Report of Project

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INT301: Open Source Technologies

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https://github.com/techtheseus/INT301Project.git

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1. Introduction

1.1 Objective of the project

The objective of this project is to use open-source software to display an overview of all the hardware and operating system details and also perform live monitoring of the temperature and current usage of various hardware components.

1.2 Description of the project

The project involves using open-source software to provide a detailed overview of the hardware and operating system details of a target system. Additionally, it involves monitoring the temperature and current usage of various hardware components in real-time. The project aims to provide a comprehensive and accurate analysis of the system's performance to aid in troubleshooting and optimization.

1.3 Scope of the project

The project's scope includes the use of open-source software to collect and display system hardware and operating system information. It also includes the development of live monitoring capabilities for various hardware components such as CPU, GPU, RAM, and storage devices. The project's scope is limited to desktop and server environments running Linux or Windows operating systems.

2. System Description

2.1 Target system description

The target system for this project is a desktop or server environment running either Linux or Windows operating systems. The system should have various hardware components such as

CPU, GPU, RAM, and storage devices. The target system's specifications and capabilities should meet the minimum requirements for the open-source software used in the project.

2.2 Assumptions and Dependencies

The project assumes that the target system is properly configured and has the necessary drivers installed for the open-source software to collect and display hardware and operating system details. The project also assumes that the system is not experiencing any hardware failures or malfunctions.

2.3 Functional/Non-Functional Dependencies

The project depends on the availability of the open-source software used to collect and display system hardware and operating system information. It also depends on the availability of hardware monitoring software and tools to collect and display real-time data on hardware component temperature and current usage.

3. Analysis Report

3.1 System snapshots and full analysis report

To display hardware and operating system details, the project uses the "lshw" command. This command displays detailed information about the user system's hardware configuration. Installing the "lshw" package using the following command:

```
┌──(daredevil㉿daredevil)-[~]
└─$ sudo apt-get install lshw
[sudo] password for daredevil:
Reading package lists ... Done
Building dependency tree ... Done
Reading state information ... Done
lshw is already the newest version (02.19.git.2021.06.19.996aaad9c7-2+b1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

After installing the package, run the following command to display hardware and operating system details:

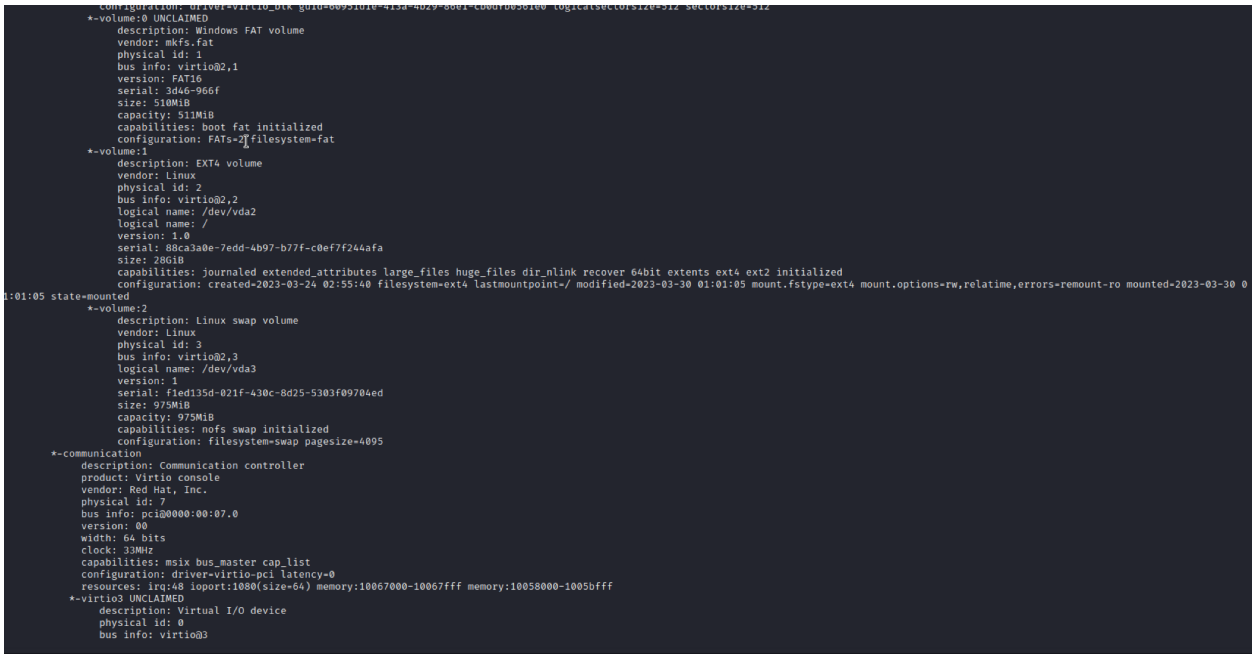
```
┌──(daredevil㉿daredevil)-[~]
└─$ sudo lshw
daredevil
    description: Computer
    product: QEMU Virtual Machine
    vendor: QEMU
    version: virt-7.2
    width: 64 bits
    capabilities: smbios-3.0.0 dmi-3.0.0 smp cp15_barrier swp tagged_addr_disabled
    configuration: boot=normal uuid=cb63c644-a0e8-4557-8497-a5da29d68197
  *-core
       description: Motherboard
       physical id: 0
     *-cpu
          description: CPU
          vendor: QEMU
          physical id: 400
          bus info: cpu@0
          version: virt-7.2
          slot: CPU 0
          size: 2GHz
          capacity: 2GHz
          configuration: cores=4 enabledcores=4 threads=1
     *-memory
          description: System Memory
          physical id: 1000
          size: 2GiB
          capacity: 2GiB
          capabilities: ecc
          configuration: errordetection=multi-bit-ecc
        *-bank
             description: DIMM RAM
             vendor: QEMU
             physical id: 0
             slot: DIMM 0
             size: 2GiB
     *-firmware
          description: BIOS
          vendor: EFI Development Kit II / OVMF
          physical id: 0
          version: 0.0.0
          date: 02/06/2015
          size: 96KiB
          capabilities: uefi virtualmachine
     *-pci
          description: Host bridge
          product: QEMU PCIe Host bridge
          vendor: Red Hat, Inc.
          physical id: 100
          bus info: pci@0000:00:00.0
          version: 00
          width: 32 bits
          clock: 33MHz
        *-network
             description: Ethernet controller
             product: Virtio network device
             vendor: Red Hat, Inc.
```

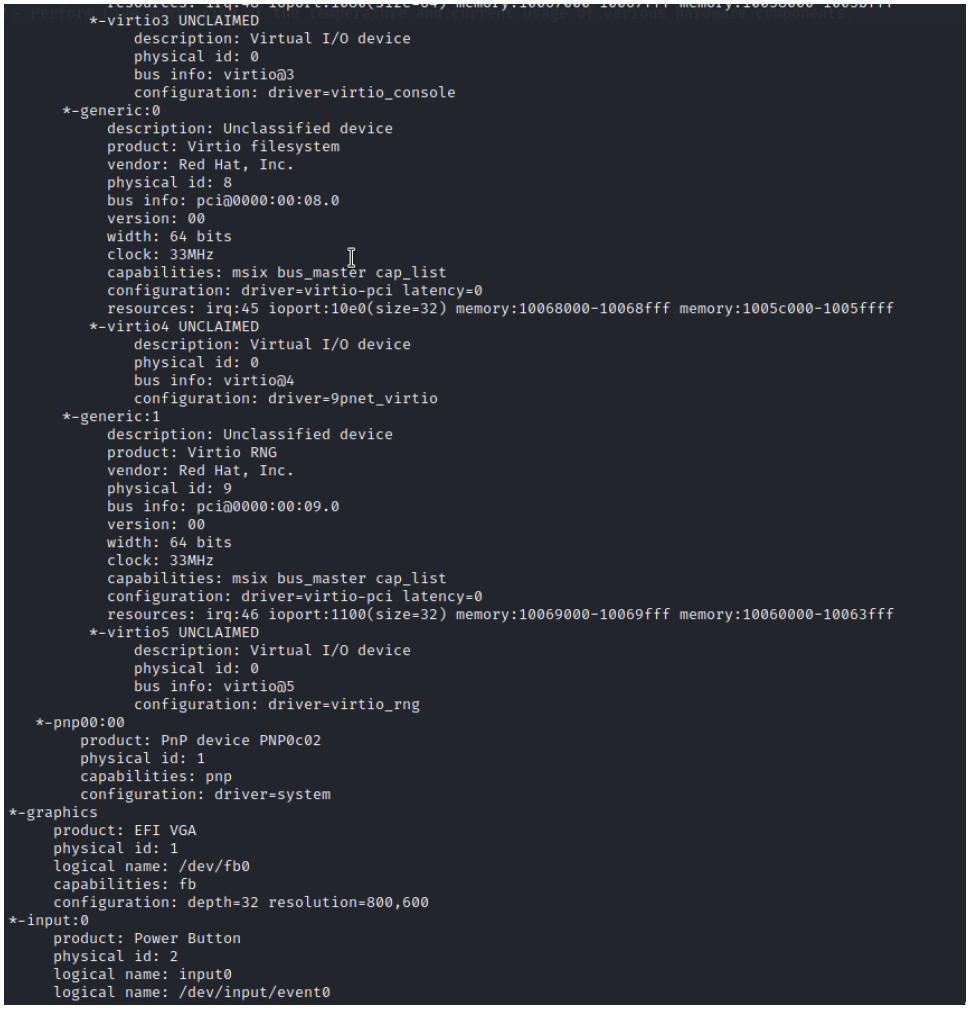
```
*-network
     description: Ethernet controller
     product: Virtio network device
     vendor: Red Hat, Inc.
     physical id: 1
     bus info: pci@0000:00:01.0
     version: 00
     width: 64 bits
     clock: 33MHz
     capabilities: msix bus_master cap_list rom
     configuration: driver=virtio-pci latency=0
     resources: irq:46 ioport:10c0(size=32) memory:10064000-10064fff memory:10040000-10043fff memory:10000000-1003ffff
   *-virtio0
        description: Ethernet interface
        physical id: 0
        bus info: virtio@0
        logical name: eth0
        serial: 76:47:09:5f:c8:bf
        capabilities: ethernet physical
        configuration: autonegotiation=off broadcast=yes driver=virtio_net driverversion=1.0.0 ip=192.168.64.5 link=yes multicast=yes
*-display
     description: Display controller
     product: Virtio GPU
     vendor: Red Hat, Inc.
     physical id: 2
     bus info: pci@0000:00:02.0
     logical name: /dev/fb1
     version: 01
     width: 64 bits
     clock: 33MHz
     capabilities: msix bus_master cap_list fb
     configuration: depth=32 driver=virtio-pci latency=0 resolution=1280,800
     resources: irq:47 memory:10065000-10065fff memory:10044000-10047fff
   *-virtio1 UNCLAIMED
        description: Virtual I/O device
        physical id: 0
        bus info: virtio@1
        configuration: driver=virtio_gpu
*-multimedia
     description: Audio device
     product: 82801FB/FBM/FR/FW/FRW (ICH6 Family) High Definition Audio Controller
     vendor: Intel Corporation
     physical id: 3
     bus info: pci@0000:00:03.0
     logical name: card0
     logical name: /dev/snd/controlC0
     logical name: /dev/snd/hwC0D0
     logical name: /dev/snd/pcmC0D0c
     logical name: /dev/snd/pcmC0D0p
     version: 01
     width: 32 bits
     clock: 33MHz
     capabilities: msi bus_master cap_list
     configuration: driver=snd_hda_intel latency=0
     resources: irq:78 memory:10048000-1004bfff
```

```
      resources: irq:78 memory:10048000-1004bfff
 *-usb:0
      description: USB controller
      product: uPD720200 USB 3.0 Host Controller
      vendor: NEC Corporation
      physical id: 4
      bus info: pci@0000:00:04.0
      version: 03
      width: 64 bits
      clock: 33MHz
      capabilities: msix pciexpress msi xhci bus_master cap_list
      configuration: driver=xhci_hcd latency=0
      resources: irq:45 memory:1004c000-1004ffff
    *-usbhost:0
         product: xHCI Host Controller
         vendor: Linux 6.1.0-kali5-arm64 xhci-hcd
         physical id: 0
         bus info: usb@1
         logical name: usb1
         version: 6.01
         capabilities: usb-2.00
         configuration: driver=hub slots=4 speed=480Mbit/s
       *-usb:0
            description: Human interface device
            product: QEMU QEMU USB Tablet
            vendor: QEMU
            physical id: 1
            bus info: usb@1:1
            logical name: input1
            logical name: /dev/input/event1
            logical name: /dev/input/mouse0
            version: 0.00
            serial: 28754-0000:00:04.0-1
            capabilities: usb-2.00 usb
            configuration: driver=usbhid maxpower=100mA speed=480Mbit/s
       *-usb:1
            description: Mouse
            product: QEMU QEMU USB Mouse
            vendor: QEMU
            physical id: 2
            bus info: usb@1:2
            logical name: input2
            logical name: /dev/input/event2
            logical name: /dev/input/mouse1
            version: 0.00
            serial: 89126-0000:00:04.0-2
            capabilities: usb-2.00 usb
            configuration: driver=usbhid maxpower=100mA speed=480Mbit/s
       *-usb:2
            description: Keyboard
            product: QEMU QEMU USB Keyboard
            vendor: QEMU
            physical id: 3
            bus info: usb@1:3
            logical name: input3
```

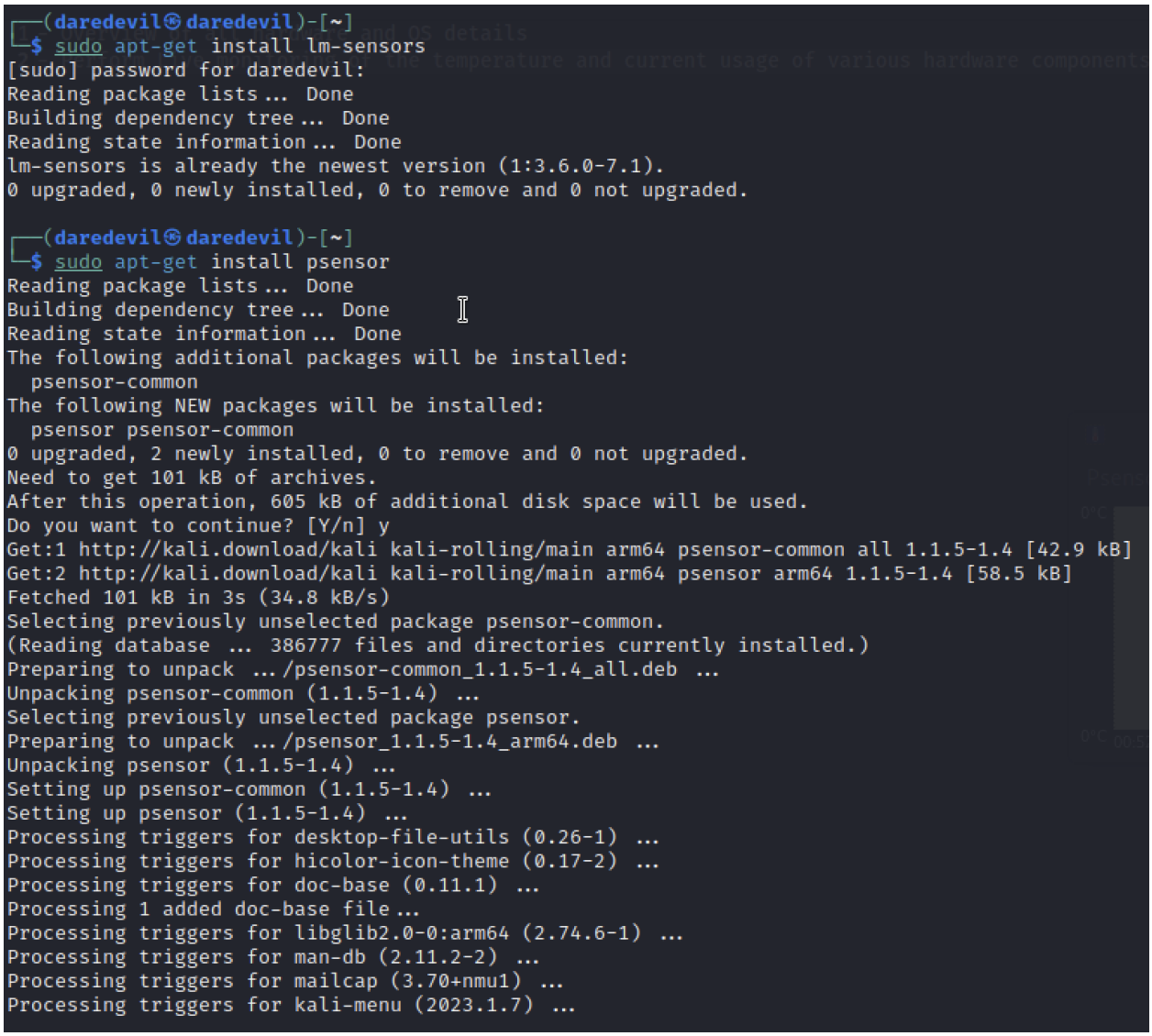
```
configuration: driver=usbhid maxpower=100mA speed=480Mbit/s
  *-usb:2
       description: Keyboard
       product: QEMU QEMU USB Keyboard
       vendor: QEMU
       physical id: 3
       bus info: usb@1:3
       logical name: input3
       logical name: /dev/input/event3
       logical name: input3::capslock
       logical name: input3::compose
       logical name: input3::kana
       logical name: input3::numlock
       logical name: input3::scrolllock
       version: 0.00
       serial: 68284-0000:00:04.0-3
       capabilities: usb-2.00 usb
       configuration: driver=usbhid maxpower=100mA speed=480Mbit/s
  *-usb:3
       description: USB hub
       product: QEMU USB Hub
       vendor: QEMU
       physical id: 4
       bus info: usb@1:4
       version: 1.01
       serial: 314159-0000:00:04.0-4
       capabilities: usb-1.10
       configuration: driver=hub slots=8 speed=12Mbit/s
     *-usb
          description: Mass storage device
          product: QEMU USB HARDDRIVE
          vendor: QEMU
          physical id: 1
          bus info: usb@1:4.1
          logical name: scsi0
          version: 0.00
          serial: 1-0000:00:04.0-4.1
          capabilities: usb-2.00 scsi emulated
          configuration: driver=usb-storage speed=12Mbit/s
        *-cdrom
             description: DVD reader
             product: QEMU CD-ROM
             vendor: QEMU
             physical id: 0.0.0
             bus info: scsi@0:0.0.0
             logical name: /dev/cdrom
             logical name: /dev/sr0
             version: 2.5+
             capabilities: removable audio dvd
             configuration: ansiversion=5 status=nodisc
*-usbhost:1
     product: xHCI Host Controller
     vendor: Linux 6.1.0-kali5-arm64 xhci-hcd
     physical id: 1
     bus info: usb@2
     logical name: usb2
```

```
        configuration: driver=hub slots=4 speed=5000Mbit/s
*-usb:1
     description: USB controller
     product: QEMU XHCI Host Controller
     vendor: Red Hat, Inc.
     physical id: 5
     bus info: pci@0000:00:05.0
     version: 01
     width: 64 bits
     clock: 33MHz
     capabilities: msix pciexpress xhci bus_master cap_list
     configuration: driver=xhci_hcd latency=0
     resources: irq:46 memory:10050000-10053fff
   *-usbhost:0
        product: xHCI Host Controller
        vendor: Linux 6.1.0-kali5-arm64 xhci-hcd
        physical id: 0
        bus info: usb@3
        logical name: usb3
        version: 6.01
        capabilities: usb-2.00
        configuration: driver=hub slots=4 speed=480Mbit/s
   *-usbhost:1
        product: xHCI Host Controller
        vendor: Linux 6.1.0-kali5-arm64 xhci-hcd
        physical id: 1
        bus info: usb@4
        logical name: usb4
        version: 6.01
        capabilities: usb-3.00
        configuration: driver=hub slots=4 speed=5000Mbit/s
*-scsi
     description: SCSI storage controller
     product: Virtio block device
     vendor: Red Hat, Inc.
     physical id: 6
     bus info: pci@0000:00:06.0
     version: 00
     width: 64 bits
     clock: 33MHz
     capabilities: scsi msix bus_master cap_list
     configuration: driver=virtio-pci latency=0
     resources: irq:47 ioport:1000(size=128) memory:10066000-10066fff memory:10054000-10057fff
   *-virtio2
        description: Virtual I/O device
        physical id: 0
        bus info: virtio@2
        logical name: /dev/vda
        size: 30GiB (32GB)
        capabilities: gpt-1.00 partitioned partitioned:gpt
        configuration: driver=virtio_blk guid=60951d1e-413a-4b29-86e1-cb0dfb0561e0 logicalsectorsize=512 sectorsize=512
      *-volume:0 UNCLAIMED
           description: Windows FAT volume
           vendor: mkfs.fat
           physical id: 1
```

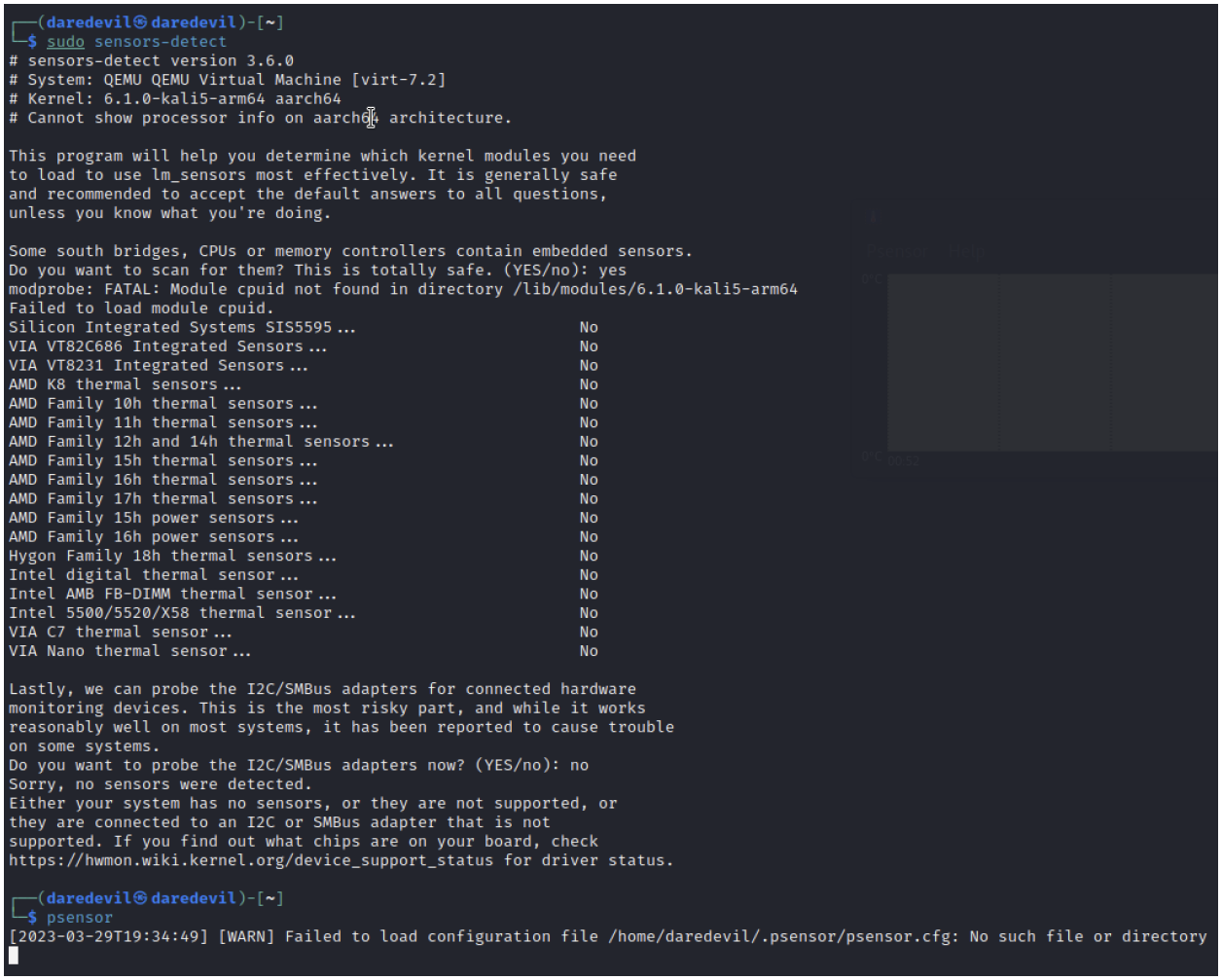

configuration: driver=virtio_blk guid=6b951b1e-413a-4b29-8bd1-cb6bfb05b1e0 logicalsectorsize=512 sectorsize=512
*-volume:0 UNCLAIMED
description: Windows FAT volume
vendor: mkfs.fat
physical id: 1
bus info: virtio@2,1
version: FAT16
serial: 3d46-966f
size: 510MiB
capacity: 511MiB
capabilities: boot fat initialized
configuration: FATs=2 filesystem=fat
*-volume:1
description: EXT4 volume
vendor: Linux
physical id: 2
bus info: virtio@2,2
logical name: /dev/vda2
logical name: /
version: 1.0
serial: 88ca3a0e-7edd-4b97-b77f-c0ef7f244afa
size: 28GiB
capabilities: journaled extended_attributes large_files huge_files dir_nlink recover 64bit extents ext4 ext2 initialized
configuration: created=2023-03-24 02:55:40 filesystem=ext4 lastmountpoint=/ modified=2023-03-30 01:01:05 mount.fstype=ext4 mount.options=rw,relatime,errors=remount-ro mounted=2023-03-30 01:01:05 state=mounted
*-volume:2
description: Linux swap volume
vendor: Linux
physical id: 3
bus info: virtio@2,3
logical name: /dev/vda3
version: 1
serial: f1ed135d-021f-430c-8d25-5303f09704ed
size: 975MiB
capacity: 975MiB
capabilities: nofs swap initialized
configuration: filesystem=swap pagesize=4095
*-communication
description: Communication controller
product: Virtio console
vendor: Red Hat, Inc.
physical id: 7
bus info: pci@0000:00:07.0
version: 00
width: 64 bits
clock: 33MHz
capabilities: msix bus_master cap_list
configuration: driver=virtio-pci latency=0
resources: irq:48 ioport:1080(size=64) memory:10067000-10067fff memory:10058000-1005bfff
*-virtio3 UNCLAIMED
description: Virtual I/O device
physical id: 0
bus info: virtio@3


*-virtio3 UNCLAIMED
description: Virtual I/O device
physical id: 0
bus info: virtio@3
configuration: driver=virtio_console
*-generic:0
description: Unclassified device
product: Virtio filesystem
vendor: Red Hat, Inc.
physical id: 8
bus info: pci@0000:00:08.0
version: 00
width: 64 bits
clock: 33MHz
capabilities: msix bus_master cap_list
configuration: driver=virtio-pci latency=0
resources: irq:45 ioport:10e0(size=32) memory:10068000-10068fff memory:1005c000-1005ffff
*-virtio4 UNCLAIMED
description: Virtual I/O device
physical id: 0
bus info: virtio@4
configuration: driver=9pnet_virtio
*-generic:1
description: Unclassified device
product: Virtio RNG
vendor: Red Hat, Inc.
physical id: 9
bus info: pci@0000:00:09.0
version: 00
width: 64 bits
clock: 33MHz
capabilities: msix bus_master cap_list
configuration: driver=virtio-pci latency=0
resources: irq:46 ioport:1100(size=32) memory:10069000-10069fff memory:10060000-10063fff
*-virtio5 UNCLAIMED
description: Virtual I/O device
physical id: 0
bus info: virtio@5
configuration: driver=virtio_rng
*-pnp00:00
product: PnP device PNP0c02
physical id: 1
capabilities: pnp
configuration: driver=system
*-graphics
product: EFI VGA
physical id: 1
logical name: /dev/fb0
capabilities: fb
configuration: depth=32 resolution=800,600
*-input:0
product: Power Button
physical id: 2
logical name: input0
logical name: /dev/input/event0

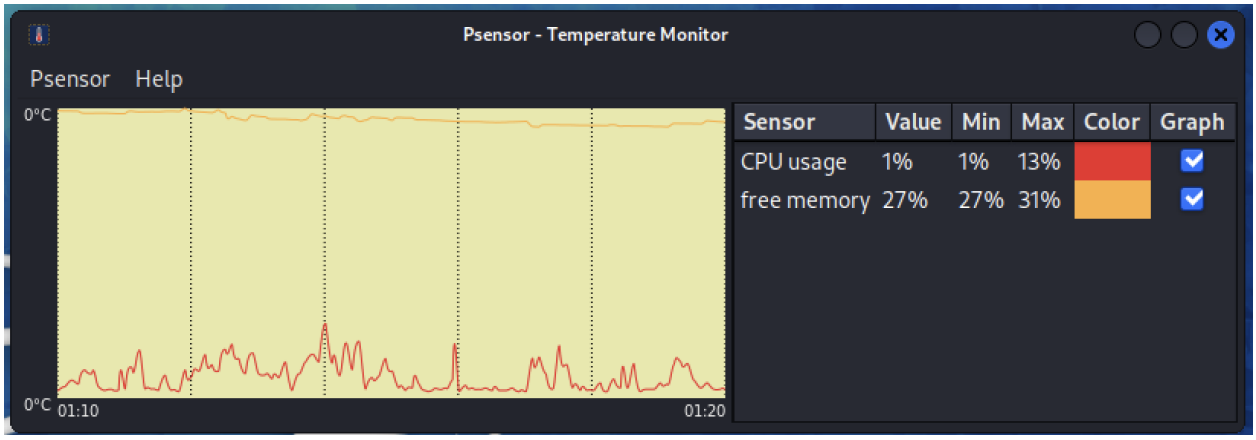
Installing the "lm-sensors" and “psensor” package using the following commands:



After installing the lm-sensors package, run the following command to detect the hardware sensors on your system:



After installing the psensor package, launch it from the Applications menu or run the following command in the terminal:



4. Reference/ Bibliography

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lm-sensors. (2021). In ArchWiki. Retrieved September 15, 2021, from https://wiki.archlinux.org/title/Lm_sensors

Psensor. (n.d.). Retrieved September 15, 2021, from https://wpitchoune.net/psensor/

Ramesh, N. (2008, November 25). How to get hardware information on Linux using lshw command. The Geek Stuff. Retrieved September 15, 2021, from https://www.thegeekstuff.com/2008/11/how-to-get-hardware-information-on-linux-using-lshw-command/