😊 Installing Prometheus

In the context of DevOps, Prometheus is an open-source monitoring and alerting toolkit originally built at SoundCloud. It is now a standalone open-source project and part of the Cloud Native Computing Foundation (CNCF).

Prometheus is designed for reliability, scalability, and the collection of metrics from various systems. It gathers metrics from instrumented jobs, stores them efficiently, and allows querying the metrics via a powerful PromQL language. It can also trigger alerts based on predefined conditions, helping to detect and mitigate issues in real-time.

Prometheus is often used in conjunction with other tools like Grafana for data visualization, Alertmanager for alert handling, and exporters for exposing metrics from third-party systems.

Overall, Prometheus plays a crucial role in the monitoring and observability aspects of DevOps, enabling teams to gain insights into the performance and health of their systems and applications.

😄 Use cases of Prometheus:

Prometheus has various use cases across different domains, including:

1. **Infrastructure Monitoring:** Prometheus can monitor the health and performance of servers, network devices, and other infrastructure components. It collects metrics such as CPU usage, memory usage, disk space, and network traffic, enabling administrators to identify bottlenecks and potential issues.
2. **Application Monitoring:** Developers can use Prometheus to monitor the performance and behavior of their applications. It can track metrics such as request latency, error rates, throughput, and resource utilization. This helps in identifying performance degradation, errors, and other anomalies.
3. **Microservices Monitoring:** In a microservices architecture, Prometheus can monitor each microservice individually as well as the interactions between them. It provides insights into the performance of individual services, dependencies, and overall system health.
4. **Container Monitoring:** Prometheus is well-suited for monitoring containerized environments such as Docker and Kubernetes. It can collect metrics from container orchestrators, container runtime environments, and individual containers. This allows operators to monitor resource usage, container health, and the performance of containerized applications.
5. **Cloud Monitoring:** Prometheus can be used to monitor cloud-based infrastructures and services. It can collect metrics from various cloud platforms, including AWS, Azure, and Google Cloud Platform, providing visibility into the performance and availability of cloud resources.
6. **Alerting and Incident Management:** Prometheus includes an alerting component called Alertmanager, which can trigger alerts based on predefined rules and

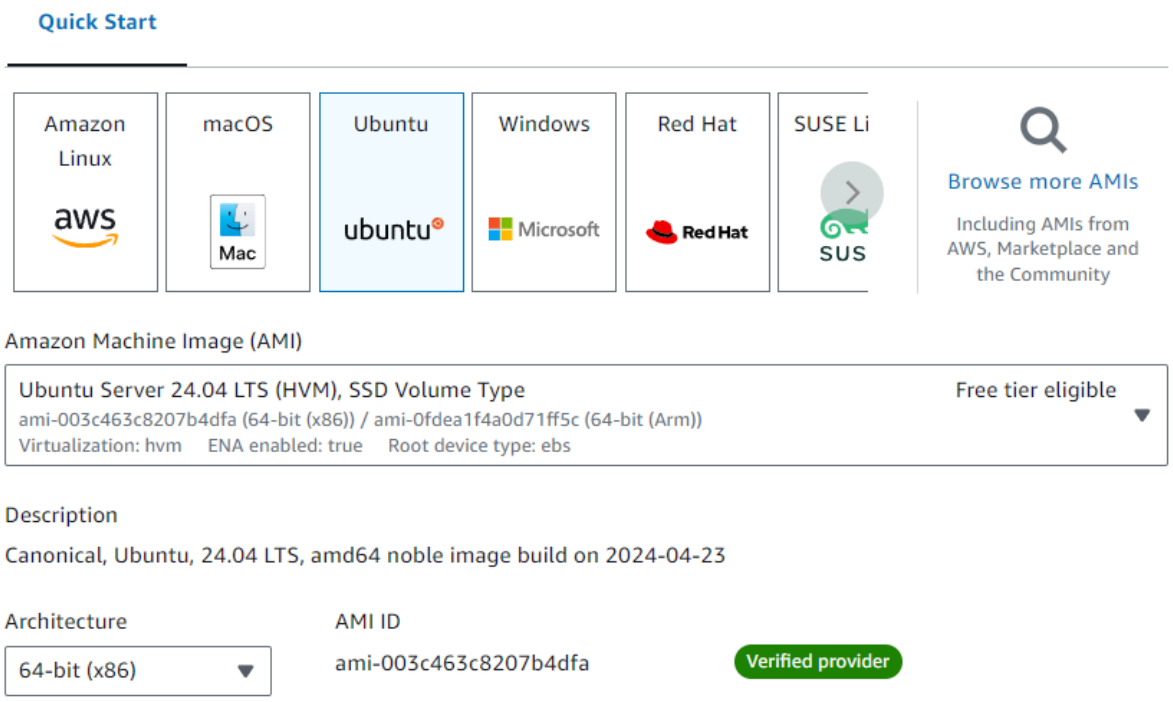
thresholds. This enables teams to proactively detect issues, notify stakeholders, and initiate incident response procedures.

7. **Capacity Planning:** By analyzing historical metrics collected by Prometheus, teams can perform capacity planning and resource allocation. This helps in scaling infrastructure and services according to demand, optimizing performance, and avoiding resource shortages.
8. **Performance Analysis and Troubleshooting:** Prometheus provides powerful querying capabilities with PromQL, allowing users to analyze metrics, identify patterns, and troubleshoot performance issues. It facilitates root cause analysis and continuous improvement of systems and applications.

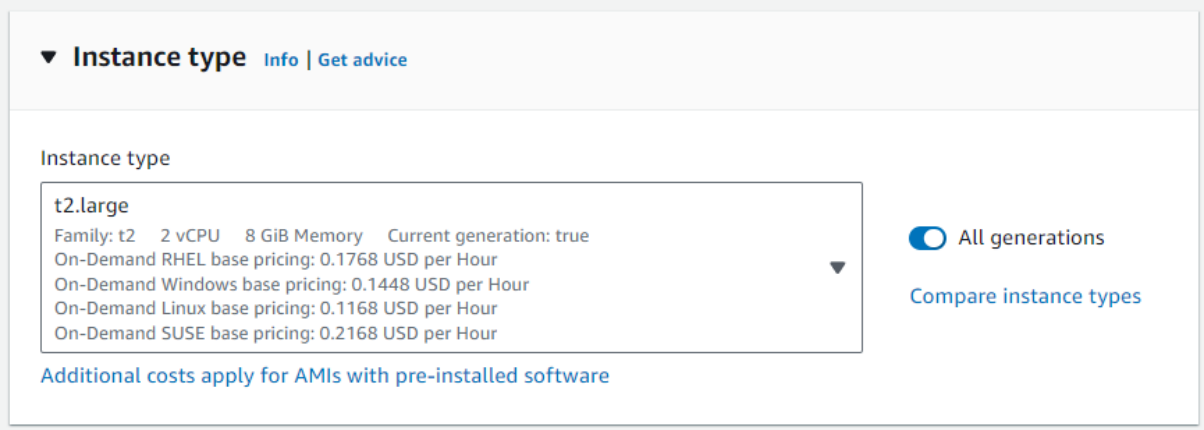
In this guide, we're installing Prometheus, an open-source monitoring and alerting toolkit, on an AWS instance running Ubuntu. The end goal is to set up a monitoring system that can collect metrics from various systems and applications, allowing us to gain insights into their performance and health. By following the steps outlined in the guide, we'll have Prometheus up and running, configured to collect metrics and accessible via a web interface for monitoring and analysis.

😄 To begin with the Lab:

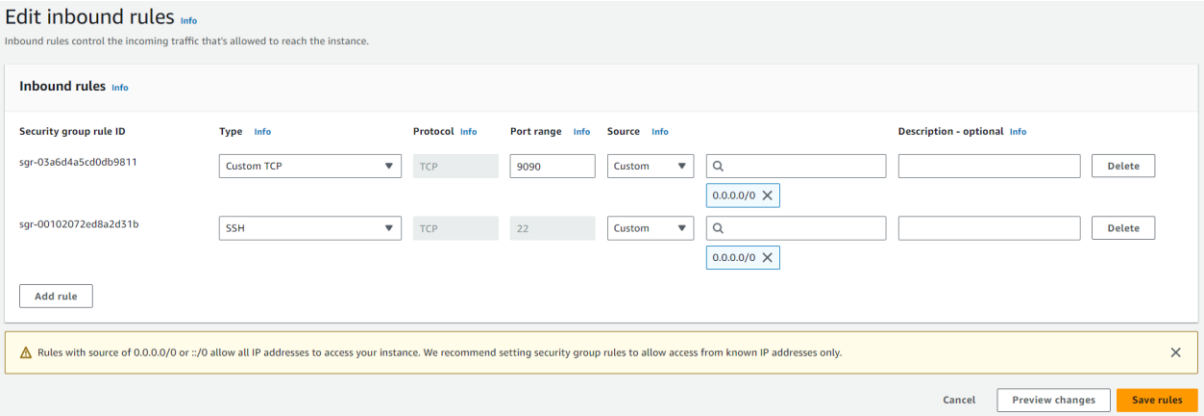
1. Login to your AWS Console and create an instance with Ubuntu as your operating system.



2. Then choose the instance type as t2.large. After that choose your key pair or create a new one.



3. After that just create your instance.
4. Once your instance is created then go to its security group and add an inbound rule for port 9090 from everywhere because Prometheus listens on this port. Then click on save rules.



5. Then connect your instance via SSH and run the update command.

   sudo apt-get update
6. Then you need to go to the official page of Prometheus and copy the download link address. You can use the below link to go there.

   https://prometheus.io/download/
7. On the download page choose your operating system as Linux and architecture as amd64.

8. Then you will see the download links you can choose of them just right click on the link and choose copy link address option.

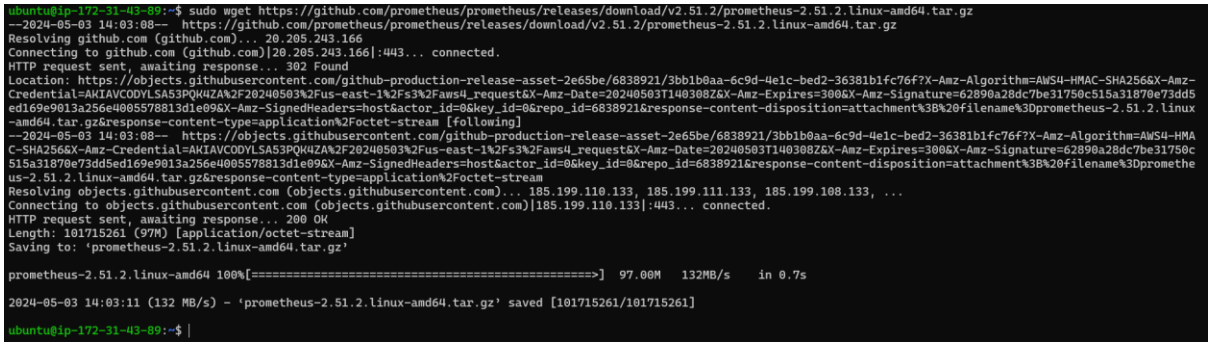
prometheus

The Prometheus monitoring system and time series database. prometheus/prometheus

2.52.0-rc.0 / 2024-04-22 Pre-release Release notes				
File name	**OS**	**Arch**	**Size**	**SHA256 Checksum**
prometheus-2.52.0-rc.0.linux-amd64.tar.gz	linux	amd64	99.81 MiB	3e90367fc502ca8c228cf8228c3f953f8d892f15a0e7c0f7184d6ec63bf9fe41
2.51.2 / 2024-04-09 Release notes				
File name	**OS**	**Arch**	**Size**	**SHA256 Checksum**
prometheus-2.51.2.linux-amd64.tar.gz	linux	amd64	97.00 MiB	9bec7432fb92d80fdc193a0154f6c53653c37f8302528b06d63cf4a10a8b897f
2.45.5 / 2024-05-02 LTS Release notes				
File name	**OS**	**Arch**	**Size**	**SHA256 Checksum**
prometheus-2.45.5.linux-amd64.tar.gz	linux	amd64	88.39 MiB	65a61cec978eb44a2a220803a4653e6f1f2dbe69510131a867492981ef39f253

9. Now you have to use the below command and the file will be downloaded on your VM.

   sudo wget https://github.com/prometheus/prometheus/releases/download/v2.51.2/prometheus-2.51.2.linux-amd64.tar.gz



10. After that you have to create a group and user for Prometheus because it need that to run.
11. To do so you need to run the below commands.

    sudo groupadd --system prometheus
    sudo useradd -s /sbin/nologin --system -g prometheus prometheus
    sudo mkdir /var/lib/prometheus
    sudo mkdir -p /etc/prometheus/rules
    sudo mkdir -p /etc/prometheus/rules.s
    sudo mkdir -p /etc/prometheus/files_sd

```
ubuntu@ip-172-31-43-89:~$ sudo groupadd --system prometheus
sudo useradd -s /sbin/nologin --system -g prometheus prometheus
sudo mkdir /var/lib/prometheus
sudo mkdir -p /etc/prometheus/rules
sudo mkdir -p /etc/prometheus/rules.s
sudo mkdir -p /etc/prometheus/files_sd
ubuntu@ip-172-31-43-89:~$
```

12. Then if we do a listing of objects in our home directory then we can see that we have Prometheus downloaded but not unzipped. So, to unzip it we will use this command.
13. Below you can see that our file has been unzipped.

    sudo tar xvf prometheus-2.51.2.linux-amd64.tar.gz

```
ubuntu@ip-172-31-43-89:~$ ls
prometheus-2.51.2.linux-amd64.tar.gz
ubuntu@ip-172-31-43-89:~$ sudo tar xvf prometheus-2.51.2.linux-amd64.tar.gz
prometheus-2.51.2.linux-amd64/
prometheus-2.51.2.linux-amd64/console_libraries/
prometheus-2.51.2.linux-amd64/console_libraries/menu.lib
prometheus-2.51.2.linux-amd64/console_libraries/prom.lib
prometheus-2.51.2.linux-amd64/promtool
prometheus-2.51.2.linux-amd64/NOTICE
prometheus-2.51.2.linux-amd64/LICENSE
prometheus-2.51.2.linux-amd64/consoles/
prometheus-2.51.2.linux-amd64/consoles/node-disk.html
prometheus-2.51.2.linux-amd64/consoles/index.html.example
prometheus-2.51.2.linux-amd64/consoles/node-overview.html
prometheus-2.51.2.linux-amd64/consoles/node.html
prometheus-2.51.2.linux-amd64/consoles/node-cpu.html
prometheus-2.51.2.linux-amd64/consoles/prometheus-overview.html
prometheus-2.51.2.linux-amd64/consoles/prometheus.html
prometheus-2.51.2.linux-amd64/prometheus.yml
prometheus-2.51.2.linux-amd64/prometheus
ubuntu@ip-172-31-43-89:~$
```

14. Now if you do a listing of objects then you will two files. The file in red color is unzipped and the file in the blue color is unzipped.

```
ubuntu@ip-172-31-43-89:~$ ls
prometheus-2.51.2.linux-amd64  prometheus-2.51.2.linux-amd64.tar.gz
ubuntu@ip-172-31-43-89:~$
```

15. Now we need to go inside of the unzipped file.

    cd prometheus-2.51.2.linux-amd64

16. Now if you do a listing of objects in that file you will see the objects.

```
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ ls
LICENSE  NOTICE  console_libraries  consoles  prometheus  prometheus.yml  promtool
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$
```

17. Then use the below command to move a certain file to user local bin. So, it could be accessible.

    sudo mv prometheus promtool /usr/local/bin/
18. Below you can see that we can see the version of our Prometheus by moving that file.

```
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo mv prometheus promtool /usr/local/bin/
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ prometheus --version
prometheus, version 2.51.2 (branch: HEAD, revision: b4c0ab52c3e9b940ab803581ddae9b3d9a452337)
  build user:       root@b63f02a423d9
  build date:       20240410-14:05:54
  go version:       go1.22.2
  platform:         linux/amd64
  tags:             netgo,builtinassets,stringlabels
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$
```

19. Now we are going to move configuration file to root of Prometheus folder using the below command.

    sudo mv prometheus.yml /etc/prometheus/prometheus.yml
20. Now we need to create a service file so that this Prometheus can be executed when the server is started.

```
[Unit]
Description=Prometheus
Documentation=https://prometheus.io/docs/introduction/overview/
Wants=network-online.target
After=network-online.target

[Service]
Type=simple
User=prometheus
Group=prometheus
ExecReload=/bin/kill -HUP $MAINPID
ExecStart=/usr/local/bin/prometheus \
  --config.file=/etc/prometheus/prometheus.yml \
  --storage.tsdb.path=/var/lib/prometheus \
  --web.console.templates=/etc/prometheus/consoles \
  --web.console.libraries=/etc/prometheus/console_libraries \
  --web.listen-address=0.0.0.0:9090 \
  --web.external-url=

SyslogIdentifier=prometheus
Restart=always

[Install]
WantedBy=multi-user.target
EOF
```

21. To do that we need to use the below command and then paste the contents shown above in it. Below you can see that we created our service file.
22. You can get this file from GitHub.

```
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo mv prometheus.yml /etc/prometheus/prometheus.yml
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo tee /etc/systemd/system/prometheus.service<<EOF
> [Unit]
Description=Prometheus
Documentation=https://prometheus.io/docs/introduction/overview/
Wants=network-online.target
After=network-online.target

[Service]
Type=simple
User=prometheus
Group=prometheus
ExecReload=/bin/kill -HUP $MAINPID
ExecStart=/usr/local/bin/prometheus \
  --config.file=/etc/prometheus/prometheus.yml \
  --storage.tsdb.path=/var/lib/prometheus \
  --web.console.templates=/etc/prometheus/consoles \
  --web.console.libraries=/etc/prometheus/console_libraries \
  --web.listen-address=0.0.0.0:9090 \
  --web.external-url=

SyslogIdentifier=prometheus
Restart=always

[Install]
WantedBy=multi-user.target
EOF
[Unit]
Description=Prometheus
Documentation=https://prometheus.io/docs/introduction/overview/
Wants=network-online.target
After=network-online.target

[Service]
Type=simple
User=prometheus
Group=prometheus
ExecReload=/bin/kill -HUP
ExecStart=/usr/local/bin/prometheus   --config.file=/etc/prometheus/prometheus.yml   --storage.tsdb.path=/var/lib/prometheus   --web.console.templates=/etc/prometheus/consoles   --web.console.libraries=/etc/prometheus/console_libraries   --web.listen-address=0.0.0.0:9090   --web.external-url=

SyslogIdentifier=prometheus
Restart=always

[Install]
WantedBy=multi-user.target
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$
```

23. We are almost on the last step, here we just need to make Prometheus the owner of all folders and file. You need to use the below commands to do that.

    sudo chown -R prometheus:prometheus /etc/prometheus
    sudo chown -R prometheus:prometheus /etc/prometheus/*

    sudo chmod -R 775 /etc/prometheus
    sudo chmod -R 775 /etc/prometheus/*

    sudo chown -R prometheus:prometheus /var/lib/prometheus/

```
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo chown -R prometheus:prometheus /etc/Prometheus
chown: cannot access '/etc/Prometheus': No such file or directory
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo chown -R prometheus:prometheus /etc/prometheus
sudo chown -R prometheus:prometheus /etc/prometheus/*
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo chmod -R 775 /etc/prometheus
sudo chmod -R 775 /etc/prometheus/*
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo chown -R prometheus:prometheus /var/lib/prometheus/
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$
```

24. Now we just need to start the service. For that use the below commands.

    sudo systemctl daemon-reload

    sudo systemctl start prometheus

    sudo systemctl enable prometheus

25. Here you can see that we have started the service.

```
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo systemctl daemon-reload
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo systemctl start prometheus
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ sudo systemctl enable prometheus
Created symlink /etc/systemd/system/multi-user.target.wants/prometheus.service → /etc/systemd/system/prometheus.service.
ubuntu@ip-172-31-43-89:~/prometheus-2.51.2.linux-amd64$ systemctl status prometheus
● prometheus.service - Prometheus
     Loaded: loaded (/etc/systemd/system/prometheus.service; enabled; preset: enabled)
     Active: active (running) since Fri 2024-05-03 14:27:06 UTC; 20s ago
       Docs: https://prometheus.io/docs/introduction/overview/
   Main PID: 1678 (prometheus)
      Tasks: 8 (limit: 9507)
     Memory: 17.7M (peak: 17.9M)
        CPU: 79ms
     CGroup: /system.slice/prometheus.service
             └─1678 /usr/local/bin/prometheus --config.file=/etc/prometheus/prometheus.yml --storage.tsdb.path=/var/lib/prometheus
```

26. Now we need to go to the browser and copy the public IP address of our instance and it in a new tab with port 9090 appended.
27. Below you can see that we are able to see our webpage for Prometheus.