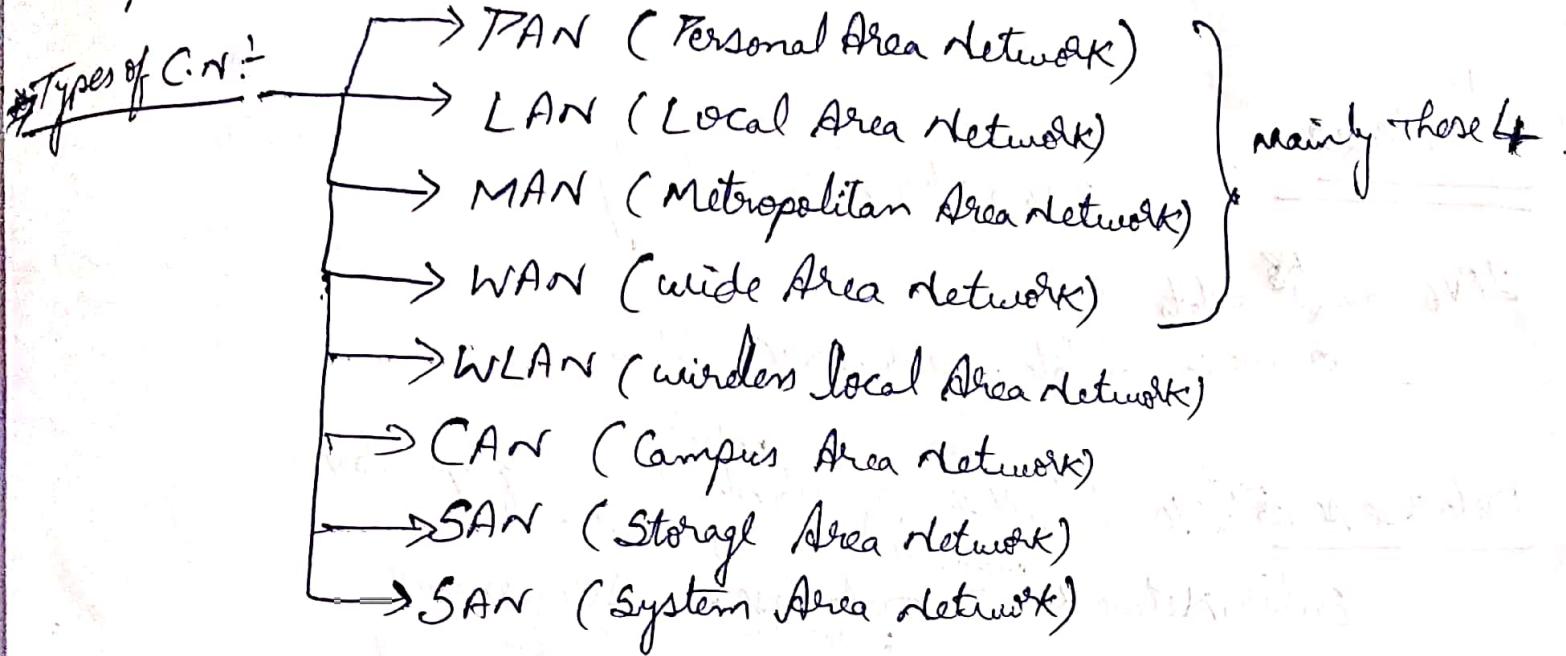


Computer network \Rightarrow It is a system that connects numerous independent computers in order to share information (data) and resources.



IP Address: It is an unique address that identifies a device on the Internet or a local network.

(*) It is an identifying number that is associated with a specific computer or computer network.

IP \rightarrow International Protocol

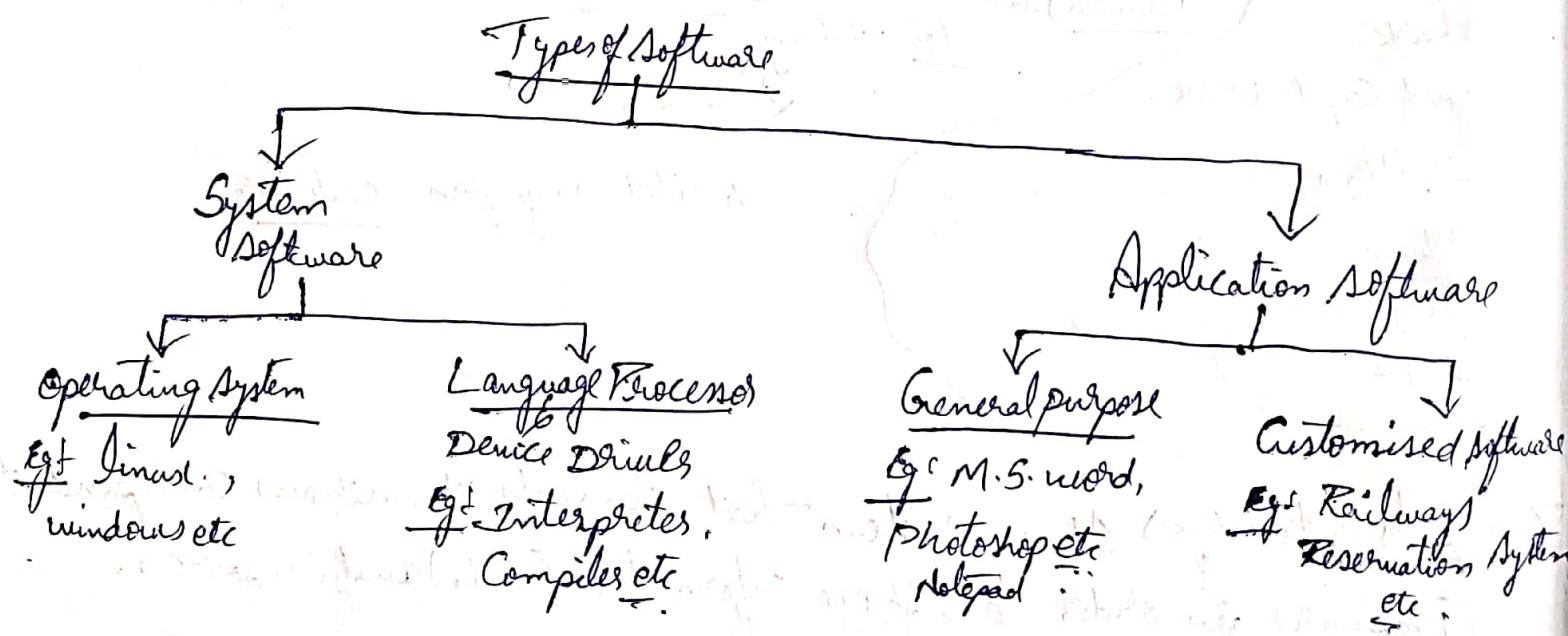
IPv4 \rightarrow International Protocol Version 4. It is the underlying technology that makes it possible for us to connect our devices to the web.

* It is the 1st version brought into action for Production within the ARPANET in 1983.

- ⇒ IPv6 :- It is a set of specifications from the Internet Engineering Task Force that improves IPv4 by extending IP addresses from 32 bits to 128 bits.
- * It is essentially an upgrade of IP version V4.

⇒ Software :- It is a set of instructions, data or programs used to operate computers and execute specific tasks.

⇒ Types of Software :-



DataBase : It is an organized collection of data, so that it can be easily accessed and managed ^{typically} stored in electronically in a computer system.

Data Base management System : It is a system software for creating and managing data bases.

* It is a software package designed to define, manipulate, retrieve and manage data in a database.

Types of DBMS :

- ① Hierarchical Databases
- ② Network D.B.
- ③ Relational D.B
- ④ Object Oriented D.B.
- ⑤ Graph D.B.
- ⑥ ER Model D.B.
- ⑦ Document D.B.

Client Server Architecture :

* It is a computing model in which the server hosts, delivers & manages most of the resources and services to be consumed by the client.

* This type of architecture has one or more client computers connected to a central server over a network or Internet connection.

* It is also known as networking computing model or client server network becoz all requests & services are delivered over a network.

Software Bug: It is an error, flaw or fault in application. This error causes the application to produce an unintended or unexpected result, such as crashing or producing invalid results.

Eg: Some main types of software bugs are listed below,

- ① Crash → (This is one of the most common & sometimes dangerous type of errors that could occur).
- ② Functional Errors
- ③ Acknowledgement message errors
- ④ Types
- ⑤ Missing Command.
- ⑥ Calculation Errors
- ⑦ Hardware usage error
- ⑧ Control flow error.

Middle ware: It is the software that lies b/w an operating system and the applications running on it, enabling communication and data management.

(Q)

- * It is the software that enables one or more kinds of communication or connectivity b/w two or more applications.

Eg: ① Database M.W.

④ message-oriented M.W;

② Application Server M.W.

③ web M.W

Web Server: It is the software & hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the world wide web.

- * The main job of a web server is to display website content through storing, processing and delivering webpages to users.

(Q)



- * It is a computer that runs websites - It's a computer program that distributes web pages as they are requested.

Eg: ① IIS

② Apache web server.

③ JBoss

④ Glassfish.

Application Server: It is a type of server designed to install, operate and host associated services and applications for the IT services, end users and organizations.

Eg: JBoss :- open source server from JBoss Community.

Glassfish :- Provided by Sun Microsystem.

(Q)

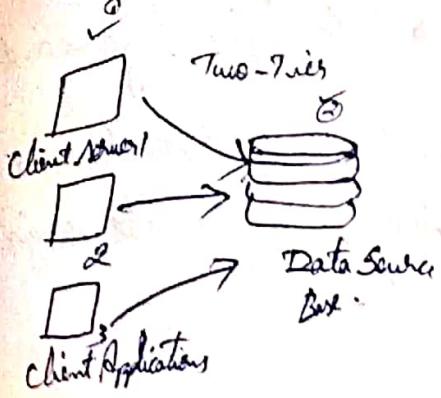
- * It is a software framework that delivers content and assets for a client application.

Load Balancer:

* It is the process of distributing incoming network traffic among multiple servers to improve a service or application's performance.

* It is also known as server farm or server pool.

2-TIER Architecture :-



- * It is a Client-Server architecture.
- * Direct Communication
- * Run faster (Tight Coupled)

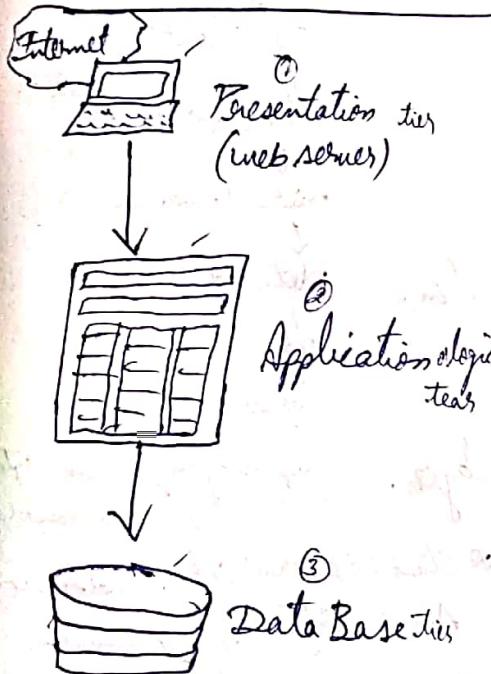
(i)

* It is like a Client Server application.

* The direct communication takes place b/w client & server. There is no intermediate b/w client & server. So, in Client application the client writes the program for saving the record in SQL server & thereby saving the data in a database.

Eg:- Games, music players, desktop applications.

3-TIER Architecture :-



* It is a Client Server Architecture in which the functional process logic, data access, Computer data storage & user interface are developed & maintained as independent module on separate platforms.

(ii)

* It is a Client Server Implementation that uses a presentation tier, application tier & data tier to organize app design.

Ex :- Business app

① Presentation :- Browser or fat Client

② Logic tier :- Business logic, typically in an application server (Based on ASP.NET).

③ Data tier :- A data base, typically a RDBMS such as MySQL or Oracle.

⇒ N-Tier Architecture :-

- * It is an architecture that divides an application into logical layers and physical tiers.
 - * Layers are a way to separate responsibilities and manage dependencies.
 - * Each layer has a specific responsibility. A higher layer can use services in a lower layer, but not the other way around.
- Eg:- Print, directory or database services.

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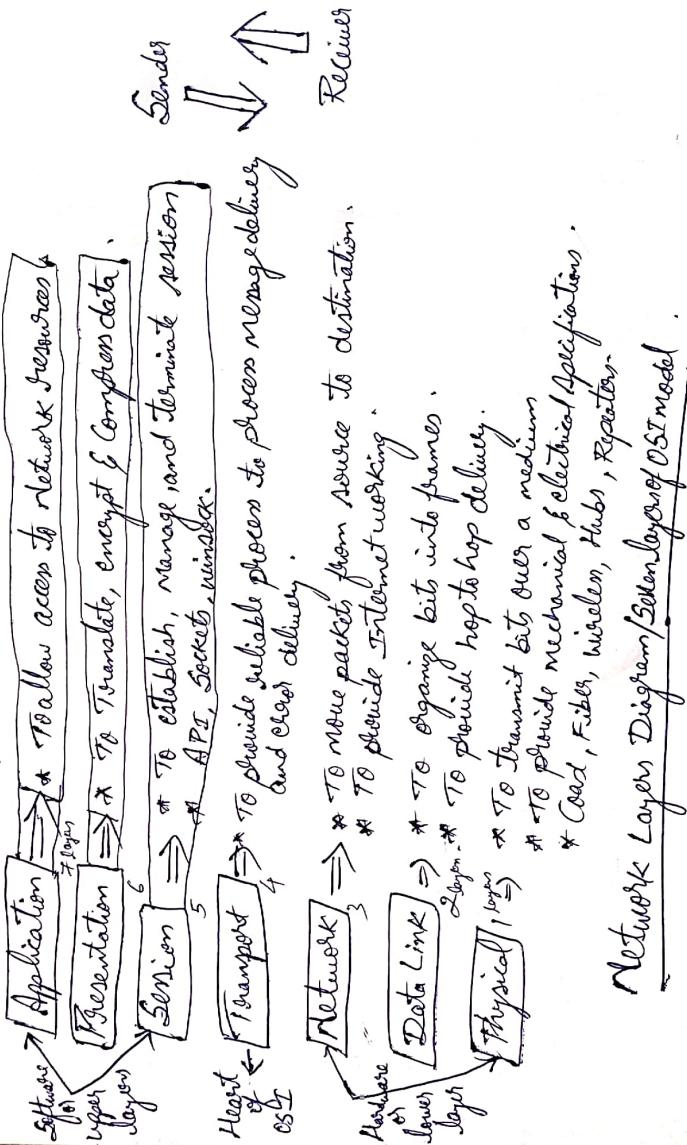
⇒ Protocol: It is a standardized set of rules for formating and processing data.

* It enables the computers to communicate with each other.

⇒ OSI model: At this a seven layered that computer system use to communicate over a network (open system interconnection model)

* It is a logical and conceptual model that defines network communication used by systems open to interconnection and communication with other systems.

* It also defines a logical network and effectively describes computer system transfer by using various layers of protocols.



Network Layer Diagram/Sixth layer of OSI model.

⇒ TCP/IP model: (Transmission Control/Internet Protocol).

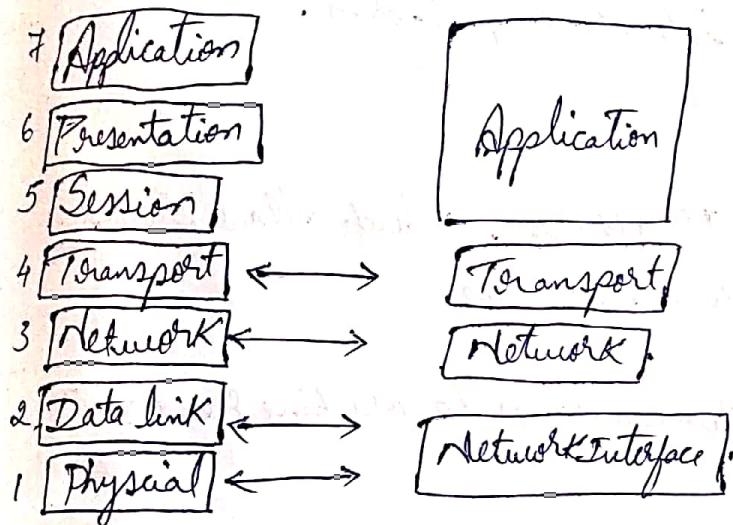
* It helps to determine how a specific computer should be connected to the internet and how data should be transmitted b/w them.

* It has a four layered that computer use to communicate over a network.

- 4 Application \Rightarrow * To allow access to network resources.
- 3 Transport \Rightarrow * To provide reliable process to process message delivery & error delivery.
- 2 Internet \Rightarrow * To move packets from source to destination
* To provide Internet working.
- 1 Network Interface \Rightarrow * Responsible for the transmission for the b/w two device on the same network.

Four layers of TCP/IP model .

\Rightarrow Diff b/w OSI & TCP/IP model :-



OSI model TCP/IP model

\Rightarrow HTTP :- (Hypertext Transfer protocol)

- * It is the foundation of the world wide web and is used to load web pages using hypertext links.
- * It is an application layer protocol designed to transfer information b/w networked devices & runs on top of other layers of the Network protocol stack.

\Rightarrow HTTPS :- (Hypertext Transfer protocol secure) .

- * This is a secure way to send data b/w a web server and a web Browser.

⇒ SSL :- (Secure Sockets Layer) It is a protocol for establishing secure links b/w networked computers.

- * It is a protocol for establishing secure links b/w networked computers.
- * It is an encryption-based Internet security protocol.

⇒ Encryption :-

- * It is the method by which information is converted into secret code that hides the information's true meaning.
- * It is essential for security on the Internet.

⇒ Decryption :-

- * It is the process of converting encrypted data into recognizable information.
- * The conversion of encrypted data into its original form.

⇒ DNS :- (Domain Name System)

- * It turns domain names into IP addresses, which allow browsers to get into websites and other Internet resources.
- * It translates human readable domain names to machine readable IP addresses.

⇒ Router :-

- * It is a physical or virtual Internet working device that is designed to receive, analyse and forward data packets b/w computer networks.

⇒ ISP? What they do?

ISP → Internet Service Provider

- * The company that provides Internet connections and services to individuals and organizations.

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→ Local Host :- It is the standard host name provided to the address of the local computer in computer networking.

* It is the host name of the computer that is currently in use to run a program, in which the computer has the role as a virtual server.

→ 127.0.0.1 IP address :- It is the standard address for IPv4 loopback traffic.

* It is the loopback IP address also called as local host.

* These address is used to establish an IP connection to the same machine or computer being used by the end user.

→ LoopBack :-

* A loopback address has been built into the IP domain system in order to allow for a device to send and receive its own data packets.

* It is a special, virtual network interface that your computer uses to communicate with itself.

→ Port :-

* It is a software defined number associated to a network protocol that receives or transmits communication for a specific service and port.

* It is a communication endpoint.

→ Reserved Ports :-

* Port numbers ranges from 0 to 65535, but only port numbers 0 to 1023 are reserved for privileged services and designated as well known ports.

→ Port reserved for http :-

The port used for http traffic is 80.

→ The port reserved for https is 443.

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⇒ IP address

- ① IP stands for Internet Protocol
- ② It is a logical address
- ③ It is Provided by the Internet Service provider (ISP)
- ④ It can be changed by changing ISP
- ⑤ It has various classes like A, B, C, D, E.
- ⑥ It is applicable on network layer of OSI model.
- ⑦ The length of IPv4 is 32 bits -
— IPv6 is 128 bits

⇒ Default Port for Apache/^{HTTP} is 80.

⇒ JDK (Java Development Kit)

* It is a software development environment that offers a collection of tools and libraries necessary for developing Java applications.

* It is a development environment for Building applications, applets and Components using the Java programming language.

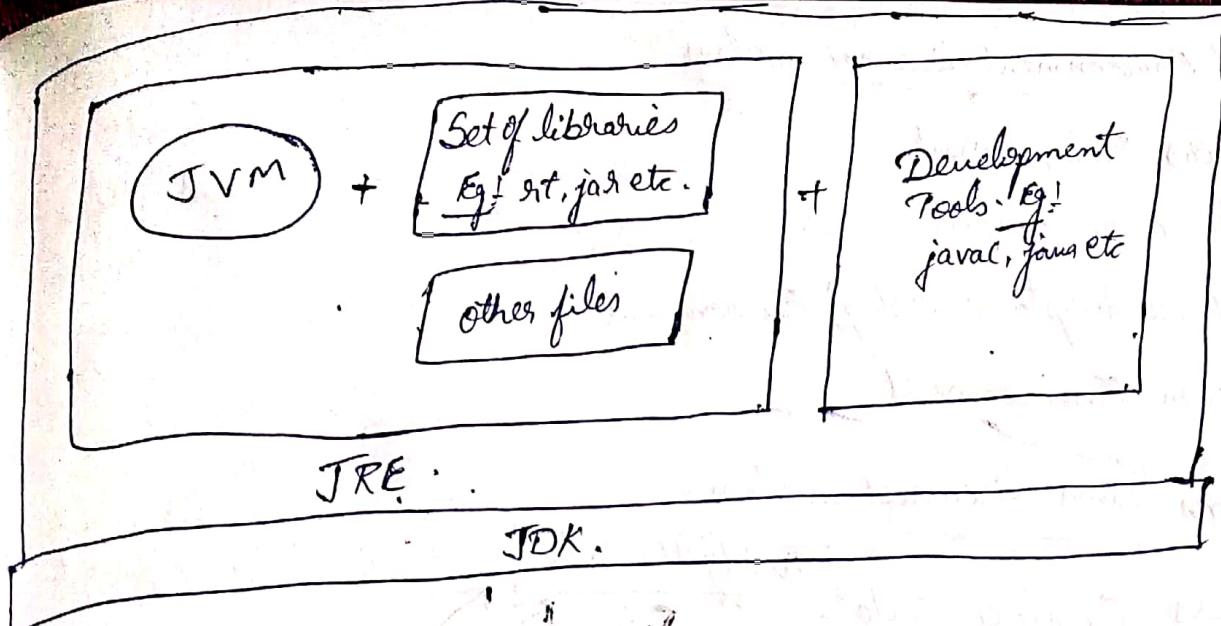
uses:-
* The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.

⇒ JRE :- (Java Runtime Environment)

* It is a set of Components to Create and Run a Java application.
* It is a part of a Java development kit (JDK)
* It is made up of a Java Virtual machine (JVM), Java class library and the Java Class loader.

MAC address

- ① It stands for media Access Control .
- ② It is a physical address .
- ③ It is provided by Computer manufacturers
- ④ It is an fixed address for a particular device .
- ⑤ It has no class Concept .
- ⑥ It is applicable on Data Link layer of OSI model .
- ⑦ The length of MAC address is 48 bits .



$JDK = JRE + \text{Development tools}$

$JRE = JVM + \text{library classes}$

⇒ JVM : (Java virtual machine)

* loads, verifies and executes Java bytecode.

* It is known as the Interpreter of the core of Java programming language because it executes Java programming.

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⇒ Data Center :-

It is a facility that provides shared access to applications and data using a coupled network, Compute and storage Infrastructure.

Who are,

⇒ Deployment/Build Engineers :- * It is also called as Release Engineers

* It is a Computer Software Engineer who is focused mainly on developing a line from a program's source code to a publicly available product.

* A Deployment engineer is responsible for the deployment of releases into the production environment.

* He is responsible for the safe deployment of one or more releases into the production environment.

→ Different types of Environment discussed in class :

- ① Developers Environment.
- ② Testers Environment
- ③ UAT (User Acceptance Testing) Environment
- ④ Production Environment

→ Different operations teams discussed in class :

STEPS :-

① Developers Create a Code

Modify the Code

② Build & Deployment team Puts the Code
on Server

③ Developer tests the Code

~~Find Bugs/Errors~~

[If any error found, Then Code is
Redirect to the Developer for modification]
Again process starts from Step 1

④ Testing Engineer tests a Code

~~If finding Bugs/Error~~

[Redirect to Developer for modification]
Again process from Step 1

⑤ UAT (User Acceptance Testing)

~~Find Bugs/Errors~~

[If any error found, Then Redirect to
Developer for modify]

Again process from Step 1

What kind of work done by Developer?

- * They design, develop and test software and ensure software adheres to best practices in performance, reliability and security.
- * They can work developing mobile applications, Coding video games, Programming websites.

Kind of work done by Testers?

- * A Tester is an individual who tests software or similar projects for bugs, errors, defects or any problems that the end user might come across.
- * The role of a Tester is to test out products and provide reports to the project teams about any issues or improvements that the product may require.

Change the Tomcat port to 9999, 7777, 8888 & Test.

Eg! ^{Change Port to 9999 [From Port 80]} the following 3 steps should be done :

This PC

Step 1:-

Local Disk (C:)

Program Files

Apache Software Foundation

Tomcat 10.0

Conf

Server.xml

Edit in notepad Page

Connector Port = "80" Protocol = "HTTP/1.1"

Remove & Change this number into 9999 or 8888 or 7777

Goto File

Save [Cancel the Page].

Step 2:-
Windows + R (long press)
Bottom

Type

Services.msc
Control
Service Page will open.

Select Apache Tomcat 10.0
Select & Right click & give

Restart [Cancel the Page].

Step 3:-

Go to Browser (Google Chrome)

↓ Enter

http://localhost:9999
127.0.0.1

↓
Apache Tomcat/10.0.20
Page will open.

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→ Java Archive file: JAR

* It is a platform-independent file format that aggregates many files into one file.

* Multiple Java applets and their requisite components (Class files, Images, Sounds) can be bundled in a JAR file & subsequently downloaded to a browser in a single HTTP transaction, greatly improving the download speed.

(Q)

* It is a file format/archiving tool which contains all the components of an executable Java application.

its uses:-

JAR files are packaged with the ZIP file format, so you can use them for tasks such as data loss, compression, archiving, decompression and archive unpacking.

→ What do you mean by Compiling a Code?

* It refers to the act of converting programs written in high-level programming language, which is understandable and written by humans, into a low-level binary language understood only by the computer.

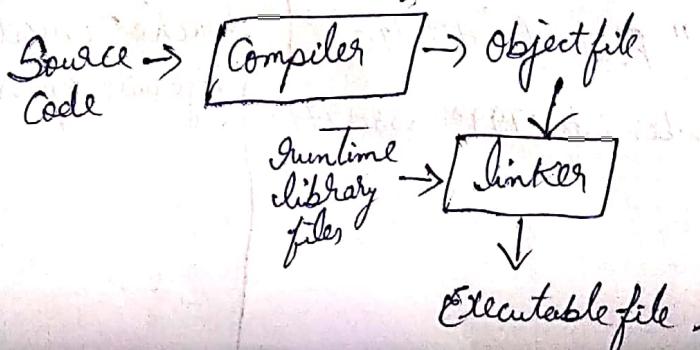
(Q)

* It is the program that translates human-readable source code into computer-executable machine code.

→ What happens when you compile a code?

* A compiler takes the program code (source code) and converts the source code to a machine language module (called an object file).

* Another specialized program, called a linker, combines this object file with other previously compiled object files (in particular run-time module) to create an executable file.



⇒ What is JAR, WAR & EAR files & its' Differences :-

JAR → Java Archive

WAR → Web Application Resource or Archive

EAR → Enterprise Application Archive.

JAR file: It is the package file format typically used to aggregate many Java class files and associated metadata and resources (text, images etc) into one file to distribute application software or libraries on the Java platform.

* It contains the jar files contains libraries, resources & accessories files like property files.

WAR file: It contains the web application that can be deployed on any servlet/jsp container.

* The war file contains jsp, html, javascript and other files necessary for the development of web applications.

* Web applications can be packaged & signed into a web archive format file using the standard java archive tools.

EAR file: It is a compressed file that contains the libraries, enterprise beans and JAR files that the application requires for deployment.

* It uses enclosed Extensible Markup Language (XML) files or deployment descriptors to describe module deployment.

⇒ Diff b/w

JAR

① A JAR file is a file with Java classes, associated metadata & resources such as text and images aggregated into one file.

② Stands for Java Archive

WAR

① It is a file that is used to distribute a collection of JAR files, JSP, Servlet, XML files, static web pages like HTML and other resources that constitute a web application.

② Stands for Web Application Resource or Archive

EAR

① It is a standard JAR file that represents the modules of the application & a metadata directory called META-INF which contains one or more deployment descriptors.

② Stands for Enterprise Application Archive.

- ③ Has .jar file Extension
- ④ Allows Java Runtime Environment (JRE) to deploy an entire application including the classes & related resources in a single request.
- ③ Has .war file Extension
- ④ Allows testing and deploying web applications easily.
- ③ Has .ear file extension
- ④ Allow deploying of modules onto an application server simultaneously.

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→ How do you deploy a war file on Tomcat Server?

1st Step :

At first open Apache Tomcat/10.0.20 page using link <http://localhost:80>

↓ After that on R.H.S of Page

Some states

Manage App ✓ Select this.
Host manager.

Username

admin

Password

admin

} Give Both
Admin only

Sign in ✓

Tomcat web Application Manager Page will open.

war file to deploy

Select war file to upload **Choose File** *no file chosen.*

Deploy

2nd step!

Then, Create & Download an Sample example of .war like, webapp.war which will be downloaded in download folder -

Then, Go & Click on 1st step [choose file] & open it webapp.war.

Select → [Deploy.] ✓

Message: [OK] [It shows At the top of the Tomcat web application manager page].

Once, the war file gets deployed in Tomcat server.

3rd step!

Once, the war file like Ex: webapp.war gets deployed, the deployed file will be Recorded in Application Table @ Tomcat webApplication manager page along with Commands.

Path	<u>version</u>	<u>Displayname</u>	<u>Running Sessions</u>	<u>Commands</u>
/webapp	None specified	webapp	True 0	[Start/Stop] [Reload] [Undeploy] [Expire sessions] with <u>>30 min</u> idle



Once these recorded in table After deployment, click on [undeploy].

The above 3 steps Should be followed for the war file in a Tomcat server for the deployment of the file.

→ How do you access a custom HTML file from Tomcat server?

1st Step :-

By taking Example using link : <https://github.com/SKLibrary/Snake/blob/master/Snake.html>

Is Right Click → Open on R.H.S. symbol
1st Step A new page will be Select → Copy Raw Content ✓

Copy the Raw Content & Create a New file (Text Document) & Name it the file has Snake.html [Anything will Create a file & saved the filename should be end it with .html]
Paste Inside the Root file Command Option Shift + Text Document → Snake.html Enter. For my Reference only.

2nd Step :- The Copied & Pasted Raw Content Should be saved in a path of Local Disk (C) : → Program Files → Apache Software Foundation

Tomcat 10.0
File Creating Process
ROOT ← webapps
Inside the Root file folder → Click on Inside Snake.html → Right click a.html
Newly Copied Raw Content Paste the Raw Content Click on File Save → Close

3rd Step Once, the Inside the ROOT file the newly saved html file is saved Then,

Go to Browser & Take a new Tab &

Enter the link to check the html file is accessed or not in Tomcat Server
<http://localhost/Snake.html> link

It should be typed what type the html file that you created, copied & saved Inside the Root file folder.

Enter .

Then, The output will occur if the html file is accessed in Tomcat Server.

18/04/2022

What is virtualization?

- It is a technology that lets you create useful IT services using resources that are traditionally bound to Hardware.
- It allows you to use a physical machine's full capacity by distributing its capabilities among many users or environments.

Eg:- VM ware - which specializes in server, desktop, network and storage virtualization.

Citrix - which has a niche in application virtualization but also offers server virtualization & virtual desktop solutions.

Set virtualization to enabled on your laptop/desktop?

Step 1. Power on the System / Laptop using Power Button.

long press $F_n + F_1/F_2$ keys or on the charge slot side there will be an \oplus button long press it.

↓ Enter & click

BIOS Setup

↓ using Arrow keys on

Keyboard
Goto

Configuration

↓ Downward it will get

Intel Virtual Technology

↓ Enter & click

Enabled option

↓ Then go to R.H.S of last option
using Arrows.

Exit

↓

Exit Saving Changes

↓ Enter

Enter

→ Done now. The steps to be done to enable virtualization in laptop/desktop

9/04/2022

⇒ Who manages the Port?

* The port is managed by Operating system.

* The IP is - - - Router.

* The OS is - - - loopback → local host of 127.0.0.1.

⇒ Who manages IP address in a network?

* IP addresses are managed ^{globally} by the Internet Assigned Numbers Authority (IANA), and by five regional Internet registries (RIRs).

* It is responsible in their designated territories for assignment to local Internet registries, such as Internet service providers (ISPs) & other end users.

⇒ Hypervisor:

* It is also known as a virtual machine monitor or VMM.

* It is a 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 & Processing.

Eg:- of Hosted Hypervisor is Oracle VM Virtual Box

② KVM

③ VM ware Server & workstation

④ QEMU.

⇒ Pre-Requisites for Installation of Hypervisor:

① Must be 64-bit & must support HVM (Intel-VT or AMD-virtualized).

② 64-bit X86 CPU.

③ Hardware Virtualization Support required.

④ 4GB of Memory.

⑤ 36GB of local disk.

⑥ Atleast 1 NIC.

⑦ Statically allocated IP Address.

⇒ Drawbacks of Hypervisor :-

- ① It lacks the capability of running VMs on domestic Computers.
- ② Virtual Network sprawl.
- ③ Data Backup.
- ④ Server Security.
- ⑤ Performance problems.
- ⑥ Single Point of failure.
- ⑦ Resource Contention.
- ⑧ Spinning up virtual Servers is too easy.
- ⑨ Takes more time to Create & Install.
- ⑩ Additional layer in the Stack.

⇒ Steps required to Create a VM :-

- ① Install virtual Box/Download the windows 10 ISO. (First off, head over to the windows 10 download Page).
- ② Create a new virtual machine.
- ③ Allocate RAM.
- ④ Create a virtual drive.
- ⑤ Locate the windows 10 ISO.
- ⑥ Configure video settings.
- ⑦ Launch the Installer.
- ⑧ Install virtual Box guest additions.

21/04/2022

⇒ Cloud :-

- * It is the delivery of different services through the Internet.
- * It includes tools and applications like data storage, servers, databases, networking and software.

Eg:- Google Drive.

⇒ Dif b/w :- Cloud & Internet :-

IOT (Internet of things) v/s Cloud Computing

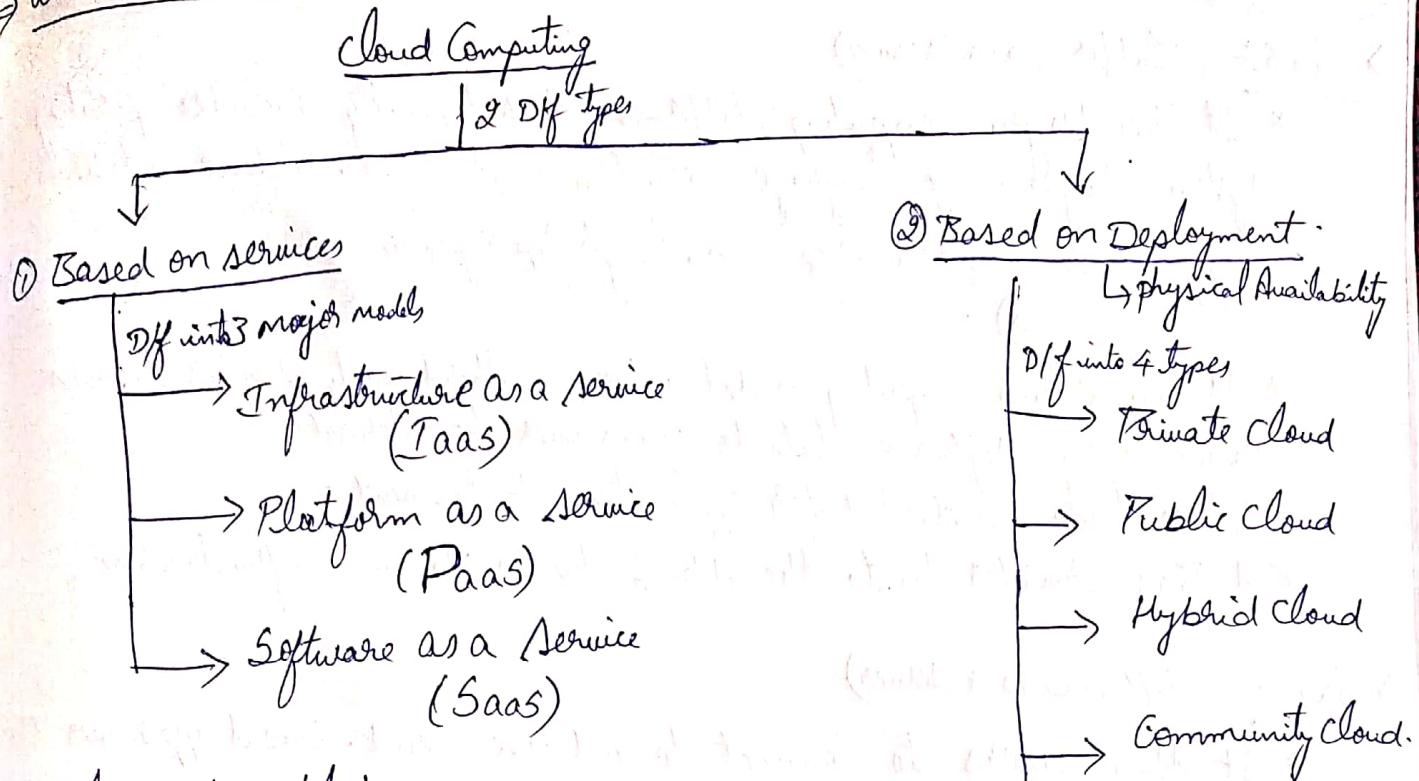
Items

① Storage	→ Limited Storage Capabilities	→ Unlimited Storage Capabilities
② Processing Capabilities	→ Limited Computational Capabilities	→ Unlimited Computational Capabilities
③ Big Data	→ Source of Big Data	→ Path or means to manage Big data
④ Connectivity	→ uses the Internet as Convergence point	→ uses the Internet to deliver Solutions
⑤ Components	→ Runs on Hardware Components	→ Runs on virtual machine that mimic hardware Components
⑥ Characteristics	→ * It is pervasive (things are everywhere) * These are real world objects.	→ * It is ubiquitous (Resources are available from everywhere) * These are virtual resources.

⇒ Service Model :-

- * It is the way that a firm offers intangible value to customers.
- * It is also be expansive descriptions of every interaction with different sets of target customers.
- * It is the application, a service, is deployed from a centralized datacenter across a network - Internet, Intranet, LAN or VPN - providing access and use on a recurring fee basis.

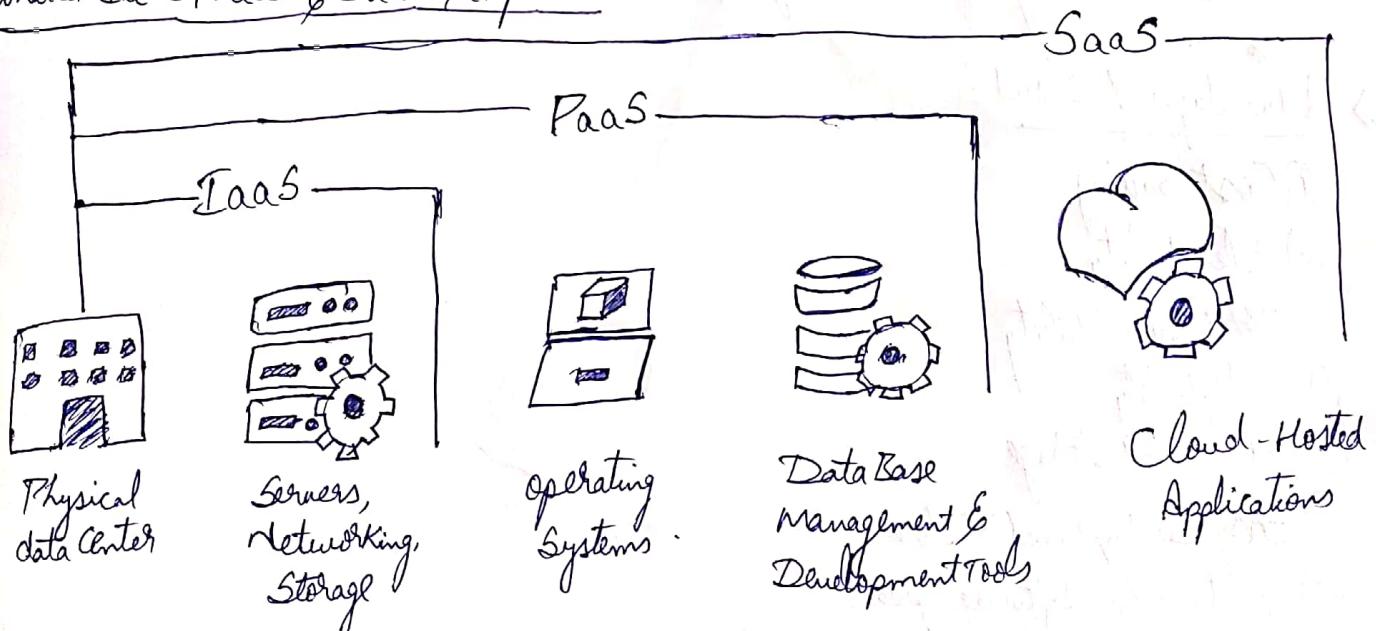
⇒ what are the 2 models available in cloud?



⇒ Deployment models?

- * It identifies the specific type of cloud environment based on ownership, scale and access, as well as the cloud's nature and purpose.
- * The location of the servers you're utilizing & who controls them are defined by a cloud deployment model.

⇒ What is IaaS, PaaS & SaaS? Explain?



IaaS:-(Infrastructure as a service)

- * It is a system of cloud computing that delivers virtualized computing resources over the Internet.
- * It is a type of cloud computing service that offers essential compute, storage, and networking resources on demand, on a Pay as you go basis.

Eg: PaaS → AWS.

⇒ PaaS :- (Platform as a Service)

- * It Provides you Computing platforms which typically includes operating system, programming language execution environment, database, web server etc.
- * Eg: Windows Azure, Force.com, Google App Engine etc.

(8)

- * It is a Cloud Computing model where a third party provider delivers Hardware and Software tools to users over the Internet.
- * These tools are needed for application development.
- * A PaaS provider hosts the H/w & S/w on its own Infrastructure.

⇒ SaaS :- (Software as a Service)

- * It allows users to Connect to and use cloud-based apps over the Internet.
- * It Provides a Complete Software solution which you purchase on a pay as you go basis from a cloud service provider.

Eg: Gmail, E-mail, MS office 365.

(9)

- * It is a way of delivering applications over the Internet as a Service.

⇒ Advantages of Cloud :-

- ① Cost Saving
- ② Flexibility
- ③ 24/7 Availability
- ④ Reliability
- ⑤ Unlimited storage
- ⑥ Easy Backup and Restore
- ⑦ Automatic Software Update
- ⑧ Performance
- ⑨ Scalability
- ⑩ Data Security

⇒ Private Cloud :-

* It is a model of Cloud Computing where the Infrastructure is dedicated to a single user organization.

(Q)

* It is the Computer Services offered either over the Internet or private Internal network and only to select users instead of the general public.

⇒ Public Cloud :-

* It is a subscription service that is also offered to any and all customers who want similar services.

Eg:- Amazon Elastic Compute Cloud (EC2), Google Cloud.

⇒ Hybrid Cloud :-

* It is a collection of cloud-based and on-premises IT resources that work together in concert, offering businesses enhanced agility, and flexibility for workload and data deployment.

Eg:- VMware Cloud on AWS.

⇒ Community Cloud :-

* It is a multitenant platform that is accessible only for a specific subset of customers.

Eg:- U.S.-based dedicated IBM Softlayer cloud for federal agencies.