

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 from the same can be seen in 18000-metrics.pdf file.

For task 3 , prometheus UI can b accessed by

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

A sample output from the same can be seen in 9090-graphs.pdf file.

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.