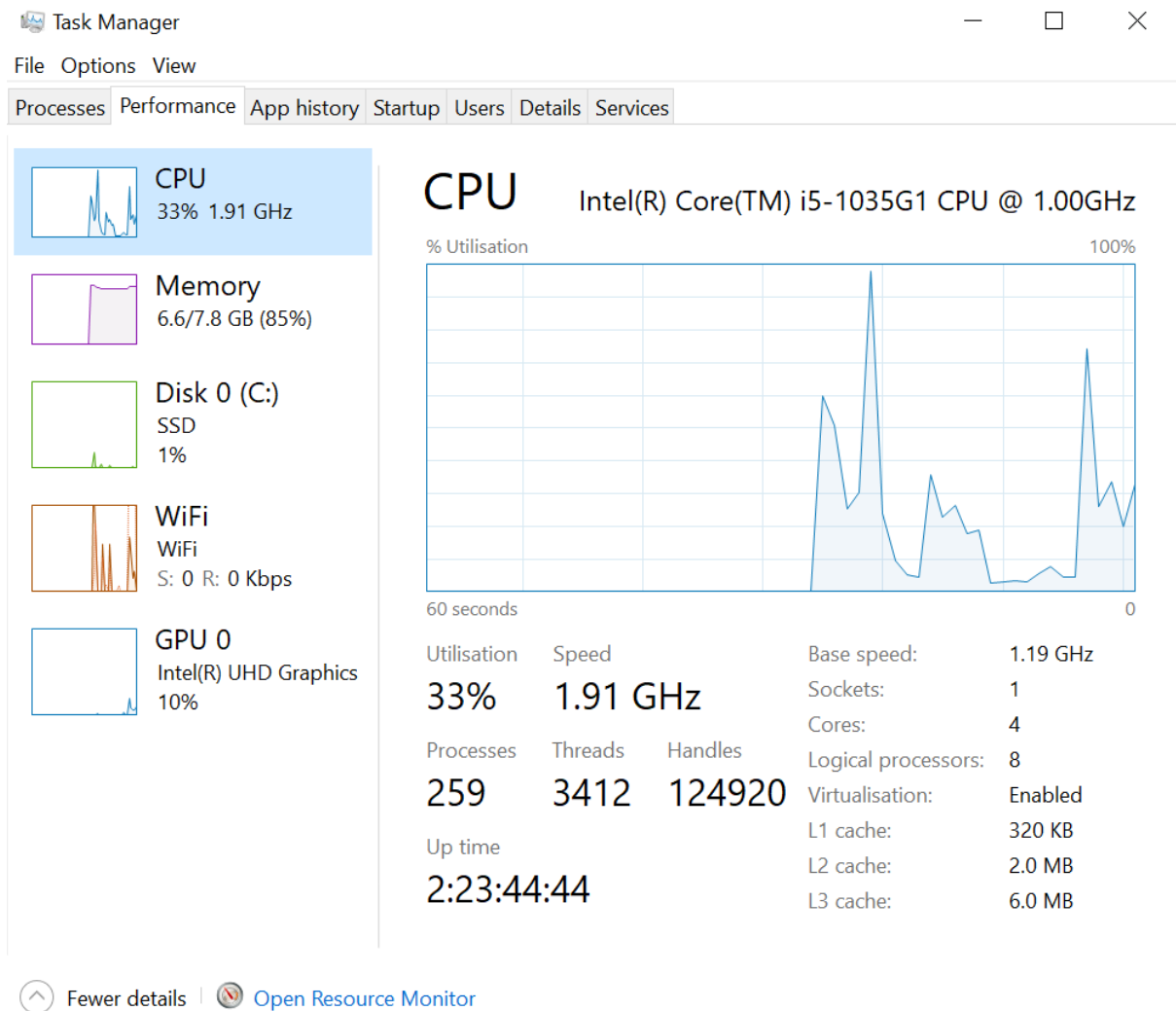


Lab 1:

1. Check if your processor supports Intel/AMD virtualization technology. Enable Intel virtualization technology in BIOS if possible.

Answer: Virtualization is enabled on my laptop.



2. The cloud is almost everywhere in our lives now. What do you think are the fundamental reasons behind its success? Name three pros and three cons of cloud.

Cloud computing helps people and businesses manage and access data and services. To highlight why it helps people/businesses with their data and services I will outline the pros of cloud computing.

1. Scalability

Cloud computing allows users to scale their resources up or down based on demand without the costs and maintenance of on-premises solutions. This can help businesses with fluctuating workloads and enables them to adapt quickly to changes.

2. Accessibility

Cloud computing provides users with access to data and applications from anywhere with an internet connection. Cloud computing is easy to access remotely on devices such as laptops or mobile phones and can allow businesses to share access with multiple staff members in the work environment and remotely which allows for better collaboration and communication.

3. Cost Effective

Cloud computing can be cost-effective, it can help organizations reduce the need to invest in and maintain their own hardware and software infrastructure as you can buy all the storage you could ever need.

4. Automated Backup/Restore Of Files And Data

Cloud backup is a service in which the data and applications on a business's servers are backed up and stored on a remote server. Companies can back up to the cloud to keep files and data readily available in the event of a system failure, outage, or a natural disaster.

5. Constant Software Updates And Improvements

Cloud service providers regularly update their software and infrastructure to enhance performance, security, and features. Users benefit from these continuous improvements without having to manage updates themselves. This ensures that organizations always have access to the latest technologies and security measures without the burden of manual upgrades.

Although there are quite a few pros to cloud computing, I will examine the cons that come with it:

1. Security

There are some security risks. The most common cloud security issues include unauthorized access through improper access controls and the misuse of employee credentials. Other security issues include internet protocol vulnerabilities, data recovery vulnerabilities, vendor security risks, and legal risks.

2. Dependency on Internet Connection

Cloud computing has a high dependency on the internet. Since businesses only receive cloud computing through the internet, there can arise an issue where the cloud service has downtime. When there is an internet outage or weak connectivity, services get interrupted, and this increases downtime.

3. Denial of service attacks (DoS)

This is an attack that shuts down a machine or network and makes it inaccessible to users. This attack floods the target with traffic or sends information that triggers a crash. Cloud service users have little or no control over DoS attacks.

4. Data Loss Or Theft And Data leakage

When you store files and data in someone else's server, you are trusting the provider with that data. Data leaks can happen due to unauthorized exposure of sensitive information through vulnerabilities in the system. Data loss can occur when data is accidentally deleted, or something causes that data to become corrupted. Viruses, physical damage or formatting errors can render data unreadable by both humans and software.

5. Limited Customization and Control

While cloud services offer convenience, users often have limited control over the infrastructure and configurations. Organizations may face challenges in customizing solutions according to specific needs, leading to a reliance on the service provider's settings, which may not align perfectly with the organization's requirements.

3. What is the primary function of a hypervisor in virtualization?

A hypervisor is software that you can use to run multiple virtual machines on a single physical machine. Every virtual machine has its own operating system and applications. The hypervisor allocates physical resources (such as CPU, memory, disk space, and network bandwidth) to multiple virtual machines. It ensures that each VM gets a fair share of the underlying hardware resource. Hypervisors often support features like live migration, allowing virtual machines to be moved from one physical host to another without service interruption. Hypervisors are present in various cloud service models, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

4. What is a virtual machine (VM)?

A virtual machine (VM) is a computing resource that uses software instead of a physical computer to run programs and deploy apps. One or more virtual "guest" machines run on a physical "host" machine. Each virtual machine runs its own operating system and functions separately from the other VMs even when they are all running on the same host. For example, a virtual MacOS virtual machine can run on a physical PC.

5. What are the benefits of using virtual machines?

- Virtual machines can run multiple operating systems on a single physical computer, which can help with saving physical space and management costs.
- Virtual machines support legacy applications which can reduce the costs of migrating to a new operating system.
- Because of cloud computing, it has become easier to introduce multiple copies of the same virtual machine to better manage increased workloads.
- Since virtual machines run independently, it's isolated from other machines. This helps provide a greater level of security for each machine, as any malware or malicious attacks will not be spread across multiple machines.

- Virtual machines are incredibly easy to manage as you don't have to worry about each machine's hardware or software configurations. You can install the VM software and create new virtual environments with a few clicks.

6. List five use cases of virtual machines.

1. **Try New Operating Systems:** You can try out a new operating system without needing to do a dual-boot setup. For example, you can install VirtualBox and create a new virtual machine such as Linux. You can now run Linux (the guest OS) in a window within your Windows System (the host OS) like any other program.
2. **Run Old or Incompatible Software:** Virtual Machines provide a great environment for running software that is not compatible with your current machine. This also makes running outdated software much safer as it's sandboxed inside the virtual machine.
3. **Developing Software for Other Platforms:** another use for virtual machines is simplifying the workflow for testing apps and websites across multiple platforms. For example, if you're developing a game that works on both desktop and mobile platforms. You can use emulation to test the various versions right on your computer. Instead of moving installer files back and forth to your phone or other test computers, you can just emulate them.
4. **Clone A System To Another Machine:** since the entire contents of a virtual machine are stored in a few files, you can easily transfer them to another computer and load the VM up without any issues (using the same hypervisor). For example, VirtualBox stores VM settings in a tiny VBOX file. The other main component is a VDI file, which acts as a virtual storage disk.
5. **Enhanced Security And Isolation:** Virtual machines provide an isolated environment that can be beneficial for security purposes. For example, if you need to run potentially risky applications, doing so in a virtual machine ensures that any potential malware or security threats are contained within the virtualized environment. This helps protect the host system from potential harm and simplifies the process of reverting to a clean state if necessary. Virtual machines can also be used for secure sandboxing and testing of software in a controlled environment.

7. In virtualization, what is the guest operating system?

- a) The main operating system running on the physical machine
- b) The operating system installed on a virtual machine
- c) The operating system running on a remote server
- d) The operating system running on a mobile device

8. What does virtual machine isolation mean?

- a) Virtual machines can communicate directly with the physical hardware.
- b) Virtual machines share the same resources and cannot be isolated.
- c) Virtual machines run independently and are isolated from each other and the host system.

d) Virtual machines can only be accessed locally.

9. What is the benefit of virtual machine portability?

a) It allows virtual machines to communicate with each other easily.

b) It ensures faster boot times for virtual machines.

c) It allows virtual machines to be moved between different physical machines with compatible hypervisors.

d) It reduces the need for hardware virtualization.

10. What is the purpose of cloning a virtual machine?

The purpose of cloning a virtual machine is to create an identical and independent copy of an existing virtual machine. This cloned copy, often referred to as a "clone," replicates the entire configuration, settings, and data of the original virtual machine. The main purposes behind cloning a virtual machine can include:

1. **Backup and Disaster Recovery:** Cloning provides a quick and efficient way to create backups of virtual machines. In the event of data loss or system failure, the cloned copy can be used to restore the virtual machine to a known good state, ensuring business continuity.
2. **System Migration:** Cloning enables the migration of virtual machines between different physical hosts or hypervisors. This portability allows organizations to move virtualized workloads to new hardware or infrastructure.
3. **Testing And Development:** Developers often use clones to create replicas of virtual machines for testing purposes. This allows them to experiment with new software, updates, or configurations without impacting the original virtual machine. Cloning supports a safe and isolated environment for software development and testing.

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