Ubuntu VirtualBox VM Monitoring with Prometheus and Grafana

Overview

This project demonstrates how to set up a virtual Ubuntu system using VirtualBox and monitor its performance using Prometheus and Grafana. It is intended for educational purposes related to understanding Linux system internals, virtualization, and basic observability tools.

Requirements

- VirtualBox (6.x or later)
- Ubuntu 20.04 or 22.04 ISO
- Prometheus
- Node Exporter
- Grafana

Virtual Machine Setup

1. Open VirtualBox and click "New".
2. Use the following settings:
    - Name: **`Ubuntu_VM_A3`**
    - Type: Linux
    - Version: Ubuntu (64-bit)
    - RAM: 2048 MB
    - Processor: 2 CPUs
    - Video Memory: 64 MB
    - Graphics Controller: VBoxVGA
3. Create a 25 GB virtual hard disk (VDI).
4. Mount the Ubuntu ISO in the Optical Drive.
5. Boot and install Ubuntu normally.

Post-Installation Configuration

After Ubuntu installation, update the system:

```
sudo apt update && sudo apt upgrade -y
sudo apt install wget curl net-tools -y
```

Installing Prometheus

1. Create a Prometheus user

```
sudo useradd --no-create-home --shell /bin/false prometheus
```

2. Download and extract Prometheus

```
wget
https://github.com/prometheus/prometheus/releases/latest/download/prometheus-*.tar.gz
tar xvf prometheus-*.tar.gz
```

3. Move binaries and config files

```
sudo mv prometheus-* /etc/prometheus
sudo mv /etc/prometheus/prometheus /usr/local/bin/
```

4. Create the systemd service file

Create the file `/etc/systemd/system/prometheus.service`:

```
[Unit]
Description=Prometheus Monitoring
After=network.target

[Service]
User=prometheus
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
Restart=always

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

5. Enable and start Prometheus

```
sudo systemctl daemon-reexec
sudo systemctl enable prometheus
sudo systemctl start prometheus
```

Access Prometheus at: **`http://localhost:9090`**

Installing Node Exporter

1. Download and run Node Exporter

```
wget
https://github.com/prometheus/node_exporter/releases/latest/download/node_exporter-*.
tar.gz
tar xvf node_exporter-*.tar.gz
cd node_exporter-*/
./node_exporter
```

2. Add Node Exporter to Prometheus config

Edit `/etc/prometheus/prometheus.yml`:

```
scrape_configs:
  - job_name: 'node'
    static_configs:
      - targets: ['localhost:9100']
```

Restart Prometheus:

```
sudo systemctl restart prometheus
```

Installing Grafana

```
sudo apt install -y software-properties-common
sudo add-apt-repository "deb https://packages.grafana.com/oss/deb stable main"
wget -q -O - https://packages.grafana.com/gpg.key | sudo apt-key add -
sudo apt update
sudo apt install grafana
```

Enable and start Grafana:

```
sudo systemctl enable grafana-server
sudo systemctl start grafana-server
```

Access Grafana at: `http://localhost:3000` Default login:

- Username: `admin`
- Password: `admin`

Folder Structure

project/

```
├── README.md
├── prometheus/
│   └── prometheus.yml
├── screenshots/
│   ├── vm-settings.png
│   ├── prometheus-ui.png
│   ├── grafana-dashboard.png
│   └── node-exporter.png
```

Troubleshooting

VirtualBox Guru Meditation

- Set graphics controller to **`VBoxVGA`**
- Increase video memory to at least 64 MB
- Disable EFI in VM settings → System → Motherboard

Prometheus Target Not Detected

- Ensure **`localhost:9100`** is listed in **`prometheus.yml`**
- Confirm Node Exporter is running on port 9100

Grafana Not Loading

- Check Grafana status:

`sudo systemctl status grafana-server`

- Confirm port 3000 is open and accessible

References

- https://prometheus.io/docs/
- https://grafana.com/docs/
- https://github.com/prometheus/node_exporter
- https://ubuntu.com/download

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