Real-time resource monitor for Linux

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Problem Statement

- To create a user interactive application for Linux that will monitor
  - CPU usage
  - Memory utilization
  - I/O devices status
  - Disk usage
  - Process
  - Network monitoring & Hardware information

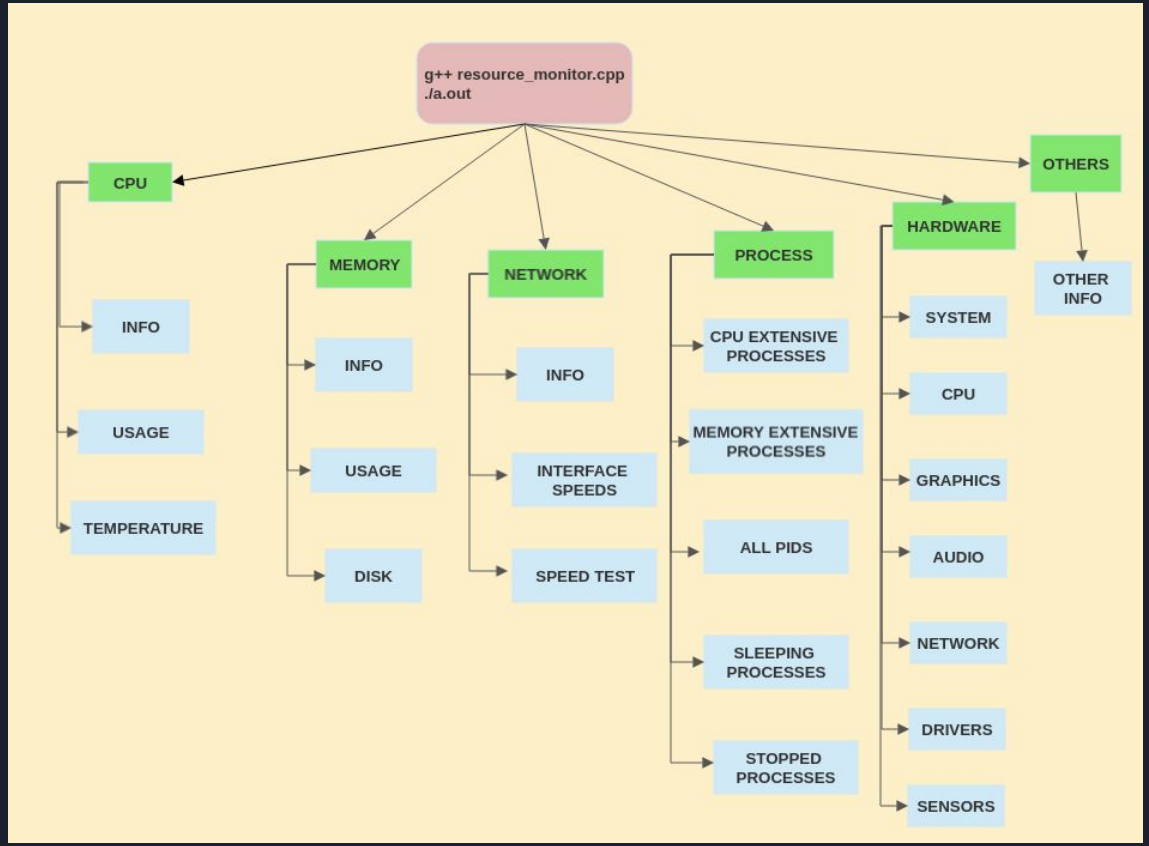
Methodology

- We have implemented our program in C++ with the help of commands that are available in the linux and a python library “psutil” .
- The program is user interactive and provides the user all the steps that they can take.
- On the first window, there are options for CPU, Memory, Network, Process, Hardware, and Others. Each functionality has its sub-functionalities. CPU window has options like Info, Usage and Temperature.
- Hardware has its sub-functionalities as System information, CPU, Graphics, Sensors, Drivers, Network.
- All these functionalities have separate scripts for their execution, some of them are in python and some in the form of linux internal commands.
- For execution of the script we have used the exec classes of functions, specially execvp as we have eliminated the dependency of path of the scripts while running by using relative paths for the execution of the scripts.

- We have used fork for handling multiple processes during running of the program so that all the scripts can run in parallel and for the data sharing between different processes we have used pipe functionality.
- We have dupped the input and output to the pipe so that different processes can use each other's result.
- There are different folders for each of the scripts so that the code can be modular and we can add more functionalities in the future.
- We have also implemented the live utilization script for network speed, CPU utilization, Ram utilization.
- This was implemented using current utilization and proportionately matching the number of bars, so that utilized unit can be shown with the same no of units.

Outcomes

Flow Chart :-



Some of the snapshots of our user interactive program :-

- The live utilization is shown as :-

```
Real time CPU Usage :
CPU Usage: |************************************------------ | 76.30%
```

- The main window :-

```
Type help

1. CPU
2. Memory
3. Network
4. Process
5. Hardware
6. Other
Enter exit to close the program

Enter the command :
```

- CPU window :-

```
CPU

1. Info
2. Usage
3. Temperature
Enter back to go to previous window

Enter the command :
```

- Hardware Window :-

```
Hardware:

1. System
2. CPU
3. Graphics
4. Audio
5. Network
6. Drivers
7. Sensors
Enter back to go to previous window

Enter the command :
```

```
CPU:
  Info: quad core model: AMD Ryzen 5 4600H with Radeon Graphics bits: 64
    type: MCP cache: L2: 2 MiB
  Speed (MHz): avg: 2994 min/max: N/A cores: 1: 2994 2: 2994 3: 2994
    4: 2994
```

- Network speed implementation :-

```
Retrieving speedtest.net configuration...
Testing from Power Grid Corporation of India Limited (220.158.144.60)...
Retrieving speedtest.net server list...
Selecting best server based on ping...
Hosted by SDH Network P. Ltd. (New Delhi) [491.12 km]: 62.443 ms
Testing download speed................................................................................
Download: 32.66 Mbit/s
Testing upload speed..................................................................................
Upload: 37.42 Mbit/s
```

Lessons Learnt

- Learnt various user and kernel level resources available.
- How to execute scripts using exec functions
- How to synchronize the data of different processes together
- Came up with real time user interactive approach which will show the details as asked by the user.
- Implementation of keyboard interrupt.
- Learnt various python modules and linux commands which helped in accessing the resource information.

Thank You !