

EXPERIMENT 10 - Prometheus & Grafana

- **INSTALL PREREQUISITES**

```
dhyepatel@Dhyeys-MacBook-Air Desktop % brew install minikube
brew install kubectl
brew install helm
Warning: minikube 1.37.0 is already installed and up-to-date.
To reinstall 1.37.0, run:
  brew reinstall minikube
Warning: kubernetes-cli 1.34.1 is already installed and up-to-date.
To reinstall 1.34.1, run:
  brew reinstall kubernetes-cli
==> Fetching downloads for: helm
==> Downloading https://ghcr.io/v2/homebrew/core/helm/manifests/3.19.0
#####
==> Fetching helm
==> Downloading https://ghcr.io/v2/homebrew/core/helm/blobs/sha256:751fccc921cdf4b4b02643f035b9f27874bc9d7d9c3684b2564bd26980b0f4
#####
==> Pouring helm--3.19.0.arm64_tahoe.bottle.tar.gz
D /opt/homebrew/Cellar/helm/3.19.0: 66 files, 56MB
==> Running `brew cleanup helm`...
Disable this behaviour by setting `HOMEBREW_NO_INSTALL_CLEANUP=1`.
Hide these hints with `HOMEBREW_NO_ENV_HINTS=1` (see `man brew`).
==> No outdated dependents to upgrade!
==> Caveats
zsh completions have been installed to:
  /opt/homebrew/share/zsh/site-functions
dhyepatel@Dhyeys-MacBook-Air Desktop %
```

- **MINIKUBE CLUSTER INITIALIZATION**

```
dhyepatel@Dhyeys-MacBook-Air Desktop % minikube start --driver=docker
🌟 minikube v1.37.0 on Darwin 26.0 (arm64)
👍 Using the docker driver based on existing profile
Starting "minikube" primary control-plane node in "minikube" cluster
🌐 Pulling base image v0.0.48 ...
🌐 Restarting existing docker container for "minikube" ...
🌐 Preparing Kubernetes v1.34.0 on Docker 28.4.0 ...
🌐 Verifying Kubernetes components...
  • Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟 Enabled addons: storage-provisioner, default-storageclass
🌟 Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
dhyepatel@Dhyeys-MacBook-Air Desktop %
```

- **HELM REPOSITORY CONFIGURATION**

```
dhyepatel@Dhyeys-MacBook-Air Desktop % helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
"prometheus-community" has been added to your repositories
dhyepatel@Dhyeys-MacBook-Air Desktop % helm repo update
Hang tight while we grab the latest from your chart repositories...
... Successfully got an update from the "prometheus-community" chart repository
Update Complete. *Happy Helm-ing!*
dhyepatel@Dhyeys-MacBook-Air Desktop %
```

- KUBE-PROMETHEUS-STACK HELM DEPLOYMENT

```
|dhyepatel@Dhyeys-MacBook-Air Desktop % helm install monitoring prometheus-community/kube-prometheus-stack --create-namespace --name monitoring
I1002 18:35:50.958577 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:50.958607 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:51.157511 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:51.157546 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:51.190326 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:51.198355 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:51.255171 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:51.852311 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:51.852349 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:52.252927 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:52.252962 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:52.556218 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:52.556252 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:52.744445 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:35:53.041931 67415 warnings.go:110] "Warning: unrecognized format \"int32\""
I1002 18:35:53.041964 67415 warnings.go:110] "Warning: unrecognized format \"int64\""
I1002 18:36:14.592833 67415 warnings.go:110] "Warning: spec.SessionAffinity is ignored for headless services"
I1002 18:36:14.593751 67415 warnings.go:110] "Warning: spec.SessionAffinity is ignored for headless services"
I1002 18:36:14.593767 67415 warnings.go:110] "Warning: spec.SessionAffinity is ignored for headless services"
I1002 18:36:14.593784 67415 warnings.go:110] "Warning: spec.SessionAffinity is ignored for headless services"
I1002 18:36:14.594710 67415 warnings.go:110] "Warning: spec.SessionAffinity is ignored for headless services"
NAME: monitoring
LAST DEPLOYED: Thu Oct 2 18:35:55 2025
NAMESPACE: monitoring
STATUS: deployed
REVISION: 1
NOTES:
kube-prometheus-stack has been installed. Check its status by running:
  kubectl --namespace monitoring get pods -l "release=monitoring"

Get Grafana 'admin' user password by running:

  kubectl --namespace monitoring get secrets monitoring-grafana -o jsonpath="{.data.admin-password}" | base64 -d ; echo

Access Grafana local instance:

  export POD_NAME=$(kubectl --namespace monitoring get pod -l "app.kubernetes.io/name=grafana,app.kubernetes.io/instance=monitoring" --selector)
  kubectl --namespace monitoring port-forward $POD_NAME 3000

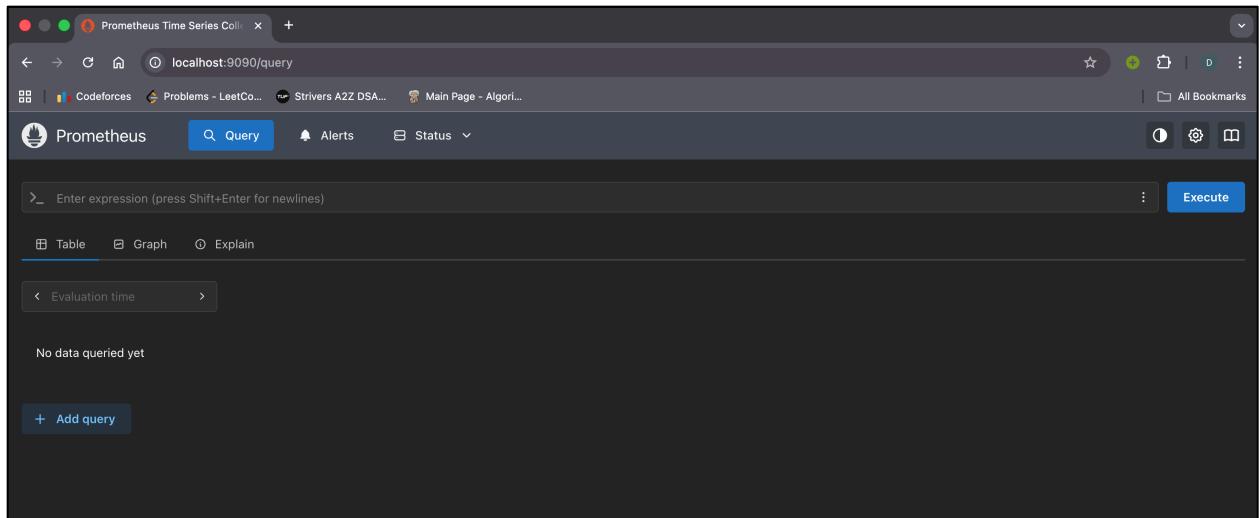
Visit https://github.com/prometheus-operator/kube-prometheus for instructions on how to create & configure Alertmanager and Prometheus instances using the Operator.
dhyepatel@Dhyeys-MacBook-Air Desktop %
```

- VERIFYING MONITORING PODS

```
|dhyepatel@Dhyeys-MacBook-Air Desktop % kubectl get pods --namespace monitoring
NAME                                         READY   STATUS    RESTARTS   AGE
alertmanager-monitoring-kube-prometheus-alertmanager-0   2/2     Running   0          3m30s
monitoring-grafana-56f4787c8b-xb7rc            3/3     Running   0          4m20s
monitoring-kube-prometheus-operator-7d58ff67c4-jbkvb   1/1     Running   0          4m20s
monitoring-kube-state-metrics-5875f599c9-42tqf   1/1     Running   0          4m20s
monitoring-prometheus-node-exporter-x85ln      1/1     Running   0          4m20s
prometheus-monitoring-kube-prometheus-prometheus-0   2/2     Running   0          3m30s
dhyepatel@Dhyeys-MacBook-Air Desktop %
```

- PROMETHEUS SERVICE DISCOVERY TARGETS

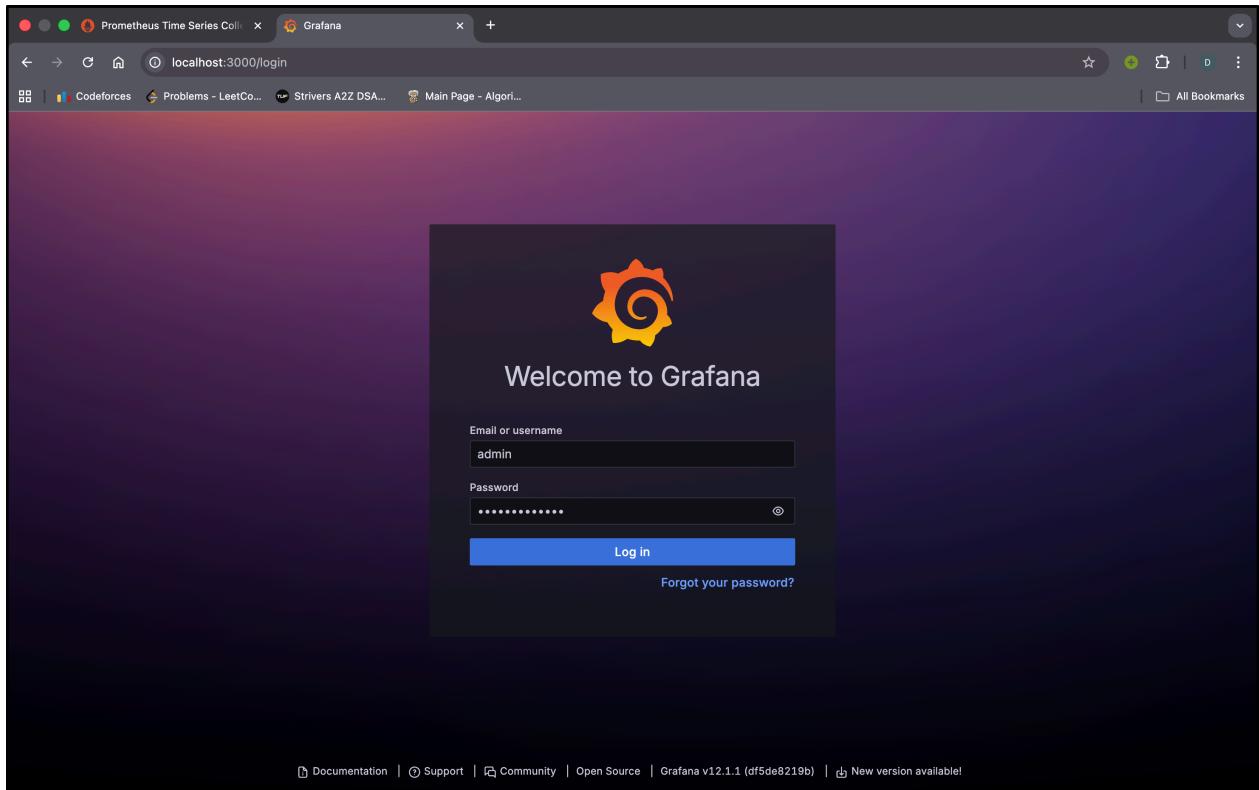
```
Last login: Thu Oct 2 12:18:02 on ttys000
|dhyepatel@Dhyeys-MacBook-Air Desktop % kubectl port-forward svc/monitoring-kube-prometheus-prometheus 9090:9090 --namespace monitoring
Forwarding from 127.0.0.1:9090 -> 9090
Forwarding from [::]:9090 -> 9090
Handling connection for 9090
Handling connection for 9090
Handling connection for 9090
Handling connection for 9090
|
```



A screenshot of the same browser window showing the "Targets" page at "localhost:9090/targets". The title bar now says "Prometheus Targets". The main content displays three sections, each representing a service monitor configuration. Each section has a header with the service name and a summary of its status (e.g., "1 / 1 up"). The first section is for "serviceMonitor/monitoring-kube-prometheus-alertmanager/0" and lists one endpoint: "http://10.244.0.11:9093/metrics". The second section is for "serviceMonitor/monitoring-kube-prometheus-alertmanager/1" and lists one endpoint: "http://10.244.0.11:8080/metrics". The third section is for "serviceMonitor/monitoring-kube-prometheus-apiserver/0" and lists one endpoint: "https://192.168.49.2:8443/metrics". Each endpoint row includes columns for "Endpoint", "Labels" (with several labels listed like "container", "job", "pod", "namespace", "service"), "Last scrape" (with timestamp and duration), and "State" (all marked as "UP").

- GRAFANA LOGIN

```
idhyepatel@Dhyey-MacBook-Air Desktop % kubectl get secret monitoring-grafana -n monitoring -o jsonpath=".data.admin-password" | base64 --decode  
prom-operatorX  
dhyepatel@Dhyey-MacBook-Air Desktop %
```



A screenshot of the Grafana interface showing the "Dashboards" section. The title bar says "Home - Dashboards - Grafana" and the address bar shows "localhost:3000?orgId=1&from=now-6h&to=now&timezone=browser". The left sidebar is titled "Grafana" and includes links for Home, Bookmarks, Starred, Dashboards, Explore, Drilldown, Alerting, Connections, and Administration. The main content area has a "Welcome to Grafana" header and a "Need help?" section with links to Documentation, Tutorials, Community, and Public Slack. Below this are two panels: "Basic" (with a "TUTORIAL" section on "DATA SOURCE AND DASHBOARDS" and "Grafana fundamentals") and "COMPLETE" sections for "Add your first data source" and "Create yo dashboard". At the bottom, there are sections for "Dashboards" (Starred dashboards and Recently viewed dashboards) and "Latest from the blog". A banner at the bottom right promotes the "4th annual Observability Survey".

- DEFAULT KUBERNETES CLUSTER DASHBOARD

The screenshot shows the Grafana interface on a Mac OS X system. The left sidebar is dark-themed and includes links for Home, Bookmarks, Starred, Dashboards (which is selected), Explore, Drilldown, Alerting, Connections, and Administration. The main content area is titled "Dashboards" and contains a search bar and a "Filter by tag" dropdown. A table lists 17 dashboards under the "Name" column and their corresponding "Tags" column. Most dashboards are tagged with "kubernetes-mixin".

Name	Tags
Alertmanager / Overview	alertmanager-mixin
CoreDNS	coredns dns
etcd	etcd-mixin
Grafana Overview	kubernetes-mixin
Kubernetes / API server	kubernetes-mixin
Kubernetes / Compute Resources / Multi-Cluster	kubernetes-mixin
Kubernetes / Compute Resources / Cluster	kubernetes-mixin
Kubernetes / Compute Resources / Namespace (Pods)	kubernetes-mixin
Kubernetes / Compute Resources / Namespace (Workloads)	kubernetes-mixin
Kubernetes / Compute Resources / Node (Pods)	kubernetes-mixin
Kubernetes / Compute Resources / Pod	kubernetes-mixin
Kubernetes / Compute Resources / Workload	kubernetes-mixin
Kubernetes / Controller Manager	kubernetes-mixin
Kubernetes / Kubelet	kubernetes-mixin

The screenshot shows a detailed view of a Kubernetes cluster resource usage dashboard. The top navigation bar indicates the URL is `localhost:3000/d/efa86fd1d0c121a26444b636a3f509a8/kubernetes-compute-resources-cluster?orgId=1&from=now-1h&to=now&timezone=utc&var-datasou...`. The left sidebar is identical to the first screenshot. The main area displays various metrics and tables. At the top, there are five summary cards: CPU Utilisation (3.51%), CPU Requests Co... (9.38%), CPU Limits Commi... (No data), Memory Utilisation (64.9%), Memory Requests ... (9.44%), and Memory Limits Co... (4.34%). Below these are sections for "CPU Usage" (No data) and "CPU Quota" (table). The "CPU Quota" table shows resource allocation across namespaces:

Namespace	Pods	Workloads	CPU Requests
kube-system	7	7	0.750
monitoring	6	6	
default	1	1	

- IMPORTED PROMETHEUS STATS DASHBOARD

The screenshot shows the 'Import dashboard' page in Grafana. The left sidebar is dark-themed and includes links for Home, Bookmarks, Starred, Dashboards (which is selected), Explore, Drilldown, Alerting, Connections, and Administration. The main content area has a light background. At the top, it says 'Import dashboard' and 'Import dashboard from file or Grafana.com'. Below this is a large dashed box with an upward arrow icon labeled 'Upload dashboard JSON file' and the sub-instruction 'Drag and drop here or click to browse'. Underneath the box, it says 'Accepted file types: .json, .txt'. Below the upload area is a text input field with placeholder text 'Grafana.com dashboard URL or ID' and a blue 'Load' button. Further down is a code editor containing a JSON model snippet:

```
{
  "title": "Example - Repeating Dictionary variables",
  "uid": "..._0hEoN4z",
  "panels": [...]
}
```

At the bottom of the code editor are two buttons: a blue 'Load' button and a grey 'Cancel' button.

This screenshot shows the same 'Import dashboard' page after a dashboard has been imported. The main content area now displays information about the imported dashboard. It says 'Importing dashboard from [Grafana.com](#)' and provides details: 'Published by jeremy b' and 'Updated on 2020-12-24 04:17:42'. Below this is a section titled 'Options' with fields for 'Name' (set to 'Prometheus 2.0 Overview') and 'Folder' (set to 'Dashboards'). A note about 'Unique identifier (UID)' explains that it's a unique identifier for the dashboard across multiple installations. There is a 'Change uid' button and a dropdown menu currently set to 'Prometheus'. At the bottom are the familiar 'Import' and 'Cancel' buttons.

