DA5402 - Assignment 6

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Overview

This project is a **Prometheus metrics exporter** that collects and exposes system performance metrics, including:

- **Disk I/O Statistics** (Read/Write rates, TPS, Bytes/sec)
- **CPU Utilization** (User, System, Idle, IOWait, etc.)
- **Memory Usage** (Data extracted from `/proc/meminfo`)

The script runs on **Linux** and utilizes the `iostat` command for disk and CPU statistics.

Features

- Collects real-time **disk I/O, CPU, and memory metrics**
- Exposes metrics via **Prometheus HTTP server** (default **port: 18000**)
- Logs errors and important events to **logs.log**
- **Gracefully exits** after a set duration or when interrupted (`Ctrl+C`) in the terminal.

Requirements

- **Linux system -** Ubuntu preferred
- Python **3.12+**
- `iostat` (from `sysstat` package)
- Prometheus Client Library

System set-up

Get the working directory set-up to run the project by:

```
git clone https://github.com/Nikshay-Jain/DA5402-Assign-6.git
cd ./DA5402-Assign-6
```

This project can be executed only in `Linux` environment, so `Windows` users can make use of WSL by starting an Ubuntu terminal by:

```
wsl -d Ubuntu
```

Setup a virtual environment for this project by:

```
python3 -m venv venv
source venv/bin/activate
```

Get prometheus folder installed in the `DA5402-Assign-6` directory for the system to work.

Then, move the `prometheus.yml` inside the prometheus-linux folder by:

```
mv prometheus.yml prometheus-2.45.0.linux-amd64/
```

Install Dependencies

Execute the following commands in the terminal

```
sudo apt install sysstat
pip install prometheus_client
```

Usage (Tasks 1,2,3)

Run the Python script & activate prometheus

*Note: The script runs for **360 seconds** by default. Modify `run_duration` inside the script to change this.*

```
python3 main.py
```

In another Ubuntu terminal, execute:

```
cd prometheus-2.45.0.linux-amd64/
sudo ./prometheus --config.file=prometheus.yml
```

Access Metrics

Once the script is running, you can fetch the metrics for `task 1 & 2` via:

```
http://localhost:18000/metrics
```

A sample output for the same is attached here: Output from localhost:18000

For `task 3`, prometheus UI can b accessed by

```
http://localhost:9090/
```

A sample output for the same is attached here: Output from localhost:9090

Exposed Metrics

Disk I/O Metrics

Metric	Description
`io_read_rate{device="sda"}`	Disk read rate (transfers/sec)
`io_write_rate{device="sda"}`	Disk write rate (transfers/sec)
`io_tps{device="sda"}`	Total disk transfers/sec
`io_read_bytes{device="sda"}`	Disk read rate in bytes/sec
`io_write_bytes{device="sda"}`	Disk write rate in bytes/sec

CPU Usage Metrics

Metric	Description
`cpu_avg_percent{mode="user"}`	CPU % in user mode
`cpu_avg_percent{mode="system"}`	CPU % in system mode
`cpu_avg_percent{mode="idle"}`	CPU % in idle state
`cpu_avg_percent{mode="iowait"}`	CPU % waiting for I/O
...	

Memory Usage Metrics

Metric	Description
meminfo_memtotal	Total system memory
meminfo_memfree	Free system memory
meminfo_buffers	Memory used for buffers
meminfo_cached	Cached memory
…	

Logging

Logs are stored in the file named `logs.log`, providing:

- Start/Stop events
- Errors (e.g., `iostat` missing)
- Unexpected metric formats

Graceful Shutdown

- **Auto-stops after 360 seconds** (configurable via `run_duration` in main.py)
- Supports **manual exit via Ctrl+C** in the terminal.

Troubleshooting

`FileNotFoundError: [Errno 2] No such file or directory: '/proc/meminfo'`

Solution: The script is designed for Linux. `/proc/meminfo` is unavailable on Windows.

So, `Linux system` or `WSL` is mandatory for this project.

`iostat: command not found`

Solution: Install `sysstat`:

```
sudo apt install sysstat  # Debian/Ubuntu
sudo yum install sysstat  # RHEL/CentOS
```

Closing Note

For any other error, the logs can be referred to debug.