

# BASICS OF NETWORKING

## Basic Fundamental of Networking

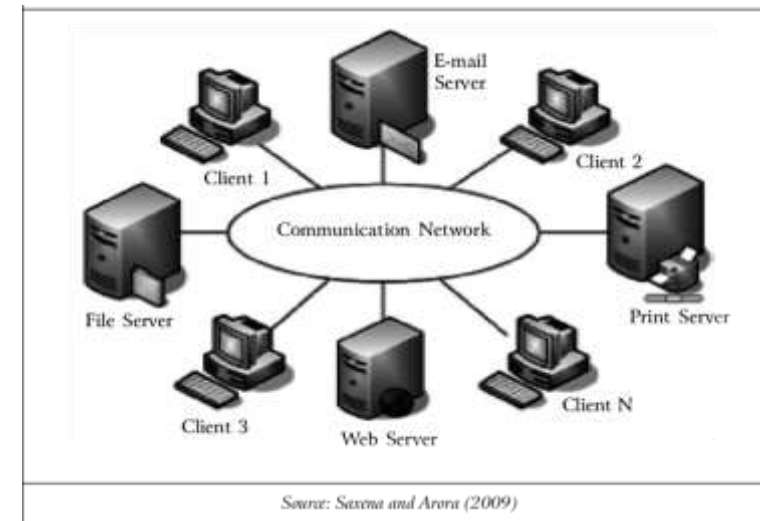


# What is networking ????

networking, is **the practice of transporting and exchanging data between nodes over a shared medium in an information system.**

Or

A computer network is a set of computers sharing resources located on or provided by network nodes. The computers use common communication protocols over digital interconnections to communicate with each other



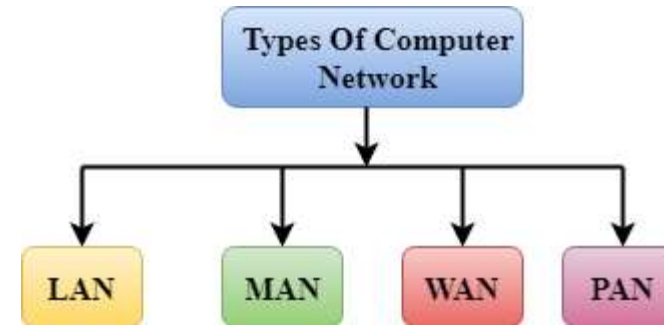
# Types of Networking

**Networks differ based on size, connectivity, coverage and design. This guide explores seven common types of networks, including their benefits and use cases.**

Local area network. ...

Metropolitan area network. ...

Wide area network. ..



# LOCAL AREA NETWORK

A local area network is a computer network that interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building

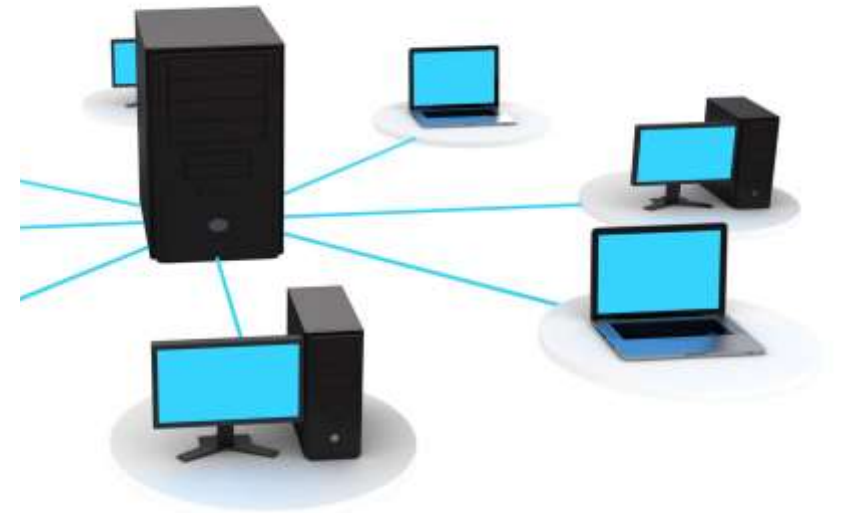
## Advantage

The fundamental LAN setup is not outrageously costly.

## Disadvantage

Because it is just so easy to gain access to other people's software components, security is a major problem. To restrict unwanted access, additional security tests are recommended

.



TechTerms.com

# metropolitan area network (MAN)

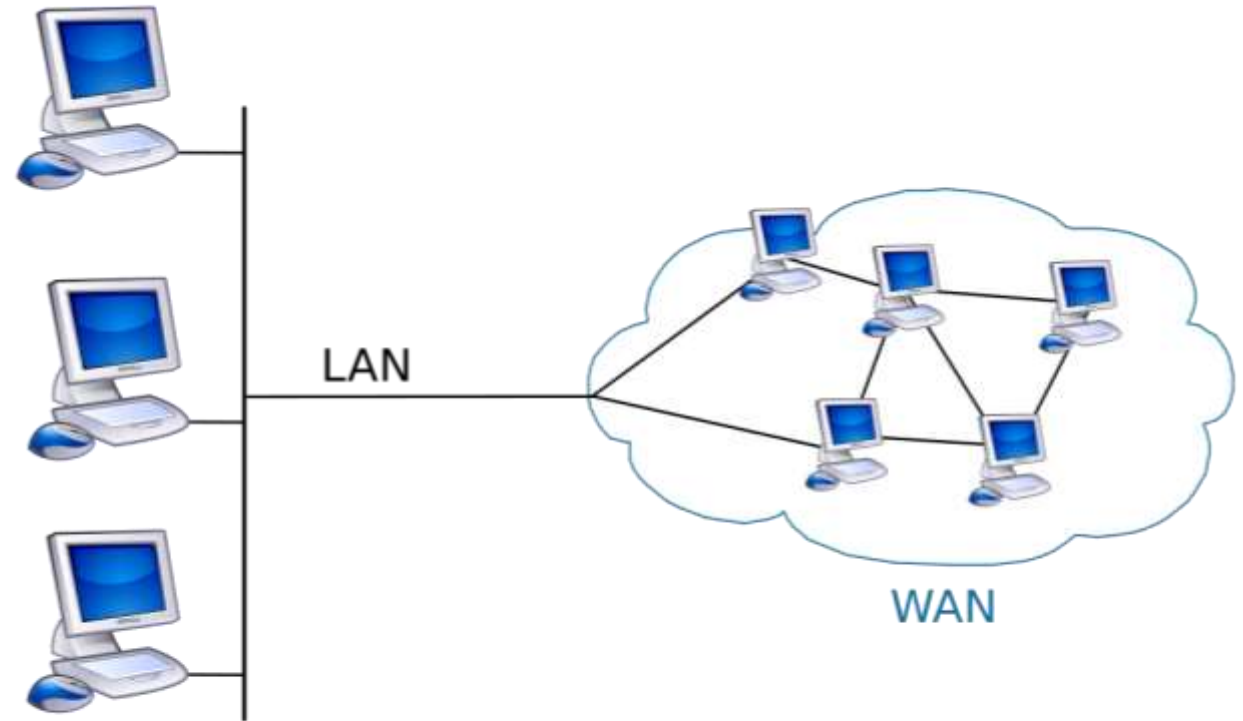
A metropolitan area network (MAN) is a **computer network that is larger than a single building local area network (LAN) but is located in a single geographic area that is smaller than a wide area network (WAN).**



# WIDE AREA NETWORK

A wide area network is a telecommunications network that extends over a large geographic area. Wide area networks are often established with leased telecommunication circuits

<https://www.tutorialspoint.com/difference-between-lan-man-and-wan#:~:text=LAN%20stands%20for%20Local%20Area,stands%20for%20Wide%20Area%20Network.&text=LAN%20is%20often%20owned%20by%20private%20organizations>

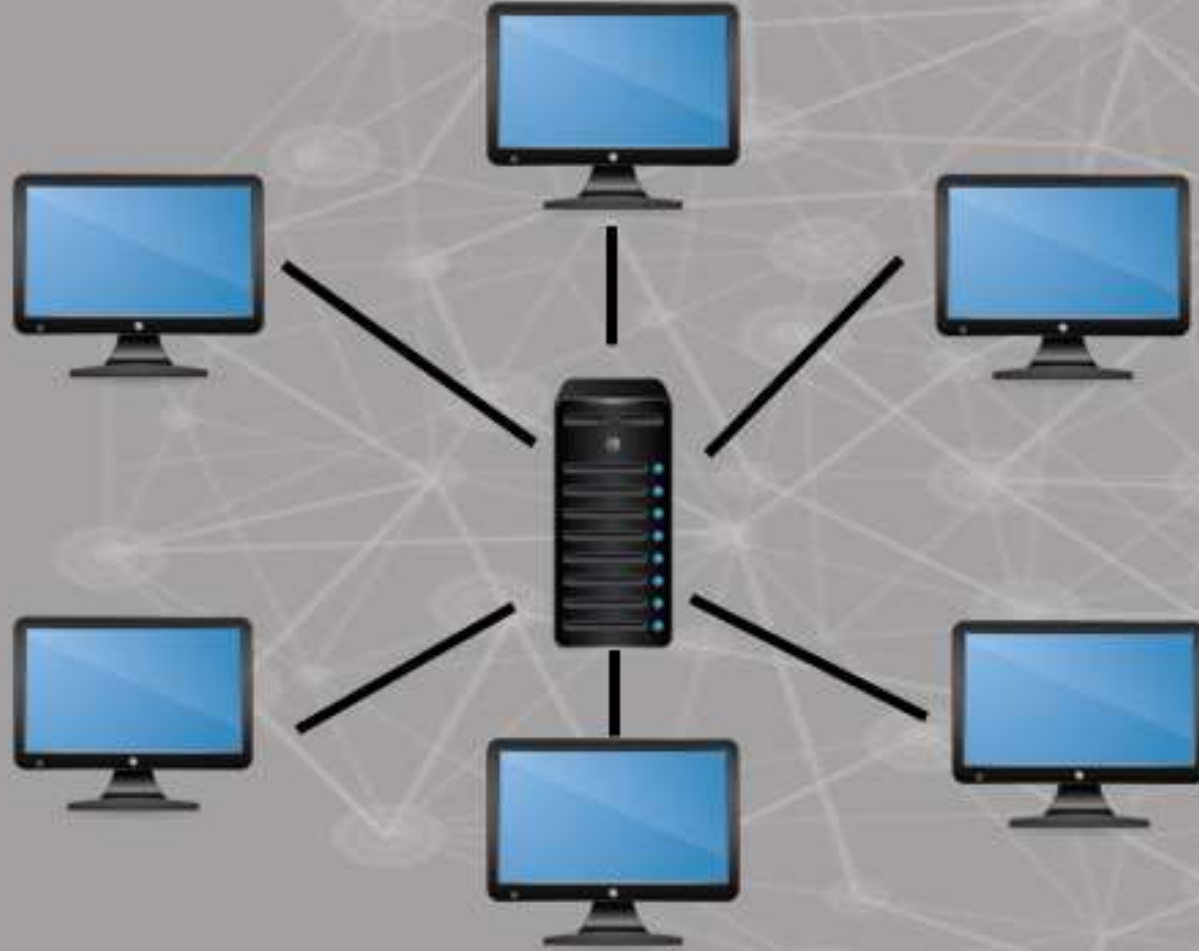


# Network fundamentals

- Wired and wire less network
- Linkes ,nodes
- IP ADDRESS and subnet mask and MAC Add
- LAYERS OF NETWORK
- Diff types of networking devices-Routers,switches and Hubs
- PROTOCOLS and ports.
- Types of communication
- DNS/DHCP/NIC

Data encryption and decryption

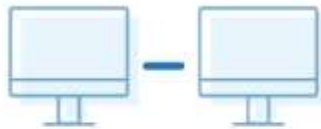
# Network Topologies



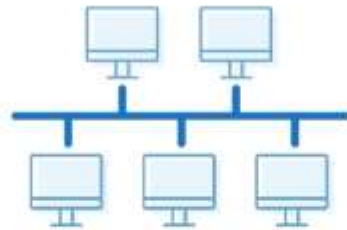


# Network Topology Types

1 Point to point



2 Bus



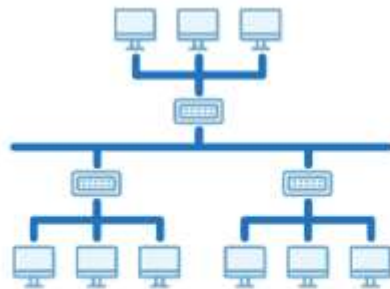
3 Ring



4 Star



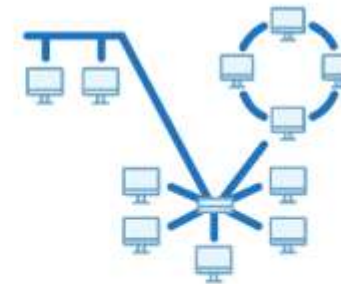
5 Tree



6 Mesh



7 Hybrid



# What are protocols

A network protocol is **an established set of rules that determine how data is transmitted between different devices in the same network**

The OSI (Open Systems Interconnection) Reference Model defines seven layers of networking protocols.

...

**In this model, there are four layers, including:**

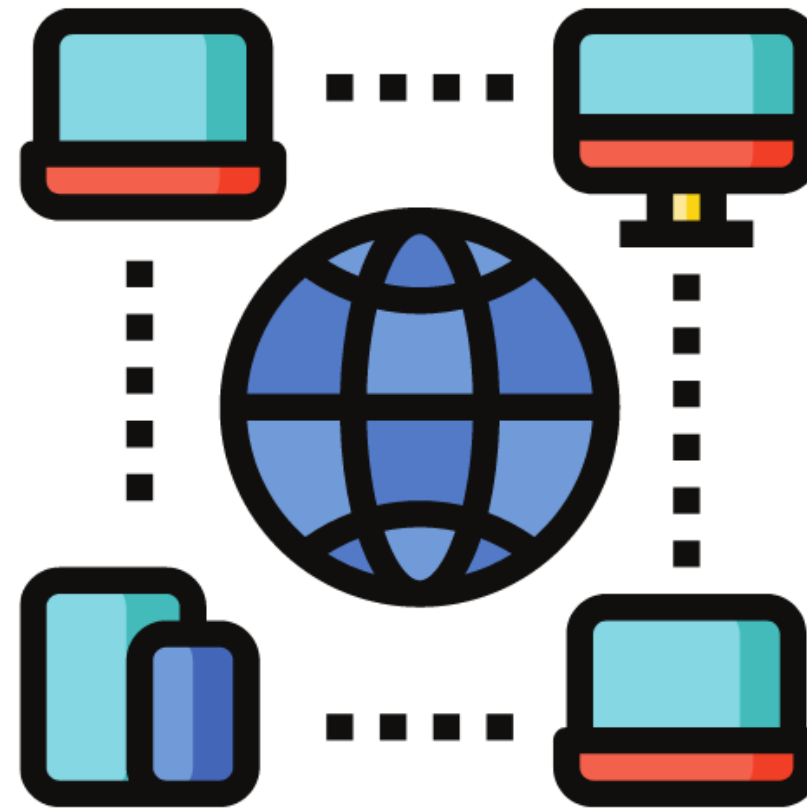
Ethernet (Physical/Data Link Layers)

IP/IPX (Network Layer)

TCP/SPX (Transport Layer)

HTTP, FTP, Telnet, SMTP, and DNS(combined Session/Presentation/Application Layers)

STUDY ALL PROTOCOLS

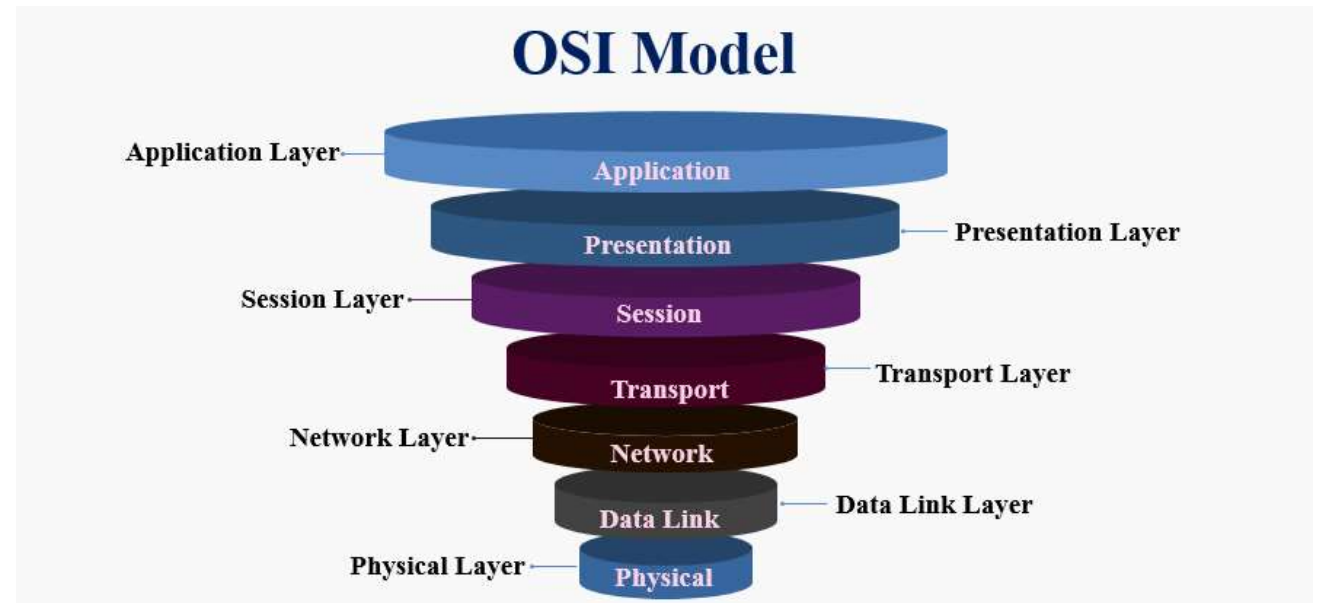


**Network Protocols**

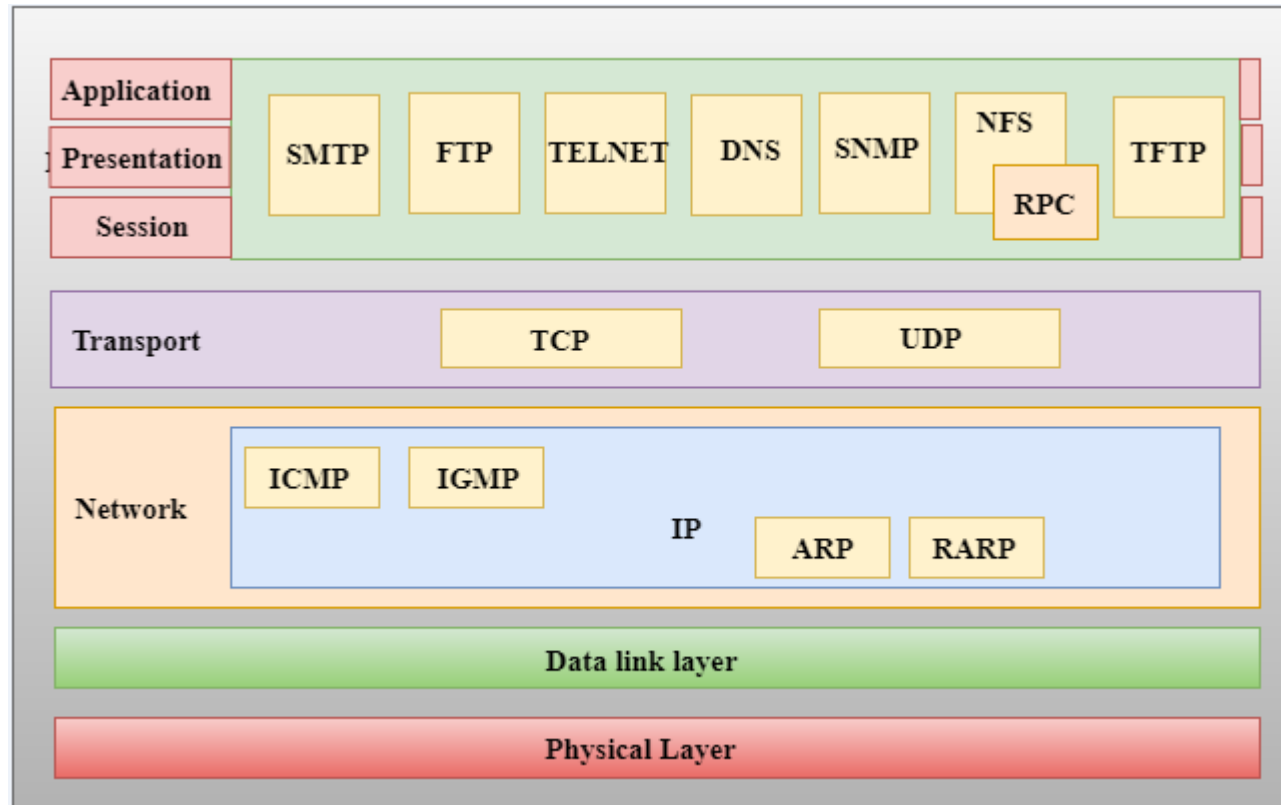
# Layers in network

Separate notes shared for osi and TCP-IP Models

Kindly check them



# TCP-IP MODEL



# IP ADDRESS

- IP V4-32 BITS
- IP V6-128 BITS
- Computer understand data in form of BIT WHICH IS 0/1
- 8BIT =1 BYTE
- 8 BYTE = 1KB
- 1024 KB = 1 MB
- 1024 MB = 1GB
- 1024 GB= 1TB

# IPV4 ADDRESS

It's a 32 bit address with 4 octats

127.0.01

The loopback address, also called localhost, is probably familiar to you. It is **an internal address that routes back to the local system.**

The loopback address in IPv4 is 127.0. 01

A 0.0. 0.0 address **indicates the client isn't connected to a TCP/IP network**, and a device may give itself a 0.0. 0.0 address when it is offline.

Class	1st octet of IP address	Default Subnet Mask	Network / Host	Number of networks	Maximum nodes in a network
A	1 - 126	255.0.0.0	N.H.H.H	126	16,777,214
B	128 - 191	255.255.0.0	N.N.H.H	16,384	65,534
C	192 - 223	255.255.255.0	N.N.N.H	2,097,152	254
D	224 - 239				
E	240 - 254				

# Private and public ip address

A private IP address is **a range of non-internet facing IP addresses used in an internal network**. Private IP addresses are provided by network devices, such as routers, using network address translation.

A public IP address is **an IP address that can be accessed directly over the internet and is assigned to your network router by your internet service provider (ISP)**

<https://www.avast.com/c-ip-address-public-vs-private#:~:text=A%20public%20IP%20addresses%20identifies,a%20unique%20private%20IP%20address.>

Private address range		
Class	start address	finish address
A	10.0.0.0	10.255.255.255
B	172.16.0.0	172.31.255.255
C	192.168.0.0	192.168.255.255

Public address range		
Class	start address	finish address
A	0.0.0.0	126.255.255.255
B	128.0.0.0	191.255.255.255
C	192.0.0.0	223.255.255.255
D	224.0.0.0	239.255.255.255
E	240.0.0.0	254.255.255.255

# Sub netting

A subnetwork or subnet is a logical subdivision of an IP address into network and host bits

## Default Subnet masks

**Class A : 255.0.0.0**

**Class B : 255.255.0.0**

**Class C : 255.255.255.0**

*Here we see the default subnet mask for each Class*



# CIDR

Classless Inter-Domain Routing (CIDR) is a **range of IP addresses a network uses**. A CIDR address looks like a normal IP address, except that it ends with a slash followed by a number. The number after the slash represents the number of addresses in the range.

**CIDR Notation**  $2^6 =$

---

192 . 168 . 100 . 4  
000000 10101000 01100100 000000  
111111 11111111 11111111 11000000

192 . 168 . 100 . 41  
255 . 255 . 255 . 192

# OPERATING SYSTEM

An operating system is system software that manages computer hardware, software resources, and provides common services for computer programs

An operating system (OS) is **the program that, after being initially loaded into the computer by a boot program, manages all of the other application programs in a computer**. The application programs make use of the operating system by making requests for services through a defined application program interface (API).

**Linux, Windows, macOS.** 64-bit OS and 32-bit OS. Batch OS, Time-Sharing OS, Distributed OS, Real-Time OS, Networking OS

- <https://www.geeksforgeeks.org/difference-between-linux-and-windows/>

# RDP AND SSH

- Remote desktop protocol (RDP) is a secure network communications protocol developed by Microsoft. It **enables network administrators to remotely diagnose problems that individual users encounter and gives users remote access to their physical work desktop computers.**
- SSH or Secure Shell is a network communication protocol that **enables two computers to communicate (c.f http or hypertext transfer protocol, which is the protocol used to transfer hypertext such as web pages) and share data.**
-

# WHAT IS CLOUD COMPUTING

- Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user.
- cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale.

# Cloud deployment model

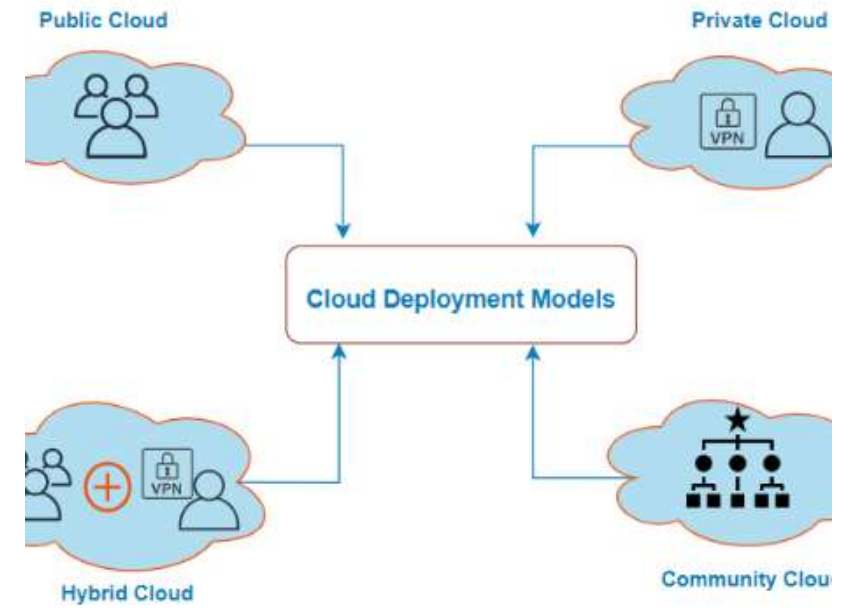
There are 4 main types of cloud deployment model: **private clouds, public clouds, hybrid clouds, and multiclouds**

Public cloud is a **cloud deployment model where computing resources are owned and operated by a provider and shared across multiple tenants via the Internet.**

The private cloud is defined as **computing services offered either over the Internet or a private internal network and only to select users instead of the general public.**

hybrid cloud platforms connect public and private resources in different ways, but they often incorporate common industry technologies, such as Kubernetes to orchestrate container-based services. Examples include **AWS Outposts, Azure Stack, Azure Arc, Google Anthos and VMware Cloud on AWS.**

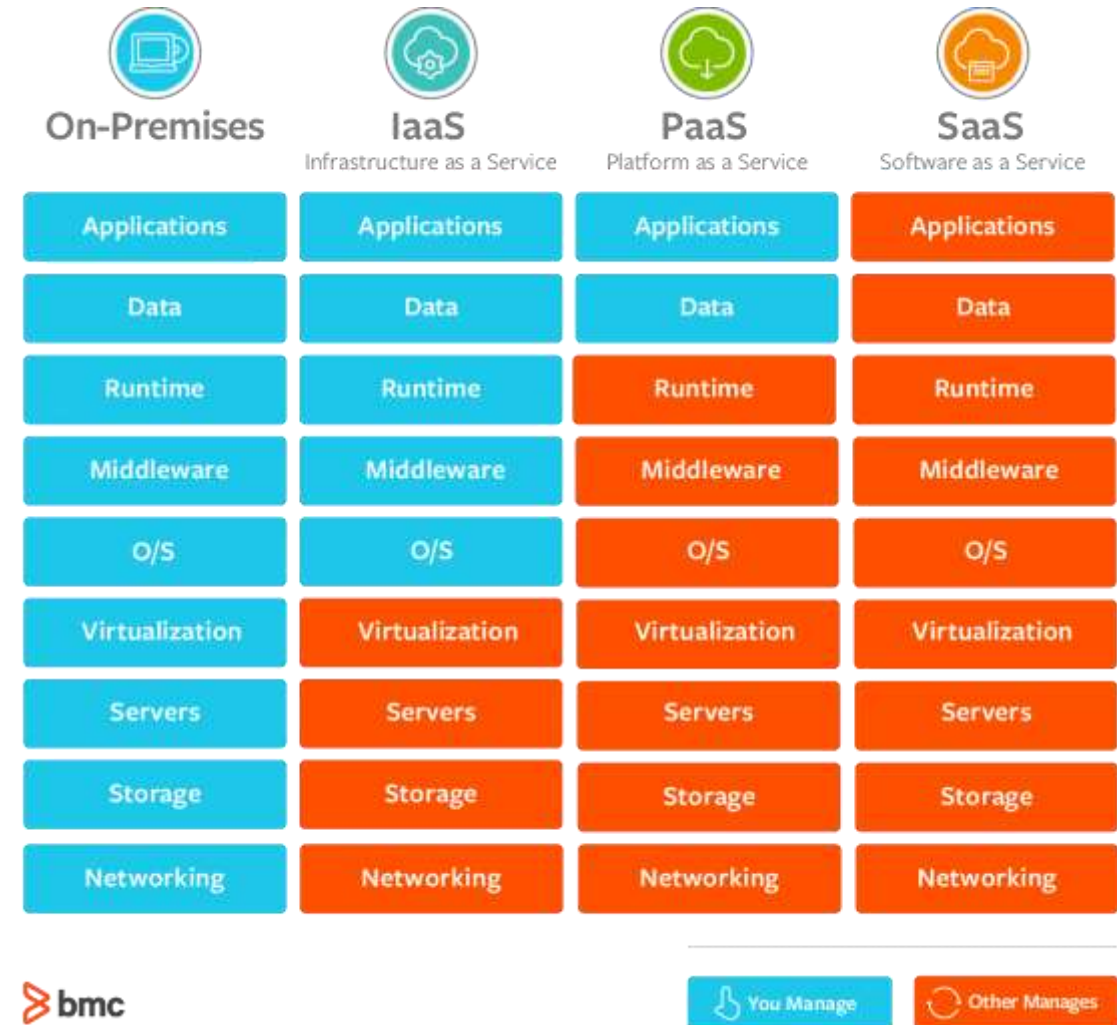
A community cloud in computing is a collaborative effort in which infrastructure is shared between several organizations from a specific community with common concerns,



# Cloud service models

There are three major cloud service models: **software as a service (SaaS)**, **infrastructure as a service (IaaS)** and **platform as a service (PaaS)**.

<https://www.techtarget.com/whatis/SaaS-IaaS-PaaS-Comparing-Cloud-Service-Models>



# Infrastructure as a Service (IaaS)

- Infrastructure as a Service (IaaS)
- IaaS is also known as **Hardware as a Service (HaaS)**. It is a computing infrastructure managed over the internet. The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.
- Characteristics of IaaS
- There are the following characteristics of IaaS -
  - Resources are available as a service
  - Services are highly scalable
  - Dynamic and flexible
  - GUI and API-based access
  - Automated administrative tasks
- **Example:** DigitalOcean, Linode, Amazon Web Services (AWS), Microsoft Azure, Google Compute Engine (GCE), Rackspace, and Cisco Metacloud.

# Platform as a Service (PaaS)

- Platform as a Service (PaaS)
- PaaS cloud computing platform is created for the programmer to develop, test, run, and manage the applications.
- Characteristics of PaaS
- There are the following characteristics of PaaS -
- Accessible to various users via the same development application.
- Integrates with web services and databases.
- Builds on virtualization technology, so resources can easily be scaled up or down as per the organization's need.
- Support multiple languages and frameworks.
- Provides an ability to "**Auto-scale**".
- **Example:** AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos, Magento Commerce Cloud, and OpenShift.



# Software as a Service (SaaS)

- SaaS is also known as "**on-demand software**". It is a software in which the applications are hosted by a cloud service provider. Users can access these applications with the help of internet connection and web browser.
- Characteristics of SaaS
- There are the following characteristics of SaaS -
- Managed from a central location
- Hosted on a remote server
- Accessible over the internet
- Users are not responsible for hardware and software updates. Updates are applied automatically.
- The services are purchased on the pay-as-per-use basis
- **Example:** BigCommerce, Google Apps, Salesforce, Dropbox, ZenDesk, Cisco WebEx, ZenDesk, Slack, and GoToMeeting.