System Programming Project

System Monitoring Dashboard

Outline

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Introduction

System monitoring systems can be challenging due to the lack of user-friendly tools that provide comprehensive insights into system performance and resource utilization.

This project addresses the need for an easy-to-use tool that provides real-time insights into system performance, resource utilization, and other critical metrics. The dashboard will be designed to assist system administrators, DevOps engineers, and other users in efficiently managing and troubleshooting systems directly from app.

Objective

- Collect and display real-time data of system metrics.
- Provide visualizations such as charts, graphs, and tables.
- Implement alerts and notifications to notify users about critical system events or threshold breaches.
- Support customization options to allow users to configure monitoring preferences and dashboard layouts according to their needs.

Technology Platform

Developing language: Python 3

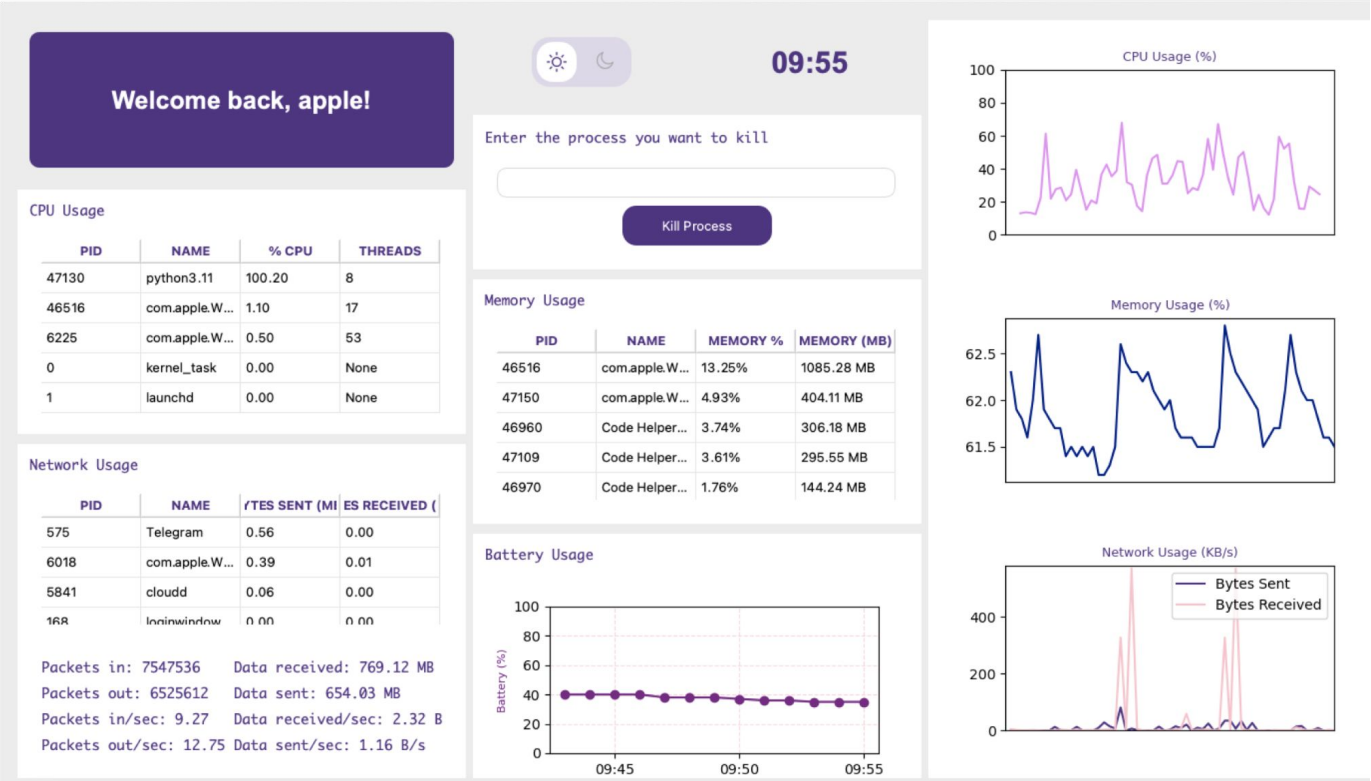
GUI: PyQT

User Interface Language: CSS

Methodology

- Conducting research on relevant technologies and tools for CLI dashboard development.
- Designing the system architecture.
- Implementing frontend and backend components in parallel, with continuous integration and testing.
- Iteratively refining the dashboard interface based on user feedback and usability testing.
- Conducting thorough testing and optimization to ensure the dashboard meets performance and reliability requirements.

Snapshots


Welcome back, apple!
09:55
Enter the process you want to kill
Kill Process
CPU Usage
PID NAME % CPU THREADS
47130 python3.11 100.20 8
46516 com.apple.W... 1.10 17
6225 com.apple.W... 0.50 53
0 kernel_task 0.00 None
1 launchd 0.00 None
Network Usage
PID NAME /TES SENT (MI ES RECEIVED (
575 Telegram 0.56 0.00
6018 com.apple.W... 0.39 0.01
5841 cloudd 0.06 0.00
Packets in: 7547536 Data received: 769.12 MB
Packets out: 6525612 Data sent: 654.03 MB
Packets in/sec: 9.27 Data received/sec: 2.32 B
Packets out/sec: 12.75 Data sent/sec: 1.16 B/s
Memory Usage
PID NAME MEMORY % MEMORY (MB)
46516 com.apple.W... 13.25% 1085.28 MB
47150 com.apple.W... 4.93% 404.11 MB
46960 Code Helper... 3.74% 306.18 MB
47109 Code Helper... 3.61% 295.55 MB
46970 Code Helper... 1.76% 144.24 MB
Battery Usage
Battery (%)
09:45
09:50
09:55
CPU Usage (%)
Memory Usage (%)
Network Usage (KB/s)
Bytes Sent
Bytes Received

Snapshots (continued)

CPU Usage

PID	NAME	% CPU	THREADS
45698	python3.11	99.80	5
17351	Code Helper	2.20	17
6225	com.apple.W...	0.60	35
0	kernel_task	0.00	None
1	launchd	0.00	None

CPU usage table contains the information about the top five CPU-consuming processes currently running on the system.

PID: process id

Name: the name of the process

%CPU: the percentage of CPU utilization by each process

Threads: Number of threads associated with each process

Snapshots (continued)

Network Usage

PID	NAME	YTES SENT (MI	ES RECEIVED (
80446	Telegram	0.34	0.00
81458	TabNine	0.17	0.15
77825	TabNine-...	0.09	0.11
81296	Code Helper	0.11	0.00
77828	vdb	0.06	0.06

```
Packets in: 8791082     Data received: 1828.86 MB
Packets out: 5973987    Data sent: 1080.37 MB
Packets in/sec: 55.90   Data received/sec: 10.55
Packets out/sec: 41.13 Data sent/sec: 13.71 B/s
```

Network usage table displays the information about the top 5 network-consuming processes running on the system.

Bytes Sent (MB):total number of bytes sent by each process over the network, represented in megabytes (MB)

Bytes Received (MB): total number of bytes received by each process over the network, represented in megabytes (MB).

Snapshots (continued)

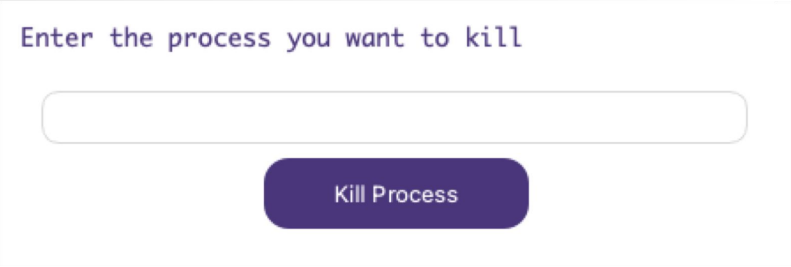
Memory Usage

PID	NAME	MEMORY %	MEMORY (MB)
44652	com.apple.W...	10.96%	897.57 MB
34573	com.apple.W...	9.15%	749.76 MB
45878	com.apple.W...	3.08%	252.65 MB
45451	Code Helper...	2.20%	180.00 MB
45875	com.apple.W...	2.00%	163.88 MB

Memory usage table provides information about the top 5 memory-consuming processes running on the system.

Memory %: displays the percentage of memory usage by each process.
Memory (MB): column displays the amount of memory consumed by each process, represented in megabytes (MB).

Snapshots (continued)

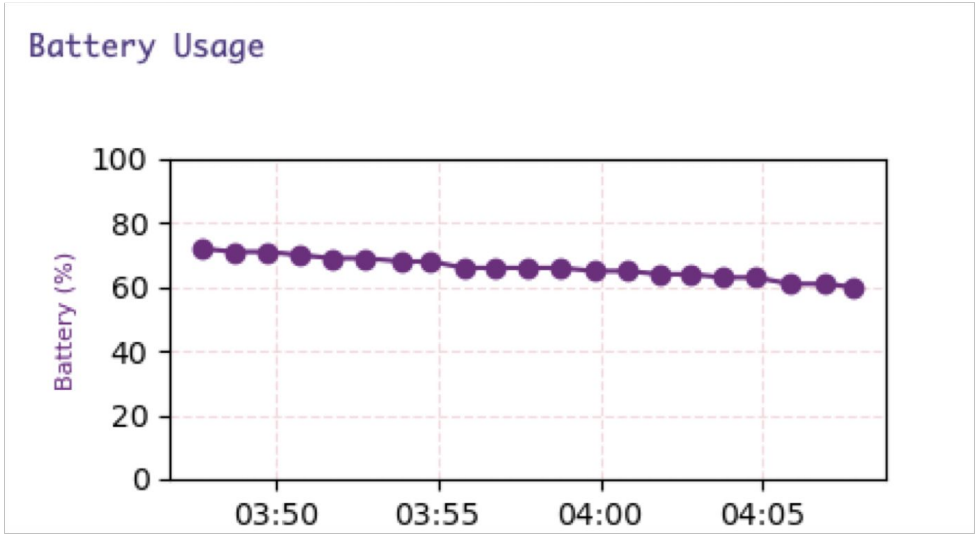


terminates the process using SIGTERM based on the provided process id

witches dark and light modes

Clock widget

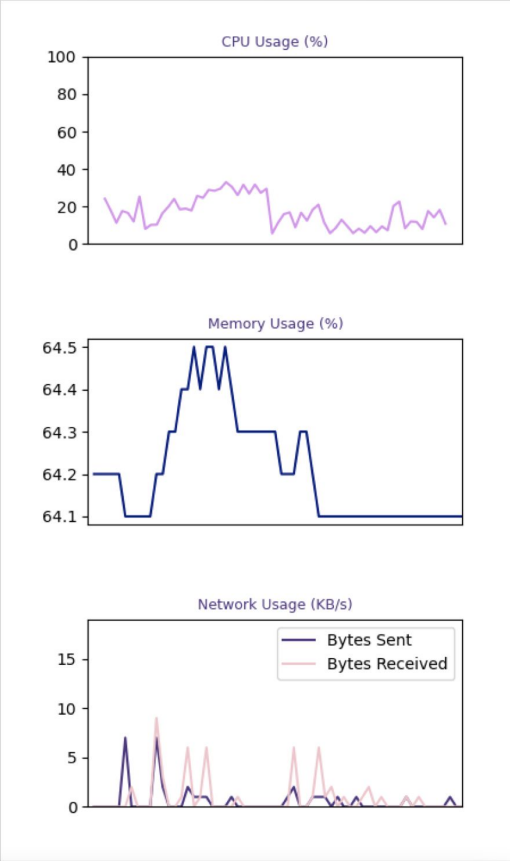
Snapshots (continued)



Real-time plot of battery level

Snapshots (continued)

Real time plots of cpu, memory and network usages that update every second and show data within a minute



Resource list

- https://github.com/aksakalli/gtop?tab=readme-ov-file
- https://dribbble.com/shots/16331784-IAAS-Dashboard
- https://www.datapine.com/blog/monitoring-dashboard-templates/
- https://medium.com/devops-dudes/monitoring-how-to-build-your-monitoring-dashboards-e11f89918dd1
- https://psutil.readthedocs.io/en/latest/
- https://doc.qt.io/qtforpython-6/

THANK YOU FOR LISTENING!

Q&A