Data Service Server Monitoring

with Prometheus

User's Manual

V1.0.2

Revision History

Date	Version	Author	Reviewer	Description
2019-03-05	1.0.0	Evelyn Tang Evelyn.Tang@advantech.com.tw		First version released
2019-03-07	1.0.1	Evelyn Tang Evelyn.Tang@advantech.com.tw		Paragraph adjustment Add architecture image
2019-03-08	1.0.2	Evelyn Tang Evelyn.Tang@advantech.com.tw		Change name to "Data Service Server"

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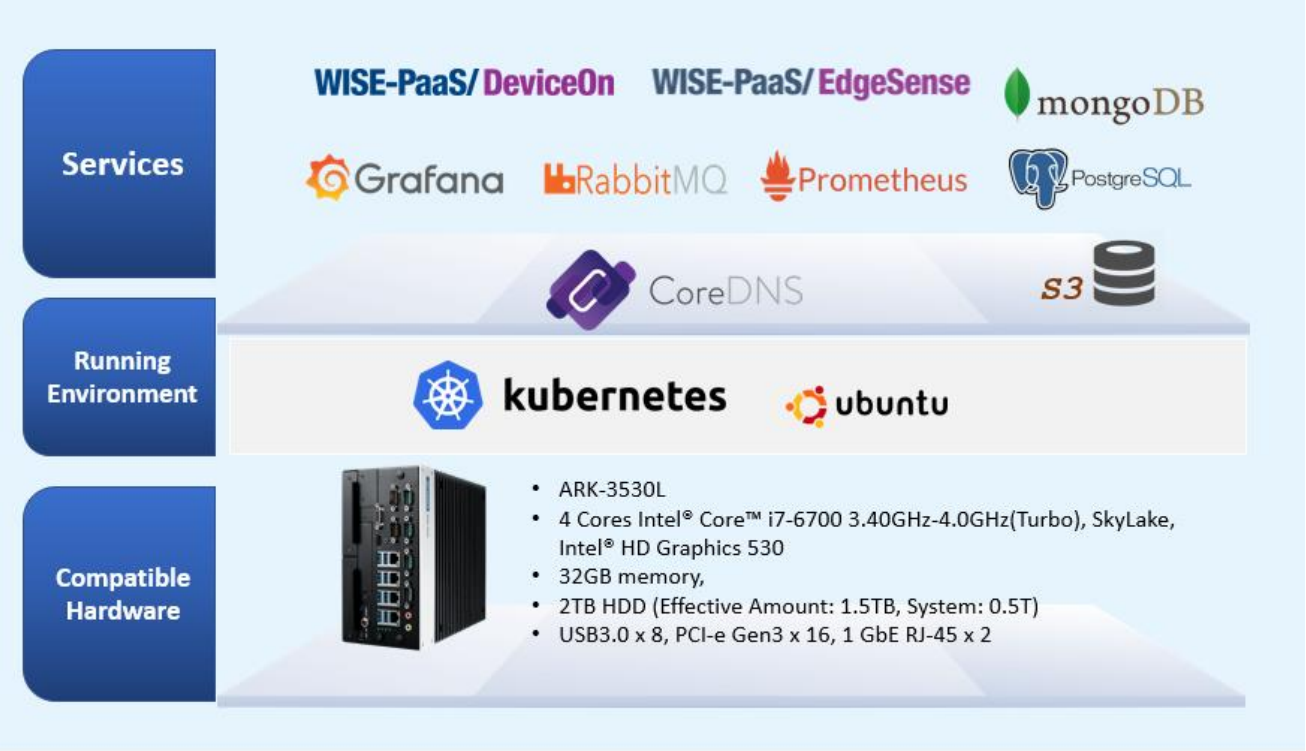
1 General Introduction

1.1 Data Service Server Architecture



- ARK-3530L
- 4 Cores Intel® Core™ i7-6700 3.40GHz-4.0GHz(Turbo), SkyLake, Intel® HD Graphics 530
- 32GB memory,
- 2TB HDD (Effective Amount: 1.5TB, System: 0.5T)
- USB3.0 x 8, PCI-e Gen3 x 16, 1 GbE RJ-45 x 2

Figure 1 Architecture of Data Service Server

Data Service Server runs Kubernetes for automating deployment, scaling and management of containerized applications. [1] As illustrated in Figure 1, collecting data from an environment composed of so many moving parts is complex and Prometheus is the best monitoring and alerting tool for Kubernetes and Docker.

Prometheus was built specifically to monitor applications and microservices running in containers at scale and is native to containerized environments. Originally developed at Soundcloud, pioneer in the adoption of cloud technology. [2] In 2016, Prometheus project became the second hosted project of the Cloud Native Computing Foundation (CNCF) after Kubernetes.

1.2 Prometheus and Kubernetes

Prometheus is a pull-based monitoring system, which means that central Prometheus servers discover and pull metrics from your services. The discovery and pull system fits well with a dynamic, cloud native environment such as Kubernetes, where Prometheus integrates well with Kubernetes to discover and enumerate the services you have running. As you scale up a service, Prometheus automatically starts pulling metrics from the extra replicas. Similarly as nodes fail and pods are restarted, Prometheus automatically notices and scrapes them. [3] The architecture of Prometheus will be briefly introduced in next section.

2 Prometheus Overview

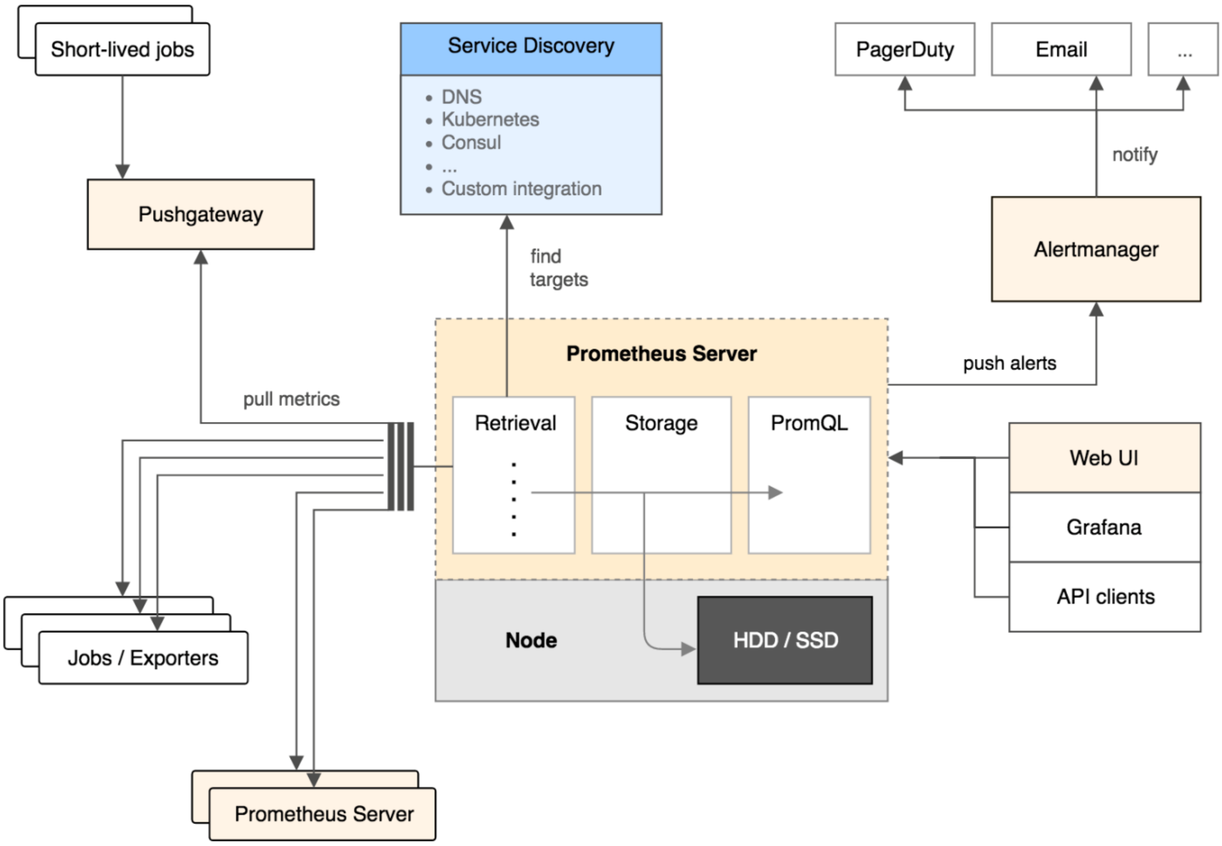


Figure 2 Architecture of Prometheus monitoring system [4]

As shown in Figure 2, Prometheus consists of several components working together. Prometheus server pulls in metrics at regular intervals through HTTP endpoints which provide information about hosts and various applications. These endpoints may be provided by the monitored application itself, or through an “exporter” . The endpoint URL is usually /metrics. [5]

Since short-lived jobs not exist long enough to be scraped, they can instead push their metrics to a Pushgateway. Pushgateway then exposes these metrics to

Prometheus server. [6] Last but not least, Prometheus Server also exposes its own metrics and monitors its own metrics. [7]

After Prometheus server scrapes metrics from instrumented jobs, either directly or via an intermediary push gateway for short-lived jobs, it stores time-series data locally. User can use PromQL to query this data or send alerts to the Alertmanager, which will convert them into pages, emails, and other notifications. [8]

Prometheus provides a web interface (Web UI) to run queries. Other applications also can run queries through the HTTP API to retrieve and work with the data; we apply Grafana to visualize the data.

Next section will cover two parts: Grafana dashboards and Prometheus WebUI. It is recommended that users completely read this document before evaluation since you will understand which data visualization method meets your needs.

3 Data visualization

3.1 Grafana Dashboards

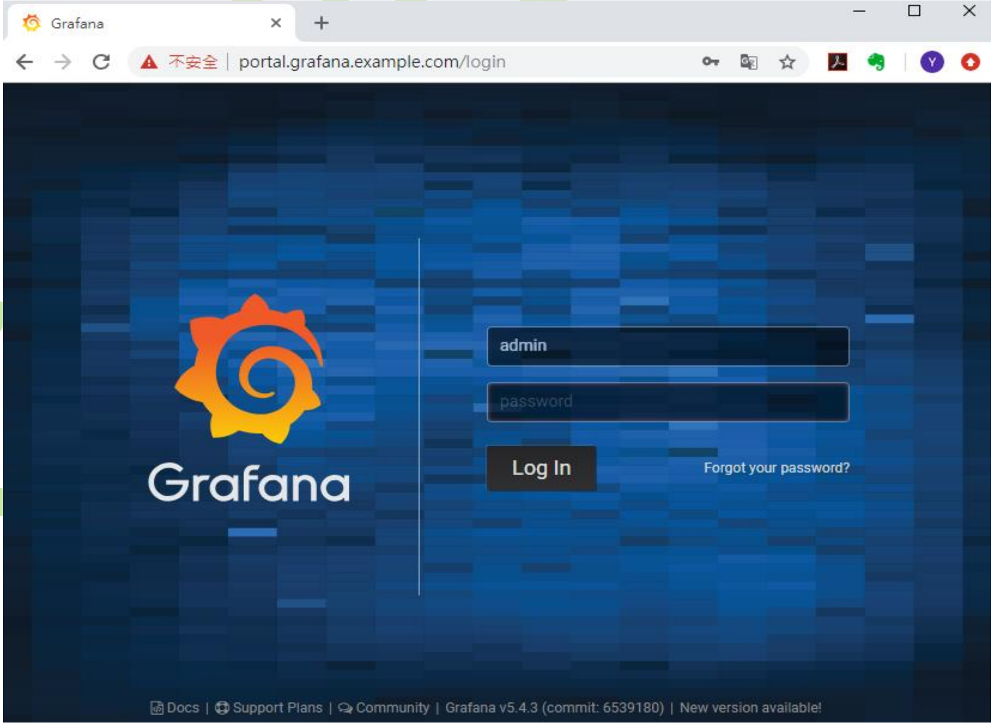
3.1.1 Introduction

Grafana is the leading graph and dashboard builder for visualizing time series infrastructure and application metrics. Therefore, we apply Grafana as data visualization tool.

3.1.2 Imported Dashboards

First of all, go to your Grafana main view and login admin account.

> We take http://portal.grafana.example.com for example as Figure 3.
>
> Please go to your Grafana domain server.



portal.grafana.example.com/login

admin

password

Docs | Support Plans | Community | Grafana v5.4.3 (commit: 6539180) | New version available!

Figure 3 Grafana login page

Please access admin account as below.

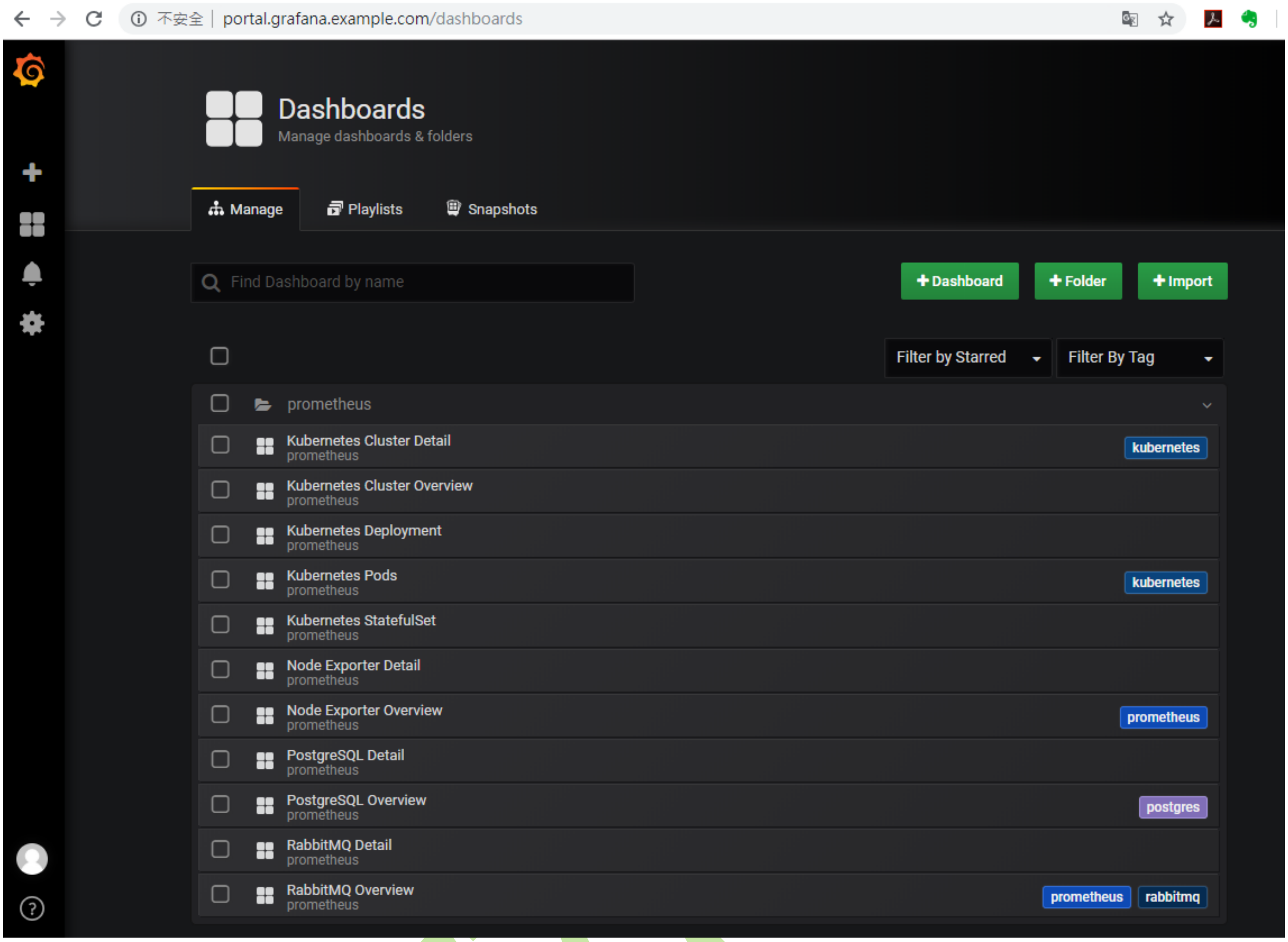
User Name: **admin**

Password: **P@ssw0rd**

You can get username and password of admin account by issuing the following kubectl command.

```
✧  Get Username:
# kubectl get secret --namespace monitoring grafana -o
jsonpath="{.data.admin-user}" | base64 --decode ; echo

✧  Get Password:
# kubectl get secret --namespace monitoring grafana -o
jsonpath="{.data.admin-password}" | base64 --decode ; echo
```



portal.grafana.example.com/dashboards

Dashboards
Manage dashboards & folders

Manage | Playlists | Snapshots

Find Dashboard by name

+ Dashboard | + Folder | + Import

Filter by Starred | Filter By Tag

□ prometheus

	Dashboard	Tags
□	Kubernetes Cluster Detail prometheus	kubernetes
□	Kubernetes Cluster Overview prometheus	
□	Kubernetes Deployment prometheus	
□	Kubernetes Pods prometheus	kubernetes
□	Kubernetes StatefulSet prometheus	
□	Node Exporter Detail prometheus	
□	Node Exporter Overview prometheus	prometheus
□	PostgreSQL Detail prometheus	
□	PostgreSQL Overview prometheus	postgres
□	RabbitMQ Detail prometheus	
□	RabbitMQ Overview prometheus	prometheus rabbitmq

Figure 4 Dashboard overview

Generally speaking, there are several Kubernetes metrics worthy to monitor. As shown in Figure 4, adequate and detailed dashboards have been imported.

- Kubernetes Cluster Overview

For cluster monitoring, the objective is to monitor the health of the entire Kubernetes cluster. As an administrator, we are interested in discovering if all the nodes in the cluster are working properly and at what capacity, how many applications are running on each node, and the resource utilization of the entire cluster. [9]The overview of cluster is shown in Figure 5 below.

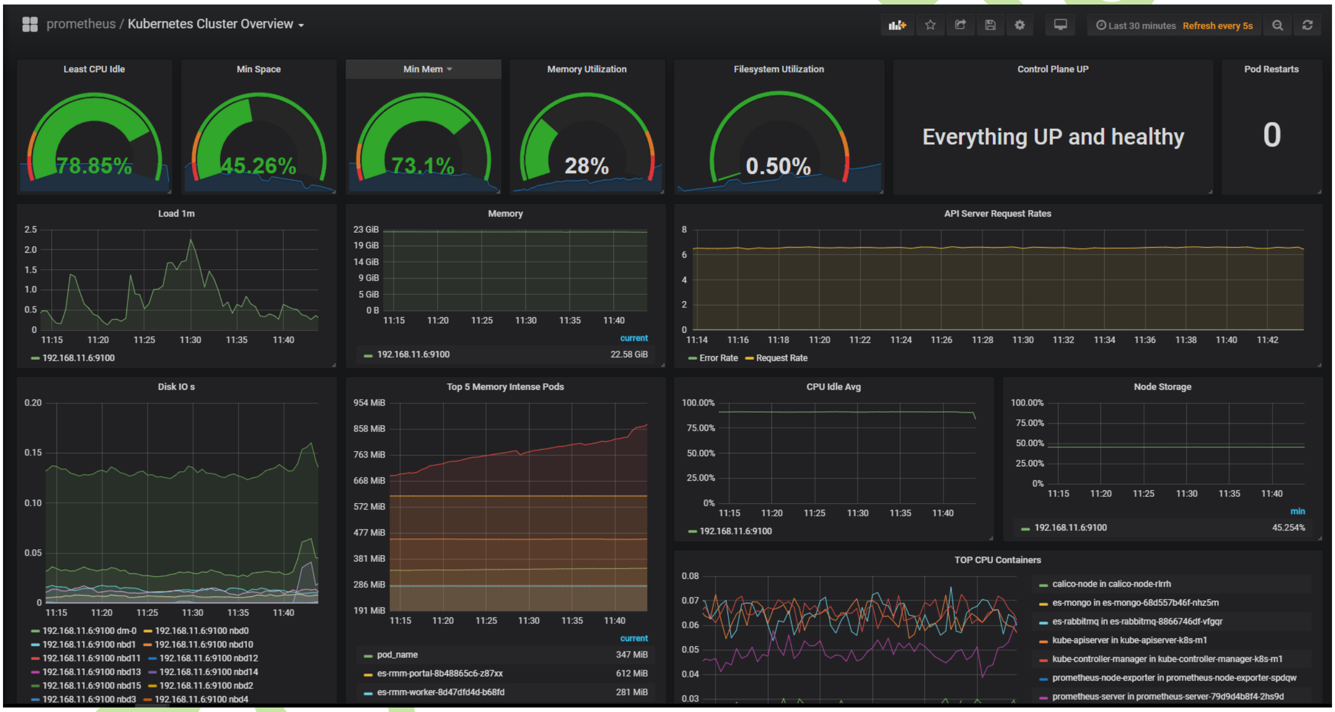


Figure 5 Kubernetes Cluster Overview

There are many measurable metrics worthy of mention, all related to node resource utilization, network bandwidth, disk utilization, CPU, and memory utilization are examples of this. You can navigate to dashboard “**Kubernetes Cluster Detail**” for more cluster information in details.

- Node Exporter Overview

One of the most widely used exporters is the NodeExporter. When NodeExporter runs on a host, it will collect data on I/O, memory, disk and CPU pressure and expose them for scraping. The overview of NodeExporter is as below Figure 6. [10] Also, we have another dashboard “**Node Exporter Detail**”, it shows individual details of memory, network and other system metrics.

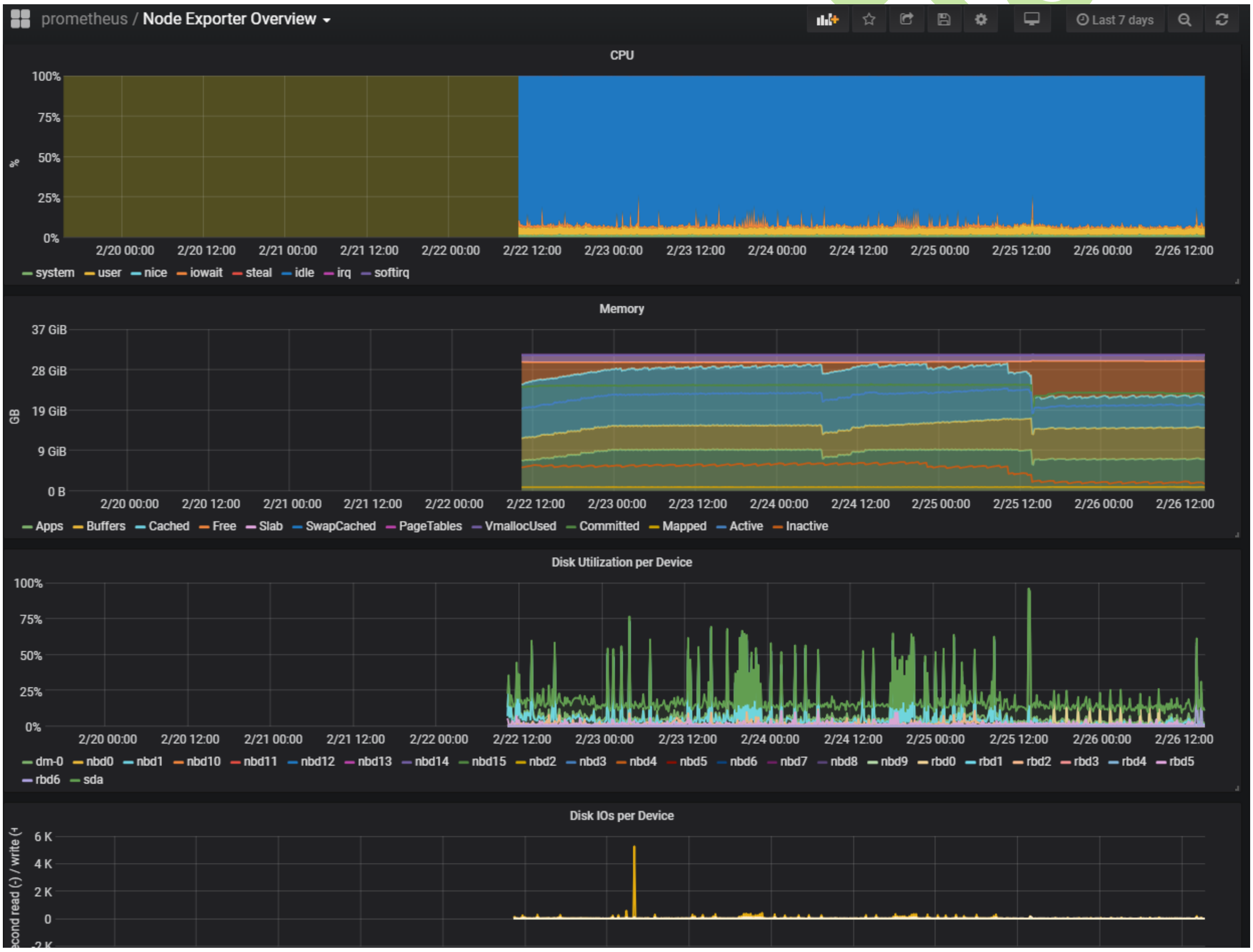
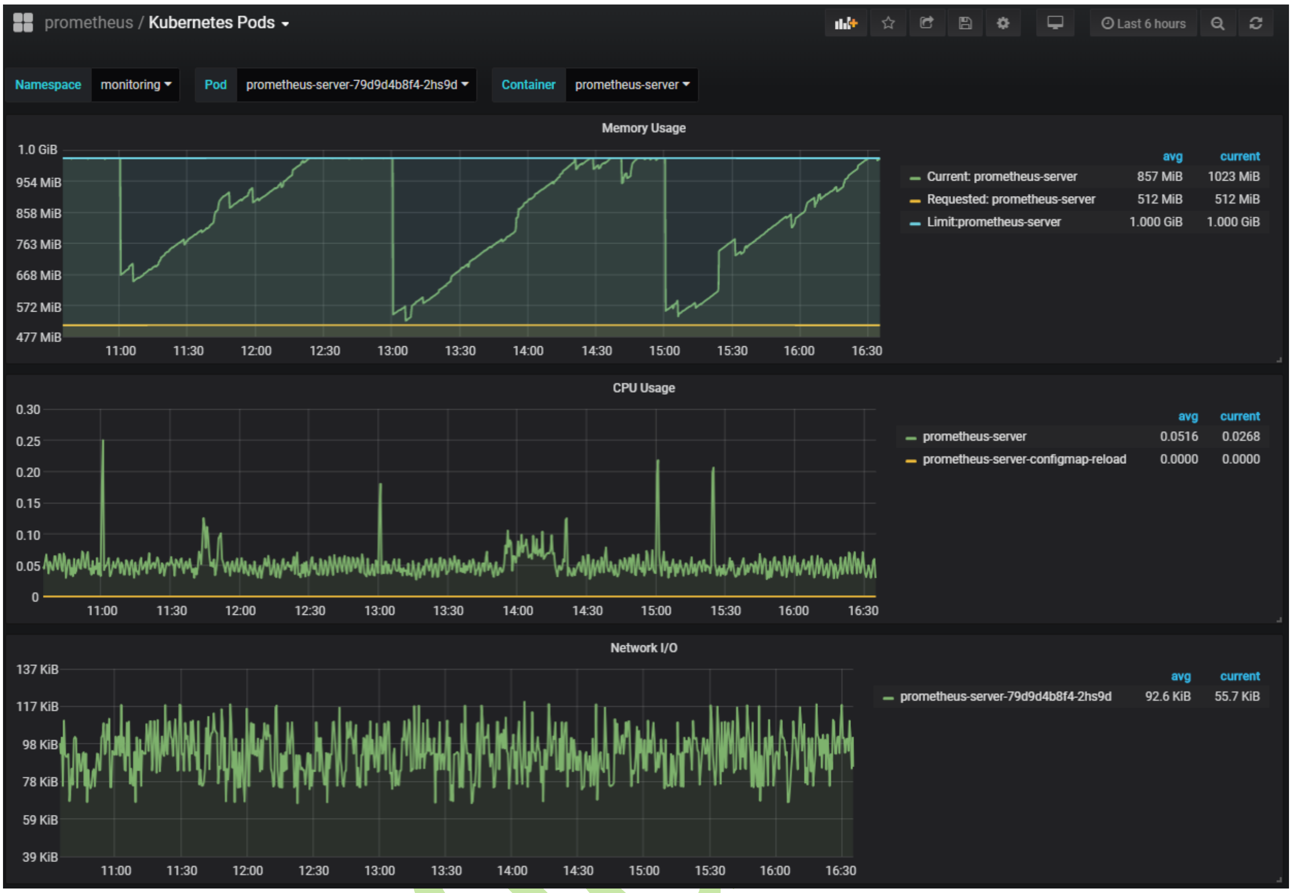


Figure 6 Node Exporter Overview

- Kubernetes Pods



Namespace: monitoring
Pod: prometheus-server-79d9d4b8f4-2hs9d
Container: prometheus-server

Memory Usage

	avg	current
Current: prometheus-server	857 MiB	1023 MiB
Requested: prometheus-server	512 MiB	512 MiB
Limit:prometheus-server	1.000 GiB	1.000 GiB

CPU Usage

	avg	current
prometheus-server	0.0516	0.0268
prometheus-server-configmap-reload	0.0000	0.0000

Network I/O

	avg	current
prometheus-server-79d9d4b8f4-2hs9d	92.6 KiB	55.7 KiB

Figure 7 Kubernetes Pods

The act of monitoring a pod can also extend to its containers. You can monitor individual container if there is more than one container in a pod. Container metrics query running container information like CPU, network, and memory usage. As Figure 7 shows above, maximum limitation is set to compare with memory usage.

- Other Kubernetes dashboards

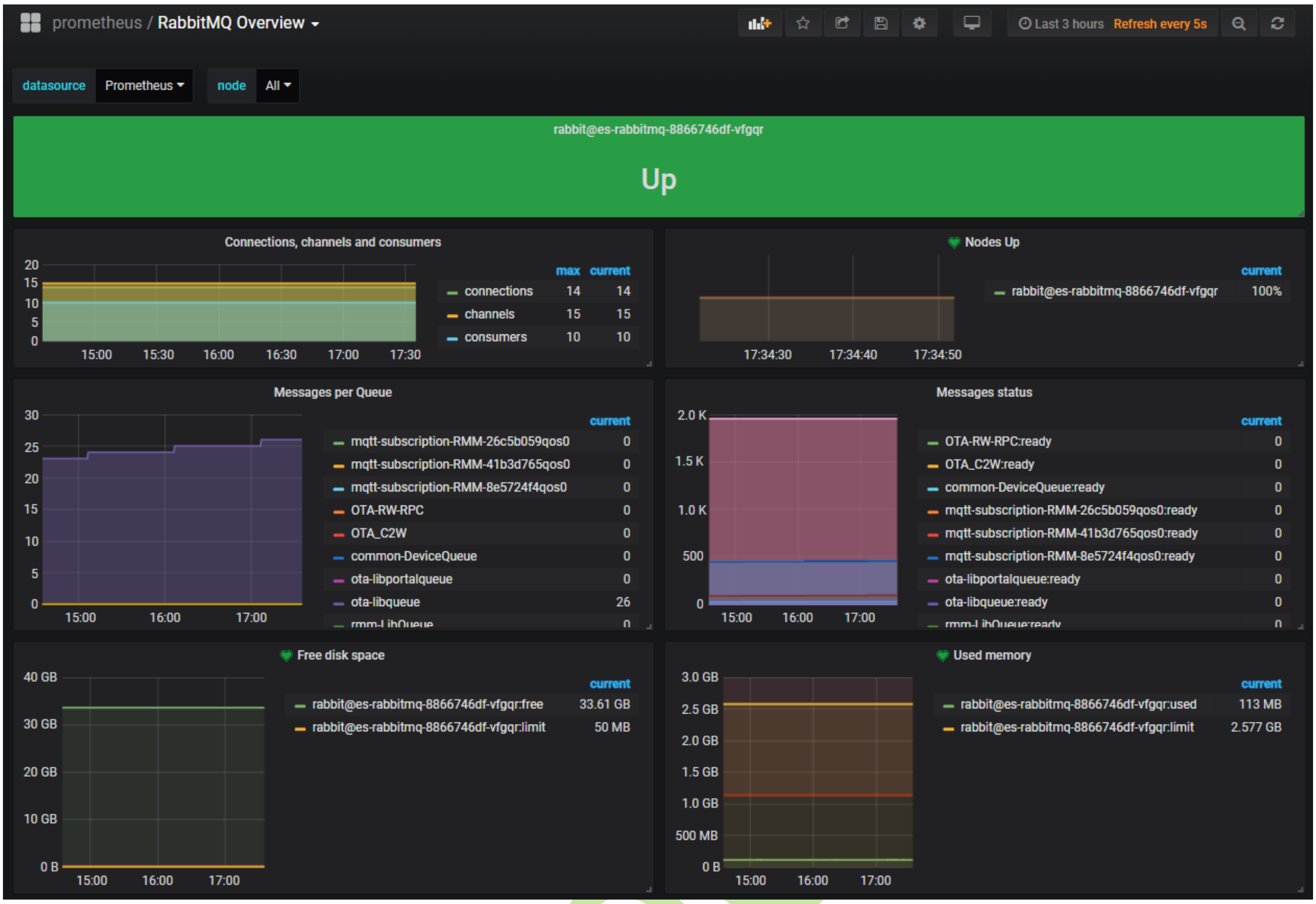
"**Kubernetes Deployment**" : Kubernetes deployment is an abstraction layer for the pods. The main purpose of the deployment is to maintain the resources declared in the deployment configuration to be its desired state. [11] User can monitor the status of every deployment in every namespace.

"**Kubernetes StatefulSet**" : Manages the deployment and scaling of a set of Pods, and provides guarantees about the ordering and uniqueness of these Pods. [12] The status overview of StatefulSet will show in this dashboard.

- Third-Party Exporter

Some other services are not natively integrated, but can be easily adapted using an exporter. An exporter is a service that collects service status and translates to Prometheus metrics ready to be scraped. [13] We have two examples in the Data Service Server.

➢ RabbitMQ Overview



	max	current
connections	14	14
channels	15	15
consumers	10	10

	current
rabbit@es-rabbitmq-8866746df-vfgqr	100%

	current
mqtt-subscription-RMM-26c5b059qos0	0
mqtt-subscription-RMM-41b3d765qos0	0
mqtt-subscription-RMM-8e5724f4qos0	0
OTA-RW-RPC	0
OTA_C2W	0
common-DeviceQueue	0
ota-libportalqueue	0
ota-libqueue	26
rmm-LibQueue	0

	current
OTA-RW-RPC:ready	0
OTA_C2W:ready	0
common-DeviceQueue:ready	0
mqtt-subscription-RMM-26c5b059qos0:ready	0
mqtt-subscription-RMM-41b3d765qos0:ready	0
mqtt-subscription-RMM-8e5724f4qos0:ready	0
ota-libportalqueue:ready	0
ota-libqueue:ready	0
rmm-LibQueue:ready	0

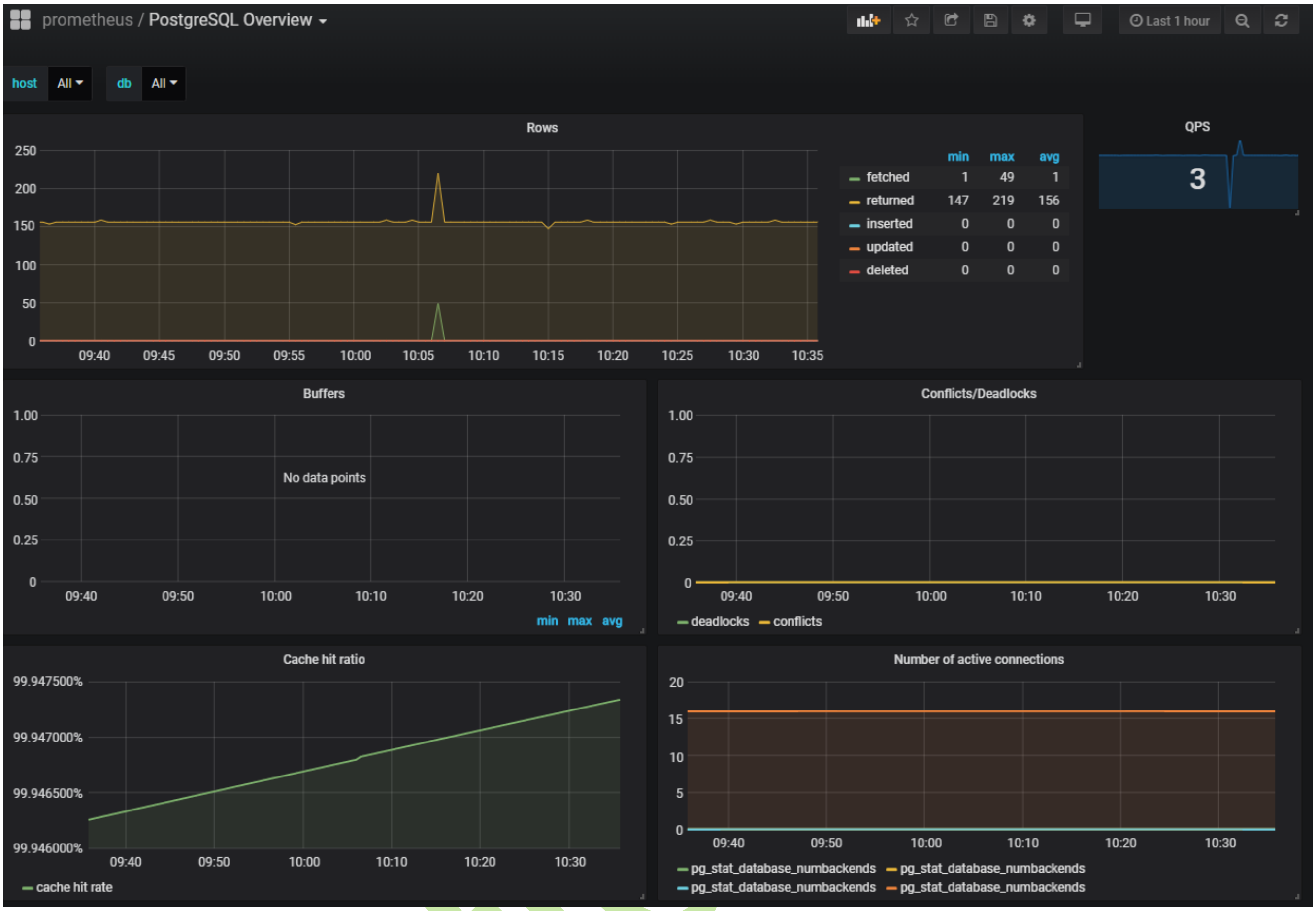
	current
rabbit@es-rabbitmq-8866746df-vfgqr:free	33.61 GB
rabbit@es-rabbitmq-8866746df-vfgqr:limit	50 MB

	current
rabbit@es-rabbitmq-8866746df-vfgqr:used	113 MB
rabbit@es-rabbitmq-8866746df-vfgqr:limit	2.577 GB

Figure 8 RabbitMQ Overview

RabbitMQ is the most widely deployed open source message broker, it supports multiple messaging protocols, message queuing, delivery acknowledgment, flexible routing to queues, multiple exchange type. [14] RabbitMQ exporter is applied to provide a starting point for monitoring RabbitMQ metrics as shown in Figure 8. Prometheus is configured 60 seconds interval to collect RabbitMQ status.

➢ PostgresSQL Overview



	min	max	avg
fetched	1	49	1
returned	147	219	156
inserted	0	0	0
updated	0	0	0
deleted	0	0	0

Figure 9 PostgresSQL Overview

PostgreSQL comes with many features aimed to help developers build applications, administrators to protect data integrity and build fault-tolerant environments, and help you manage your data no matter how big or small the dataset. [15] [16] The account and device information of Data Service Server are stored in PostgresSQL, as shown in Figure 9, you can monitor real-time status of PostgresSQL.

3.2 Prometheus Web UI

3.2.1 Introduction

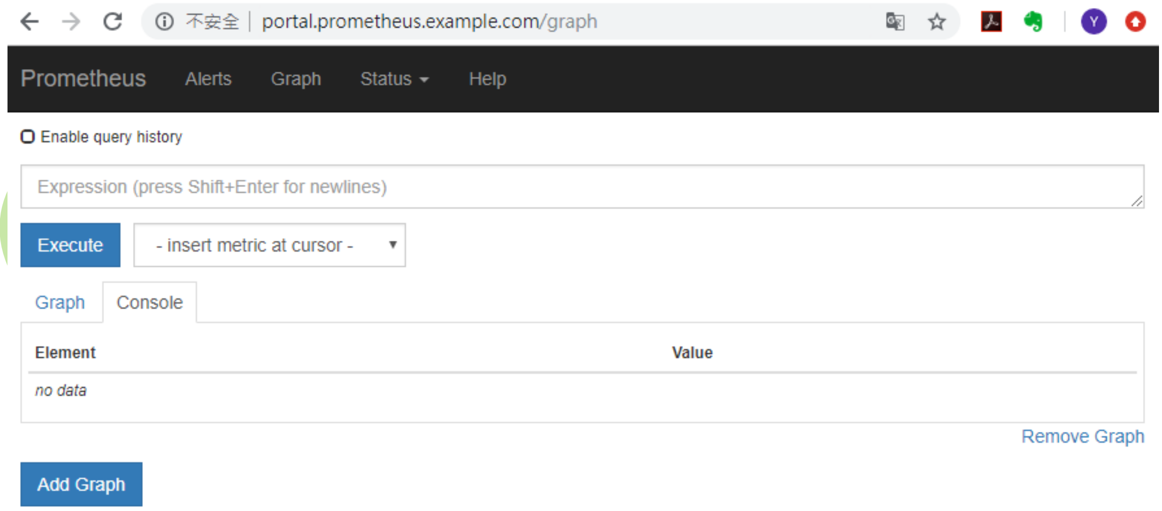
Prometheus provides a functional query language called PromQL (Prometheus Query Language) that lets user select and aggregate time series data in real time. The result of an expression can either be shown as a graph, viewed as tabular data in Prometheus's expression browser. It will be a good choice if you need to query specific metrics using PromQL.

3.2.2 PromQL

At first, go to your Prometheus Web UI with no username and password.

We take http://portal.prometheus.example.com for example as Figure 10.

Please go to your Prometheus WebUI domain server.

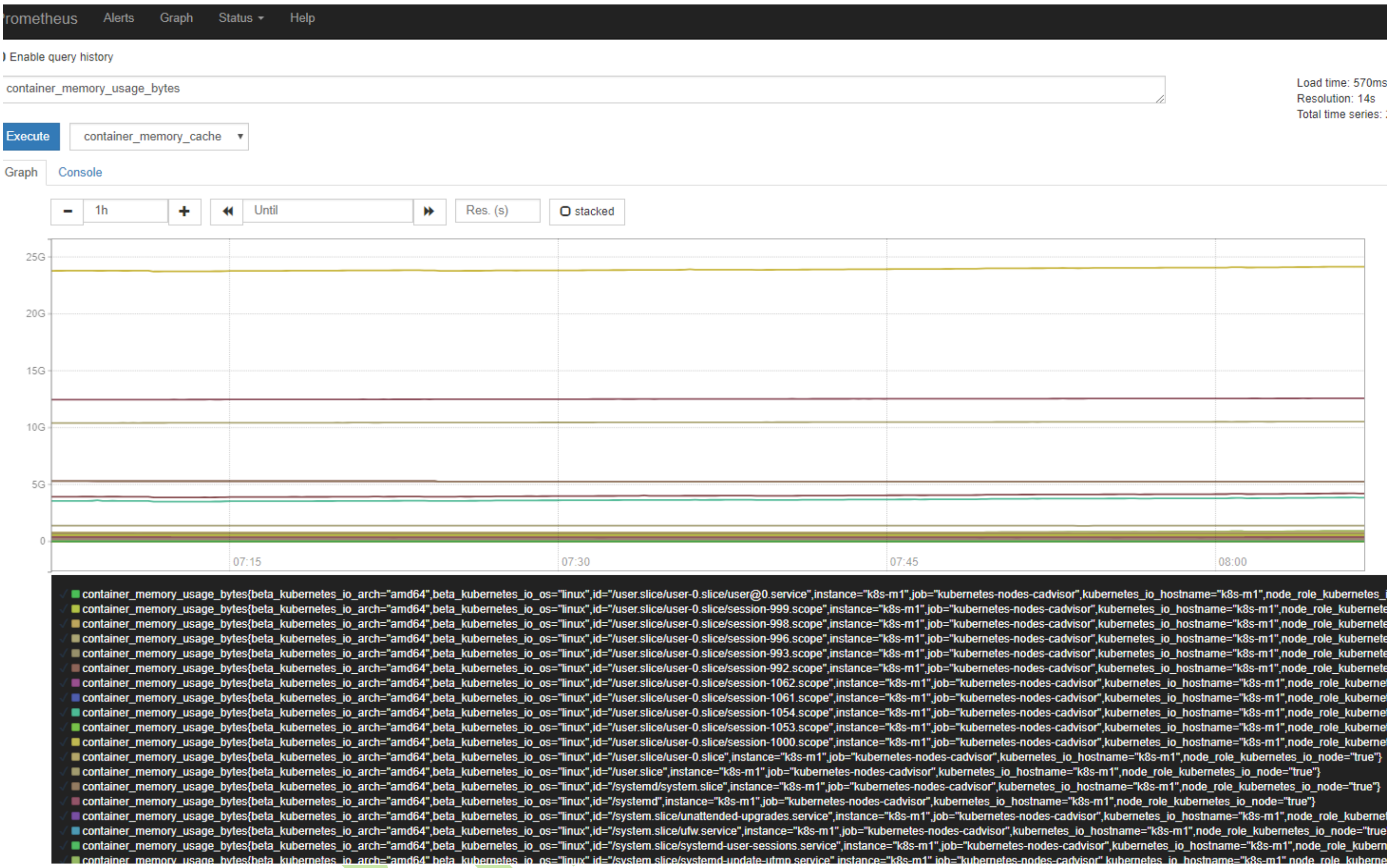


不安全 | portal.prometheus.example.com/graph

Element	Value
no data	

Figure 10 Prometheus Web UI

Take container_memory_usage_bytes for quick example, it selects all time-series that have the container_memory_usage_bytes metric name. Figure 11 below shows the query results with graph mode.



container_memory_usage_bytes

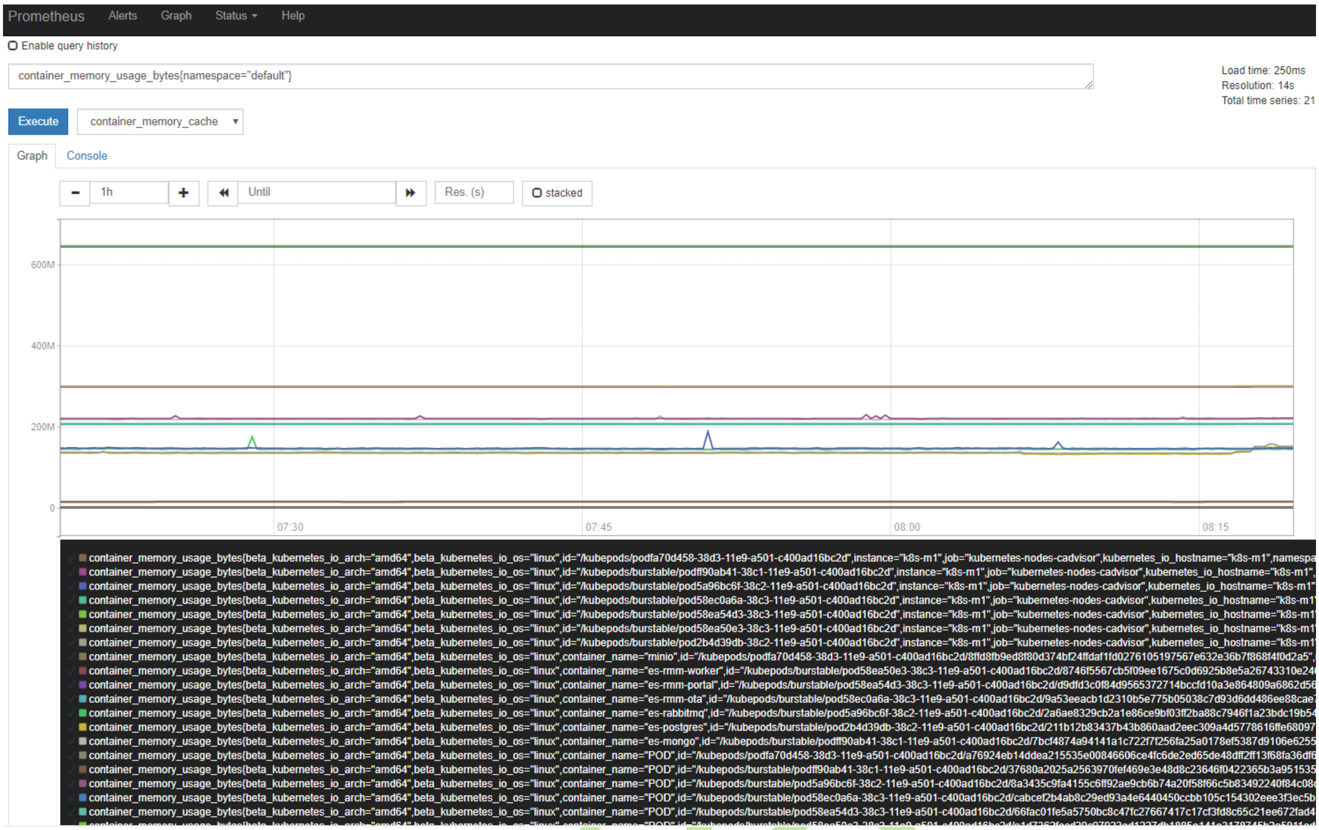
Load time: 570ms
Resolution: 14s
Total time series: :

```
✓ 🟩 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/user@0.service",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernetes_i
✓ 🟩 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-999.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernete
✓ 🟨 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-998.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernete
✓ 🟨 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-996.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernete
✓ 🟫 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-993.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernete
✓ 🟫 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-992.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernete
✓ 🟪 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-1062.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernet
✓ 🟦 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-1061.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernet
✓ 🟩 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-1054.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernet
✓ 🟩 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-1053.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernet
✓ 🟨 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice/session-1000.scope",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernet
✓ 🟨 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice/user-0.slice",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernetes_io_node="true"}
✓ 🟨 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/user.slice",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernetes_io_node="true"}
✓ 🟫 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/systemd/system.slice",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernetes_io_node="true"}
✓ 🟥 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/systemd",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernetes_io_node="true"}
✓ 🟪 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/system.slice/unattended-upgrades.service",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernet
✓ 🟦 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/system.slice/ufw.service",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubernetes_io_node="true
✓ 🟩 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/system.slice/systemd-user-sessions.service",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kubern
✓ 🟩 container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/system.slice/systemd-update-utmp.service",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",node_role_kuberne
```

Figure 11 Simple query result

The above results contain all the container_memory_usage_bytes metrics, the data is large. If you want to query more specific data in advanced, append a set of labels to match in curly braces ({}). Take container_memory_usage_bytes for example, append one term in PromQL as below.

```
✧  container_memory_usage_bytes{namespace="default"}
```



○ Enable query history

container_memory_usage_bytes{namespace="default"}

Load time: 250ms
Resolution: 14s
Total time series: 21

```
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/podfa70d458-38d3-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",namespa
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/burstable/podff90ab41-38c1-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1",
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/burstable/pod5a96bc6f-38c2-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1"
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/burstable/pod58ec0a6a-38c3-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/burstable/pod58ea54d3-38c3-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/burstable/pod58ea50e3-38c3-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",id="/kubepods/burstable/pod2b4d39db-38c2-11e9-a501-c400ad16bc2d",instance="k8s-m1",job="kubernetes-nodes-cadvisor",kubernetes_io_hostname="k8s-m1
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="minio",id="/kubepods/podfa70d458-38d3-11e9-a501-c400ad16bc2d/8ffd8fb9ed8f80d374bf24ffdaf1fd0276105197567e632e36b7f868f4f0d2a5",
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="es-rmm-worker",id="/kubepods/burstable/pod58ea50e3-38c3-11e9-a501-c400ad16bc2d/8746f5567cb5f09ee1675c0d6925b8e5a26743310e24
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="es-rmm-portal",id="/kubepods/burstable/pod58ea54d3-38c3-11e9-a501-c400ad16bc2d/d9dfd3c0f84d9565372714bccfd10a3e864809a6862d56
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="es-rmm-ota",id="/kubepods/burstable/pod58ec0a6a-38c3-11e9-a501-c400ad16bc2d/9a53eeacb1d2310b5e775b05038c7d93d6dd486ee88cae
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="es-rabbitmq",id="/kubepods/burstable/pod5a96bc6f-38c2-11e9-a501-c400ad16bc2d/2a6ae8329cb2a1e86ce9bf03ff2ba88c7946f1a23bdc19b54
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="es-postgres",id="/kubepods/burstable/pod2b4d39db-38c2-11e9-a501-c400ad16bc2d/211b12b83437b43b860aad2eec309a4d5778616ffe68097
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="es-mongo",id="/kubepods/burstable/podff90ab41-38c1-11e9-a501-c400ad16bc2d/7bcf4874a94141a1c722f7f256fa25a0178ef5387d9106e6255
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="POD",id="/kubepods/podfa70d458-38d3-11e9-a501-c400ad16bc2d/a76924eb14ddea215535e00846606ce4fc6de2ed65de48dff2ff13f68fa36df6
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="POD",id="/kubepods/burstable/podff90ab41-38c1-11e9-a501-c400ad16bc2d/37680a2025a2563970fef469e3e48d8c23646f0422365b3a951535
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="POD",id="/kubepods/burstable/pod5a96bc6f-38c2-11e9-a501-c400ad16bc2d/8a3435c9fa4155c6ff92ae9cb6b74a20f58f66c5b83492240f84c08
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="POD",id="/kubepods/burstable/pod58ec0a6a-38c3-11e9-a501-c400ad16bc2d/cabcef2b4ab8c29ed93a4e6440450ccbb105c154302eee3f3ec5b
container_memory_usage_bytes{beta_kubernetes_io_arch="amd64",beta_kubernetes_io_os="linux",container_name="POD",id="/kubepods/burstable/pod58ea54d3-38c3-11e9-a501-c400ad16bc2d/66fac01fe5a5750bc8c47fc27667417c17cf3fd8c65c21ee672fad4
```

Figure 12 Advanced query result

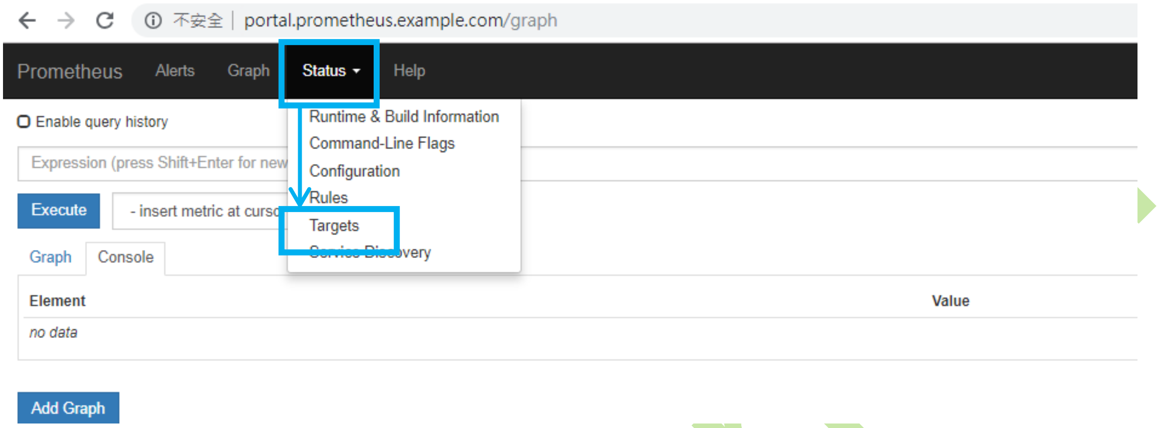
The result shows in Figure 12 that container_memory_usage_bytes metrics with namespace “default”. Therefore, user can query any specific metric if in need. Please refer to the document for more detail of PromQL.

https://prometheus.io/docs/prometheus/latest/querying/basics/

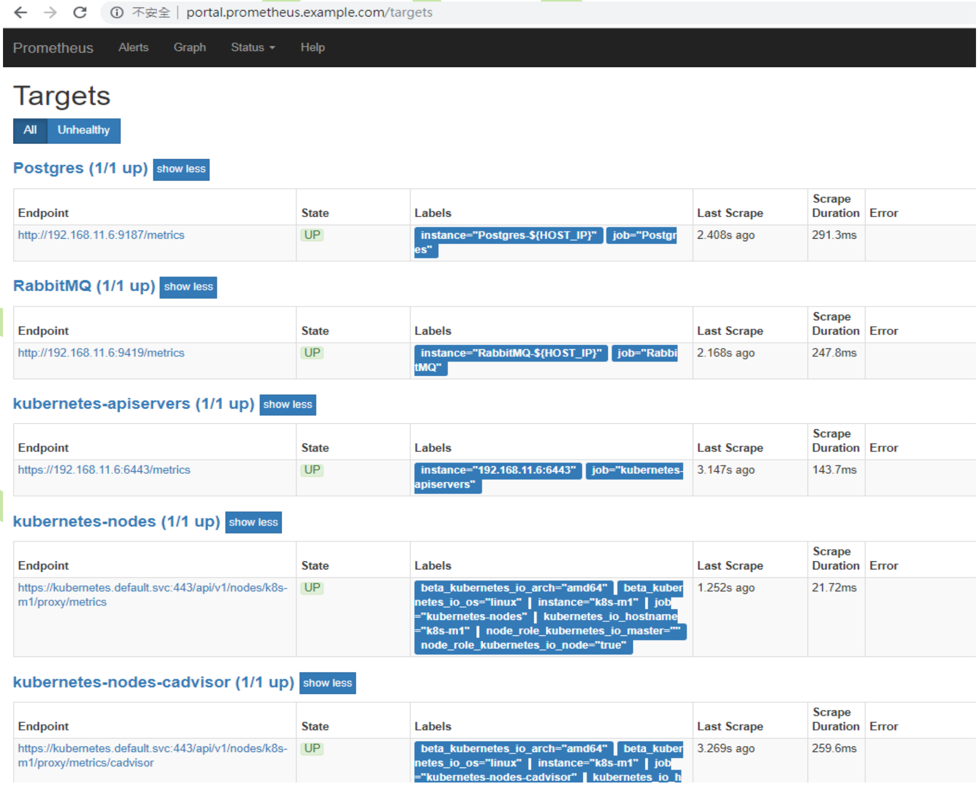
FAQ

✧ How to simply check if all the targets are under monitored?

1. Go to your Prometheus Web UI and navigate to "Targets" page.



2. All the monitored targets will be listed as below, the targets will show "up" if their status are healthy.



Targets

Postgres (1/1 up) show less

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://192.168.11.6:9187/metrics	UP	instance="Postgres-${HOST_IP}" job="Postgres"	2.408s ago	291.3ms	

RabbitMQ (1/1 up) show less

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://192.168.11.6:9419/metrics	UP	instance="RabbitMQ-${HOST_IP}" job="RabbitMQ"	2.168s ago	247.8ms	

kubernetes-apiservers (1/1 up) show less

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
https://192.168.11.6:6443/metrics	UP	instance="192.168.11.6:6443" job="kubernetes-apiservers"	3.147s ago	143.7ms	

kubernetes-nodes (1/1 up) show less

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
https://kubernetes.default.svc:443/api/v1/nodes/k8s-m1/proxy/metrics	UP	beta_kubernetes_io_arch="amd64" beta_kubernetes_io_os="linux" instance="k8s-m1" job="kubernetes-nodes" kubernetes_io_hostname="k8s-m1" node_role_kubernetes_io_master="" node_role_kubernetes_io_node="true"	1.252s ago	21.72ms	

kubernetes-nodes-cadvisor (1/1 up) show less

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
https://kubernetes.default.svc:443/api/v1/nodes/k8s-m1/proxy/metrics/cadvisor	UP	beta_kubernetes_io_arch="amd64" beta_kubernetes_io_os="linux" instance="k8s-m1" job="kubernetes-nodes-cadvisor" kubernetes_io_h	3.269s ago	259.6ms	

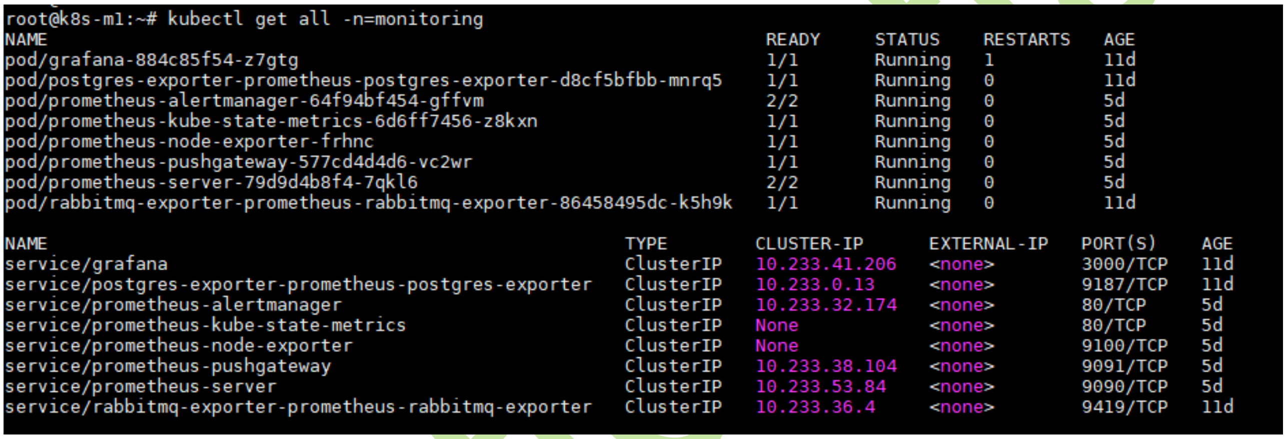
✧ As mentioned above, if there is a target with "down" status and error message, how to check the error in detail?

Please use command kubectl to get more information.

1. Issue command to get all resources in namespace “monitoring”.

```
# kubectl get all -n=monitoring
```

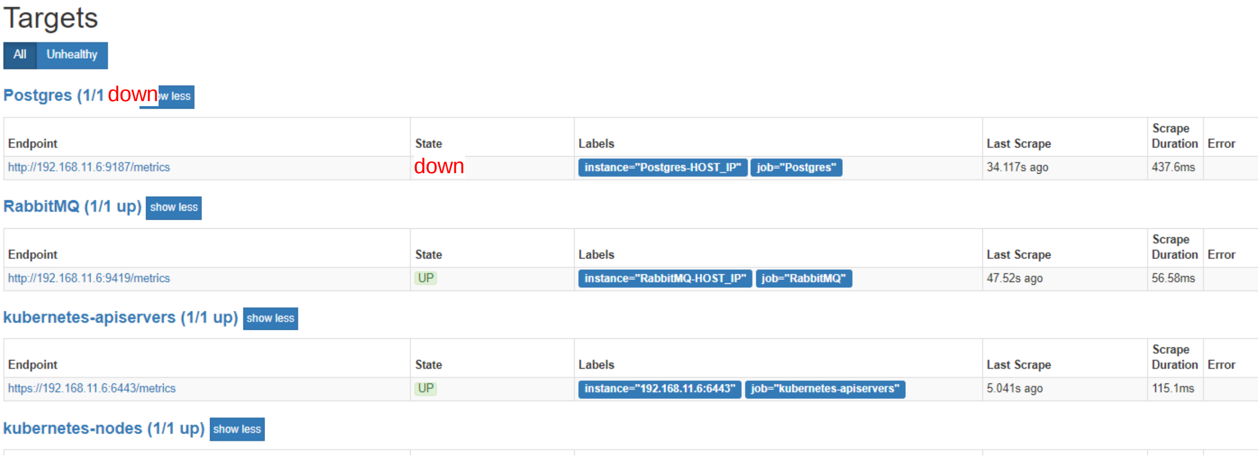
All the resources in “monitoring” will show as below.



```
root@k8s-m1:~# kubectl get all -n=monitoring
NAME                                                          READY     STATUS    RESTARTS   AGE
pod/grafana-884c85f54-z7gtg                                   1/1       Running   1          11d
pod/postgres-exporter-prometheus-postgres-exporter-d8cf5bfbb-mnrq5   1/1       Running   0          11d
pod/prometheus-alertmanager-64f94bf454-gffvm                  2/2       Running   0          5d
pod/prometheus-kube-state-metrics-6d6ff7456-z8kxn             1/1       Running   0          5d
pod/prometheus-node-exporter-frhnc                            1/1       Running   0          5d
pod/prometheus-pushgateway-577cd4d4d6-vc2wr                   1/1       Running   0          5d
pod/prometheus-server-79d9d4b8f4-7qkl6                        2/2       Running   0          5d
pod/rabbitmq-exporter-prometheus-rabbitmq-exporter-86458495dc-k5h9k   1/1       Running   0          11d

NAME                                                 TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)    AGE
service/grafana                                      ClusterIP   10.233.41.206   <none>        3000/TCP   11d
service/postgres-exporter-prometheus-postgres-exporter   ClusterIP   10.233.0.13     <none>        9187/TCP   11d
service/prometheus-alertmanager                      ClusterIP   10.233.32.174   <none>        80/TCP     5d
service/prometheus-kube-state-metrics                ClusterIP   None            <none>        80/TCP     5d
service/prometheus-node-exporter                     ClusterIP   None            <none>        9100/TCP   5d
service/prometheus-pushgateway                       ClusterIP   10.233.38.104   <none>        9091/TCP   5d
service/prometheus-server                            ClusterIP   10.233.53.84    <none>        9090/TCP   5d
service/rabbitmq-exporter-prometheus-rabbitmq-exporter   ClusterIP   10.233.36.4     <none>        9419/TCP   11d
```

Take “Postgres” for example and assume “Postgres” is down.



Targets

Postgres (1/1 down

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://192.168.11.6:9187/metrics	down	instance="Postgres-HOST_IP" job="Postgres"	34.117s ago	437.6ms	

RabbitMQ (1/1 up)

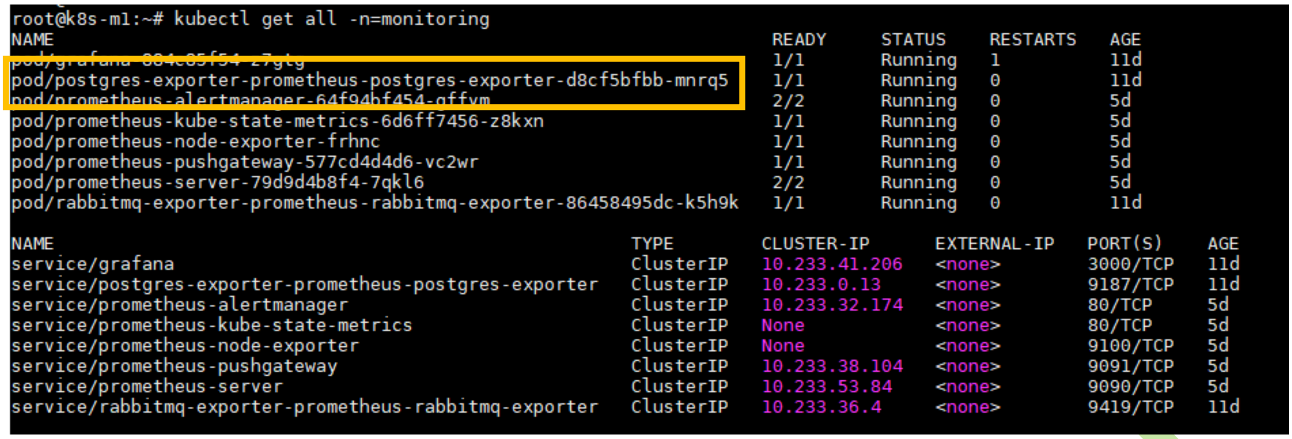
Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://192.168.11.6:9419/metrics	UP	instance="RabbitMQ-HOST_IP" job="RabbitMQ"	47.52s ago	56.58ms	

kubernetes-apiservers (1/1 up)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
https://192.168.11.6:6443/metrics	UP	instance="192.168.11.6:6443" job="kubernetes-apiservers"	5.041s ago	115.1ms	

kubernetes-nodes (1/1 up)

2. We need to get more information from “Postgres” Pod.



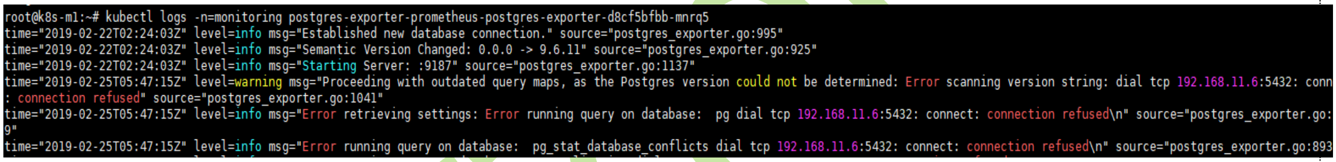
```
root@k8s-m1:~# kubectl get all -n=monitoring
NAME                                                             READY   STATUS    RESTARTS   AGE
pod/grafana-884c85f54-z7gtg                                      1/1     Running   1          11d
pod/postgres-exporter-prometheus-postgres-exporter-d8cf5bfbb-mnrq5   1/1     Running   0          11d
pod/prometheus-alertmanager-64f94bf454-qffvm                     2/2     Running   0          5d
pod/prometheus-kube-state-metrics-6d6ff7456-z8kxn                1/1     Running   0          5d
pod/prometheus-node-exporter-frhnc                               1/1     Running   0          5d
pod/prometheus-pushgateway-577cd4d4d6-vc2wr                      1/1     Running   0          5d
pod/prometheus-server-79d9d4b8f4-7qkl6                           2/2     Running   0          5d
pod/rabbitmq-exporter-prometheus-rabbitmq-exporter-86458495dc-k5h9k   1/1     Running   0          11d

NAME                                                    TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)    AGE
service/grafana                                         ClusterIP   10.233.41.206   <none>        3000/TCP   11d
service/postgres-exporter-prometheus-postgres-exporter  ClusterIP   10.233.0.13     <none>        9187/TCP   11d
service/prometheus-alertmanager                         ClusterIP   10.233.32.174   <none>        80/TCP     5d
service/prometheus-kube-state-metrics                   ClusterIP   None            <none>        80/TCP     5d
service/prometheus-node-exporter                        ClusterIP   None            <none>        9100/TCP   5d
service/prometheus-pushgateway                          ClusterIP   10.233.38.104   <none>        9091/TCP   5d
service/prometheus-server                               ClusterIP   10.233.53.84    <none>        9090/TCP   5d
service/rabbitmq-exporter-prometheus-rabbitmq-exporter  ClusterIP   10.233.36.4     <none>        9419/TCP   11d
```

```
# kubectl logs -n=monitoring ${POD_NAME}
```

Please fill in your pod name here and you will see the logs of this pod.

i.e. kubectl logs -n=monitoring postgres-exporter-prometheus-postgres-exporter-d8cf5bfbb-mnrq5



```
root@k8s-m1:~# kubectl logs -n=monitoring postgres-exporter-prometheus-postgres-exporter-d8cf5bfbb-mnrq5
time="2019-02-22T02:24:03Z" level=info msg="Established new database connection." source="postgres_exporter.go:995"
time="2019-02-22T02:24:03Z" level=info msg="Semantic Version Changed: 0.0.0 -> 9.6.11" source="postgres_exporter.go:925"
time="2019-02-22T02:24:03Z" level=info msg="Starting Server: :9187" source="postgres_exporter.go:1137"
time="2019-02-25T05:47:15Z" level=warning msg="Proceeding with outdated query maps, as the Postgres version could not be determined: Error scanning version string: dial tcp 192.168.11.6:5432: conn
: connection refused" source="postgres_exporter.go:1041"
time="2019-02-25T05:47:15Z" level=info msg="Error retrieving settings: Error running query on database:  pg dial tcp 192.168.11.6:5432: connect: connection refused\n" source="postgres_exporter.go:
9"
time="2019-02-25T05:47:15Z" level=info msg="Error running query on database:  pg_stat_database_conflicts dial tcp 192.168.11.6:5432: connect: connection refused\n" source="postgres_exporter.go:893
```

3. By the two steps above, if you can correct the error successfully, congrats!

   But if you still have no ideas, please issue command below.

```
# kubectl describe pod -n=monitoring ${POD_NAME}
  Please fill in your pod name here.
```

i.e. kubectl describe pod -n=monitoring postgres-exporter-prometheus-postgres-exporter-d8cf5bfbb-mnrq5

Please copy and paste all the information from "kubectl logs" and "kubectl describe" commands and contact Advantech support team. Thanks!

Reference

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