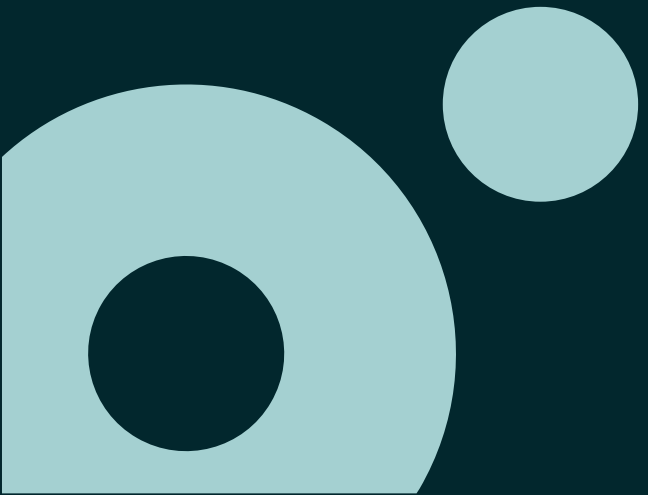
Containers & Kubernetes

Session #09



Monitoring and Operation

Kubernetes Dashboard

Auto-scalling: HPA

Lab

Monitoring and Operation

Best practices

Monitoring & Operation

- Containers must write logs to STDOUT or STDERR
  - Log files can be lost when container is removed
  - Common monitoring platform automatically stream stdout and stderr
- Pods must implement only one service/process
- Use services for internal communication between pods
- Use ingress to allow communication from outside the cluster

kubectl logs

Monitoring & Operation

kubectl logs <pod> [-n <namespace>]

- Shows pod stdout and stderr
- Flag **–f** blocks the console and show new lines

kubectl attach

Monitoring & Operation

kubectl attach [-it] <pod> [-c container] [-n <ns>]

- Attach to a process that is already running inside an existing container
- Adding **[-it]** flags allow to send commands to the pod

kubectl describe

Monitoring & Operation

kubectl describe pod <pod> [-n <namespace>]

- Shows details about pod
  - Metadata
  - Network
- Lists all events occurred during pod lifecycle
- First place to go when pod don't have "Running" status

kubectl port-forward

Monitoring & Operation

```
kubectl port-forward pod <pod> [-n <ns>] hostport:podPort
kubectl port-forward svc <svc> [-n <ns>] hostport:podPort
```

- Maps a port on machine with pod port
- Allow to make direct requests
- When using service, maps directly to only on container (no load balancing)

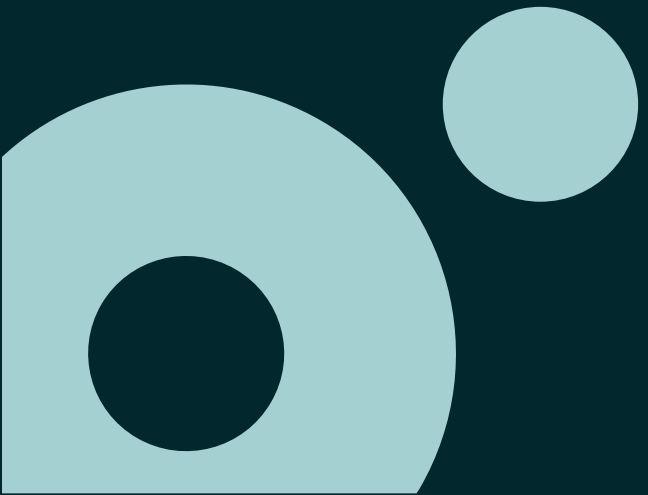
kubectl top

Monitoring & Operation

```
kubectl top node <node>
kubectl top pod <pod> [-n <ns>]
```

- Display resource (CPU/memory) usage of the resources (nodes or pods)
- Due to the metrics pipeline delay, they may be unavailable for a few minutes since pod creation

Kubernetes Dashboard



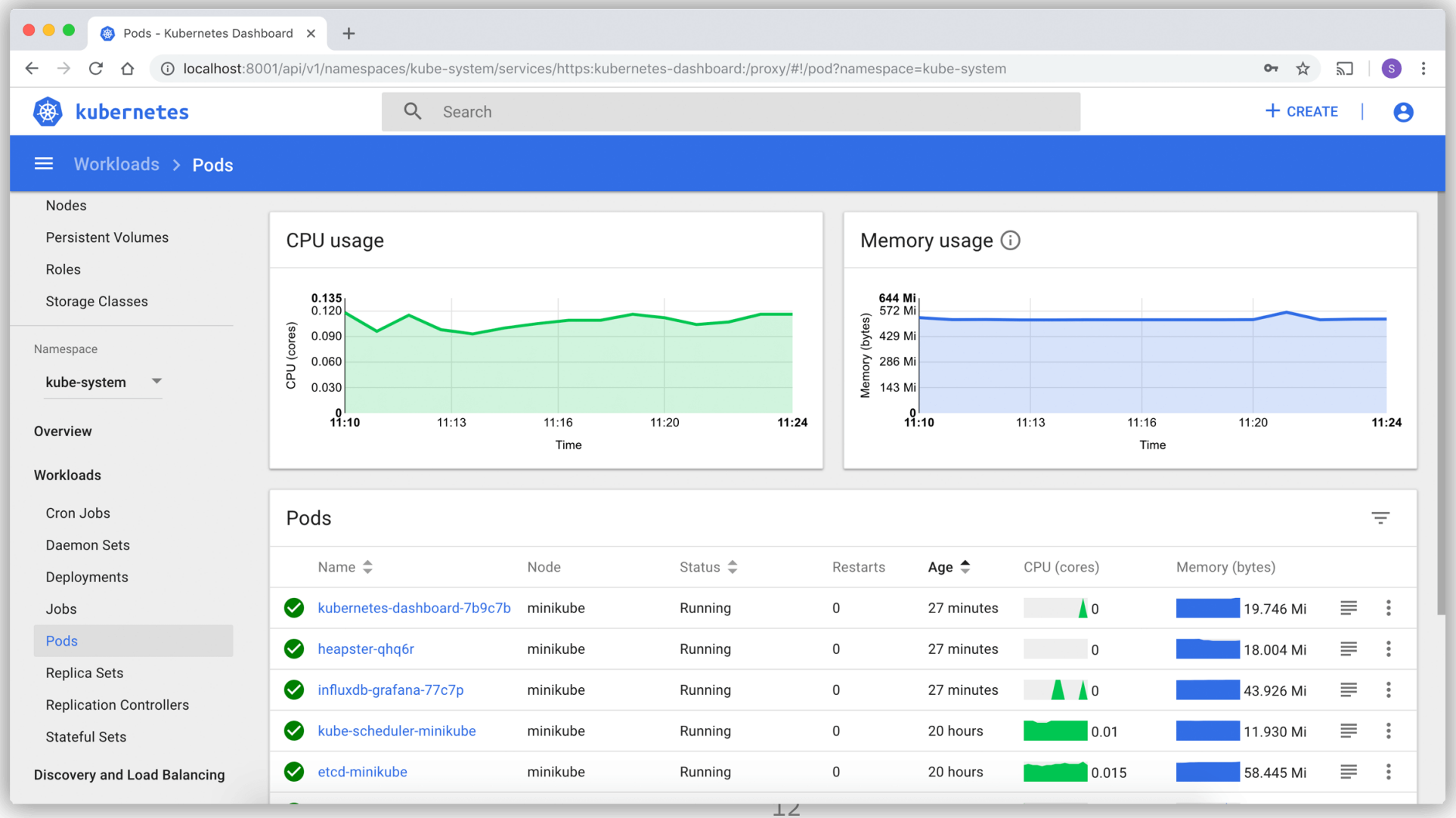
Kubernetes Dashboard

Observability

- Web-based Kubernetes user interface.
- You can use Dashboard to deploy containerized applications to a Kubernetes cluster, troubleshoot your containerized application, and manage the cluster resources.
- You can use Dashboard to get an overview of applications running on your cluster, as well as for creating or modifying individual Kubernetes resources. For example, you can scale a Deployment, initiate a rolling update, restart a pod or deploy new applications using a deploy wizard.
- Dashboard also provides information on the state of Kubernetes resources in your cluster and on any errors that may have occurred.

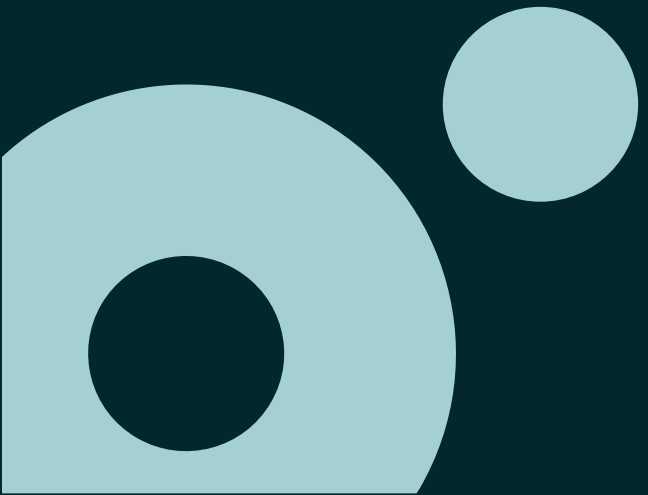
Kubernetes Dashboard

Observability



Demo: Kubernetes Dashboard

Auto-Scalling: HPA



Motivation

HPA

- Kubernetes can handle several replicas of the same pods
  - ReplicaSets handle replication
  - Services handle load balancing between them
- However, if the demand of a service starts to grow, the number of replicas deployed may be not sufficient to handle requests
- Number of replicas can be changed manually but it's not scalable
- Kubernetes have a HorizontalPodAutoscaller (HPA) object to handle scalability of a Deployment automatically

HorinzontalPodAutoscaler

HPA

- Horizontal scaling means that the response to increased load is to deploy more Pods
- HPA defines a minimum and maximum number of replicas
- If the load increases, and the number of Pods is below the configured maximum, the HPA instructs the Deployment to scale up
- If the load decreases, and the number of Pods is above the configured minimum, the HPA instructs the workload resource to scale down
- HPA uses an interval (default is 15 seconds) to check if some change is needed

Metrics

HPA

- To make the decision about scaling, HPA uses metrics about pods resources (CPU, Memory) utilization
- Metric target can be set as a percentage or an average value (preferable)
- Value used for check need to scale up/down is the average utilization of all pods
- Is mandatory that pods have resources (limits) defined

desiredReplicas = ceil[currentReplicas * (currentMetricValue / desiredMetricValue)]

Demo: HPA