- kubelet
- Container runtime
- systemd
- Network reachability
- Server online

Troubleshooting - Control Plane

- Control Plane Pods
- Static pod manifest
- kubelet
- Container runtime
- systemd
- Network reachability
- Server online

Accessible?

Correct?


```
/var/lib/kubelet/config.yaml
staticPodPath: /etc/kubernetes/manifests
```

Troubleshooting - Control Plane

```
kubectl get pods -n kube-system
```

NAME	READY	STATUS	RESTARTS	AGE
coredns-78fcdf6894-5dntv	1/1	Running	0	1h
coredns-78fcdf6894-knpzl	1/1	Running	0	1h
etcd-master	1/1	Running	0	1h
kube-apiserver-master	1/1	Running	0	1h
kube-controller-manager-master	1/1	Running	0	1h
kube-proxy-fvbpj	1/1	Running	0	1h
kube-proxy-v5r2t	1/1	Running	0	1h
kube-scheduler-master	1/1	Running	0	1h
weave-net-7kd52	2/2	Running	1	1h
weave-net-jtl5m	2/2	Running	1	1h

Troubleshooting - Control Plane

```
kubectl logs kube-apiserver-master -n kube-system
```

```
I0401 13:45:38.190735       1 server.go:703] external host was not specified, using 172.17.0.117
I0401 13:45:38.194290       1 server.go:145] Version: v1.11.3
I0401 13:45:38.819705       1 plugins.go:158] Loaded 8 mutating admission controller(s) successfully in the following order:
NamespaceLifecycle,LimitRanger,ServiceAccount,NodeRestriction,Priority,DefaultTolerationSeconds,DefaultStorageClass,MutatingAdmissionWebhook.
I0401 13:45:38.819741       1 plugins.go:161] Loaded 6 validating admission controller(s) successfully in the following order:
LimitRanger,ServiceAccount,Priority,PersistentVolumeClaimResize,ValidatingAdmissionWebhook,ResourceQuota.
I0401 13:45:38.821372       1 plugins.go:158] Loaded 8 mutating admission controller(s) successfully in the following order:
NamespaceLifecycle,LimitRanger,ServiceAccount,NodeRestriction,Priority,DefaultTolerationSeconds,DefaultStorageClass,MutatingAdmissionWebhook.
I0401 13:45:38.821410       1 plugins.go:161] Loaded 6 validating admission controller(s) successfully in the following order:
LimitRanger,ServiceAccount,Priority,PersistentVolumeClaimResize,ValidatingAdmissionWebhook,ResourceQuota.
I0401 13:45:38.985453       1 master.go:234] Using reconciler: lease
W0401 13:45:40.900380       1 genericapiserver.go:319] Skipping API batch/v2alpha1 because it has no resources.
W0401 13:45:41.370677       1 genericapiserver.go:319] Skipping API rbac.authorization.k8s.io/v1alpha1 because it has no resources.
W0401 13:45:41.381736       1 genericapiserver.go:319] Skipping API scheduling.k8s.io/v1alpha1 because it has no resources.
```

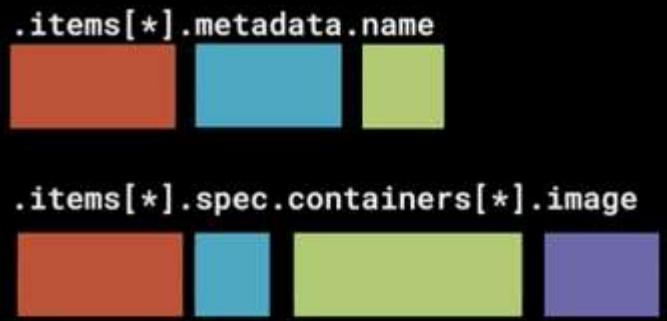
```
sudo journalctl -u kube-apiserver
```

```
Mar 20 07:57:25 master-1 systemd[1]: Started Kubernetes API Server.
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.553377   15767 flags.go:33] FLAG: --address="127.0.0.1"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558273   15767 flags.go:33] FLAG: --admission-control="[]"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558325   15767 flags.go:33] FLAG: --admission-control-config-file=""
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558339   15767 flags.go:33] FLAG: --advertise-address="192.168.5.11"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558353   15767 flags.go:33] FLAG: --allow-privileged="true"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558365   15767 flags.go:33] FLAG: --alsologtostderr="false"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558413   15767 flags.go:33] FLAG: --anonymous-auth="true"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558425   15767 flags.go:33] FLAG: --api-audiences="[]"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558442   15767 flags.go:33] FLAG: --apiserver-count="3"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558454   15767 flags.go:33] FLAG: --audit-dynamic-configuration="false"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558464   15767 flags.go:33] FLAG: --audit-log-batch-buffer-size="10000"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558474   15767 flags.go:33] FLAG: --audit-log-batch-max-size="1"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558484   15767 flags.go:33] FLAG: --audit-log-batch-max-wait="0s"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558495   15767 flags.go:33] FLAG: --audit-log-batch-throttle-burst="0"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558504   15767 flags.go:33] FLAG: --audit-log-batch-throttle-enable="false"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558514   15767 flags.go:33] FLAG: --audit-log-batch-throttle-qps="0"
Mar 20 07:57:25 master-1 kube-apiserver[15767]: I0320 07:57:25.558528   15767 flags.go:33] FLAG: --audit-log-format="json"
```

Accessing Objects with JsonPath

```
#List just all pod names
kubectl get pods -o jsonpath='{ .items[*].metadata.name }'

#Get all container images in use by all pods in all namespaces
kubectl get pods --all-namespaces  \
    -o jsonpath='{ .items[*].spec.containers[*].image }'
```

Accessing Object Data with JsonPath




```
"items": [
    {
        "apiVersion": "v1",
        "kind": "Pod",
        "metadata": {
            "name": "nginx-86c57db685-fmwk6",
            ...
        }
        "spec": {
            ...
            "containers": [
                {
                    "image": "nginx",
                }
            ]
            ...
        }
    }
]
```

Filtering Object with JsonPath

```
#Get all Internal IP Addresses of Nodes in a cluster
kubectl get nodes \
    -o jsonpath="{ .items[*].status.addresses[?(@.type=='InternalIP')].address }"
```


Q
A