Welcome to CVTECH LLC

Cyber Security Class BEGINS TODAY @ 9AM

Prompt!!!

Please MUTE Phone as you join the Class.

Thank You

QUESTION????

This Week Topics

1. What Is A Computer
2. Components that make up the computer system
3. Internal and External storage devices.
4. Different types of computers
5. Types of Operating Systems (OSs), Software, Firmware, Middleware, Applications, and Programs
6. Network Architecture
7. Types of Network and Network Topologies
8. Introduction to FISMA

What is a computer?

By definition, a computer is an electronic device that is made up of both **hardware** and **software** structure, with ability to ***accept inputs*** in the form of digitalized data, *process* the input and ***generate an output***. A computer also has the ability to *store* and ***retrieve*** processed digitalized data.

Types of Computers

There are several types of computers that are currently in use with varying abilities and purposes.

- Examples are:
  - Laptops
  - Desktops or Workstations
  - Tablets
  - Smart Phones
  - Micro Computers
  - Main Frames
  - Super Computers or Servers

Types of Computers

Mainframe – large, general purpose computers operating in a multi-user, multiprocessing environment that serves thousands of internal/external users.

Minicomputer – computers used by mid-sized organizations and operate in a multi-user, multiprocessing environment.

Personal Computer PCs (or Microcomputer) – small, inexpensive computers called PCs or workstations and designed for individual users. They are inexpensive and use microprocessor technology.

Notebook/laptop computers – Light weight (under 10 pounds/5 Kgs) personal computers powered by normal AC connection or rechargeable battery back.

By being portable they are vulnerable to theft or connectivity hijacked in a LAN, wireless connection etc.

Types of Computers

Other types of computers include smart phones and Personal Digital Assistants (PDAs). They are:

- small handheld digital devices, also known as palmtops;
- used as a personal organizer and planners, telephone, fax, networking capabilities, and can interface with PCs;
- used for field data collection, and for communication;
- use pen-based stylus instead of keyboard;
- Include scheduler, phone/address book, to-to list, office automation (spreadsheets, text editor e.g. MS word); and
- can have handwriting recognition capability.

Types of Computers

Microcomputer

Minicomputer

Personal computer

Supercomputer

Laptop

Components Of A Computer – Intro

- **The External and Internal Hardware Units**
- The computer is made up of both hardware and software components. The hardware component is divided into two sections which is the external tangible and visible system unit (the computer case) which houses the internal components made up of the internal hardware pieces and software applications including the firmware. The internal hardware includes the motherboard, internal disk drives, power supply, etc. The motherboard contains hardware including the CPU, memory slots, firmware, and peripheral slots.

Components Of A Computer – *cont'd*

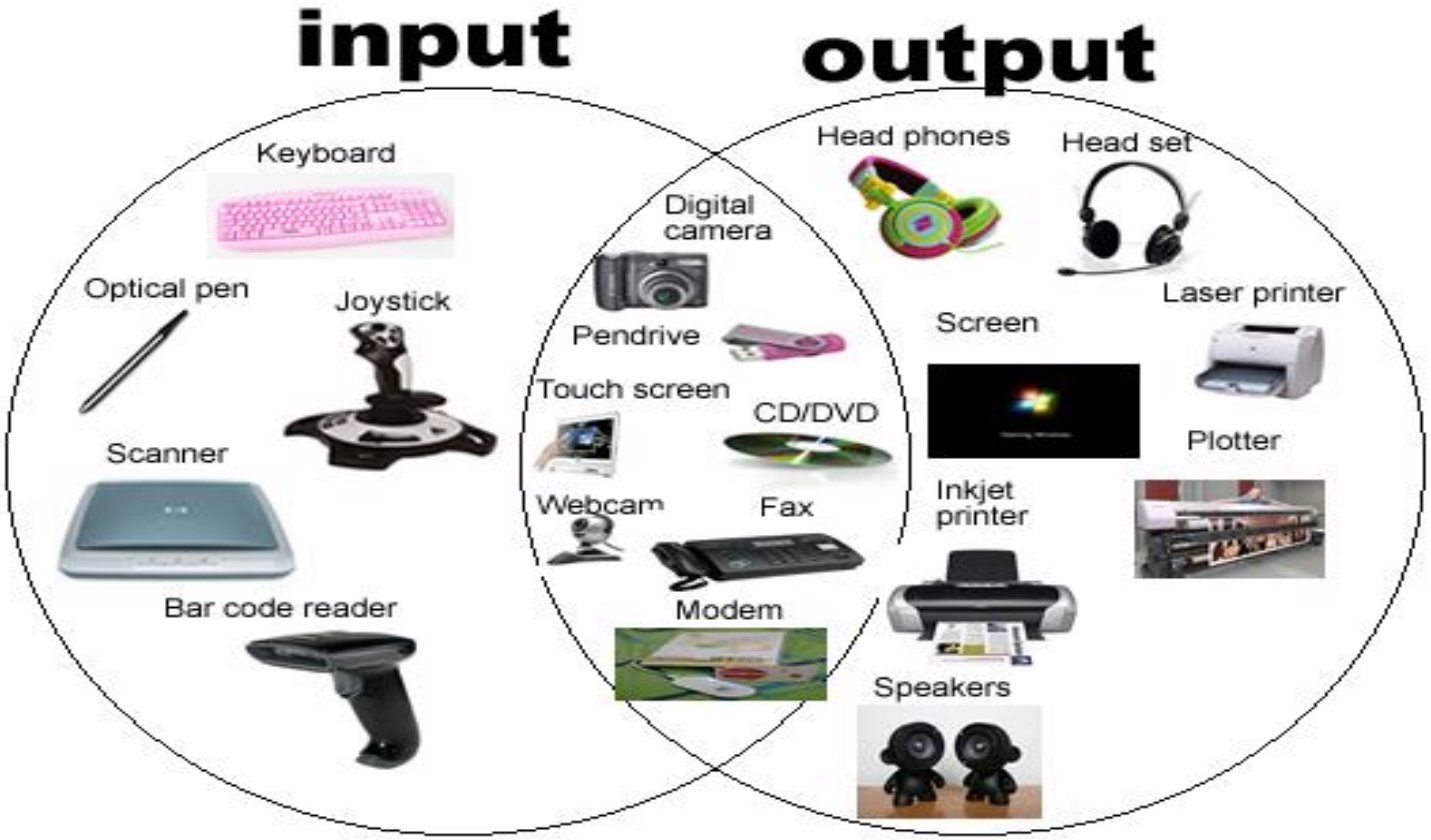
- **Internal and External Input/Output Devices**
- A computer system is composed of several input and output devices that enable the system to receive commands from the user, run its programs, and perform its functions. Input devices like the keyboard, mouse, and scanner are the means by which command instructions are injected into the computer to enable it function as the user intends. Output devices like the monitor, printer and speakers, on the other hand enable the user to see what happens on the inside of the computer as well as get outputs in the form of processed information and data documents. Communication between input and output devices of the computer are made possible on what was called the **Front-Side-Bus** (FSB) of the computer. Thus, the FSB is the interface between input and output devices of the computer.

Input/Output Devices

INPUT DEVICES	OUTPUT DEVICES
Keyboard	Monitor (LED, LCD, CRT, etc.)
Mouse	Speakers
Scanner	Printers
Webcam	Head Phones
Microphone	Projectors
Touchpad	Plotters
Point of Sale (POS) – e.g. credit card devices	Computer Output Microfilms, etc. etc.
Joystick, ATM Machines, etc. etc.	

Input/output Device Samples

Some of the input and output devices listed above do perform dual functions as both input and output devices. The picture table below provides examples of input-output devices and shows a segment sample of devices that perform dual functions in a computer system.



Storage Devices

- **Internal and External Storage Devices**
- A computer system is also made up of *internal* and *external* storage devices that help it to store, process, and retrieve information. Internal storage devices are the storage devices embedded within the computer's hardware and houses the operating system (OS) of the computer. They are sometimes called internal and external *memory* of the computer, even though the memory of the computer may appropriately refer to the Random Access Memory (RAM) and the Read Only Memory (ROM). By proper definition, the RAM of the computer stores data for *short term access* whereas the storage is where data can be stored for *long term access*.

Storage Devices

- **Internal Storage**
- It is the internal storage that also house or accommodate any applications or programs that a user will install on the computer. All documents or data that are saved on the computer are also saved to the internal memory or storage.
- **External Storage**
- External storage devices are those storage devices that are externally connected to the computer by a slot/port (e.g. Universal Serial Bus – USB port), a floppy or zip disk drive, or a CD-ROM drive.

Storage Devices

The table below highlights and differentiates between internal and external storage devices.

INTERNAL STORAGE DEVICES	EXTERNAL STORAGE DEVICES
Hard Disk Drive (HDD)	External Hard Disk Drive (EHDD)
PC Card	Secure Digital (SD) Card
Random Access Memory (RAM)	Floppy Diskette
Read Only Memory (ROM)	Compact Disk (CD)
	Zip Disk
	Digital Versatile/Video Disc (DVD)
	Flash/Pen Drive

Types of Storage Devices

Hard Disk

Secure Digital Card

Pen Drive

Floppy Diskette

Compact Disc

Secure Digital Card

Blu-ray DVD

Digital Versatile Disc
Or
Digital Video Disc

Zip Disk

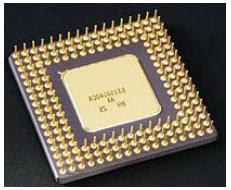
PC Card

Processing Devices

Processing components:

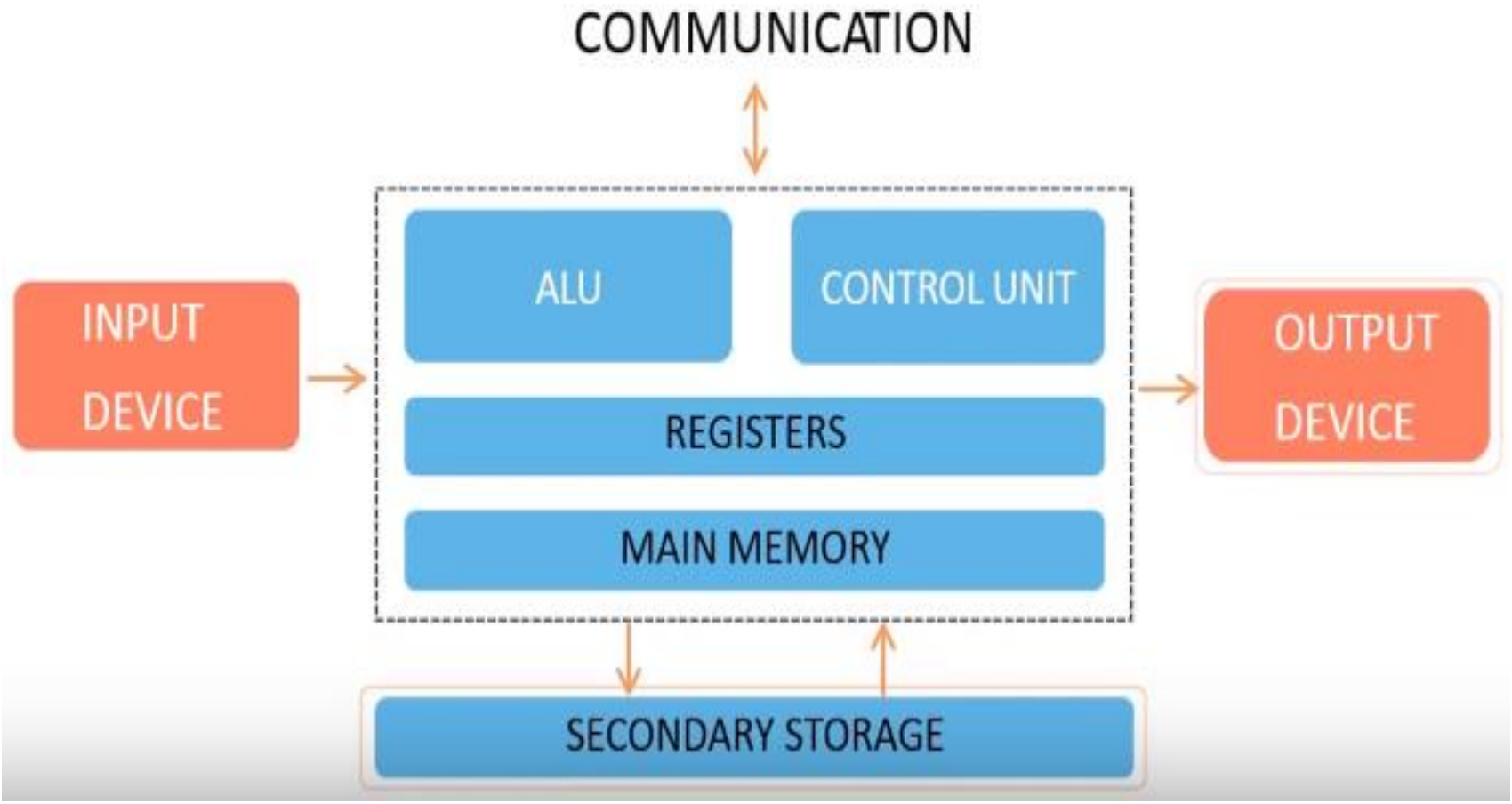
- Central Processing Unit (CPU) – This has an arithmetic logic unit (ALU) which performs mathematical and logical operations
- Control Unit
- Internal memory (processing transactions)

- Samples of Central Processing Unit (CPU)
  - Intel



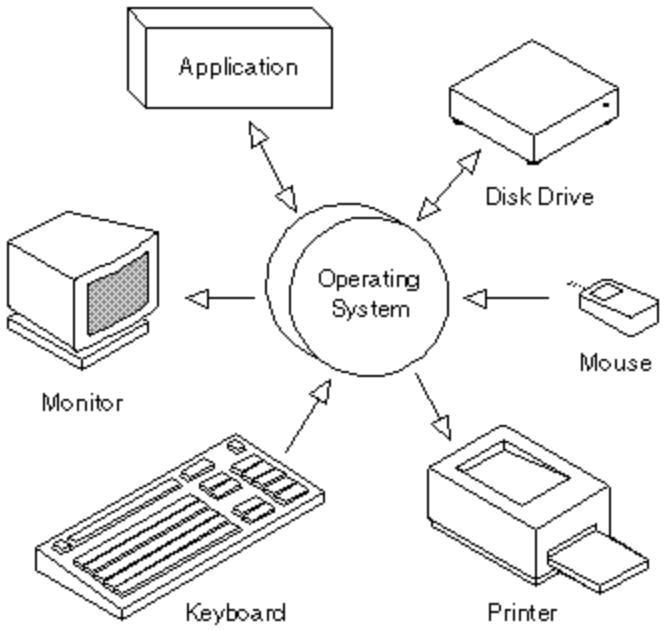
  - AMD

Information Processing



Types of Software

- Operating systems (OS) are used to manage computer resources. They do so by performing basic tasks such as recognizing input from the keyboard , sending output to the display screen , keeping track of files and directories on the disk , and controlling peripheral devices such as disk drives and printers. It controls and allocates computer resources
  - Windows
  - Linux
  - Unix
  - Android



Application Software

- An application is a program designed to perform a specific function or task directly for the user or, in some cases, for another application program.
  - word processors
  - Excel
  - database programs
  - Web browsers
  - development tools
  - drawing, paint
  - image editing programs
- Applications use the services of the computer's operating system and other supporting applications.

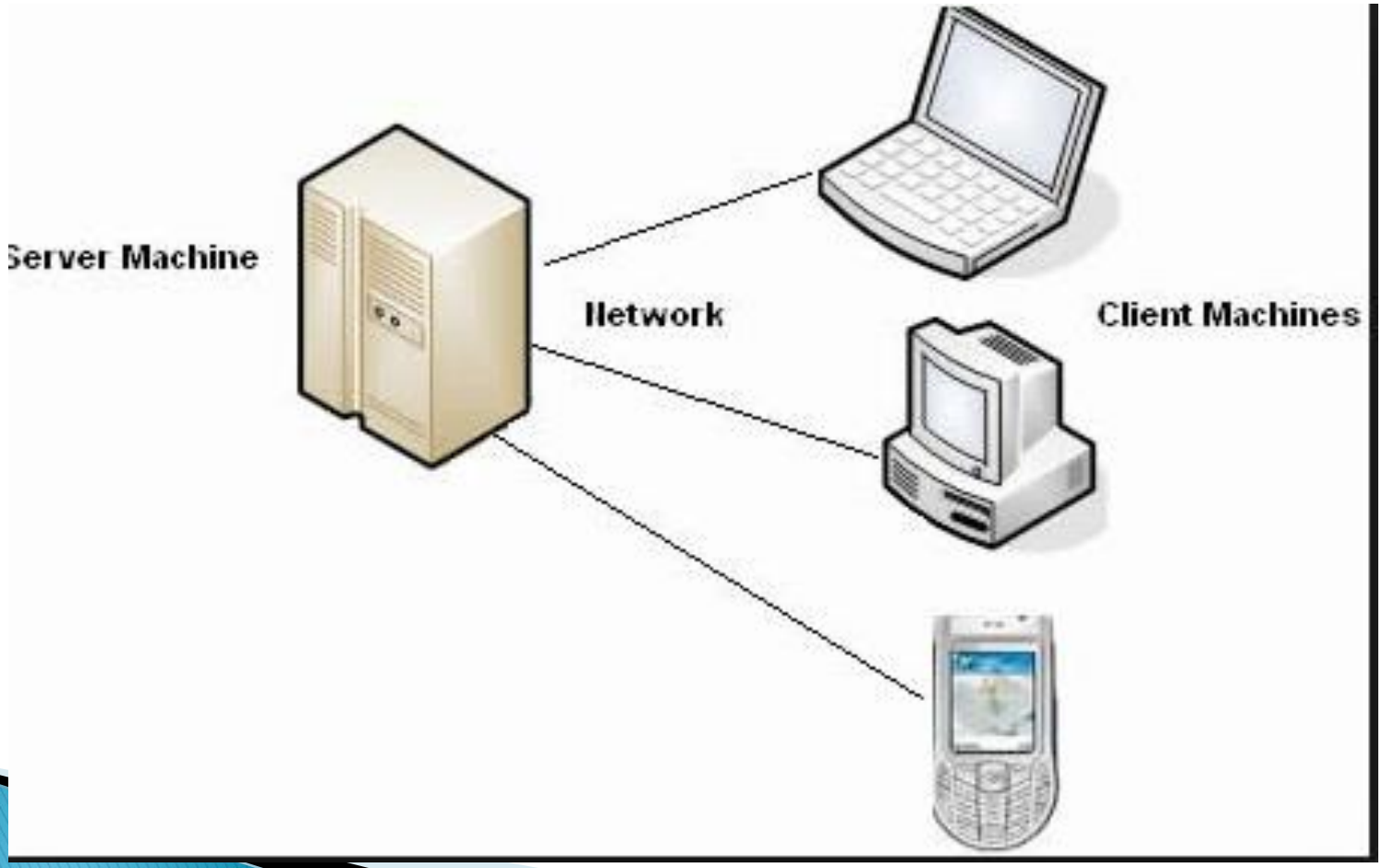
Network Architecture

- Legacy Architecture – Main frame

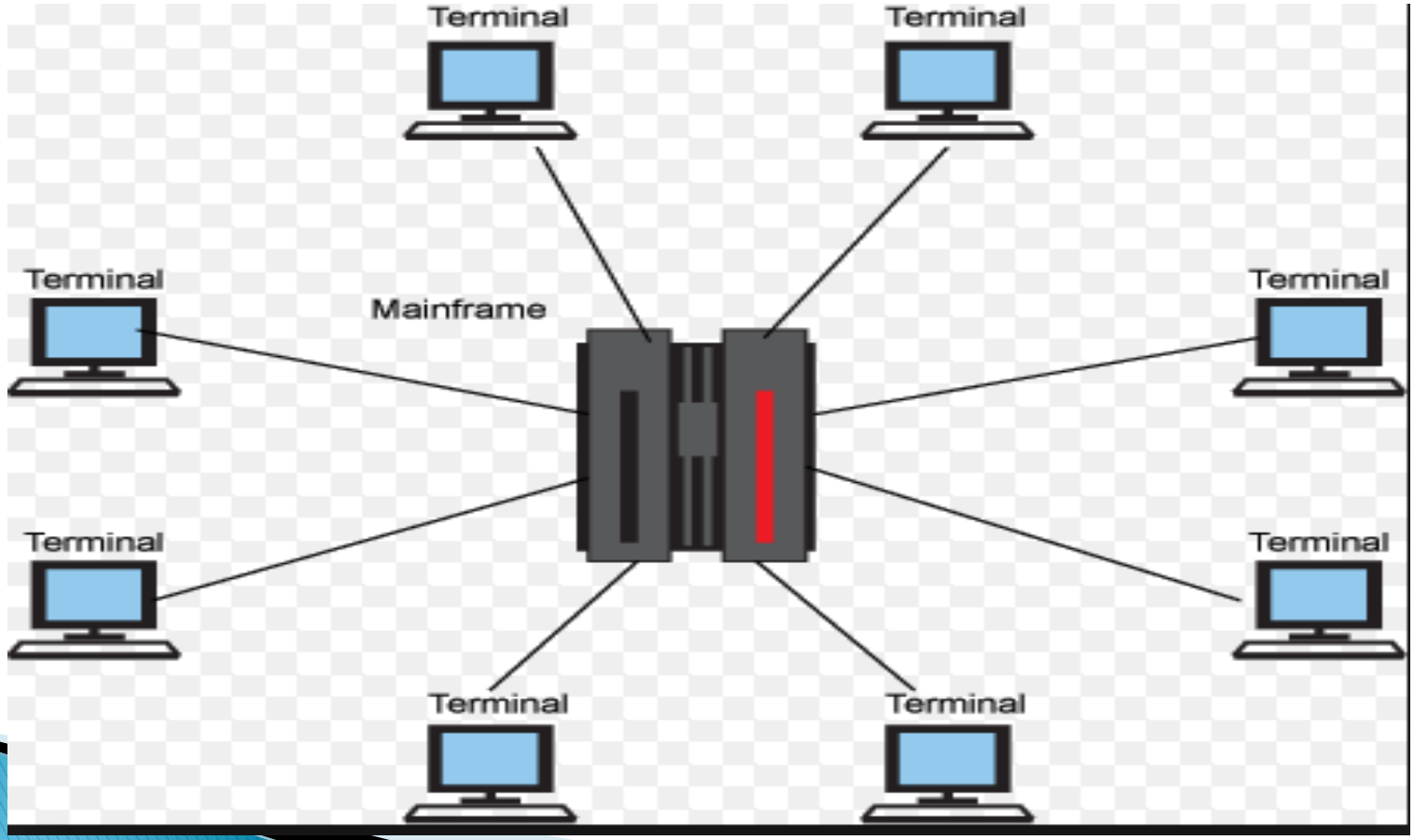
Terminal is used for input and output, processing is done by the main frame

- Client/Server Architecture
  - **Client** is the information **requester** – Laptop/workstation
  - **Server** is the information **provider** – email servers, DNS servers, File servers, application, printer, or Web servers, etc.
  - **Thick or Fat Client**:– Is any computer with capability to input, output, process, and store information.
  - **Thin Client**:– Is a computer that can only input and output information (i.e. limited capability)
- **Peer to Peer(P2P)**–Ad hoc (no server) wired or wireless connection between 2 or more computers – Can only be up to 10 computers

Client Sever Architecture



Legacy Network-Main Frame



Peer to Peer–Ad hoc connection

Set up a wireless ad hoc network

An ad hoc network (sometimes called a computer-to-computer network) is a temporary network used for sharing files, presentations, or an Internet connection among multiple computers and devices.

Computers and devices in ad hoc networks must be within 30 feet of each other.

If you're currently connected to a wireless network, you might be disconnected when you set up this network.

Network Topology/Network Types

- Network – A collection of computers and other hardware components interconnected by communication channels that allow sharing of resources and information
- **Bus**:- Is a straight-line network of computers. Has continuity problem when one node is out.
- **Star**:- Failure when central stop working
- Ring:- Too long to reach out to device
- **Partial Mesh and Full Mesh**:- More expensive and a complex to implement, but the best topology infrastructure.

Network Topology Diagrams

Fully Connected Network Topology

Mesh Network Topology

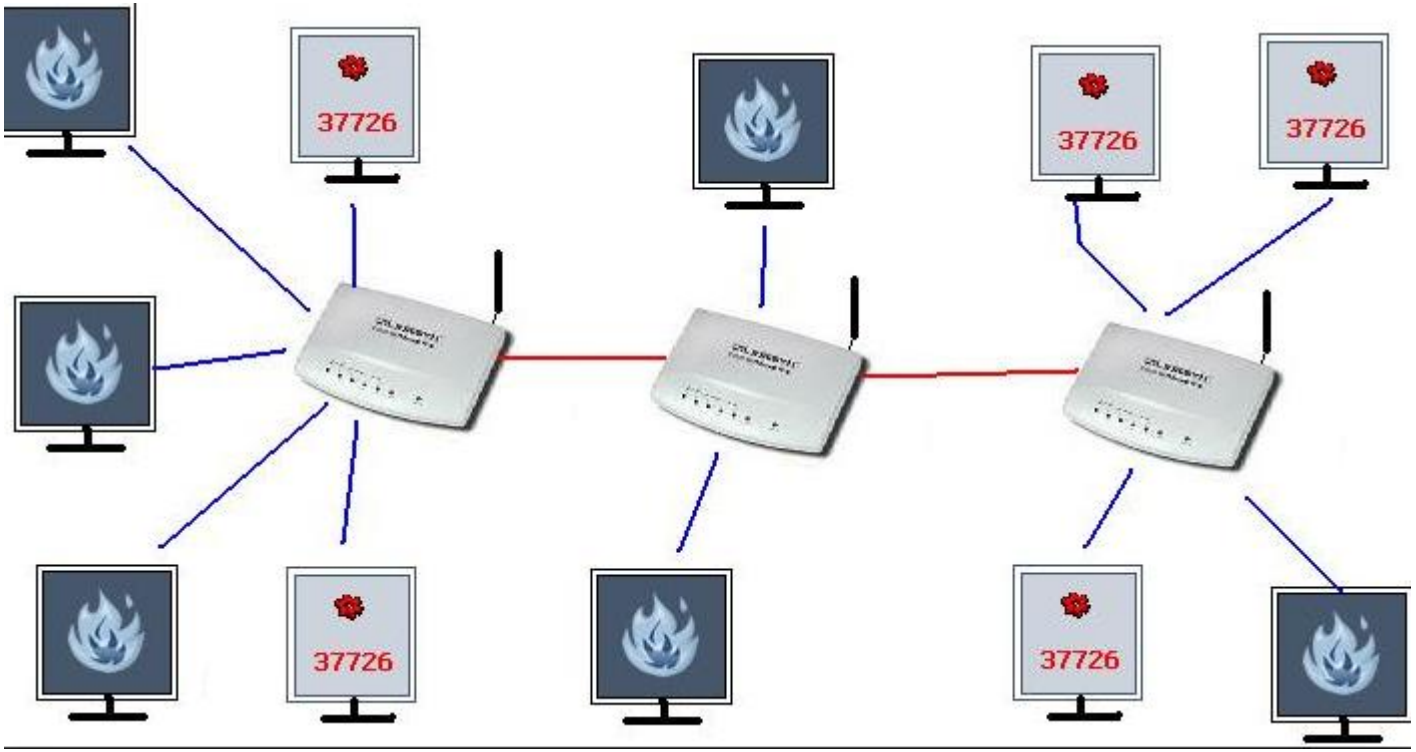
Star Network Topology

Common Bus Topology

Ring Network Topology

Combined Network Topology

Example of Star/Bus connections



Types of Network

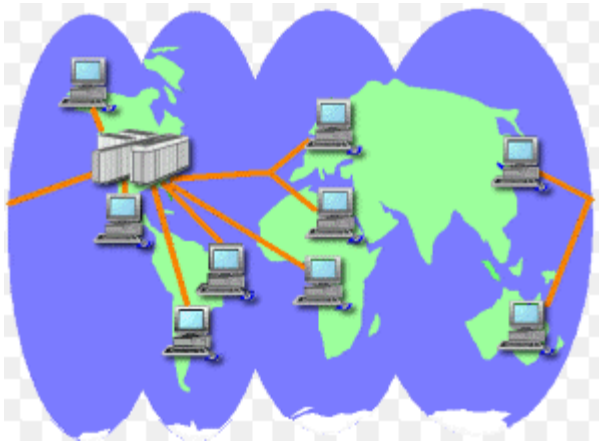
- **LAN** – Local Area Network. This is used in our homes and offices
- **WLAN** – Wireless Local Area Network
- **CAN** – Campus Area Network. Used to connect building in the same area (e.g. university campus)
- **MAN** – Metropolitan Area Network Use to connect Cities
- **WAN** –Wide Area Network – Used to connect countries

Types of Network

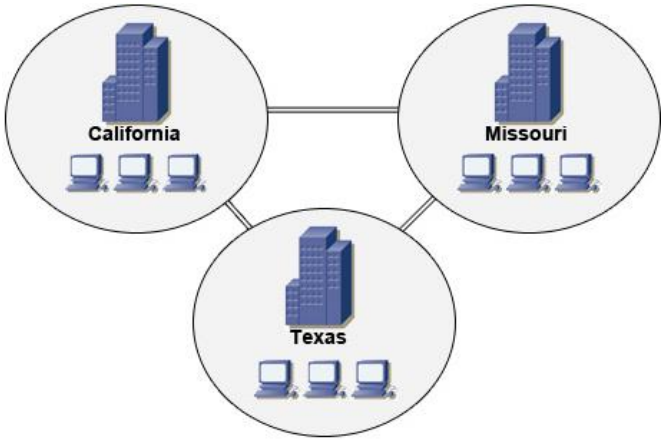
Different types of networks are discussed below.

- A Personal area networks (PANs) is a microcomputer network used for communications in telephones, PDAs, printers, cameras, scanners, among other computer devices being used by an individual person.
- Local area networks (LANs) are computer networks that cover a limited area such as a home, office or campus.
- Wide Area Networks (WANs) are computer networks that cover a broad area such as a city, region, nation or an international link. The Internet is an example (the largest example) of a WAN.
- Metropolitan Area Networks (MANs) are WANs that are limited to a city or region; usually, MANs are characterized by higher data transfer rates than WANs.
- Storage area networks (SANs) are a variation of LANs and are dedicated to connecting storage devices to servers and other computing devices. SANs centralize the process for the storage and administration of data.

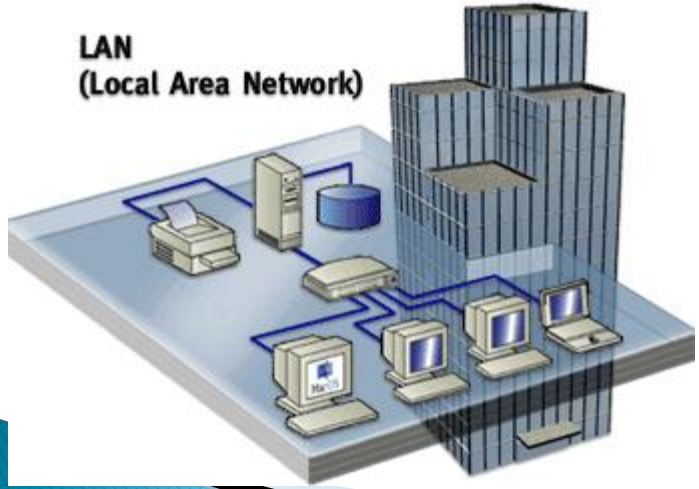
Type Of Network

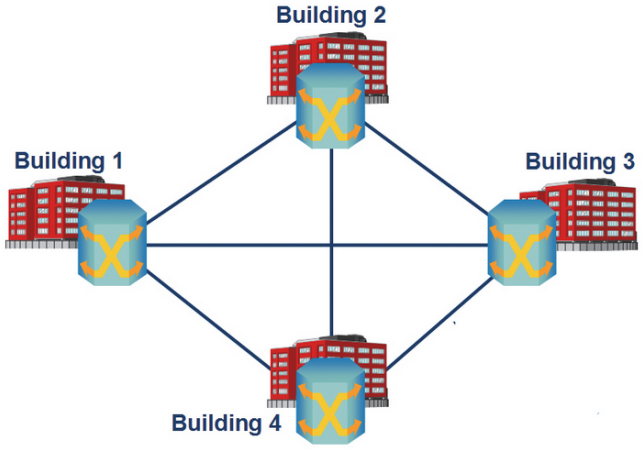


Wide area network



Metropolitan area network





Campus area network

Wireless Networks

Wireless technologies, enable one or more devices to communicate without physical connections, i.e., without requiring network or peripheral cabling. The technology uses radio frequency transmissions/electromagnetic signals through free space as the means for transmitting data.

Wireless networks serve as the transport mechanism between devices, and among devices and the traditional wired networks. Wireless networks are many and diverse but are frequently categorized into four groups based on their coverage range:

- WANs
- LANs
- Wireless personal area networks (WPANs)
- Wireless ad hoc networks

Wireless Networks Risks

Wireless Risks

- Interception of sensitive information
- Loss or theft of devices
- The misuse of devices
- The loss of data contained in the devices
- Distractions caused by the devices
- Possible health effects of device usage

Introduction To FISMA

- The **Federal Information Security Management Act** (**FISMA**) is United States legislation that defines a comprehensive framework to protect government information, operations and assets against natural or man-made threats.
- FISMA was signed into law as part of the Electronic Government Act of 2002.
- The goal of FISMA is to protect the **Confidentiality**, **Integrity** and **Availability (CIA)** of information and information system
- **Office of Management Budget** (**OMB**) is executive branch of the government **responsible for the implementation of the FISMA Law**. OMB ensures that all government agencies **comply** with FISMA. They also report their FISMA compliance status to OMB
- Agencies are obligated to comply or have their fiscal budgets not approved.

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Introduction To FISMA

- National Institute of Standards and Technology (**NIST**) has been tasked by OMB to come out with a framework to help government agencies to comply with the FISMA.
- **FISMA Risk Management Framework** (RMF) **has 6 phases** (**CSIAAM**):
  - **C**ategorization of the information to be protected in levels of ***Low, Moderate*** *or* ***High*** based on the **information type** that the system **stores, processes**, or **transmits.**
  - **S**election of Control
  - **I**mplementation of the selected security controls
  - **A**ssessment of the security controls to ensure their effectiveness
  - **A**uthorization of the information system for processing.
  - **M**onitoring the security controls on a **continuous basis**

National Institute of Standards and Technology

National Institute of Standards and Technology (**NIST**) has various publications to help government to comply with FISMA

- **Federal Information Processing Standard** (**FIPS**)
- NIST **Special Publication** (**SP**)
  - 500 series – General IT guidelines
  - **800 series** – Aims at Computer Security

Any Question