

## Creating and Alerting on Logs-based Metrics

### **Overview**

This project demonstrates how to:

- Deploy a GKE cluster.
- Configure a Docker repository using Artifact Registry.
- Deploy an application that emits Prometheus metrics.
- Create log-based and metric-based alerts in Google Cloud Monitoring.

### **Objective:**

To deploy a GKE cluster, configure logging and monitoring using log-based metrics and alerts, and integrate with Artifact Registry using Docker images.

### **Task 1: Deploy a GKE Cluster**

- Set GCP compute zone:

bash

```
gcloud config set compute/zone "ZONE"
```

- Set the current project ID:

bash

```
export PROJECT_ID=$(gcloud info --format='value(config.project)')
```

- Deploy the GKE cluster:

bash

```
gcloud container clusters create gmp-cluster --num-nodes=1 --zone "ZONE"
```

**Verification:** The cluster status shows as RUNNING.

```
Welcome to Cloud Shell! Type "help" to get started.  
Your Cloud Platform project in this session is set to qwiklabs-gcp-03-080c8b59b128.  
Use `gcloud config set project [PROJECT_ID]` to change to a different project.  
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ gcloud config set compute/zone us-central1-a  
Updated property [compute/zone].  
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$
```

```
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ export PROJECT_ID=$(gcloud info --format='value(config.project)')  
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$
```

```
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ gcloud container clusters create gmp-cluster --num-nodes=1 --zone us-central1-a  
Note: The Kubelet readonly port (10255) is now deprecated. Please update your workloads to use the recommended alternatives. See https://cloud.google.com/kubernetes-engine/docs/how-to/disable-kubelet-readonly-port for ways to check usage and for migration instructions.  
Note: Your Pod address range ('--cluster-ipv4-cidr') can accommodate at most 1008 node(s).  
Creating cluster gmp-cluster in us-central1-a.... Cluster is being configured...working...
```

```
Creating cluster gmp-cluster in us-central1-a.... Cluster is being health-checked (Kubernetes Control Plane is healthy)...done.  
Created [https://container.googleapis.com/v1/projects/qwiklabs-gcp-03-080c8b59b128/zones/us-central1-a/clusters/gmp-cluster].  
To inspect the contents of your cluster, go to: https://console.cloud.google.com/kubernetes/workload_/gcloud/us-central1-a/gmp-cluster?project=qwiklabs-gcp-03-080c8b59b128  
kubeconfig entry generated for gmp-cluster.  
NAME: gmp-cluster  
LOCATION: us-central1-a  
MASTER_VERSION: 1.32.3-gke.1785003  
MASTER_IP: 34.46.206.197  
MACHINE_TYPE: e2-medium  
NODE_VERSION: 1.32.3-gke.1785003  
NUM_NODES: 1  
STATUS: RUNNING
```

## Task 2: Create a Log-based Alert

- Use **Logs Explorer** with this query:

ini

CopyEdit

```
resource.type="gce_instance" protoPayload.methodName="v1.compute.instances.stop"
```

- Create an alert:
  - Name: stopped vm
  - Notification frequency: 5 min
  - Autoclose: 1 hr
- Set up email notification via **Notification Channels**.

**Test:** Stop a VM to trigger the alert and verify via **Monitoring > Alerting**.

**X Create logs-based alert policy** [Send feedback](#)

**1 Choose logs to include in the alert**

Create an inclusion filter to determine which logs are included in the alert.

**Alert query**

```
resource.type="gce_instance"
protoPayload.methodName="v1.compute.instances.stop"
```

**2 Set notification frequency and autoclose duration**

Configure the minimum amount of time between receiving notifications for logs that match this filter, and the duration to autoclose corresponding incidents.

Time between notifications \*

Incident autoclose duration

Select a duration after which the incident will close automatically when matching log entries are absent.

[Next](#)

**3 Who should be notified? (optional)**

When alerting policy violations occur, you will be notified via these channels.

**Notification channels**

<b>PagerDuty Services</b>	No PagerDuty services configured	<a href="#">Add New</a>
<b>PagerDuty Sync <small>Beta</small></b>	No PagerDuty Sync channels configured	<a href="#">Add New</a>
<b>Slack <small>?</small></b>	No Slack channels configured	<a href="#">Add New</a>
<b>Webhooks</b>	No webhook channels configured	<a href="#">Add New</a>
<b>Email</b>	No emails configured	<a href="#">Add New</a>
<b>SMS</b>	No SMS channels configured	<a href="#">Add New</a>
<b>Pub/Sub</b>	No Pub/Sub channels configured	<a href="#">Add New</a>

**Create Email Channel**

Email addresses can be set to receive notifications from your alerting when a new incident is created.

Email Address \*

Display Name \*

[Cancel](#) [Save](#)

Notification channels

X Learn

**PagerDuty Services**

No PagerDuty services configured

**PagerDuty Sync Beta**

No PagerDuty Sync channels configured

**Slack** ⓘ

No Slack channels configured

**Webhooks**

No webhook channels configured

**Email**

Add New

Filter Filter email addresses ⓘ

Email	Display Name
student-02-2d29e50251ea@qwiklabs.net	Vinod

⋮

⋮

Logs Explorer

Share link Query library Preferences ⏪ ⏴ Last 1 hour ⓘ IST ⏵ ⏶ ⏷ ⏸ ⏹ Run query

Project logs Search all fields

VM Instance All log names All severities Correlate by +1 filter Show query

1 resource.type="gce\_instance" protoPayload.methodName="v1.compute.instances.stop"

Example queries Query language guide Language: LQL

Fields Timeline

No data found

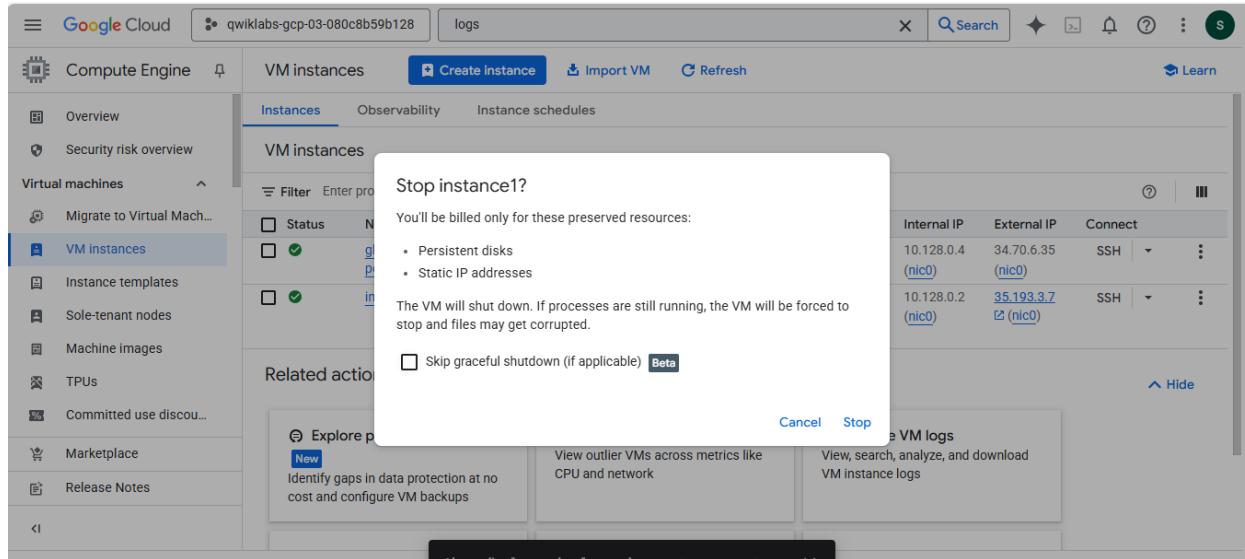
Alert policy "stopped vm" created View alert policy ⌂

May 21, 7:57 PM May 21, 8:58 PM

0 results Actions

SEVERITY TIME SUMMARY

03-080c8b59h1281



### Task 3: Create a Docker Repository

- Create a Docker repository:

bash

```
gcloud artifacts repositories create docker-repo --repository-format=docker \
--location=Region --description="Docker repository" --project=PROJECT_ID
```

- Load and tag the Docker image:

bash

```
wget https://storage.googleapis.com/spls/gsp1024/flask_telemetry.zip
unzip flask_telemetry.zip
docker load -i flask_telemetry.tar
```

```
docker tag gcr.io/ops-demo-
330920/flask_telemetry:61a2a7aabc7077ef474eb24f4b69faeab47deed9 \
Region-docker.pkg.dev/PROJECT_ID/docker-repo/flask-telemetry:v1
```

- Push the Docker image:

bash

```
docker push Region-docker.pkg.dev/PROJECT_ID/docker-repo/flask-telemetry:v1
```

Alerting    + Create policy    Edit notification channels    Learn

### Summary

Incidents firing	Incidents acknowledged	Alert policies
1 <span style="color:red;">●</span>	0	1
		<a href="#">View all</a>

### Incidents

Show closed incidents

State	Severity	Policy name	Incident summary	Opened	Last updated
<span style="color:red;">●</span>	No severity	<a href="#">stopped vm</a>	<a href="#">Log match condition fired for VM Instance with (instance_id=4158149427925637888, project_id=qwiklabs-gcp-03-080c8b59b128)</a>	May 21, 2025, 9:06:52 PM	<a href="#">▼</a>

[→ See all incidents](#)

### Snoozes

[Create snooze](#)

State	Name	Start time	End time
No rows to display			

[Open Editor](#) | [Cloud Shell](#) | Terminal [\(qwiklabs-gcp-03-080c8b59b128\)](#) [+](#) [▼](#)

```

student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ resource.type="gce_instance" protoPayload.methodName="v1.compute.instances.stop"
-bash: resource.type=gce instance: command not found
student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ gcloud artifacts repositories create docker-repo --repository-format=docker \
--location=us-central1 --description="Docker repository" \
--project=qwiklabs-gcp-03-080c8b59b128
Create request issued for: [docker-repo]
Waiting for operation [projects/qwiklabs-gcp-03-080c8b59b128/locations/us-central1/operations/9ab22ee1-3eb9-4167-9bd0-cc670b6b919d] to complete...done.
Created repository [docker-repo].
student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$

```

```

student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ wget https://storage.googleapis.com/spls/gsp1024/flask_telemetry.zip
unzip flask_telemetry.zip
docker -i flask_telemetry.tar
--2025-05-21 15:40:39-- https://storage.googleapis.com/spls/gsp1024/flask_telemetry.zip
Resolving storage.googleapis.com (storage.googleapis.com)... 74.125.24.207, 142.251.10.207, 142.251.12.207, ...
Connecting to storage.googleapis.com (storage.googleapis.com)|74.125.24.207|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 362330581 (346M) [application/x-zip-compressed]
Saving to: 'flask_telemetry.zip'

flask_telemetry.zip          18%[=====>] 345.54M 22.8MB/s   eta 23s

```

```

flask_telemetry.zip          100%[=====>] 345.54M 22.8MB/s   in 17s
2025-05-21 15:40:56 (20.9 MB/s) - 'flask_telemetry.zip' saved [362330581/362330581]

Archive: flask_telemetry.zip
  inflating: flask_telemetry.tar
62a747bf1719: Loading layer [=====>] 129.1MB/129.1MB
0b3c02b5d746: Loading layer [=====>] 11.3MB/11.3MB
9f9f651e9303: Loading layer [=====>] 19.31MB/19.31MB
b6fe5ff31f23: Loading layer [=====>] 156.5MB/156.5MB
8f56c3340629: Loading layer [=====>] 537.7MB/537.7MB
7fc2d600f5ad: Loading layer [=====>] 19.04MB/19.04MB
02a38a0d0553: Loading layer [=====>] 51.8MB/51.8MB
7b656bb058c4: Loading layer [=====>] 4.608kB/4.608kB
f77bec5d5d162: Loading layer [=====>] 8.87MB/8.87MB
44ec0057da31: Loading layer [=====>] 2.048kB/2.048kB
30c442d6d651: Loading layer [=====>] 130.6kB/130.6kB
f71f44c0bd5b: Loading layer [=====>] 33.92MB/33.92MB
Loaded image: gcr.io/ops-demo-330920/flask_telemetry:61a2a7abc7077ef474eb24f4b69faeab47deed9
student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$

```

```

student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ docker tag gcr.io/ops-demo-330920/flask_telemetry:61a2a7abc7077ef474eb24f4b69faeab47deed9 \
us-central1-docker.pkg.dev/qwiklabs-gcp-03-080c8b59b128/docker-repo/flask-telemetry:v1
student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$

```

```

student 02 2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ docker push us-central1-docker.pkg.dev/qwiklabs-gcp-03-080c8b59b128/docker-repo/flask-telemetry:v1
The push refers to repository [us-central1-docker.pkg.dev/qwiklabs-gcp-03-080c8b59b128/docker-repo/flask-telemetry]
f71f44c0bd5b: Preparing
80c442d6d651: Preparing
44ec0057da31: Preparing
f77bec5d5d162: Preparing
7b656bb058c4: Preparing
02a38a0d0553: Waiting
7fc2d600f5ad: Waiting
8f56c3340629: Waiting
b6fe5ff31f23: Waiting
9f9f651e9303: Waiting
0b3c02b5d746: Waiting
62a747bf1719: Waiting

```

## Task 4: Deploy an Application that Emits Metrics

- Authenticate cluster:

bash

```
gcloud container clusters get-credentials gmp-cluster
```

- Create namespace:

bash

```
kubectl create ns gmp-test
```

- Download deployment files and update image in flask\_deployment.yaml:

bash

```
nano flask_deployment.yaml
# Replace <ARTIFACT> REGISTRY IMAGE NAME> with your image path
```

- Deploy app:

bash

```
kubectl -n gmp-test apply -f flask_deployment.yaml
kubectl -n gmp-test apply -f flask_service.yaml
```

- Verify:

bash

```
kubectl get services -n gmp-test
curl $(kubectl get services -n gmp-test -o jsonpath='{.items[*].status.loadBalancer.ingress[0].ip}')/metrics
```

```
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ gcloud container clusters list
NAME: gmp-cluster
LOCATION: us-central1-a
MASTER_VERSION: 1.32.3-gke.1785003
MASTER_IP: 34.46.206.197
MACHINE_TYPE: e2-medium
NODE_VERSION: 1.32.3-gke.1785003
NUM_NODES: 1
STATUS: RUNNING
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$
```

```
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ gcloud container clusters get-credentials gmp-cluster
Fetching cluster endpoint and auth data.
kubeconfig entry generated for gmp-cluster.
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$
```

```
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ kubectl create ns gmp-test
namespace/gmp-test created
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$
```

```
student_02_2d29e50251ea@cloudshell:~ (qwiklabs-gcp-03-080c8b59b128)$ wget https://storage.googleapis.com/spls/gsp1024/gmp_prom_setup.zip
unzip gmp_prom_setup.zip
cd gmp_prom_setup
--2025-05-21 15:44:33-- https://storage.googleapis.com/spls/gsp1024/gmp_prom_setup.zip
Resolving storage.googleapis.com (storage.googleapis.com)... 172.217.194.207, 142.250.4.207, 172.253.118.207, ...
Connecting to storage.googleapis.com (storage.googleapis.com)|172.217.194.207|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2454 (2.4K) [application/x-zip-compressed]
Saving to: 'gmp_prom_setup.zip'

gmp_prom_setup.zip          100%[=====] 2.40K --.-KB/s   in 0s

2025-05-21 15:44:33 (22.8 MB/s) - 'gmp_prom_setup.zip' saved [2454/2454]

Archive: gmp_prom_setup.zip
  creating: gmp_prom_setup/
  inflating: gmp_prom_setup/flask_deployment.yaml
  inflating: gmp_prom_setup/flask_service.yaml
  inflating: gmp_prom_setup/prom_deploy.yaml
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$
```

```
GNU nano 7.2                               flask_deployment.yaml *
spec:
  replicas: 1
  selector:
    matchLabels:
      app: hello
  template:
    metadata:
      labels:
        app: hello
  spec:
    containers:
    - name: hello-app
      image: us-central1-docker.pkg.dev/qwiklabs-gcp-03-080c8b59b128/docker-repo/flask-telemetry:v1
      # Original image: gcr.io/ops-demo-330920/flask_telemetry:61a2a7abc7077ef474eb24f4b69faeab47deed9
      # This app listens on port 4000 for web traffic by default.
      ports:
        - containerPort: 4000
```

```
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$ kubectl -n gmp-test apply -f flask_deployment.yaml
deployment.apps/helloworld-gke created
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$
deployment.apps/helloworld-gke deleted
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$ kubectl -n gmp-test apply -f flask_service.yaml
service/hello created
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$
```

```
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$ kubectl get services -n gmp-test
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
hello     LoadBalancer  34.118.237.30  <pending>      80:31335/TCP  19s
student_02_2d29e50251ea@cloudshell:~/gmp_prom_setup (qwiklabs-gcp-03-080c8b59b128)$
```

## Task 5: Create a Log-based Metric

- In Logs Explorer:

severity=ERROR

resource.labels.container\_name="hello-app"

textPayload: "ERROR: 404 Error page not found"

- Create metric:

- Type: Counter
- Name: hello-app-error

## Create log-based metric

[Send feedback](#)

### Distribution

Collects numeric data from log entries matching a given filter

[Learn more !\[\]\(71ceb62b681518c82e95d615e7265d66\_img.jpg\)](#)

#### Details

Log-based metric name \*

#### Description

Enter a description for this metric (optional)

#### Units

The units of measurement that apply to this metric (for example, bytes or seconds). For counter metrics, leave this blank or insert the digit '1'. For distribution metrics, you can optionally enter units, such as 's', 'ms', etc. [Learn more !\[\]\(ac7494f141109b59d18bf9c3aeb84d93\_img.jpg\)](#)

#### Filter selection

[Preview logs](#)

Define your log-based metric

Select project or log bucket

## Create log-based metric

[Send feedback](#)

The units of measurement that apply to this metric (for example, bytes or seconds). For counter metrics, leave this blank or insert the digit '1'. For distribution metrics, you can optionally enter units, such as 's', 'ms', etc. [Learn more](#)

### Filter selection

[Preview logs](#)

Define your log-based metric

Select project or log bucket –  
Project logs

Select whether your log-based metric examines (or counts) log entries that are routed by your project, or only those log entries in a log bucket.

#### Build filter \*

[Query language](#)

Press Alt+F1 for accessibility options.

1

```
severity=ERROR  
resource.labels.container_name="hello-app"  
textPayload: "ERROR: 404 Error page not found"
```

### Labels

Labels allow log-based metrics to contain multiple time series [Learn more](#)

[+ Add label](#)

Logs Explorer

Query library Share link Preferences Last 1 hour IST Run query Show query

Project logs Search all fields All resources All log names All severities Correlate by

1

Example queries Query language guide Language: LQL

Fields Timeline

Search fields and values

System Metadata Severity 25,674 Showing top 5 of 6 values

- Default 19,180
- Debug 3,751
- Info 2,489
- Error 149

25,674 results Actions

SEVERITY TIME SUMMARY

Q\* 89% of results are similar and can be hidden. Hide similar entries Preview Close message Metric "hello-app-error" created. Data should be available soon. View in Metrics explorer

CLOUD SHELL Terminal (qwiklabs-gcp-03-080c8b59b128)

### About log-based metrics

Log-based metrics count the log entries that match a given filter. Project scoped log-based metrics only apply to logs generated in this project, and bucket scoped log-based metrics only apply to logs exported to buckets in this project.

User-defined metrics [Create metric](#) [Delete](#)

Filter user-defined metrics

Enabled	Name	Type	Description	Previous month usage	Month-to-date usage (MTD)	Created	⋮
<input checked="" type="checkbox"/>	hello-app-error	Counter		0 B	0 B	2025-05-21 21:20:40.960 IST	⋮

### System-defined metrics

## Task 6: Create a Metrics-based Alert

- From the created metric hello-app-error, create an alert:
  - Rolling window: 2 minutes
  - Name: log based metric alert
  - Add previously created email notification channel

[Create alerting policy](#) [+ Add alert condition](#) [Delete alert condition](#) [View Code](#)

**ALERT CONDITIONS**

- New condition
- Configure trigger

**ALERT DETAILS**

- Notifications and name
- Review alert

**Policy configuration mode**

- Builder
- Code editor (MQL or PromQL)

**Select a metric** [②](#)

Enter a Monitoring filter  
metric.type="logging.googleapis.com/user/hello-app-error"

**Transform data**

Within each time series [②](#)

Rolling window \*

Adjust the length of time a signal is calculated for. Example: Mean of CPU utilization for 5 minutes is above 80%

**Direct filter chart** [①](#)

No data is available for the selected time frame. [X](#)

May 21, 2025, 8:28:59 PM [Threshold](#) 0

UTC+5:30 8:40 PM 8:50 PM 9:00 PM 9:10 PM 9:20 PM

**Create Policy** [Provide feedback](#) [Cancel](#)

## Task 7: Generate Some Errors

- Run the following to generate 404 errors:

```
bash
```

```
timeout 120 bash -c -- 'while true; do curl $(kubectl get services -n gmp-test -o jsonpath='{.items[*].status.loadBalancer.ingress[0].ip}')/error; sleep $((RANDOM % 4)) ;
```

done'

- Verify in:
  - **Logs Explorer** (search for 404 errors)
  - **Monitoring > Alerting > Incidents**

## Summary

Component	Status
GKE Cluster	Running
Log-based Alert (VM)	Created and triggered
Docker Repo	Created and image pushed
Flask App	Deployed with metrics
Log-based Metric	Configured
Metrics-based Alert	Triggered by simulated errors