

# Lab: Kubernetes Metrics Pipeline

**Goal:** Deploy `metrics-server` → Scrape with `Prometheus` → Visualize in `Grafana`

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## Prerequisites

- A running Kubernetes cluster (Minikube, Kind, or similar)
  - `kubectl` and optionally `helm` installed
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## Overview

```
+-----+
| metrics-server | <-- collects resource metrics (CPU/mem) from nodes and
pods
+-----+
      ↓
+-----+
| Prometheus     | <-- scrapes metrics-server via HTTP
+-----+
      ↓
+-----+
| Grafana        | <-- visualizes Prometheus metrics
+-----+
```

## Step-by-Step Instructions

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### Deploy `metrics-server`

```
kubectl apply -f https://github.com/kubernetes-sigs/metrics-
server/releases/latest/download/components.yaml
```

⚠ If you're using Minikube, patch the deployment:

```
kubectl patch deployment metrics-server -n kube-system \
  --type=json -p='[{"op":"add","path":"/spec/template/spec/containers/0/args/-", "value":"--kubelet-insecure-tls"}]'
```

Confirm it's working:

```
kubectl get --raw "/apis/metrics.k8s.io/v1beta1/nodes"
```

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## Install Prometheus using Helm

```
helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
helm repo update

helm install prometheus prometheus-community/prometheus \
  --namespace monitoring --create-namespace
```

Verify installation:

```
kubectl get pods -n monitoring
kubectl port-forward svc/prometheus-server -n monitoring 9090:80
```

Visit: <http://localhost:9090>

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## Configure Prometheus to Scrape Metrics Server

### Add a new scrape config

Create a configmap to add custom scrape configs:

```
# metrics-scrape-config.yaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: additional-scrape-configs
  namespace: monitoring
data:
  scrape-configs.yaml: |
    - job_name: 'metrics-server'
      metrics_path: /metrics
      scheme: https
      static_configs:
        - targets: ['metrics-server.kube-system.svc:443']
      tls_config:
        insecure_skip_verify: true
```

Apply it:

```
kubectl apply -f metrics-scrape-config.yaml
```

Now update the Prometheus release to use it:

```
helm upgrade prometheus prometheus-community/prometheus \
  --namespace monitoring \
  --set server.extraScrapeConfigsSecret.enabled=true \
  --set server.extraScrapeConfigsSecret.name=additional-scrape-configs \
  --set-file server.extraScrapeConfigsSecret.data.scrape-configs.yaml=metrics-
scrape-config.yaml
```

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## Install Grafana with Helm

```
helm install grafana grafana/grafana \
  --namespace monitoring \
  --set adminPassword='admin' \
  --set service.type=NodePort \
  --create-namespace
```

Forward port:

```
kubectl port-forward svc/grafana -n monitoring 3000:80
```

Visit: <http://localhost:3000> Login with: admin / admin

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## Configure Grafana

- Add Prometheus as a data source:
  - URL: `http://prometheus-server.monitoring.svc.cluster.local`
  - Import dashboard (ID: **6417** for Kubernetes resource metrics)
- 


## Done

Now you're visualizing real-time Kubernetes metrics via metrics-server → Prometheus → Grafana.

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## Cleanup

```
helm uninstall prometheus -n monitoring
helm uninstall grafana -n monitoring
kubectl delete ns monitoring
kubectl delete -f https://github.com/kubernetes-sigs/metrics-server/releases/latest/download/components.yaml
```

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