Topic: THE Internet

• Assignment level Basic:

1-What do you mean by the term URL ?

A URL (Uniform Resource Locator) is a unique identifier used to locate a resource on the Internet. It is also referred to as a web address. URLs consist of multiple parts -- including a protocol and domain name -- that tell a web browser how and where to retrieve a resource.

End users use URLs by typing them directly into the address bar of a browser or by clicking a hyperlink found on a webpage, bookmark list, in an email or from another application.

The URL contains the name of the [protocol](https://www.techtarget.com/searchnetworking/definition/protocol) needed to access a resource, as well as a resource name. The first part of a URL identifies what protocol to use as the primary access medium. The second part identifies the [IP address](https://www.techtarget.com/whatis/definition/IP-address) or domain name -- and possibly subdomain -- where the resource is located.

URL protocols include [HTTP](https://www.techtarget.com/whatis/definition/HTTP-Hypertext-Transfer-Protocol) (Hypertext Transfer Protocol) and [HTTPS](https://www.techtarget.com/searchsoftwarequality/definition/HTTPS) (HTTP Secure) for web resources, mail to for email addresses, FTP for files on a File Transfer Protocol (FTP) server, and telnet for a session to access remote computers. Most URL protocols are followed by a colon and two forward slashes; "mail to" is followed only by a colon.

Optionally, after the domain, a URL can also specify:

* a path to a specific page or file within a domain;
* a network [port](https://www.techtarget.com/searchnetworking/definition/port) to use to make the connection;
* a specific reference point within a file, such as a named anchor in an HTML file; and
* a query or search parameters used -- commonly found in URLs for search results.

**Importance of a URL design**

URLs can only be sent over the Internet using the [ASCII](https://www.techtarget.com/whatis/definition/ASCII-American-Standard-Code-for-Information-Interchange) character-set. Because URLs often contain non-ASCII characters, the URL must be converted into a valid ASCII format. URL encoding replaces unsafe ASCII characters with a "%" followed by two hexadecimal digits. URLs cannot contain spaces.

**URL examples**

When designing URLs, there are different theories about how to make the syntax most usable for readers and archivists. For example, in the URL's path, dates, authors, and topics can be included in a section referred to as the "slug." Consider, for example, the URL for this definition:

**https://www.techtarget.com/searchnetworking/definition/URL**

Look past the protocol (identified as HTTPS) and the permalink (www.techtarget.com) and we see the file path includes two paths (searchnetworking and definition) and the title of the definition (URL).

Additionally, some URL designers choose to put the date of the post, typically, as (YYYY/MM/DD).

2. Term which is used to see web pages is called what

The term used to view web pages is typically referred to as a "web browser." A web browser is a software application that allows users to access and navigate the World Wide Web, displaying web pages and content. Examples of popular web browsers include Google Chrome, Mozilla Firefox, Microsoft Edge, Safari, and others.

• Assignment level Intermediate:

1. In the Ethernet which topology is used?

Ethernet can be implemented using various topologies, but the most common and widely used topology for Ethernet networks is the star topology. In a star topology, each device on the network is connected to a central hub or switch, forming a star-like structure. The central hub or switch facilitates communication between devices by managing the data traffic on the network.

While star topology is predominant, other topologies like bus and ring were used in older Ethernet implementations. However, these topologies are less common in modern Ethernet networks. The star topology offers advantages such as simplicity, ease of troubleshooting, and scalability, making it the preferred choice for Ethernet networks in most cases.

1. Top of Form

2 - Set of rules and regulations while working on internet, which term is used?

The set of rules and regulations that govern behavior and activities while working on the internet is often referred to as "Netiquette." Netiquette is a combination of the words "internet" and "etiquette," and it encompasses guidelines for appropriate and respectful online behavior. These guidelines help users navigate online spaces, communicate effectively, and maintain a positive digital environment. Netiquette covers various aspects, including email communication, online forums, social media interactions, and general online conduct. Adhering to netiquette helps create a more pleasant and productive online experience for everyone involved.

• Assignment level advance:

1. What do you mean by RAS?

RAS, which stands for Reliability, Availability, and Serviceability, is a set of key characteristics that are essential in the design, operation, and maintenance of various systems, particularly in the field of information technology and engineering. Here's a brief explanation of each component:

1. **Reliability:**
   * **Definition:** Reliability refers to the ability of a system or component to perform its functions under specific conditions for a specified period of time.
   * **Key Aspect:** It involves the system's ability to consistently operate without failure and to deliver the expected performance over time.
2. **Availability:**
   * **Definition:** Availability is the measure of the system's readiness to perform its functions at any given point in time.
   * **Key Aspect:** It takes into account factors such as downtime, maintenance, and repair time. High availability implies minimal downtime and quick recovery from failures.
3. **Serviceability:**
   * **Definition:** Serviceability, sometimes also referred to as Maintainability, relates to the ease with which a system can be repaired or maintained.
   * **Key Aspect:** A system with good serviceability is designed in a way that makes it straightforward to identify, diagnose, and rectify faults or issues. This characteristic contributes to minimizing downtime during maintenance or repairs.

The RAS attributes are crucial in various industries, including IT, telecommunications, manufacturing, and transportation, where the reliability and availability of systems are paramount. Designing systems with high RAS characteristics helps ensure optimal performance, minimal disruptions, and efficient maintenance processes. These principles are particularly important in mission-critical environments where system failures or downtime can have significant consequences.

1. What are the main search engines to get more website URL on Internet?

The main search engines used to find website URLs on the internet include:

1. **Google:** Google is the most widely used search engine globally. It uses complex algorithms to index and rank websites based on relevance to search queries.
2. **Bing:** Bing is another popular search engine developed by Microsoft. It functions similarly to Google and provides search results based on relevance.
3. **Yahoo:** While Yahoo's search engine is not as dominant as Google or Bing, it still indexes and provides search results for websites.
4. **DuckDuckGo:** DuckDuckGo is known for its focus on user privacy. It sources search results from various sources, including Bing, to provide users with relevant information without tracking their personal data.
5. **Baidu:** Baidu is a prominent search engine in China and is used primarily for Chinese-language searches. It's one of the largest search engines globally.
6. **Yandex:** Yandex is a Russian search engine that also provides services in various other countries. It's particularly popular in Russia and neighboring regions.

When you want to find website URLs, you can use these search engines by entering relevant keywords or phrases related to the content or topic you are looking for. Keep in mind that search engine algorithms may differ, so the search results might vary across different platforms.

3-What does the PROTOCOL consist of?

In networking, a protocol is a set of rules for formatting and processing data. Network protocols are like a common language for computers. The computers within a network may use vastly different software and hardware; however, the use of protocols enables them to communicate with each other regardless.

Standardized protocols are like a common language that computers can use, similar to how two people from different parts of the world may not understand each other's native languages, but they can communicate using a shared third language. If one computer uses the [Internet Protocol (IP)](https://www.cloudflare.com/learning/network-layer/internet-protocol/) and a second computer does as well, they will be able to communicate — just as the United Nations relies on its 6 official languages to communicate amongst representatives from all over the globe. But if one computer uses IP and the other does not know this protocol, they will be unable to communicate.

On the Internet, there are different protocols for different types of processes. Protocols are often discussed in terms of which OSI model layer they belong to.

Topic: Virtualization

• Assignment level Basic:

1. What is Virtualization ?

Virtualization is the creation of a virtual -- rather than actual -- version of something, such as an operating system (OS), a server, a storage device or network resources.

Virtualization uses software that simulates hardware functionality to create a virtual system. This practice allows IT organizations to operate multiple operating systems, more than one virtual system and various applications on a single server. The benefits of virtualization include greater efficiencies and economies of scale.

OS virtualization is the use of software to allow a piece of hardware to run multiple operating system images at the same time. The technology got its start on mainframes decades ago, allowing administrators to avoid wasting expensive processing power.

2. What is the Difference between Full Virtualization and Para Virtualization?

The difference between Full Virtualization and Paravirtualization are as follows:

| **S.No.** | **Full Virtualization** | **Paravirtualization** |
| --- | --- | --- |
| **1.** | In Full virtualization, virtual machines permit the execution of the instructions with the running of unmodified OS in an entirely isolated way. | In paravirtualization, a virtual machine does not implement full isolation of OS but rather provides a different API which is utilized when OS is subjected to alteration. |
| **2.** | Full Virtualization is less secure. | While the Paravirtualization is more secure than the Full Virtualization. |
| **3.** | Full Virtualization uses binary translation and a direct approach as a technique for operations. | While Paravirtualization uses hypercalls at compile time for operations. |
| **4.** | Full Virtualization is slow than paravirtualization in operation. | Paravirtualization is faster in operation as compared to full virtualization. |
| **5.** | Full Virtualization is more portable and compatible. | Paravirtualization is less portable and compatible. |
| **6.** | Examples of full virtualization are Microsoft and Parallels systems. | Examples of paravirtualization are Microsoft Hyper-V, Citrix Xen, etc. |
| **7.** | It supports all guest operating systems without modification. | The guest operating system has to be modified and only a few operating systems support it. |
| **8.** | The guest operating system will issue hardware calls. | Using the drivers, the guest operating system will directly communicate with the hypervisor. |
| **9.** | It is less streamlined compared to para-virtualization. | It is more streamlined. |
| **10.** | It provides the best isolation. | It provides less isolation compared to full virtualization. |

• Assignment level Intermediate:

1. What is Hyper-visor?

## A hypervisor, also known as a virtual machine monitor or VMM, is software that creates and runs virtual machines (VMs). A hypervisor allows one host computer to support multiple guest VMs by virtually sharing its resources, such as memory and processing. Benefits of hypervisors

There are several benefits to using a hypervisor that hosts multiple virtual machines:

* **Speed**: Hypervisors allow virtual machines to be created instantly, unlike bare-metal servers. This makes it easier to provision resources as needed for dynamic workloads.
* **Efficiency**: Hypervisors that run several virtual machines on one physical machine’s resources also allow for more efficient utilization of one physical server. It is more cost- and energy-efficient to run several virtual machines on one physical machine than to run multiple underutilized physical machines for the same task.
* **Flexibility**: Bare-metal hypervisors allow operating systems and their associated applications to run on a variety of hardware types because the hypervisor separates the OS from the underlying hardware, so the software no longer relies on specific hardware devices or drivers.
* **Portability**: Hypervisors allow multiple operating systems to reside on the same physical server (host machine). Because the virtual machines that the hypervisor runs are independent from the physical machine, they are portable. IT teams can shift workloads and allocate networking, memory, storage and processing resources across multiple servers as needed, moving from machine to machine or platform to platform. When an application needs more processing power, the virtualization software allows it to seamlessly access additional machines.

Why use a hypervisor?

Hypervisors make it possible to use more of a system’s available resources and provide greater IT mobility since the guest VMs are independent of the host hardware. This means they can be easily moved between different servers. Because multiple virtual machines can run off of one physical server with a hypervisor, a hypervisor reduces:

* Space
* Energy
* Maintenance requirements

2-What are different hypervisors available in Linux?

Linux supports several hypervisors, which are software platforms that enable virtualization. Virtualization allows multiple operating systems to run on a single physical machine. Some popular hypervisors for Linux include:

1. **KVM (Kernel-based Virtual Machine):** KVM is a Linux kernel module that turns the host operating system into a hypervisor. It is part of the mainline Linux kernel and provides hardware-assisted virtualization. Tools like QEMU are often used in conjunction with KVM to manage virtual machines.
2. **Xen:** Xen is an open-source hypervisor that allows for paravirtualization and hardware-assisted virtualization. It can run multiple virtual machines on a single physical machine and is known for its performance and resource efficiency.
3. **VirtualBox:** While VirtualBox is not exclusive to Linux, it is a popular cross-platform hypervisor. It is open-source and supports a wide range of guest operating systems. VirtualBox is developed by Oracle and provides a user-friendly interface for managing virtual machines.
4. **QEMU (Quick Emulator):** QEMU is a versatile emulator that can also function as a hypervisor. It supports various guest architectures and provides dynamic translation to achieve good performance. When used with KVM, it enhances virtualization performance.
5. **VMware Workstation Player:** VMware offers a player for Linux that allows users to run and evaluate virtual machines. While VMware's enterprise solutions are more common, the Workstation Player is a free option for personal use.
6. **Virt-manager:** Virt-manager is a desktop application for managing virtual machines through libvirt. It provides a graphical user interface for creating, managing, and monitoring virtual machines running on KVM or QEMU.
7. **Proxmox Virtual Environment (Proxmox VE):** Proxmox VE is an open-source virtualization platform based on Debian that combines two virtualization technologies: KVM for virtual machines and LXC (Linux Containers) for lightweight container-based virtualization.

These are just a few examples, and the choice of a hypervisor depends on specific requirements, preferences, and use cases. Each hypervisor has its strengths and weaknesses, and users should select the one that best fits their needs

2-What is Virtualization and what are its types?

Virtualization is a technology that allows you to create multiple simulated environments or dedicated resources from a single, physical hardware system. The goal of virtualization is to enhance efficiency, flexibility, and resource utilization in computing environments. It enables the simultaneous operation of multiple operating systems or applications on a single physical machine, known as a host, without interference.

There are several types of virtualization, each serving different purposes:

1. **Hardware Virtualization (or Full Virtualization):**
   * This type of virtualization involves creating a complete simulation of the underlying physical hardware. Virtual machines (VMs) are created that behave like independent physical machines, and they can run their own operating systems. Hypervisors, also known as Virtual Machine Monitors (VMM), manage the interaction between the virtual machines and the physical hardware.
   * Examples of hardware virtualization include VMware, Microsoft Hyper-V, and KVM (Kernel-based Virtual Machine).
2. **Software Virtualization (or Application Virtualization):**
   * In this type, applications are encapsulated and isolated from the underlying operating system. This allows applications to run independently, avoiding conflicts with other applications or the operating system.
   * Examples include containerization technologies like Docker and application virtualization tools such as Wine (allows running Windows applications on Linux).
3. **Operating System Virtualization (or Containerization):**
   * This involves encapsulating an entire operating system along with its applications and dependencies into a container. Containers share the host OS kernel, but they have separate user spaces, making them lightweight and efficient.
   * Popular containerization platforms include Docker and Kubernetes.
4. **Network Virtualization:**
   * Network virtualization abstracts network resources and functionality from the underlying physical network. It allows the creation of virtual networks, enabling multiple logical networks to run on the same physical infrastructure.
   * Examples include technologies like Virtual LANs (VLANs) and software-defined networking (SDN).
5. **Storage Virtualization:**
   * This type virtualizes storage resources, abstracting physical storage devices into a unified storage pool. It enables efficient management of storage resources and improves flexibility in allocating and scaling storage.
   * Storage Area Networks (SANs) often incorporate storage virtualization.
6. **Desktop Virtualization:**
   * Desktop virtualization allows multiple virtual desktops to run on a single physical machine. Users can access these virtual desktops remotely, providing flexibility and centralized management.
   * Examples include Virtual Desktop Infrastructure (VDI) solutions like VMware Horizon and Citrix Virtual Apps and Desktops.

Virtualization is a key technology in modern computing, contributing to resource optimization, scalability, and enhanced security in IT environments.

Top of Form

• Assignment level advance:

1. Name the components that are used in VMware infrastructure What is benefits of Virtualization?

VMware infrastructure typically consists of several key components that enable virtualization. Here are some of the primary components:

1. **ESXi (Hypervisor):** ESXi is a bare-metal hypervisor that runs directly on the physical server hardware. It abstracts the physical resources and allows multiple virtual machines (VMs) to run on a single physical host.
2. **vCenter Server:** vCenter Server is a centralized management platform that provides a unified interface to manage and monitor virtualized environments. It helps in managing multiple ESXi hosts and provides features like VM provisioning, resource allocation, and monitoring.
3. **VMware vSphere Client:** This is the web-based interface used to interact with vCenter Server and manage the virtual infrastructure. It allows administrators to perform tasks such as creating VMs, configuring networks, and monitoring performance.
4. **VMware vSphere Hypervisor (Free ESXi):** This is a free version of ESXi that can be used for basic virtualization needs. It lacks some advanced features found in the licensed version but still provides a robust virtualization platform.
5. **VMware Tools:** These are guest operating system utilities that enhance the performance and functionality of VMs. They include drivers and other components that improve integration between the guest VM and the host system.

Benefits of Virtualization:

1. **Resource Utilization:** Virtualization allows for better utilization of physical hardware by running multiple virtual machines on a single physical server. This leads to increased efficiency and cost savings.
2. **Isolation:** Virtualization provides isolation between virtual machines. If one VM experiences issues or crashes, it does not affect other VMs running on the same host.
3. **Flexibility and Agility:** Virtualization makes it easy to create, move, and scale virtual machines. This flexibility allows for quicker deployment of new services and applications.
4. **Cost Savings:** By consolidating multiple servers onto a single physical host, organizations can save on hardware costs, power consumption, and data center space.
5. **Disaster Recovery:** Virtualization facilitates the creation of snapshots and backups, making it easier to recover from disasters or system failures.
6. **Testing and Development:** Virtualization provides an ideal environment for testing and development. Virtual machines can be easily cloned or snapshot, allowing developers to work in isolated environments.
7. **Green Computing:** Virtualization can contribute to energy efficiency and environmental sustainability by reducing the number of physical servers and associated energy consumption.
8. **High Availability:** Virtualization platforms often include features like live migration and failover, ensuring that VMs can be moved or restarted on other hosts in case of hardware failures.

Overall, virtualization brings efficiency, flexibility, and cost savings to IT infrastructures, making it a fundamental technology in modern data centers