

## **Report of Project**

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INT301: Open Source Technologies

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

29/03/2023

## **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.
```

```

clock: 33MHz
*-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

```



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Configuration: driver=virtio_blk gold=6951016 4134 4029 8061 4000000000 logicalsectors126=312 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: 510MiB
  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

```

```

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
  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:

```
(daredevil@daredevil)-[~]
$ sudo apt-get install lm-sensors
[sudo] password for daredevil:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
lm-sensors is already the newest version (1:3.6.0-7.1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.

(daredevil@daredevil)-[~]
$ sudo apt-get install psensor
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  psensor-common
The following NEW packages will be installed:
  psensor psensor-common
0 upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
Need to get 101 kB of archives.
After this operation, 605 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://kali.download/kali kali-rolling/main arm64 psensor-common all 1.1.5-1.4 [42.9 kB]
Get:2 http://kali.download/kali kali-rolling/main arm64 psensor arm64 1.1.5-1.4 [58.5 kB]
Fetched 101 kB in 3s (34.8 kB/s)
Selecting previously unselected package psensor-common.
(Reading database ... 386777 files and directories currently installed.)
Preparing to unpack .../psensor-common_1.1.5-1.4_all.deb ...
Unpacking psensor-common (1.1.5-1.4) ...
Selecting previously unselected package psensor.
Preparing to unpack .../psensor_1.1.5-1.4_arm64.deb ...
Unpacking psensor (1.1.5-1.4) ...
Setting up psensor-common (1.1.5-1.4) ...
Setting up psensor (1.1.5-1.4) ...
Processing triggers for desktop-file-utils (0.26-1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for doc-base (0.11.1) ...
Processing 1 added doc-base file...
Processing triggers for libglib2.0-0:arm64 (2.74.6-1) ...
Processing triggers for man-db (2.11.2-2) ...
Processing triggers for mailcap (3.70+nmu1) ...
Processing triggers for kali-menu (2023.1.7) ...
```

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

```
(daredevil@daredevil)-[~]
$ sudo sensors-detect
# sensors-detect version 3.6.0
# System: QEMU QEMU Virtual Machine [virt-7.2]
# Kernel: 6.1.0-kali5-arm64 aarch64
# Cannot show processor info on aarch64 architecture.

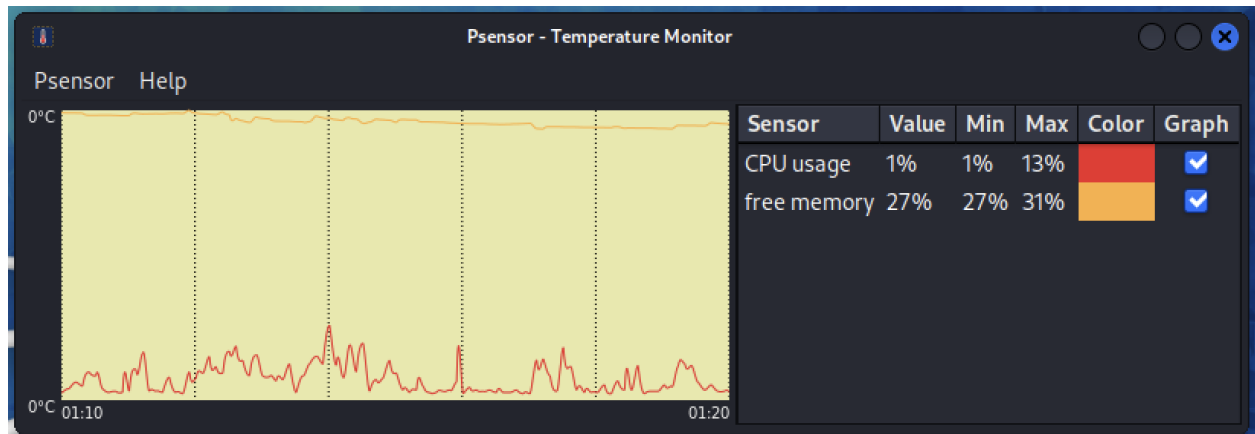
This program will help you determine which kernel modules you need
to load to use lm_sensors most effectively. It is generally safe
and recommended to accept the default answers to all questions,
unless you know what you're doing.

Some south bridges, CPUs or memory controllers contain embedded sensors.
Do you want to scan for them? This is totally safe. (YES/no): yes
modprobe: FATAL: Module cpuid not found in directory /lib/modules/6.1.0-kali5-arm64
Failed to load module cpuid.
Silicon Integrated Systems SIS5595 ... No
VIA VT82C686 Integrated Sensors ... No
VIA VT8231 Integrated Sensors ... No
AMD K8 thermal sensors ... No
AMD Family 10h thermal sensors ... No
AMD Family 11h thermal sensors ... No
AMD Family 12h and 14h thermal sensors ... No
AMD Family 15h thermal sensors ... No
AMD Family 16h thermal sensors ... No
AMD Family 17h thermal sensors ... No
AMD Family 15h power sensors ... No
AMD Family 16h power sensors ... No
Hygon Family 18h thermal sensors ... No
Intel digital thermal sensor ... No
Intel AMB FB-DIMM thermal sensor ... No
Intel 5500/5520/X58 thermal sensor ... No
VIA C7 thermal sensor ... No
VIA Nano thermal sensor ... No

Lastly, we can probe the I2C/SMBus adapters for connected hardware
monitoring devices. This is the most risky part, and while it works
reasonably well on most systems, it has been reported to cause trouble
on some systems.
Do you want to probe the I2C/SMBus adapters now? (YES/no): no
Sorry, no sensors were detected.
Either your system has no sensors, or they are not supported, or
they are connected to an I2C or SMBus adapter that is not
supported. If you find out what chips are on your board, check
https://hwmon.wiki.kernel.org/device\_support\_status for driver status.

(daredevil@daredevil)-[~]
$ psensor
[2023-03-29T19:34:49] [WARN] Failed to load configuration file /home/daredevil/.psensor/psensor.cfg: No such file or directory
```

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



#### **4. Reference/ Bibliography**

Open Hardware Monitor. (n.d.). Retrieved September 15, 2021, from

<https://openhardwaremonitor.org/>

lm-sensors. (2021). In ArchWiki. Retrieved September 15, 2021, from

[https://wiki.archlinux.org/title/Lm\\_sensors](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/>