**LAB CYCLE:1**

**EXPERIMENT NO:1**

**Date:**

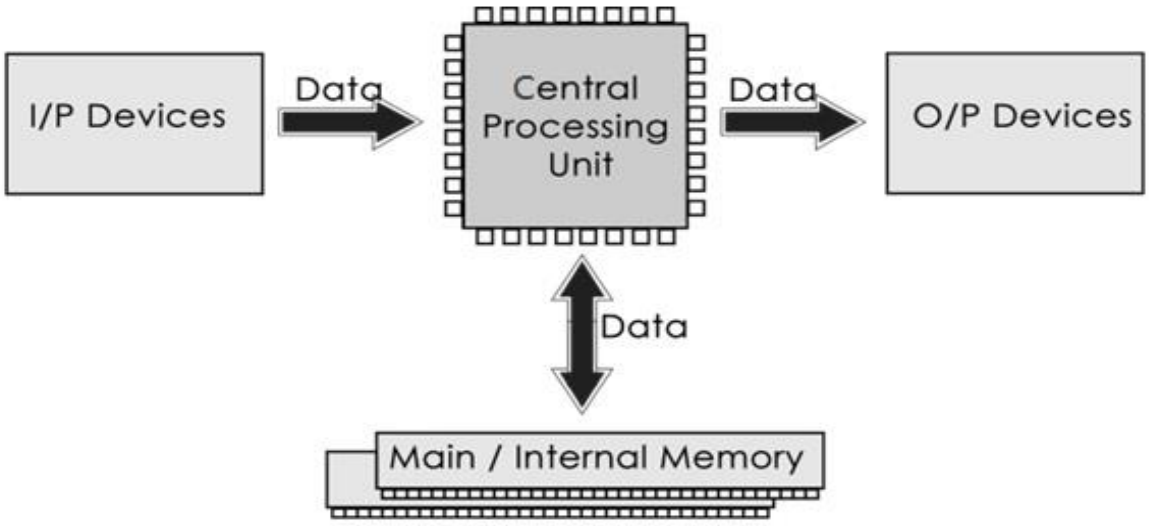
**Aim:** Familiarisation with computer hardware.

Introduction to Computer hardware: Physical identification of major components of a computer system such as mother board, RAM modules, daughter cards, bus slots, SMPS, internal storage devices, interfacing ports. Specifications of desktop and server class computers. Installation of common operating systems for desktop and server use.

**Description:**

**a) Introduction to Computer hardware**

Components of a computer system are the primary elements which make the functioning of an electronic device smooth and faster. Computer systems consist of three components as shown in below image: **Central Processing Unit, Input devices and Output devices**. Input devices provide data input to processor, which processes data and generates useful information that's displayed to the user through output devices. This is stored in computer's memory.




The operations of computer components are given below:

**1) Inputting:** It is the process of entering raw data, instructions and information into the computer. It is performed with the help of input devices.

**2) Storing:** The computer has primary memory and secondary storage to store data and instructions. It stores the data before sending it to CPU for processing and also stores the processed data before displaying it as output.

**3) Processing:** It is the process of converting the raw data into useful information. This process is performed by the CPU of the computer. It takes the raw data from storage, processes it and then sends back the processed data to storage.

**4) Outputting:** It is the process of presenting the processed data through output devices like monitor, printer and speakers.

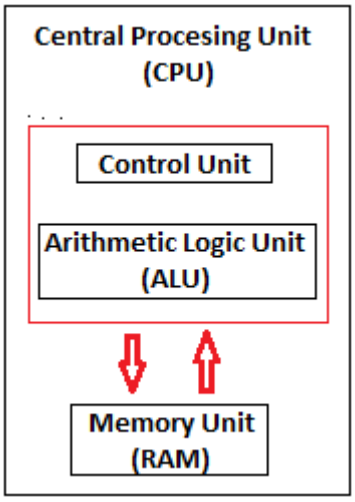
**5) Controlling:** This operation is performed by the control unit that is part of CPU. The control unit ensures that all basic operations are executed in a right manner and sequence.

**Central Processing Unit (CPU)**

A Central Processing Unit is also called a processor, central processor, or microprocessor. It carries out all the important functions of a computer. It receives instructions from both the hardware and active software and produces output accordingly. It stores all important programs like operating systems and application software. CPU also helps Input and output devices to communicate with each other. Owing to these features of CPU, it is often referred to as the brain of the computer.

CPU has three components:

- ALU (Arithmetic Logic Unit)
- Control Unit
- Memory or Storage Unit




**b) Physical identification of major components**

Hardware, which is abbreviated as HW, refers to all physical components of a computer system, including the devices connected to it. You cannot create a computer or use software without using hardware. The screen on which you are reading this information is also a hardware

**1. Motherboard:** The motherboard is generally a thin circuit board that holds together almost all parts of a computer except input and output devices. All crucial hardware like CPU, memory, hard drive, and ports for input and output devices are located on the motherboard. It is the biggest circuit board in a computer chassis. It allocates power to all hardware located on it and enables them to communicate with each other. It is meant to hold the computer's microprocessor chip and let other components connect to it. Each component that runs the

computer or improves its performance is a part of the motherboard or connected to it through a slot or port.

**Fig.1**

**2. RAM Modules:** RAM stands for Random Access Memory. It is also called the main memory. RAM is a temporary data storage device in computers and other devices. SRAM,DRAM, SDRAM, DDR etc are the various types of RAM available. A memory module or RAM stick is a narrow-printed circuit board that holds memory chips (RAM chips).

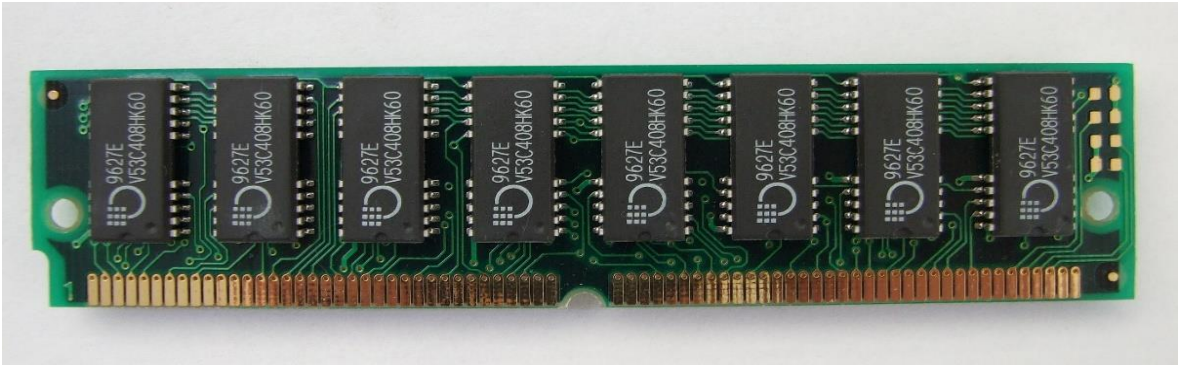



**Fig.2**

SRAM (static RAM) is random access memory (RAM) that retains data bits in its memory as long as power is being supplied. You can lose data if your SRAM is not powered. SRAM does not offer to refresh programs. SRAM has a low storage capacity(about 1MB).

Dynamic random access memory (DRAM) is a type of semiconductor memory that is typically used for the data or program code needed by a computer processor to function. The advantage of a DRAM is it only requires a single transistor compared to around six in a typical static RAM, SRAM memory cell. The costs of DRAM are much lower than those for SRAM,and they are able to provide much higher levels of memory density(about 1GB).

SDRAM (synchronous DRAM) is a generic name for various kinds of DRAM that are synchronized with the clock speed that the microprocessor is optimized for. That is same external clock pulse can be used to operate both SRAM and processor. This tends to increase the number of instructions that the processor can perform in a given time.

DDR Stands for "Double Data Rate." It is an advanced version of SDRAM, DDR-SDRAM can transfer data twice as fast as regular SDRAM chips. This is because DDR memory can send and receive signals twice per clock cycle. DDR operates about 2.5 V and DDR2 averages about 1.8 V, with DDR3 the voltage is reduced to 1.5 V.DDR3 has transfer rates between 800MT/s and 1600MT/s.DDR4 is the latest generation of DDR. It has the lowest operating voltage of 1.2 V and has higher transfer rates than previous generations. DDR5 launch speeds delivery nearly double the bandwidth of DDR4. It also enables scaling memory performance without degrading channel efficiency at higher speeds under real-world conditions. Crucial DDR5 memory will operate at 4800MT/s at launch, which is 1.5x the maximum standard DDR4 speed.

**3. Daughter cards:** A daughterboard (daughter card) is a type of circuit board that plugs in or is attached to the motherboard or similar expansion card to extend its features and services.

**Fig.3**

A daughterboard is connected directly to the motherboard. Like a motherboard, a daughterboard has sockets, pins, plugs and connectors to be attached to other boards.Today, these boards are not found or used in desktop computers. They were replaced with ISA card, PCI card and onboard options.With the rise of connective USB ports and other technology, it has become less necessary to upgrade devices with daughtercards or daughterboards.

**4. Bus Slots:** An expansion slot is a socket on the motherboard that is used to insert an expansion card, which provides additional features to a computer such as video, sound, advanced graphics, Ethernet or memory.

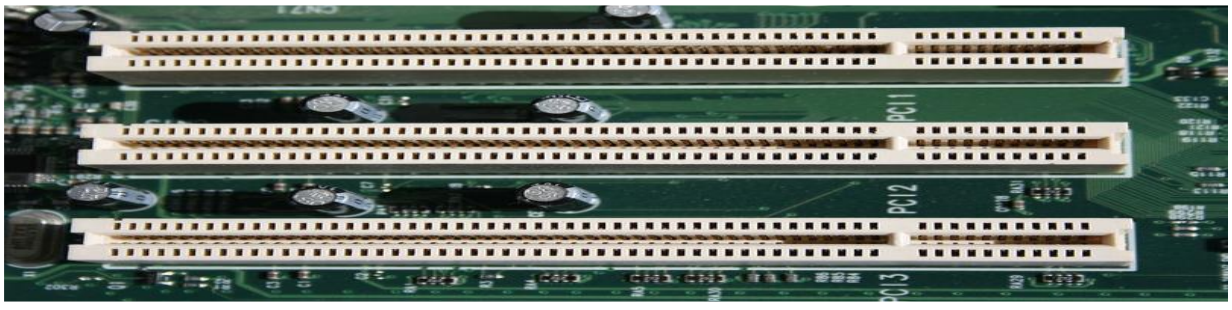


**Fig.4**

PATA stands for Parallel Advanced Technology Attachment and SATA stands for Serial Advanced Technology Attachment both are two bus interfaces used for connecting secondary storage devices like hard disks, optical drives.

Serial refers to the fact that data is sent one bit at a time down a single connection in each direction. There's a separate connection for data going in to and out of the device.Parallel refers to the fact that data is sent 16 bits at a time through a single 16-bit connection, which is used for data traveling in both directions.

SCSI stands for Small Computer System Interface is a set of standards for physically connecting and transferring data between computers and peripheral devices.

IDE stands for Integrated Drive Electronics is a standard interface for connecting a motherboard to storage devices such as hard drives and CD/DVD drives.

PCI (Peripheral Component Interconnect)is a bus standard that connects the computer motherboard and external devices. PCIe (peripheral component interconnect express) is an interface standard for connecting high-speed components. Every desktop PC motherboard has a number of PCIe slots.

**5. SMPS:** SMPS stands for Switched-Mode Power Supply. It is an electronic power supply that uses a switching regulator to convert electrical power efficiently.


**Fig. 5**

It is a power supply unit (PSU) generally used in computers to convert the voltage into the computer acceptable range. Technically briefing, an SMPS in a desktop system that converts 220V AC and 50HZ into +5V, -5V, +12V and +3.3 V DC at various electrical components in the computer.

**6. Internal Storage:** A storage device is an integral part of the computer hardware which stores information or data to process the result of any computational work. Internal storage is a storage device that's internal (inside the case) and is not a removable storage or external storage. For example, the hard drive inside your computer is an example of internal storage.HDD (Hard Disk Drive) also known as fixed disk uses magnetic tape for the storage of data. HDD has a moving read/write head to access data from storage like a gramophone player and slower to read and write. Unlike HDD, SSD (Solid State Drive) has no moving parts, and it obtains data from storage instantly. SSD can give faster performance than traditional magnetic-based computer storage devices. Although both of them perform the same task.

**Fig 6.i**

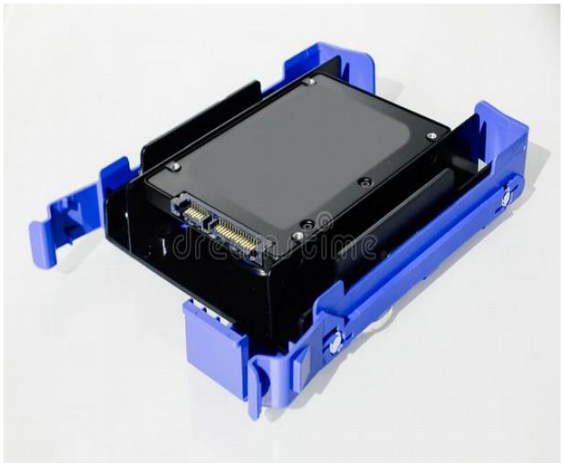


**Fig 6.ii**

**7. Interfacing ports:** A port is a connection or a jack provided on a computer to connect external or peripheral devices to the computer, for example, you will need a port on your device to connect a keyboard, mouse, pen-drives, etc. So, it acts as an interface or a point of attachment between computer and external devices. It is also called a communication port, as it is the point where you plug in a peripheral device to allow data transfer or communication between the device and computer. Generally, they are four to six in number and present on the back or sides of the computer.

Based on the type of protocol used for communication, computer ports can be of two types: Serial Ports and Parallel Ports.

**i.** Serial Ports

**Fig 7.i**

This type of ports provides an interface to connect to peripheral devices using a serial protocol. In this port, the rate of transmission of data is one bit at a time through a single communication line. For example, D-Subminiature or D-sub connector is a commonly used serial port, which carries RS-232 signals.

**i.** Parallel Ports

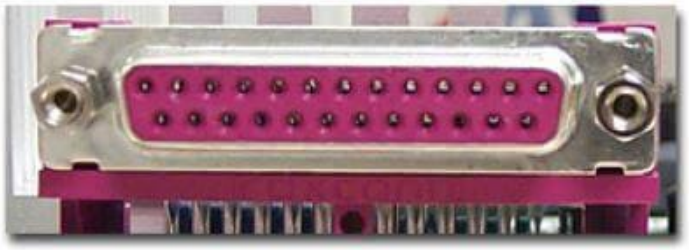


**Fig 7.ii**

As the name suggests, a parallel port is an interface that allows communication or data transfer between a computer and a device in a parallel manner through more than one communication line. For example, a printer port is a parallel port.

Some computer ports are:

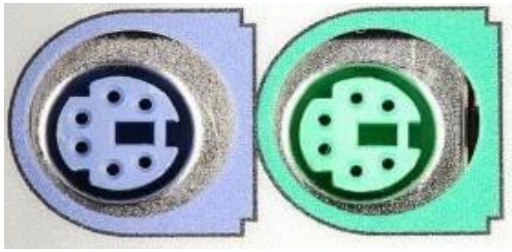


Fig:**PS/2**

Fig: **VGA**

Fig:**DVI**


Fig: **RJ-45**


Fig: **HDMI**

**8. Specifications of desktop and server class:**

**Desktop:**

| | |
|---|---|
| Processor | Core i5 |
| Processor speed | 3.90 GHz |
| Number of cores | 4 |
| Typical Memory | 32GB |
| Cache size | L1:8KB -1MB, L2:256KB - 3MB |
| Memory type | DDR4 |

**Web Server:**

| | |
|---|---|
| Processor | Intel® Xeon® Bronze 3206R<br><br>Processor (Multiple Processors) |
| Processor speed | 1.90 GHz |
| Number of cores | 8 |
| Typical Memory | 512GB |
| Cache size | L1:1-2MB, L2:8MB, L3:32-64MB |
| Memory type | DDR4 |

**Result:**

Familiarisation of computer and hardware done successfully.

## LAB CYCLE:1

## EXPERIMENT NO:2

**Date:**

**Aim:** Familiarisation of OS installation.

Oracle Virtual Box is already installed on your Desktop.

1. Create a Virtual Machine with sufficient RAM (nearly half the RAM of your Desktop).
2. Create a virtual hard disk (vmdk) of 20 GB (variable size).
3. Download Ubuntu Desktop iso (64 bit) from official website.
4. Attach ISO to the Virtual Machine as CD Drive.
5. Boot from it. Execute gparted
6. Create 2 Primary partitions of equal size and install Ubuntu in one of them.
7. Make a copy of the vmdk file for later experiments.
8. You can also install another OS to the other partition.
   Write down a description of Virtualbox and vmdk format. Take the screenshots of Steps 1,2,4 and 6 and affix.

**Solution:**

VirtualBox is an open-source software for virtualizing the x86 computing architecture. It acts as a hypervisor, creating a VM (virtual machine) where the user can run another OS (operating system).

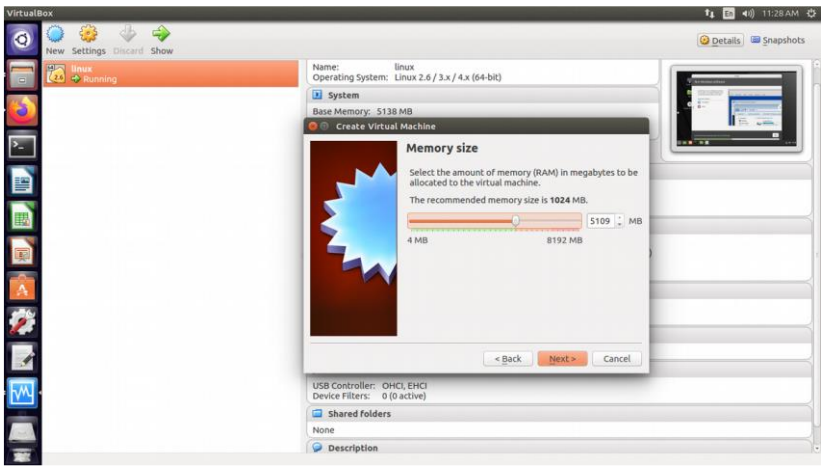
VMDK (short for Virtual Machine Disk) is a file format that describes containers for virtual hard disk drives to be used in VM.

**Installation of Ubuntu using VirtualBox:**

1.We have installed VirtualBox and you have downloaded the Ubuntu. Now set to install Linux in VirtualBox.

2.Start VirtualBox, and click on the New icon. Give the virtual OS a relevant name.

3.Allocate RAM to the virtual OS.

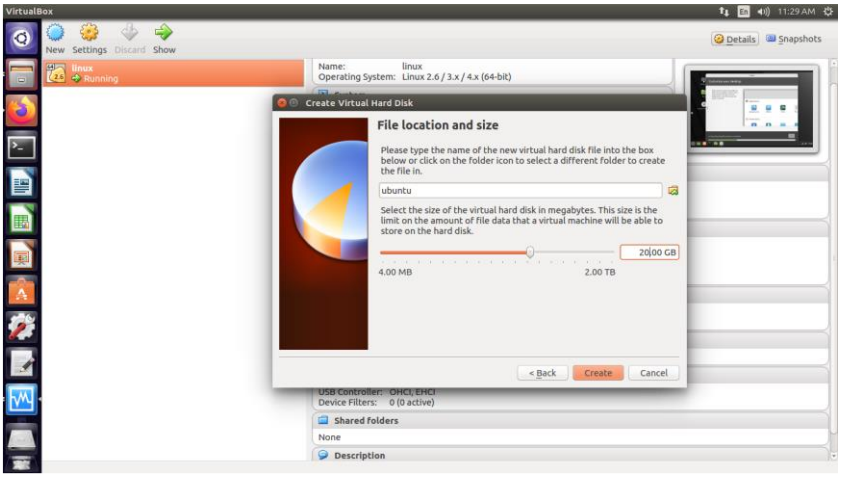



4.Create a virtual disk. This serves as the hard disk of the virtual Linux system.

5.Choose VDI file type as file type for new virtual hard disk.

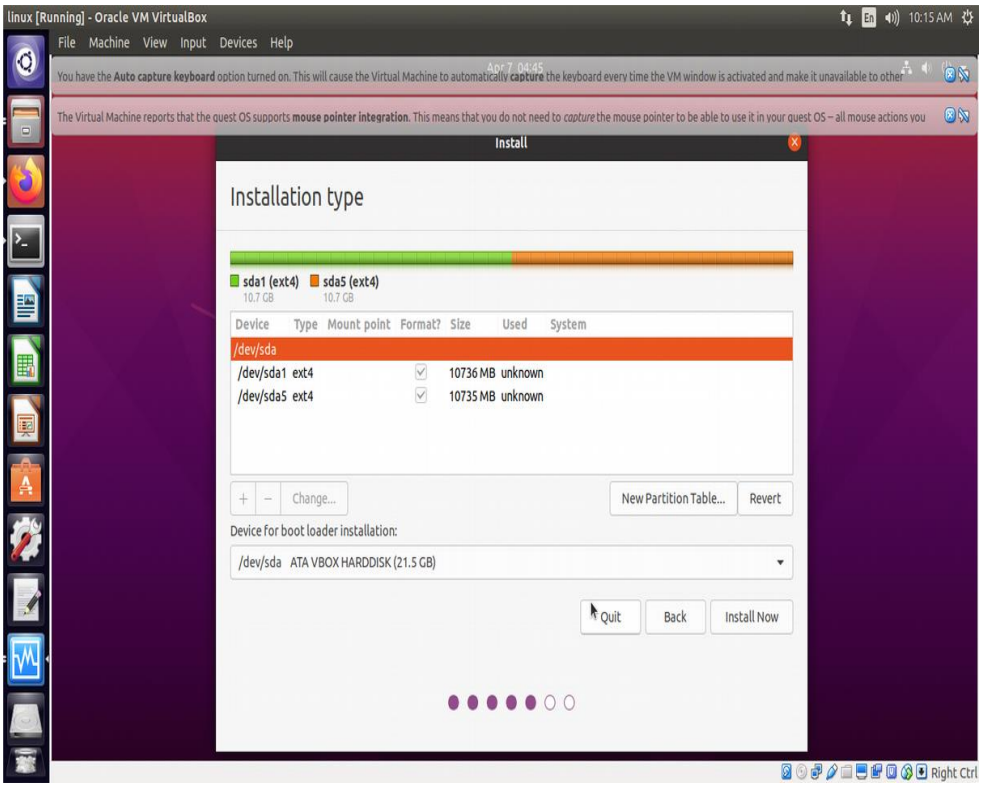
6.Choose either the “Dynamically allocated” or the “Fixed size” option for creating the virtual hard disk.

7.Allocate size for virtual hard disk (recommended size is 20GB).

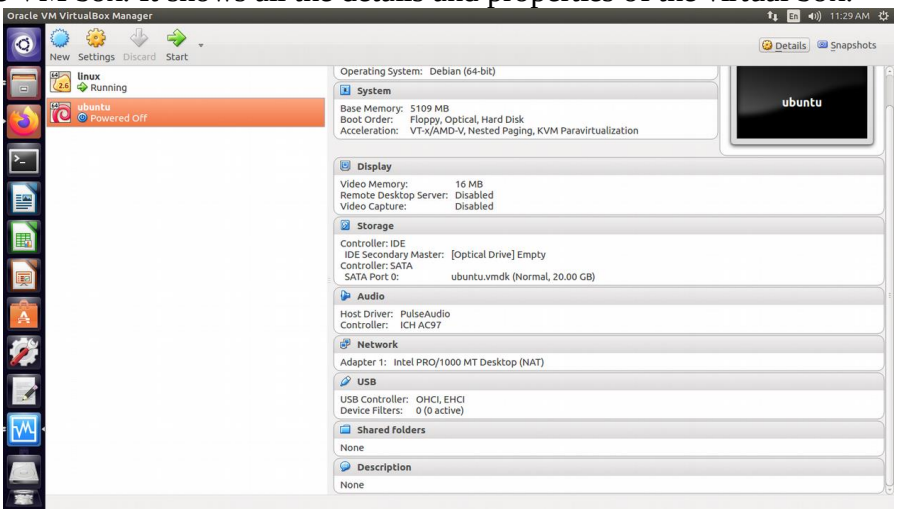



8.Install Ubuntu

9.

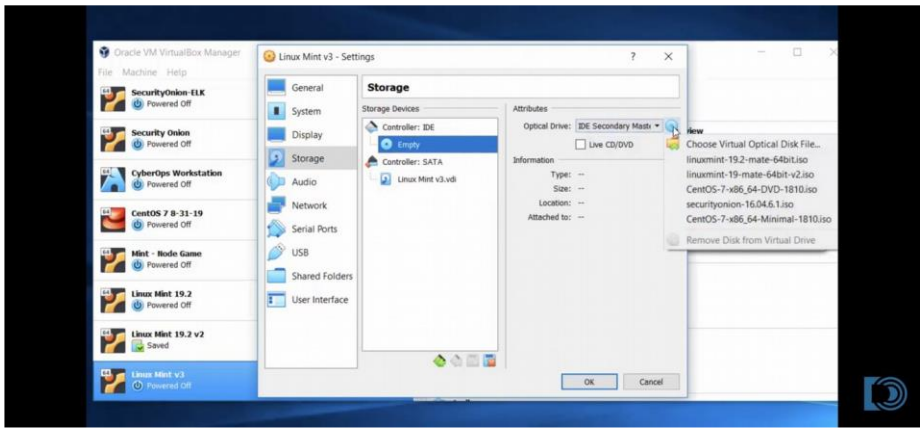


10. Open the VM box. It shows all the details and properties of the virtual box.




**Installation of another OS (Linux Mint) to the other partition:**

1. Download Linux Mint OS.
2. Choose

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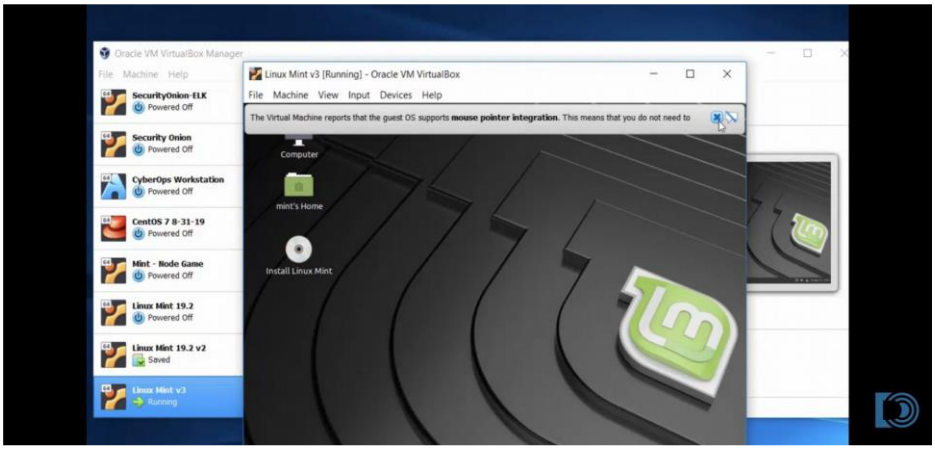


4. Install linux mint.

**Result:**

Program executed successfully and output is verified.