

IEN: -**Batch: -****Name of the Student: -****Div.: -****Date of Performance: -****Course Outcome: - L 605.2:**

EXPERIMENT NO.: - 02

Aim: Study and implement Virtualization using Virtual Box. (Technology : Virtual Box)

(Understand Different types of virtualization, Host and bare metal hypervisors and implement horizontal scalability)

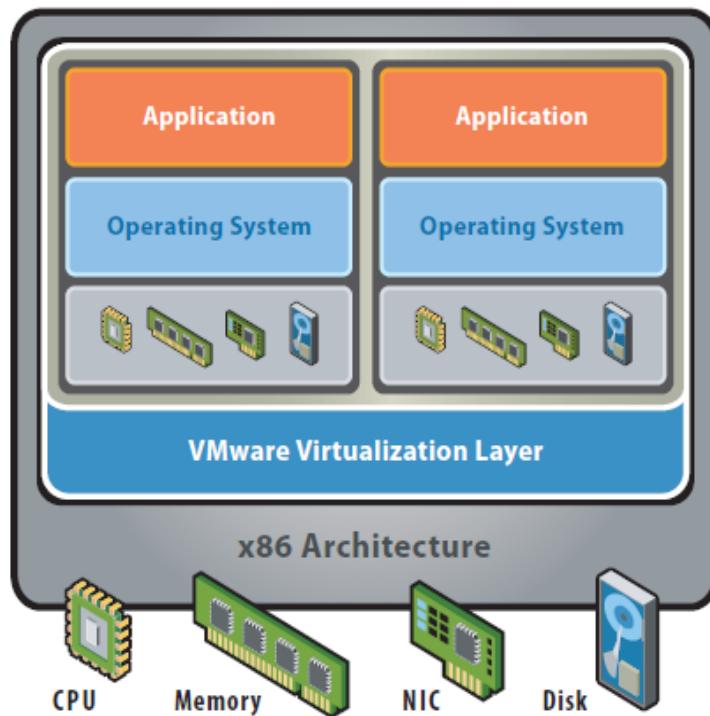
System Software/ Instruments/ Equipment's Requirements: -Windows/Linux os, Virtualization tool such as virtual box,Vmware , Iso file of any operating system.

Theory/ Working Principle:

Virtualization is one of the hardware reducing, cost saving and energy saving technology that is rapidly transforming the IT infrastructure.

Virtualization makes servers, workstations, storage and other systems independent of the physical hardware layer.

Virtualization is a foundational element of cloud computing and helps deliver on the value of cloud computing, Cloud computing is the delivery of shared computing resources, software or data — as a service and on-demand through the Internet.



- Hardware-independence of operating system and applications
- Virtual machines can be provisioned to any system
- Can manage OS and application as a single unit by encapsulating them into virtual Machines

Objectives of Virtualization

There are four main objectives to virtualization, demonstrating the value offered to organizations:

- Increased use of hardware resources
- Reduced management and resource costs
- Improved business flexibility
- Improved security and reduced downtime.

VM-

A virtual machine (VM) is an operating system OS or application environment that is installed on software which imitates dedicated hardware. The end user has the same experience on a virtual machine as they would have on dedicated hardware.eg VMware

HyperVisor-

Specialized software called a hypervisor emulates the PC client or server's CPU, memory, hard disk, network and other hardware resources completely, enabling virtual machines to share the resources. The hypervisor can emulate multiple virtual hardware platforms that are isolated from each other, allowing virtual machines to run Linux and Windows server operating systems on the same underlying physical host. Virtualization saves costs by reducing the need for physical hardware systems. Virtual machines more efficiently use hardware, which lowers the quantities of hardware and associated maintenance costs, and reduces power and cooling demand.

Benefits of Virtualization in Cloud-

Partitioning: In virtualization, many applications and operating systems (OSes) are supported in a single physical system by partitioning (separating) the available resources.

Isolation: Each virtual machine is isolated from its host physical system and other virtualized machines. Because of this isolation, if one virtual instance crashes, it doesn't affect the other virtual machines. In addition, data isn't shared between one virtual container and another.

Encapsulation: A virtual machine can be represented (and even stored) as a single file, so you can identify it easily based on the service it provides. In essence, the encapsulated process could be a business service. This encapsulated virtual machine can be presented to an application as a complete entity. Therefore, encapsulation can protect each application so that it doesn't interfere with another application.

Maximize resources — Virtualization can reduce the number of physical systems you need to acquire, and you can get more value out of the servers. Most traditionally built systems are underutilized. Virtualization allows maximum use of the hardware investment.

Multiple systems — With virtualization, you can also run multiple types of applications and even run different operating systems for those applications on the same physical hardware.

IT budget integration — When you use virtualization, management, administration and all the attendant requirements of managing your own infrastructure remain a direct cost of your IT operation.

BENEFITS OF VIRTUALIZATION

1. More flexible and efficient allocation of resources.
2. Enhance development productivity.
3. It lowers the cost of IT infrastructure.
4. Remote access and rapid scalability.
5. High availability and disaster recovery.
6. Pay peruse of the IT infrastructure on demand.
7. Enables running multiple operating systems.

Types of Virtualization:

1. Application Virtualization.
2. Network Virtualization.
3. Desktop Virtualization.
4. Storage Virtualization.
5. Server Virtualization.
6. Data virtualization.

1. Application Virtualization:

Application virtualization helps a user to have remote access of an application from a server. The server stores all personal information and other characteristics of the application but can still run on a local workstation through the internet. Example of this would be a user who needs to run two different versions of

the same software. Technologies that use application virtualization are hosted applications and packaged applications.

2. Network Virtualization:

The ability to run multiple virtual networks with each has a separate control and data plan. It co-exists together on top of one physical network. It can be managed by individual parties that potentially confidential to each other.

Network virtualization provides a facility to create and provision virtual networks—logical switches, routers, firewalls, load balancer, Virtual Private Network (VPN), and workload security within days or even in weeks.

3. Desktop Virtualization:

Desktop virtualization allows the users' OS to be remotely stored on a server in the data centre. It allows the user to access their desktop virtually, from any location by a different machine. Users who want specific operating systems other than Windows Server will need to have a virtual desktop. Main benefits of desktop virtualization are user mobility, portability, easy management of software installation, updates, and patches.

4. Storage Virtualization:

Storage virtualization is an array of servers that are managed by a virtual storage system. The servers aren't aware of exactly where their data is stored, and instead function more like worker bees in a hive. It makes managing storage from multiple sources to be managed and utilized as a single repository. Storage virtualization software maintains smooth operations, consistent performance and a continuous suite of advanced functions despite changes, break down and differences in the underlying equipment.

5. Server Virtualization:

This is a kind of virtualization in which masking of server resources takes place. Here, the central-server(physical server) is divided into multiple different virtual servers by changing the identity number, processors. So, each system can operate its own operating systems in isolate manner. Where each sub-server knows the identity of the central server. It causes an increase in the performance and reduces the operating cost by the deployment of main server resources into a sub-server resource. It's beneficial in virtual migration, reduce energy consumption, reduce infrastructural cost, etc.

6. Data virtualization:

This is the kind of virtualization in which the data is collected from various sources and managed that at a single place without knowing more about the technical information like how data is collected, stored & formatted then arranged that data logically so that its virtual view can be accessed by its interested people and stakeholders, and users through the various cloud services remotely. Many big giant companies are providing their services like Oracle, IBM, At scale, Cdata, etc.

It can be used to performing various kind of tasks such as:

- **Data-integration**
- **Business-integration**
- **Service-oriented architecture data-services**
- **Searching organizational data**

VirtualBox is designed to run virtual machines on your physical machine without reinstalling your OS that is running on a physical machine.

Installation steps of VM- as per application used for virtulization

1. Download link for ubuntu ISO file

<https://ubuntu.com/download/desktop>

2.Download link for Virtualization software “virtual box”.

<https://www.virtualbox.org/wiki/Downloads>

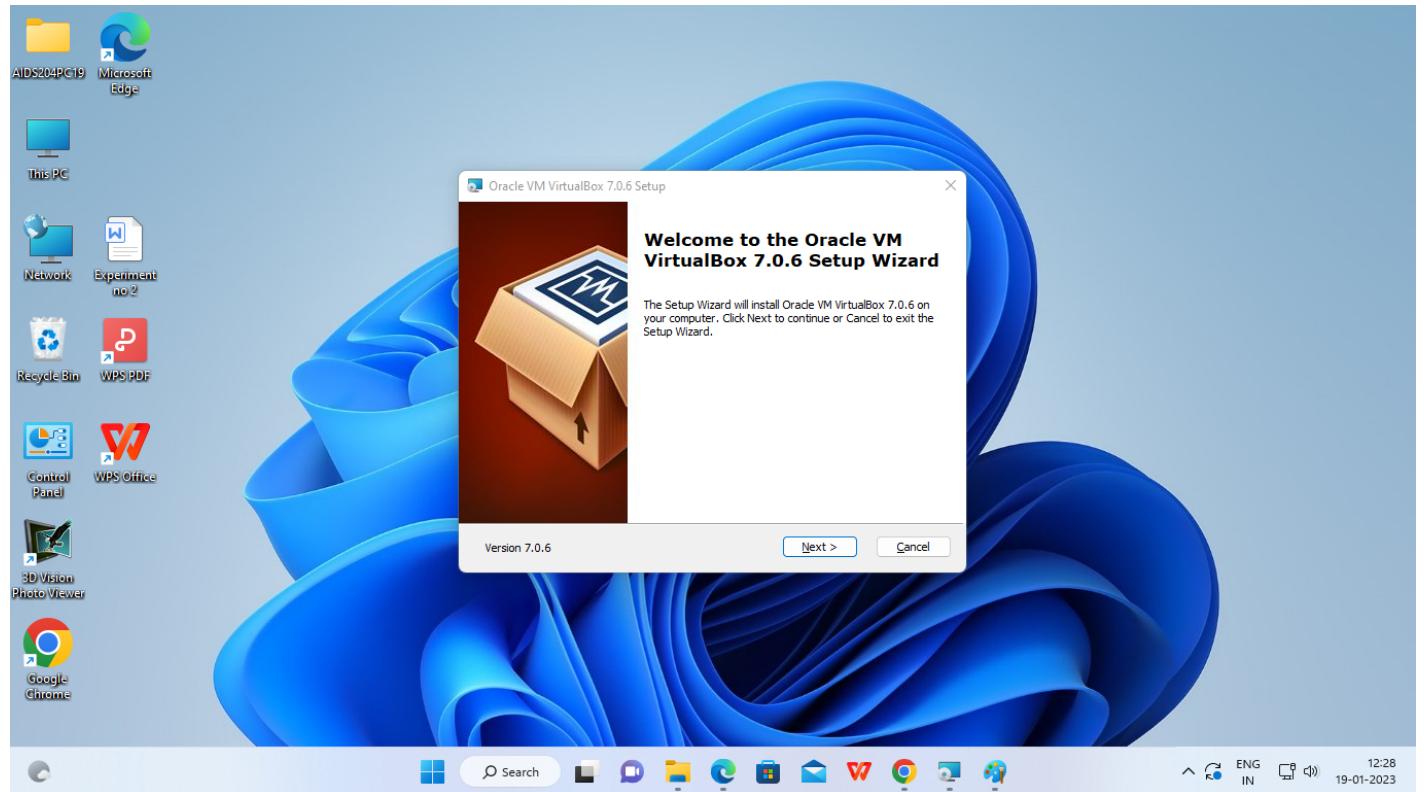
Screen shots for installation of Virtual Box

Fig 1. Virtual Box Setup

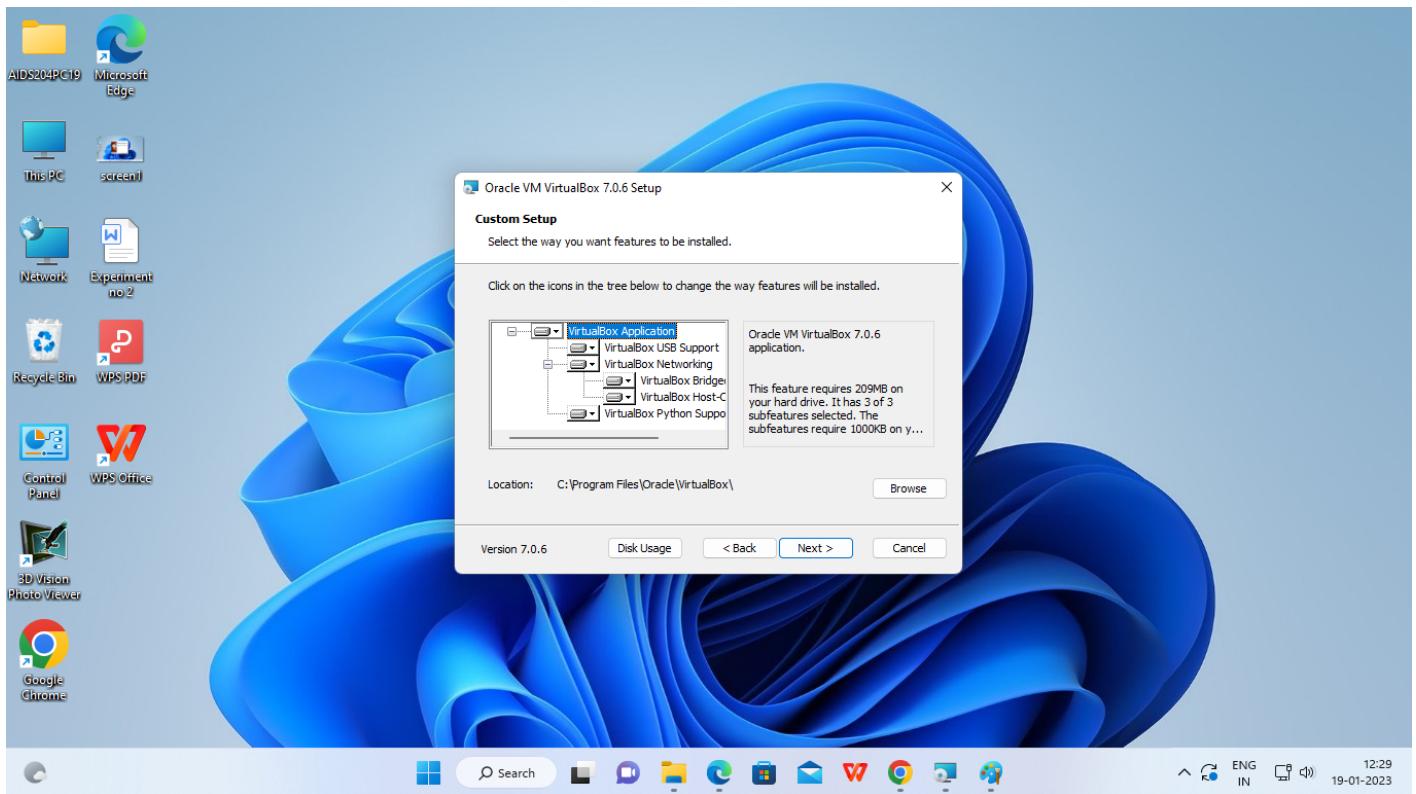


fig 2 Options Customize set up

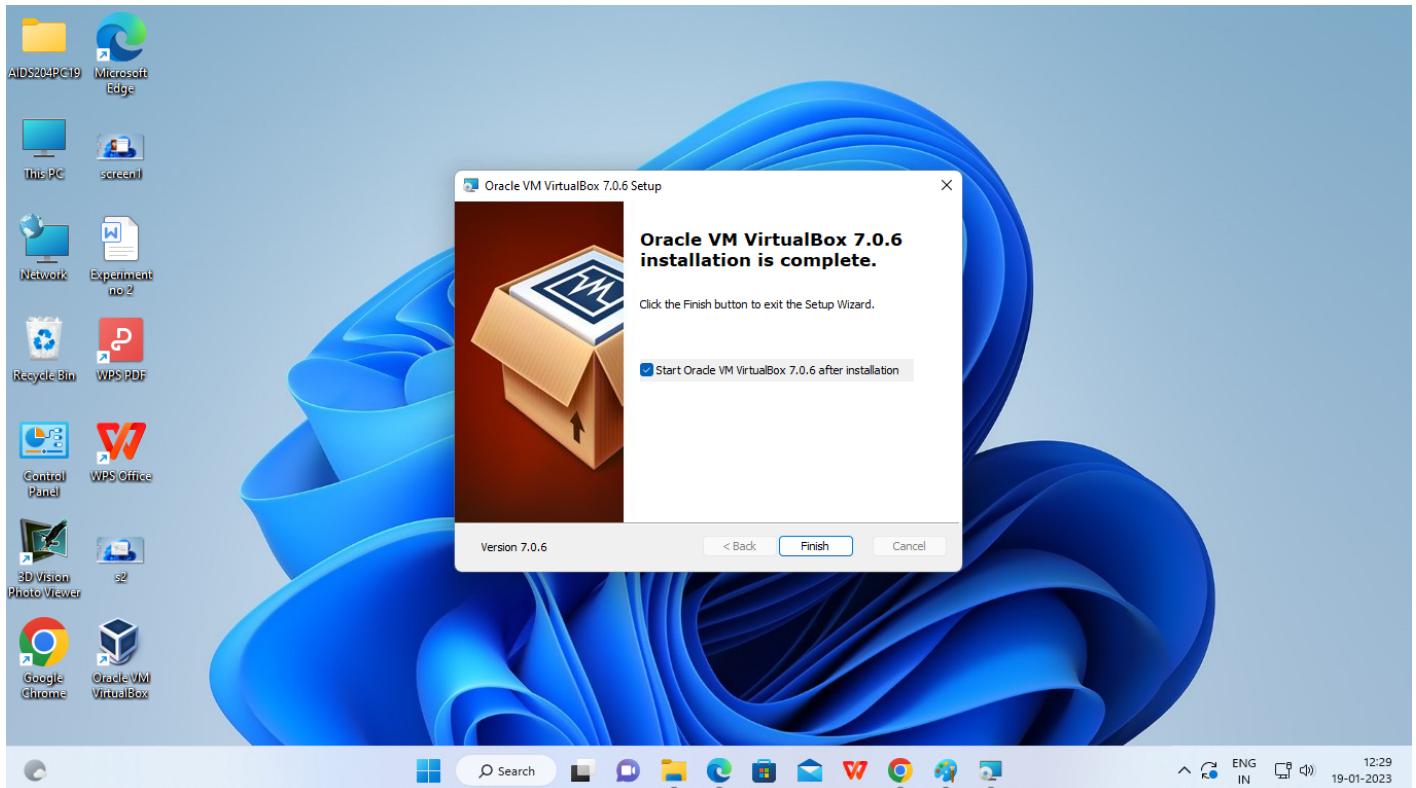


Fig 3 Virtual box Setup Complete

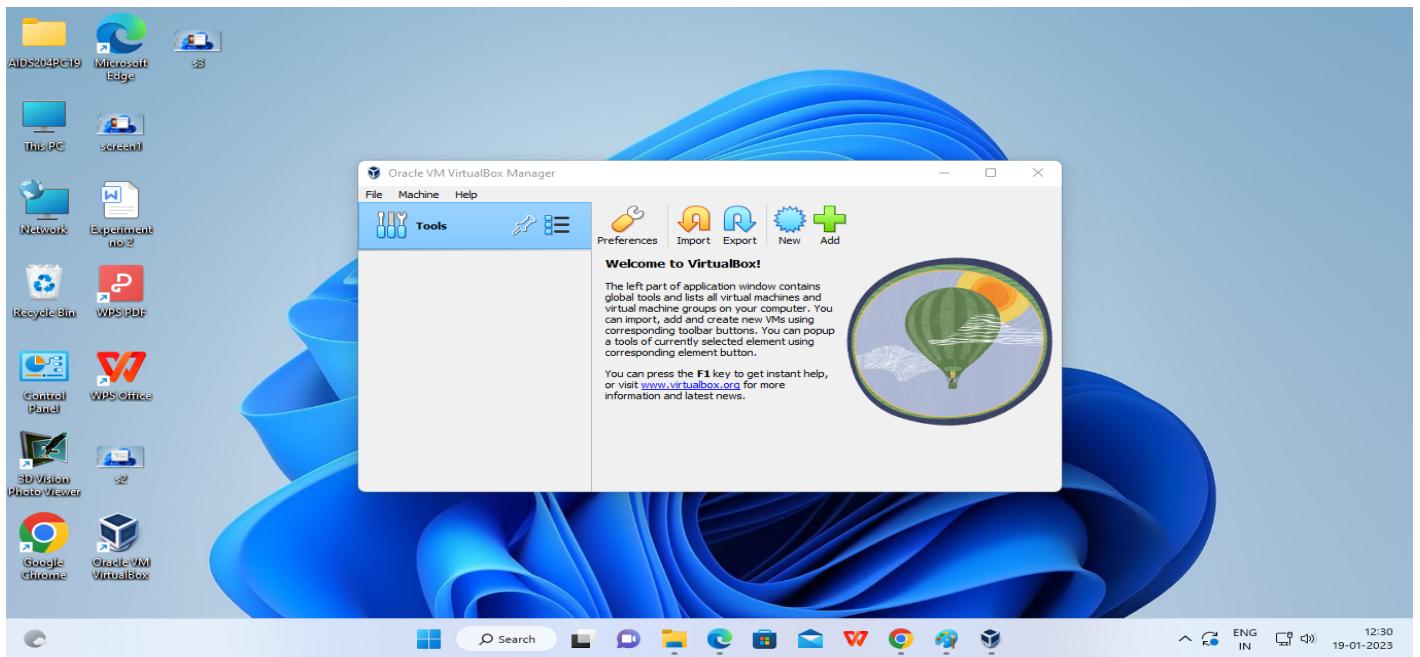


Fig 4 . Dashboard of Virtual Box showing Configuration

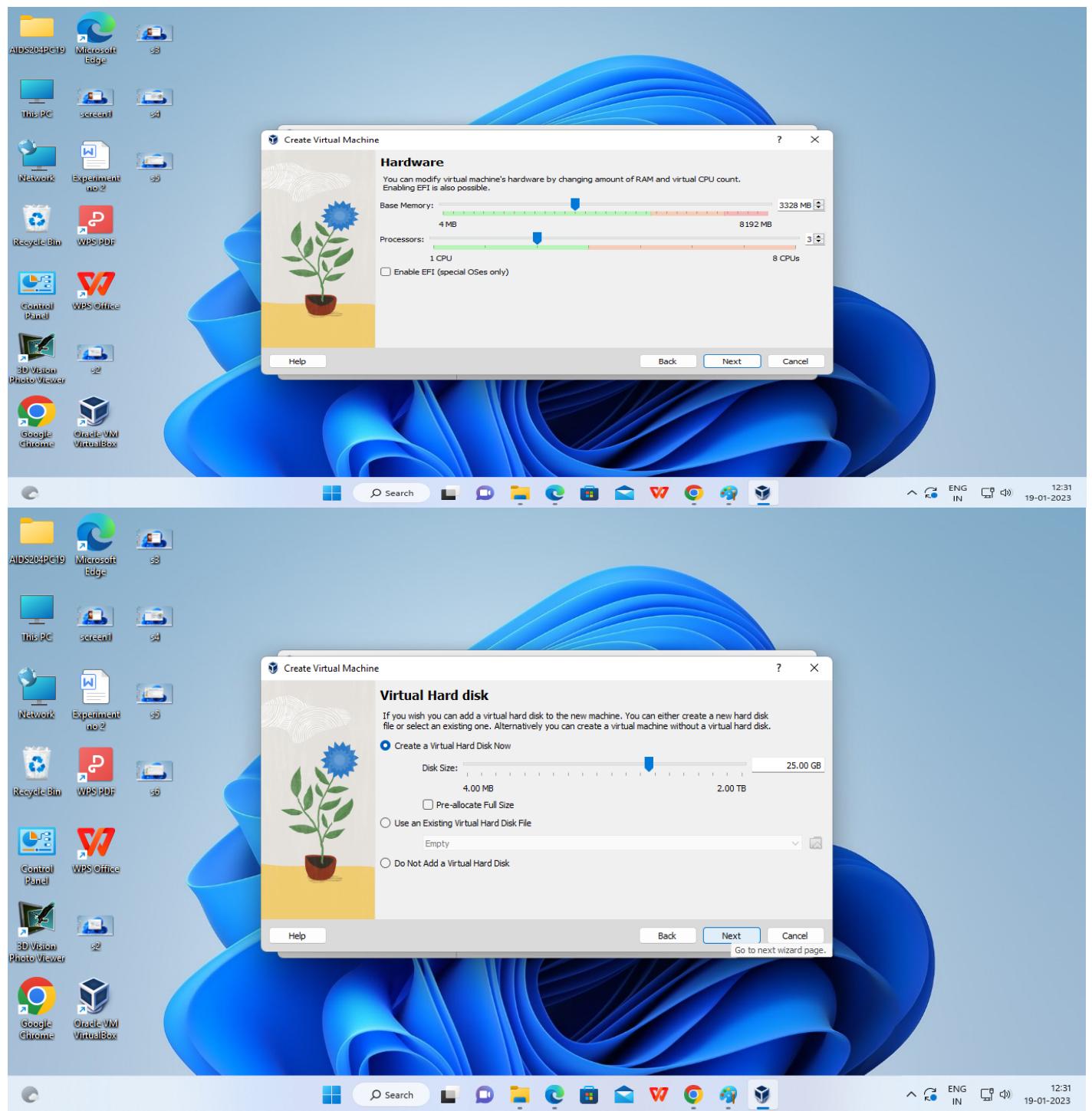


Fig 5 & 6 Selection of Ram , Cpu core, Virtual Hard Disk

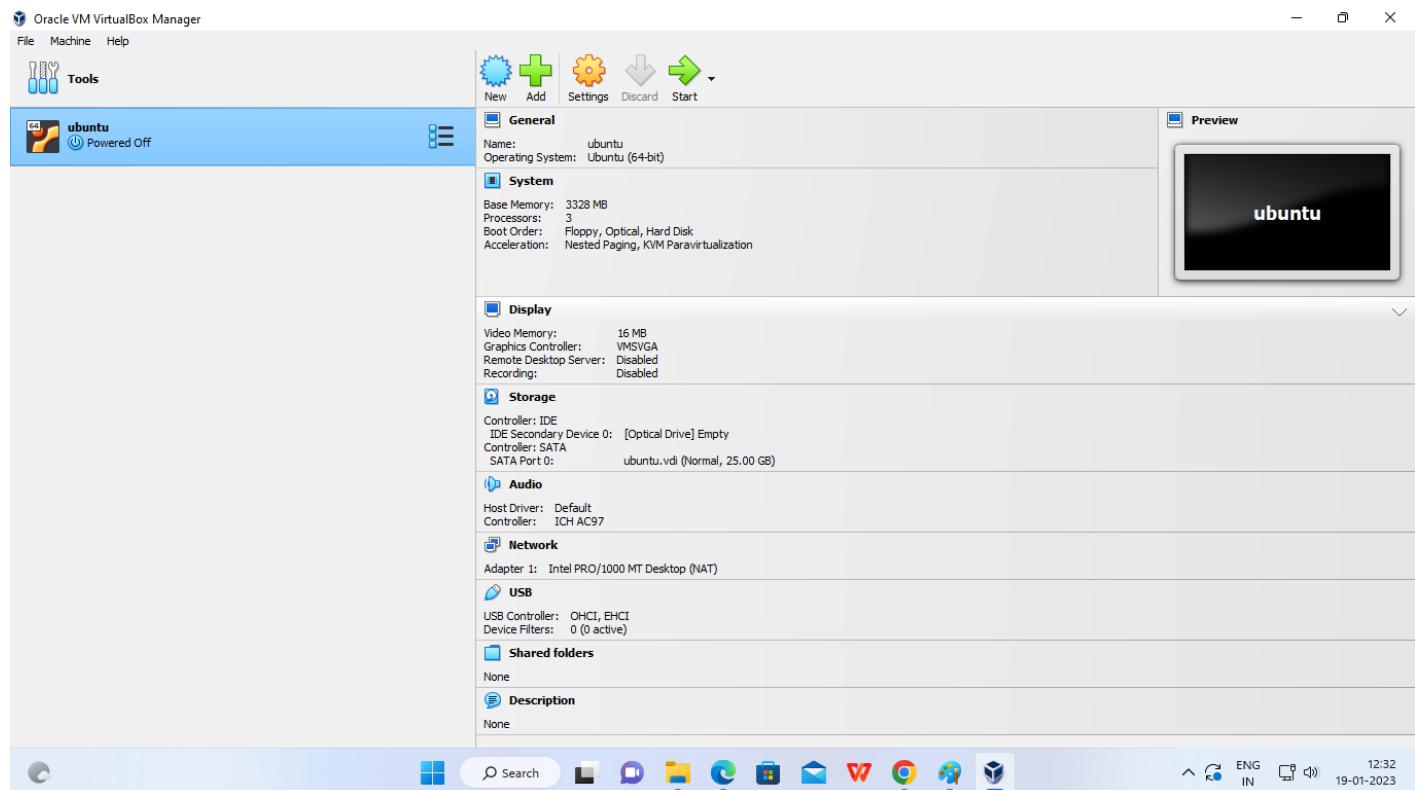
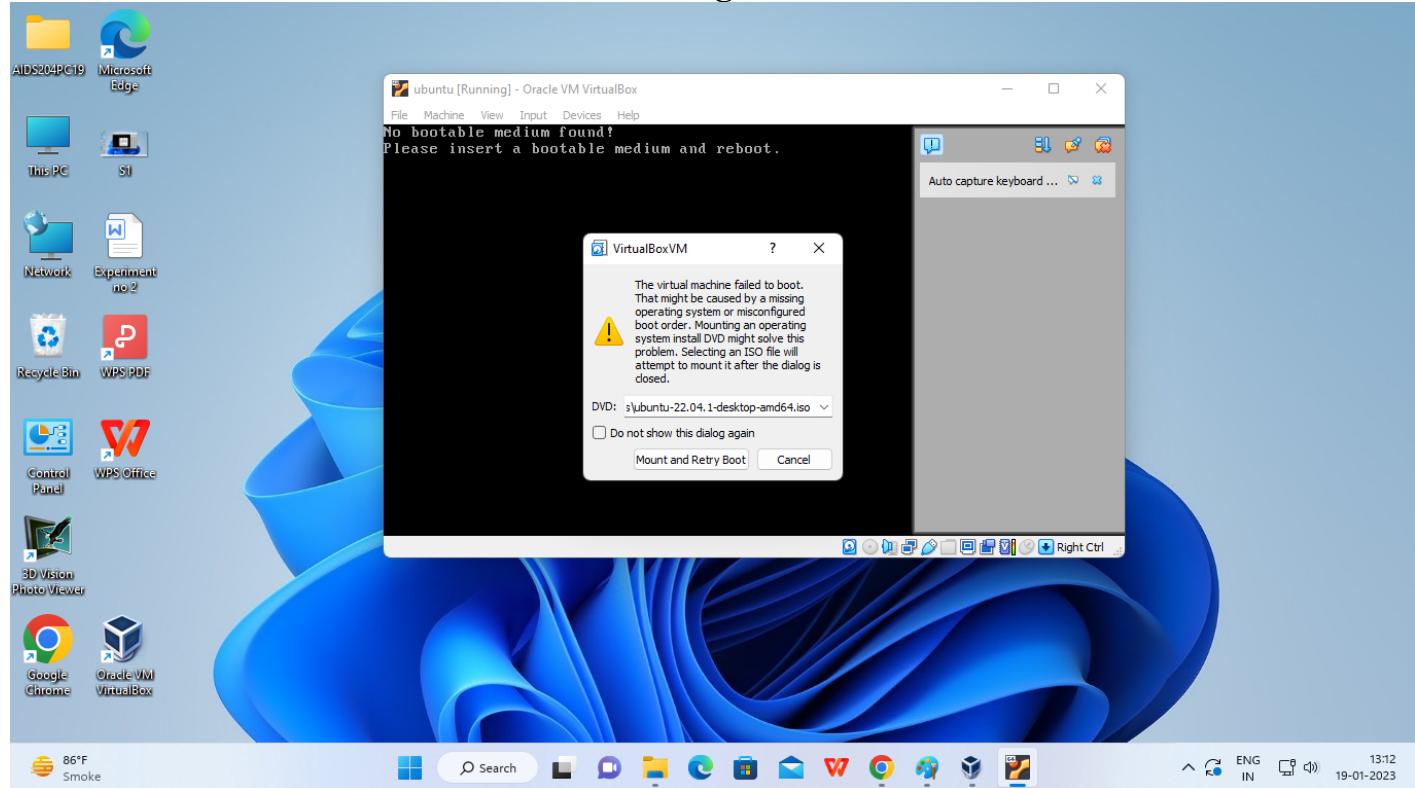
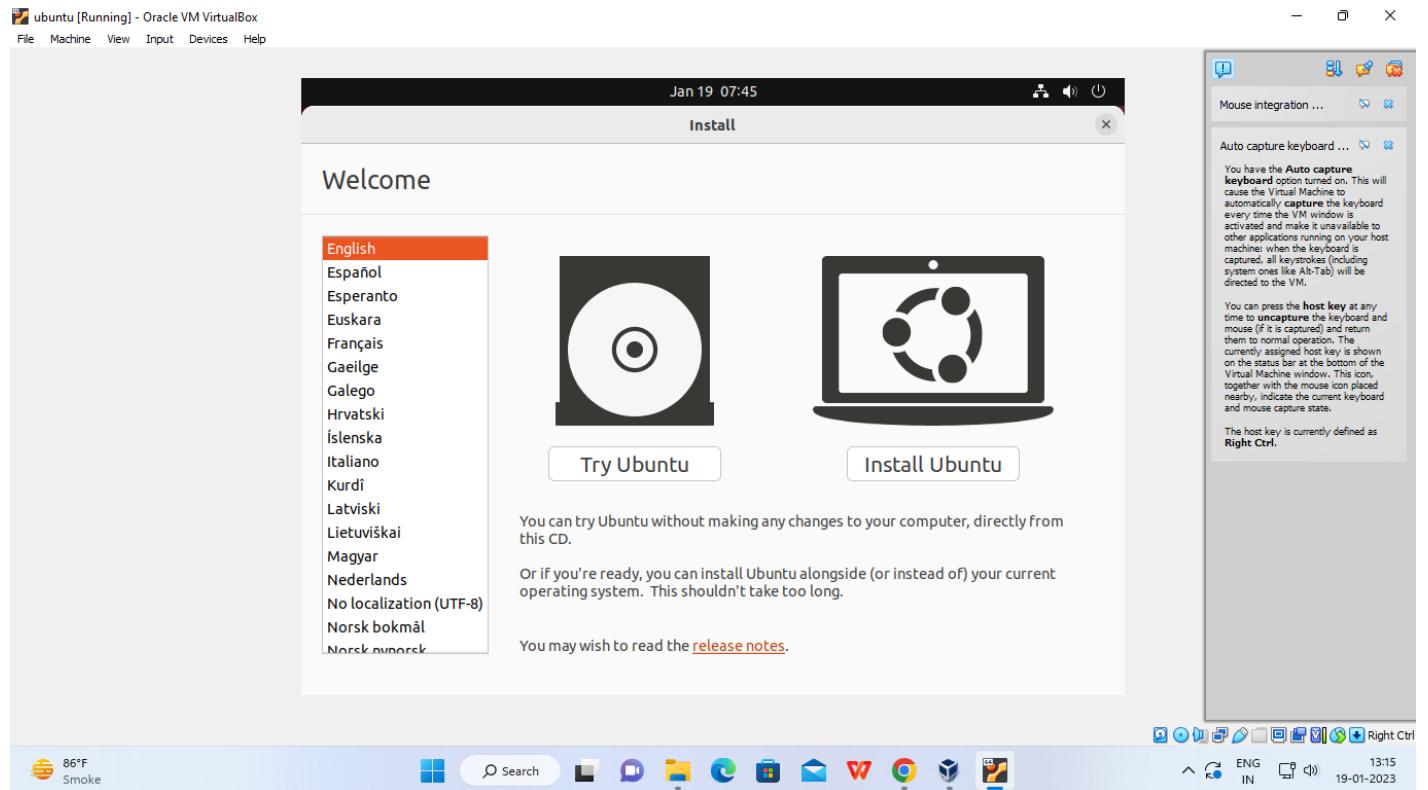


Fig 7 Summary of Virtual Machine

Screenshot of Virtual Machine ubuntu Being Installed





Conclusion:

Experiment Rubric:

Evaluation Criteria	Marks	Signature of Instructor with Date
Lab Performance		
Topic Knowledge		
Task Conclusion		
Attainment Level (Out of 3)		

