



DevOps Lab/Even Sem 2023-23/Experiment 1

Name : Dyotak Kachare	Class/Roll No. : D11AD/26	Grade:
-------------------------------------	---	---------------

Title of Experiment :

To understand DevOps: Principles, Practices, and DevOps Engineer Role and Responsibilities

Objective of Experiment :

To understand DevOps practices which aims to simplify Software Development Life Cycle

Outcome of Experiment :

To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements

Problem Statement :

To understand DevOps: Principles, Practices, and DevOps Engineer Role and Responsibilities

Description / Theory :



Prometheus



[Prometheus](#) is an open-source systems monitoring and alerting toolkit originally built at [SoundCloud](#). Since its inception in 2012, many companies and organizations have adopted Prometheus, and the project has a very active developer and user [community](#). It is now a standalone open source project and maintained independently of any company. To emphasize this, and to clarify the project's governance structure, Prometheus joined the [Cloud Native Computing Foundation](#) in 2016 as the second hosted project, after [Kubernetes](#).

Prometheus collects and stores its metrics as time series data, i.e. metrics information is stored with the timestamp at which it was recorded, alongside optional key-value pairs called labels. For more elaborate overviews of Prometheus, see the resources linked from the [media](#) section.

Features

Prometheus's main features are:

- a multi-dimensional [data model](#) with time series data identified by metric name and key/value pairs
- PromQL, a [flexible query language](#) to leverage this dimensionality
- no reliance on distributed storage; single server nodes are autonomous
- time series collection happens via a pull model over HTTP
- [pushing time series](#) is supported via an intermediary gateway
- targets are discovered via service discovery or static configuration
- multiple modes of graphing and dashboarding support

What are metrics?



DevOps Lab/Even Sem 2023-23/Experiment 1

Metrics are numerical measurements in layperson terms. The term time series refers to the recording of changes over time. What users want to measure differs from application to application. For a web server, it could be request times; for a database, it could be the number of active connections or active queries, and so on.

Metrics play an important role in understanding why your application is working in a certain way. Let's assume you are running a web application and discover that it is slow. To learn what is happening with your application, you will need some information. For example, when the number of requests is high, the application may become slow. If you have the request count metric, you can determine the cause and increase the number of servers to handle the load.

Components

The Prometheus ecosystem consists of multiple components, many of which are optional:

- the main [Prometheus server](#) which scrapes and stores time series data
- [client libraries](#) for instrumenting application code
- a [push gateway](#) for supporting short-lived jobs
- special-purpose [exporters](#) for services like HAProxy, StatsD, Graphite, etc.
- an [alertmanager](#) to handle alerts
- various support tools

Most Prometheus components are written in [Go](#), making them easy to build and deploy as static binaries.



Vivekanand Education Society's Institute of Technology

Approved by AICTE & Affiliated to University of Mumbai

Artificial Intelligence and Data Science Department

DevOps Lab/Even Sem 2023-23/Experiment 1

Code and Output :

The image shows two screenshots of the Prometheus website. The top screenshot is the homepage, which features a dark header with navigation links (DOCS, DOWNLOAD, COMMUNITY, SUPPORT & TRAINING, BLOG) and a search bar. The main content area has an orange background with the text "From metrics to insight" and "Power your metrics and alerting with the leading open-source monitoring solution." Below this are two buttons: "GET STARTED" and "DOWNLOAD". The bottom section highlights four key features: Dimensional data, Powerful queries, Great visualization, and Efficient storage.

The bottom screenshot is the "DOWNLOAD" page, which provides information on how to download Prometheus. It includes a list of officially maintained components and a list of independently maintained exporters. The page also features a filter section for "Operating system" (popular) and "Architecture" (amd64). The version "2.49.1 / 2024-01-15" is displayed, along with a link to the "Release notes".

Dimensional data
Prometheus implements a highly dimensional data model. Time series are identified by a metric name and a set of key-value pairs.

Powerful queries
PromQL allows slicing and dicing of collected time series data in order to generate ad-hoc graphs, tables, and alerts.

Great visualization
Prometheus has multiple modes for visualizing data: a built-in expression browser, Grafana integration, and a console template language.

Efficient storage
Prometheus stores time series in memory and on local disk in an efficient custom format. Scaling is achieved by functional sharding and

DOWNLOAD

We provide precompiled binaries and Docker images for most officially maintained Prometheus components. If a component is not listed here, check the respective repository on Github for further instructions.

There is also a constantly growing number of independently maintained exporters listed at Exporters and integrations.

- [prometheus](#)
- [alertmanager](#)
- [blackbox_exporter](#)
- [consul_exporter](#)
- [graphite_exporter](#)
- [memcached_exporter](#)
- [mysqld_exporter](#)
- [node_exporter](#)
- [promlens](#)
- [pushgateway](#)
- [statsd_exporter](#)

Operating system: popular Architecture: amd64

prometheus

The Prometheus monitoring system and time series database. [prometheus/prometheus](#)

2.49.1 / 2024-01-15 [Release notes](#)



DevOps Lab/Even Sem 2023-23/Experiment 1

The screenshot shows the Visual Studio Code interface with the file explorer on the left displaying the project structure. The main editor shows the `prometheus.yml` file. The terminal at the bottom shows the command `ls` being executed in the directory `/mnt/c/Users/dyotak/Desktop/prometheus-2.49.1.linux-amd64`, listing the files `LICENSE`, `NOTICE`, `prometheus`, `prometheus.yml`, and `promtool`.

The screenshot shows the Visual Studio Code interface with the file explorer on the left displaying the project structure. The main editor shows the `prometheus.yml` file with the following content:

```
13 global:
12   scrape_interval: 5s
11
10 scrape_configs:
9   - job_name: "prometheus"
8     static_configs:
7       - targets:
6         - localhost:9090
5   - job_name: "demo"
4     static_configs:
3       - targets:
2         - demo.promlabs.com:10000
1         - demo.promlabs.com:10001
14         - demo.promlabs.com:10002
1
```

The terminal at the bottom shows the command `ls` being executed in the directory `/mnt/c/Users/dyotak/Desktop/prometheus-2.49.1.linux-amd64`.



Vivekanand Education Society's Institute of Technology

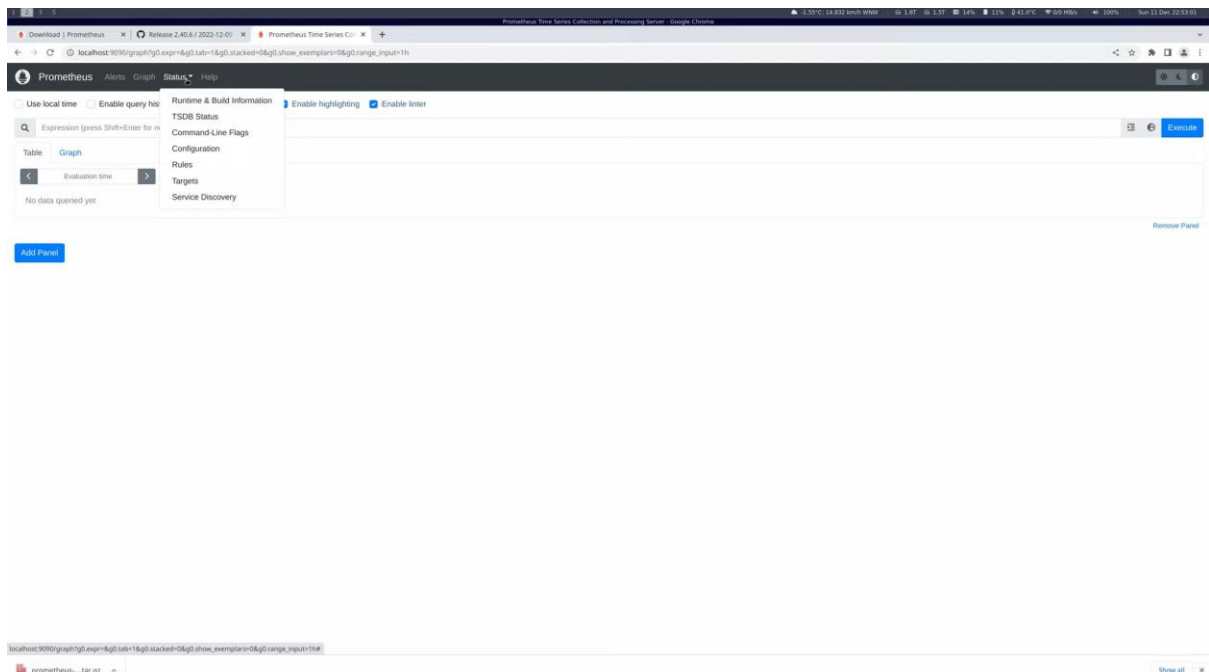
Approved by AICTE & Affiliated to University of Mumbai

Artificial Intelligence and Data Science Department

DevOps Lab/Even Sem 2023-23/Experiment 1

```
File Edit Selection View Go Run ... • prometheus.yml - prometheus-2.49.1.linux-amd64 - Visual Studio Code
PROBLEMS 4 DEBUG CONSOLE TERMINAL PORTS OUTPUT wsl + - x

dyotak@Dyotak: /mnt/c/Users/dyota/Desktop/prometheus-2.49.1.linux-amd64$ ./prometheus
ts=2024-02-03T17:34:02.649Z caller=main.go:544 level=info msg="No time or size retention was set so using the default
time retention" duration=15d
ts=2024-02-03T17:34:02.650Z caller=main.go:588 level=info msg="Starting Prometheus Server" mode=server version="(versi
on=2.49.1, branch=HEAD, revision=43e14844a33b65e2a396e3944272af8b3a494071)"
ts=2024-02-03T17:34:02.650Z caller=main.go:593 level=info build_context="(go=go1.21.6, platform=linux/amd64, user=root
@6d5f4c649d25, date=20240115-16:58:43, tags=netgo,builtinassets,stringlabels)"
ts=2024-02-03T17:34:02.650Z caller=main.go:594 level=info host_details="(Linux 5.15.133.1-microsoft-standard-WSL2 #1 S
MP Thu Oct 5 21:02:42 UTC 2023 x86_64 Dyotak )"
ts=2024-02-03T17:34:02.650Z caller=main.go:595 level=info fd_limits="(soft=1048576, hard=1048576)"
ts=2024-02-03T17:34:02.650Z caller=main.go:596 level=info vm_limits="(soft=unlimited, hard=unlimited)"
ts=2024-02-03T17:34:02.663Z caller=web.go:565 level=info component=web msg="Start listening for connections" address=0
.0.0.0:9090
ts=2024-02-03T17:34:02.665Z caller=main.go:1039 level=info msg="Starting TSDB ..."
ts=2024-02-03T17:34:02.668Z caller=tsdb.go:274 level=info component=web msg="Listening on" address=[::]:9090
ts=2024-02-03T17:34:02.670Z caller=tsdb.go:277 level=info component=web msg="TLS is disabled." http2=false addre
ss=[::]:9090
ts=2024-02-03T17:34:02.691Z caller=head.go:606 level=info component=tsdb msg="Replaying on-disk memory mappable chunks
if any"
ts=2024-02-03T17:34:02.691Z caller=head.go:687 level=info component=tsdb msg="On-disk memory mappable chunks replay co
mpleted" duration=3.106µs
ts=2024-02-03T17:34:02.691Z caller=head.go:695 level=info component=tsdb msg="Replaying WAL, this may take a while"
ts=2024-02-03T17:34:02.697Z caller=head.go:766 level=info component=tsdb msg="WAL segment loaded" segment=0 maxSegment
=0
ts=2024-02-03T17:34:02.697Z caller=head.go:803 level=info component=tsdb msg="WAL replay completed" checkpoint_replay_
duration=2.132964ms wal_replay_duration=3.123004ms wbl_replay_duration=202ns total_replay_duration=5.307088ms
ts=2024-02-03T17:34:02.701Z caller=main.go:1060 level=info fs_type=1021997
ts=2024-02-03T17:34:02.701Z caller=main.go:1063 level=info msg="TSDB started"
ts=2024-02-03T17:34:02.701Z caller=main.go:1245 level=info msg="Loading configuration file" filename=prometheus.yml
ts=2024-02-03T17:34:02.705Z caller=main.go:1282 level=info msg="Completed loading of configuration file" filename=prom
```





Vivekanand Education Society's Institute of Technology

Approved by AICTE & Affiliated to University of Mumbai

Artificial Intelligence and Data Science Department

DevOps Lab/Even Sem 2023-23/Experiment 1

Download | Prometheus | Release 2.40.6 / 2022-12-01 | Prometheus Time Series Collection and Processing Server - Google Chrome

localhost:9090/targets?search=

Prometheus Alerts Graph Status Help

Targets

All Unhealthy Collapse All

Filter by endpoint or labels

demo (3/3 up)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://demo.promlabs.com:30001/metrics	up	prometheus="demo-prometheus-alert-30001" job="demo"	3.758s ago	110.358ms	
http://demo.promlabs.com:30001/metrics	up	prometheus="demo-prometheus-alert-30001" job="demo"	4.663s ago	111.846ms	
http://demo.promlabs.com:30002/metrics	up	prometheus="demo-prometheus-alert-30002" job="demo"	1.711s ago	108.860ms	

prometheus (1/1 up)

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://localhost:9090/metrics	up	prometheus="localhost-9090" job="prometheus"	457.000ms ago	10.183ms	

prometheus--tar.gz

Show all

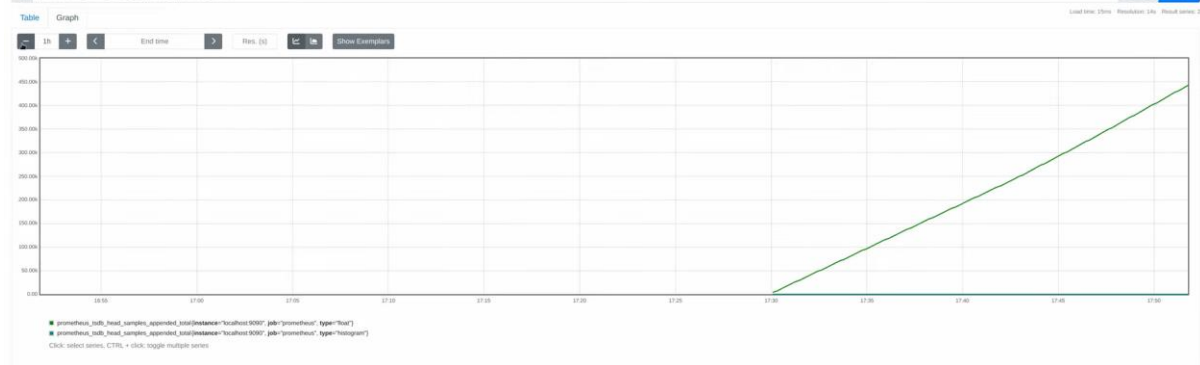
Download | Prometheus | Release 2.41.0-rc.0 / 2023-11-01 | Prometheus Time Series Collection and Processing Server - Google Chrome

localhost:9090/graph?g0.expr=prometheus_tsdb_head_samples_appended_total&g0.tab=0&g0.stacked=0&g0.show_exemplars=0&g0.range_input=1h

Prometheus Alerts Graph Status Help

Use local time Enable query history Enable autocomplete Enable highlighting Enable inser

prometheus_tsdb_head_samples_appended_total



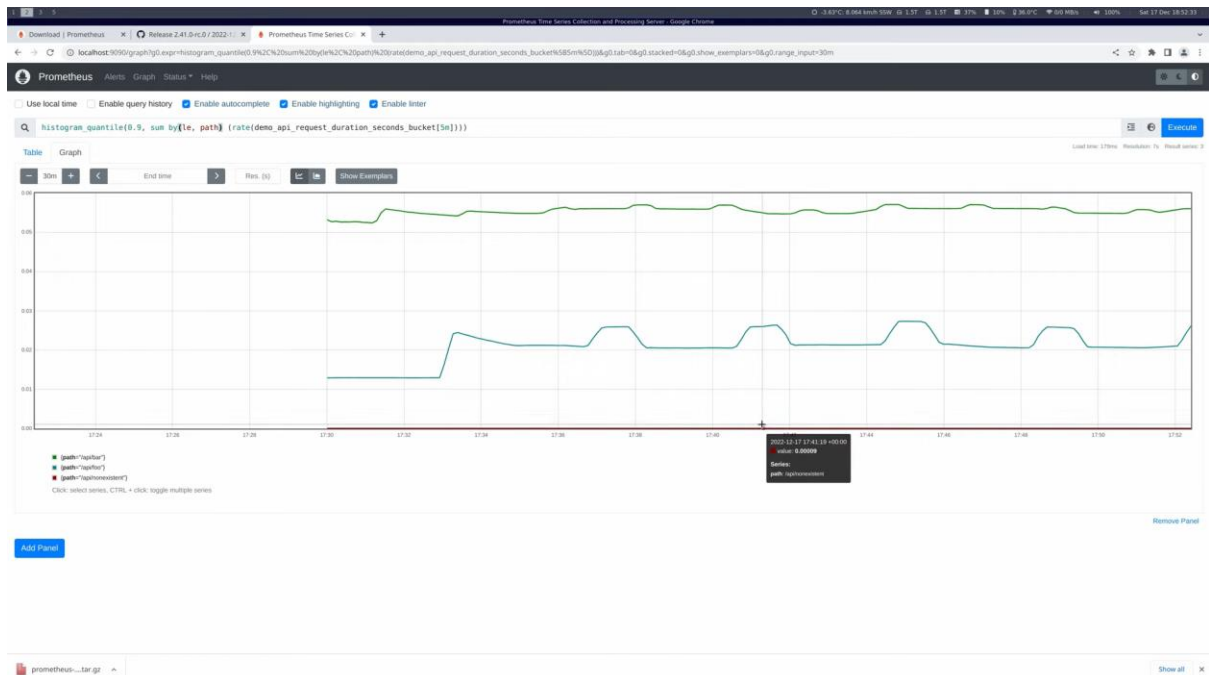
Add Panel

prometheus--tar.gz

Show all



DevOps Lab/Even Sem 2023-23/Experiment 1



Result and Discussion :

Using Prometheus has provided valuable insights into monitoring and managing the performance of systems. It offers a robust platform for collecting and storing metrics, enabling real-time visibility into various aspects of applications and infrastructure.