## Computer Generations

<table>
<thead>
<tr>
<th>Generation</th>
<th>Date</th>
<th>Description</th>
<th>Famous Scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>(1956–1963)</td>
<td>Uses transistors which were smaller than vacuum tubes. Advantages: no need warm up time, consumed less energy, generate less heat, faster &amp; more reliable. Famous computer scientists: John Bardeen, Walter House Brattain, William Shockley.</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>(1964–1971)</td>
<td>IBM 370 series - 1964. CDC 7600 and B2500. Integrated circuit begins. Use silicon chips – reliable, compact, cheaper. Hardware and software sold separately. First 256 bit RAM were introduced and was the basis for development of 1K bit RAM.</td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td>(1971–present)</td>
<td>Famous computer scientists: Steve Jobs (built the 1st Apple computer), Bill Gates, Michael Dell. Silicone chips, microprocessor, storage devices were invented. Computer became 100 times smaller than ENIAC. Gain in speed, reliability and storage capacity. Personal and software industry bloomed.</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>(Present – beyond)</td>
<td>Based on Artificial Intelligence (AI). New hardware technology was introduce: Silicone chips, Processor, Robotics, Virtual reality, Intelligent system, Programs which translate languages.</td>
<td></td>
</tr>
</tbody>
</table>
9. **Data manipulation**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Update</strong></td>
<td>to correct inaccurate data and to change old data with new data</td>
</tr>
<tr>
<td><strong>Insert</strong></td>
<td>to add new records in the file when new data are obtained.</td>
</tr>
<tr>
<td><strong>Delete</strong></td>
<td>to remove a record from a file when it is no longer needed</td>
</tr>
<tr>
<td><strong>Retrieve</strong></td>
<td>to obtain specific information from the tables in order to refer or make changes the information.</td>
</tr>
<tr>
<td><strong>Sort</strong></td>
<td>To arrange the records according to ascending or descending order based on a specific field.</td>
</tr>
<tr>
<td><strong>Filter</strong></td>
<td>to exclude unwanted records from being retrieved by using certain condition or criteria in a query.</td>
</tr>
<tr>
<td><strong>Search</strong></td>
<td>To find specific records that fulfills the user’s requirements.</td>
</tr>
</tbody>
</table>

2. **Positive impact of ICT on the society**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6 positive impacts:</strong></td>
<td></td>
</tr>
<tr>
<td>Faster communication speed</td>
<td></td>
</tr>
<tr>
<td>Lower communication cost</td>
<td></td>
</tr>
<tr>
<td>Reliable mode of communication</td>
<td></td>
</tr>
<tr>
<td>Effective sharing of information</td>
<td></td>
</tr>
<tr>
<td>Paperless environment</td>
<td></td>
</tr>
<tr>
<td>Borderless communication</td>
<td></td>
</tr>
</tbody>
</table>

3. **Negative impact of ICT on the society**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 negative impacts:</strong></td>
<td></td>
</tr>
<tr>
<td>Social problems</td>
<td></td>
</tr>
<tr>
<td>Health problems</td>
<td></td>
</tr>
</tbody>
</table>

4. **Why ethics and law in computing is needed?**

<table>
<thead>
<tr>
<th>Principle</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respecting ownership</td>
<td>not steal other people’s work either by duplicating or distributing</td>
</tr>
<tr>
<td>Respecting privacy and confidentiality</td>
<td>refraining oneself from invading other’s privacy without permission</td>
</tr>
<tr>
<td>Respecting property</td>
<td>do not tamper and change electronic information</td>
</tr>
</tbody>
</table>

5. **Intellectual Property protection**

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patent for inventions</strong></td>
<td>utility, design, plant patent, (protect inventions and improvements)</td>
</tr>
<tr>
<td><strong>Trademark for brand identity</strong></td>
<td>Words, names, symbols, devices, images (represent products, goods or services)</td>
</tr>
<tr>
<td><strong>Copyright for material</strong></td>
<td>Literary and artistic material, music, films, sounds recording and road casts</td>
</tr>
<tr>
<td><strong>Design for product appearance</strong></td>
<td>particular lines, contours, colour, shape, texture, ornamentations.</td>
</tr>
</tbody>
</table>
6. **Methods of authentications**
   - **authentications** - a process where users verify their identity
   - 2 types of authentications:
     - **Biometric devices** – a device that translates personal characteristic into digital code
       - Fingerprint recognition
       - Facial recognition
       - Hand geometry scanning
       - Iris scanning (the area near to the colored area of the pupil)
       - Retinal scanning (the eyeball)
       - Voice recognition
       - Signature verification system
   - **Callback system** – checking system that authenticates the user (commonly used in the bank operation and business transaction)
     - When booking the taxi service
     - Operator call and call back for confirm the service required

7. **Methods of verification**
   - **Verification** - the act of proving or disproving the correctness of a system with respect to a certain formal specification
   - 2 common methods:
     - **User identification** – show passport, key-in user name & password, show exam slip
     - **Processed object** – swipe security card to enter building, police check the driver’s license to identify valid driver

8. **Controversial content**
   - **Pornography** – any form of media or material that depicts erotic behavior and is intended to cause sexual excitement
   - **Slander** – legal term for false and malicious statement

9. **Internet filtering**
   - 3 common methods:
     - **Keyword blocking** – uses a list of banned words to filter access to the site
     - **Website / site blocking** – uses software to prevent access to any sites on the list
     - **Web rating system** – browser gain access to a certain level of ratings

7. **Primary key and foreign key**
   - **Primary key** – these keys must not be null values, and it is unique. It helps to avoid duplication
   - **Foreign key** – the field that matches the primary key in another table. It may have duplicate values.

8. **Phases of System Development**
   - **Analysis Phase**
     - Developers will perform problem analysis by finding out the needs of target users.
     - Developers also identify the input, process and output for the new system.
   - **Design Phase**
     - Based on the needs of target users, the system developers will design an Entity Relationship Diagram (ERD)
   - **Implementation Phase**
     - Developers create database using database software.
   - **Testing Phase**
     - The system will be tested by the target users in the Testing Phase. If there is any error detected; the system developers will fix the error.
   - **Documentation Phase**
     - Developers will produce the documents for the program
   - **Maintenance Phase** – monitor the system performance and make changes when needed.
     - 3 types of maintenance:
       - **Corrective maintenance** – to repair error in the system design.
       - **Perfective maintenance** – to improve a computer program.
       - **Preventive maintenance** – aim for future breakdowns and failures.
4. Hierarchy of Data

Bits → Bytes → Fields → Records → Files → Database

Bit – smallest unit of data the computer can store. It is in binary digit (1 and 0).

Byte – 8 bits = 1 byte = 1 character.

Field – smallest unit of meaning information in the database. It is also unit of data consist of one or more characters. Example: field that describe Name, Class, Address

Record – collection of related fields. Example: Data about a student [Name, StudentID, Age]

File – collection of related records.

Database – Structured collection of information on specific subjects.

5. Benefits of using database

Minimise data redundancy – no need to repeat recording the same data.

Data Integrity is assured – changes of data in database will be automatically for all files.

Data can be shared – allow ease of sharing data especially over the network.

Information can be easily accessed

6. Features of table, query, form and report

Table – stores a collection of information about specific topic.

Query – request for a specific data from a database

Form – interface to enter information.

Report – summary of information from the database.

10. Cyber law acts in Malaysia

Digital Signature Act 1997 – secures electronic communications especially on the internet

Computer Crimes Act 1997 – gives protection against misuse of computers and computer criminal activities

Telemedicine Act 1997 – Ensure only qualified medical practitioners can practice telemedicine

Communications and Multimedia Act 1998 – ensures that information is secure, network is reliable, and service is affordable all over Malaysia

11. Computer Crimes

Computer Fraud – intention to take advantage or causing loss (mainly monetarily basis)

Copyright Infringement – involves illegal copy or reproduction of copyright material by black market group

Computer Theft – unauthorized use of another person’s property

Computer Attack – to disrupt the equipment of computer systems

12. Computer Security

Hardware Security – used to protect the computer hardware

Software and Data Security – used to protect software and the loss of data files

Network Security – used to protect the network system
13. Security Threat

- Malicious code
  - Virus – a program that can pass in the malicious code to other programs by modifying them
  - Trojan Horse – a program which can perform useful and unexpected action
  - Logic Bomb – that goes off when a specific condition occurs
  - Trapdoor or Backdoor – a program that allows someone to access the program with privileges
  - Worm – a program that copies and spreads itself through a network

- Hacker – unauthorised person who access (hack) into computer system

- Natural and environmental threat – flood, fire, earthquake

- Theft – steal money, goods, information and resources

14. Security Measures

- Data backup – a program of file duplication. It is necessary so that they can be recovered in case of an emergency

- Cryptography – process of hiding information by altering the actual information into different representation.

- Antivirus – program that protects a computer against viruses by identifying and removing any computer viruses found in the computer memory, storage or incoming email files.

- Anti-spyware – program used to remove spyware

- Firewall – hardware or software which functions in a networked environment to prevent some communications forbidden by the security policies.
  - Screening router
  - Proxy gateway
  - Guard

Chapter 6: Information Systems

1. Definition

- Data – raw material that are not organized, and has little value

- Information – processed data that are organized, meaningful and useful.

- Information System – a set of related components that collects data, processes data and provides information.

2. Component of IS

- Data – raw inputs for information system such as number, image, figure or sound

- Hardware – set of physical equipment such as a processor, monitor, keyboard and etc.

- Software – a set of computer programs that provide step by step instruction

- People – individuals who use the hardware, software and its output

- Procedures – the set of instructions indicating the entire above component in order to process information and generate the expected outcome.

3. Types of IS

- Management Information System (MIS) – provide regular information about the daily activities of a business to the manager

- Transaction Processing System (TPS) – record business transaction and keep track of the daily transaction in the database.

- Decision Support System (DSS) – provides managers with information to make the best decisions. It also helps to analyse information, recognize problems and making decisions.

- Executive Information System (EIS) – helps top-level managements to plan strategies. It is also used to forecast future trends.

- Expert System (ES) – store knowledge and make logical suggestions for the user.
### 6. Control Structure

**Sequence control** — linear execution of codes within the program (in sequence order)

**Selection control** — execution of codes involving decision making based on the situation given. There will be decision symbol present in the control

**Repetition control** — execution of codes where the codes are repeated while condition remains true. The arrowhead in the flow chart usually will return the part of the decision to repeat the process for true condition

### 7. Program Development Phase

**Problem analysis phase**
- Programmer reviews and defines the problems
- Identify the data input, process and output for the program

**Program design phase**
- The programmer generates a top-down design model
- Programmer writes the pseudo code for the program based on the top-down design model
- Programmer draws the flow chart that shows the data flow of the program
- Programmer also produces input and output user interfaces base on the existing form

**Coding phase** — the process of writing the solution using computer programming language.
- Programmer uses a program development tool which generates or provides some or all codes.

**Testing and debugging phase** — the process of locating and correcting of syntax and logic errors in a program.
- **3 types of errors**
  1. **Syntax error** — caused by wrong spelling, case sensitive, punctuation and wrong words in command.
  2. **Logic error** — expected output and actual output do no match for any set of data.
  3. **Run-time error** — occurs while the program is running or executing.

**Documentation phase** — the process of written description and pseudo code of computer programs.

### 15. Security Procedures

**Data Protection**
- Backup files
- Detect virus and do cleanup
- Warn others on virus attack

**Detecting illegal access to systems**
- **Tcpwrappers** — control access at the application level rather than at socket level.
- **Tripwire** — detect and report on any changes in the thousands of strategic system files.

**Preventing illegal access to system**

**Preventing illegal access to root**

**Patch** — small updates to software

**Human aspect** — refer to the user and also the intruder of a computer system.

- **Organisation self awareness** — aware of the people they work with
- **Organisation user self awareness** — provide employee with adequate training and importance of security and control
- **Individual user self awareness** — aware of software from unreliable sources. Do not expose important information to stranger.
1. Computer System
   Hardware + Software + User

2. Computer Hardware
   **Input Devices** – texts, graphics, audio, video
   **Output Devices** – texts, graphics, audio, animations, video
   **Storage Devices** – Primary (RAM & ROM), Secondary (Magnetic, Flash, Optical, ROM)
   **Processor** – the main brain in the system unit

3. Computer Software
   **System Software** – Operating System (Linux, Window XP, Mac OS X, Window Vista) & Utility program (Antivirus, File Manager, Screen Saver, Diagnostic utility)
   **Application Software**
   - **Word Processing** – Corel Word Perfect, Microsoft Word, Sun StarOffice Writer
   - **Spreadsheet** – Corel Quattro Pro, Microsoft Excel, Sun StarOffice Calc
   - **Presentation** – Corel Presentations, Microsoft PowerPoint, Sun StarOffice Impress
   - **Graphics editing** – Adobe Photoshop CS2, CorelDraw, Macromedia Freehand, GIMP
   **Software Suite** – collection of individual program sold as a single package

4. Information processing diagram
   ![Information processing diagram]

5. Machine cycle diagram
   ![Machine cycle diagram]

4. Basic element
   **Constant** – value *never change* at any time during the course of a program
   **Variables** – value *may change* at any time during the course of a program

5. Flow Chart
   **Terminator** – shows beginning or end of a program
   **Flow line and arrowhead** – shows connect symbols and indicate the sequences of operation.
   **Input / output** – shows either an input operation or output operation
   **Process** – shows process to be carried out
   **Decision** – shows a decision to be made
## Chapter 5: Programming

### 1. Generations of programming language

**Low Level Programming Language**

1GL (Machine Language) – in binary codes and each statement corresponds to one machine action.

2GL (Assembly Language) – human readable notation, using symbolic instructions codes that are meaning abbreviations or mnemonics.

**High Level Programming Language**

3GL (Procedural language) – uses a series of English-like words that are closer to human language to write instructions. Example: PASCAL, FORTRAN, BASIC, COBOL, C, C++

4GL (Non-procedural language) – enables user to access data in a database. Limited to a very specific application. Example: SQL, NOMAD and FOCUS.

5GL (Visual programming / Natural language) – provides a visual or graphics interface, allows people to interact with computers without needing any specialised knowledge. Example: Prolog and Mercury.

### 2. Programming approaches

Structured programming (top-down design model) – map out the overall program structure into separate subsection from top to bottom. Example: Ada, Pascal and Fortran.

Object oriented programming (OOP) – combines data with functions to create objects. The object has relationships with one another. Example: Smalltalk, Java, Visual Basic, C++

### 3. Translator

**Compiler** – execute the program after translates the entire program statement, if any errors found, it records them in the program-listing file, it runs faster than interpreter. Example: COBOL, FORTRAN, C, C++

**Interpreter** – interpret and execute program directly from its source without compiling it first. Execute in real time when user execute it. Example: BASIC, Logo and Smalltalk.

**Assembler** – computer program for translating assembly language into machine language. Example: MACRO-80 Assembler and Microsoft MASM.

### 6. Data representation

- **8 bits = 1 byte = 1 character**

### 7. Character codes

- **ASCII** (American Standard Code for Information Interchange)
  - Pronounced as ASK-KEY
  - Most widely used coding system to represent data
  - Used mostly in PC and midrange server.
  - Uses 7 out of 8 bits in the character.

- **EBCDIC** (Extended Binary Coded Decimal Interchange Code)
  - Pronounced as EB-SEE-DIC
  - Primarily used in mainframe computers and high-end server.

- **Unicode**
  - Support all the world language including Asian Language
  - Example: Chinese, Japanese, Korean
  - Uses 16 bits instead of the usual 8 bit per character.

### 8. Component of motherboard

- **Central Processing Unit (CPU)** – control the operations of the computer. It interpret and carries basic instructions that operate a computer. It have 2 subcomponent that is Control Unit (CU) and Arithmetic Logic Unit (ALU).

- **Expansion Slots** – sockets where the circuit board or the adapter card can be inserted into the motherboard.

- **RAM Slot** – slot where computer memory (RAM) is placed on the computer’s motherboard.

- **Ports** – the point where peripherals attaches to a system unit.
  - **Serial port** – connect a device to the system unit by transmitting data one bit at a time.
  - **Parallel port** – connect devices by transferring information more than one bit at a time.
  - **Universal Serial Bus (USB) port** – socket on a computer or peripheral devices into which a USB cable is plugged in. Can connect up to 127 different peripherals together with a single connector.
  - **FireWire port** – connect multiple types of devices that requires faster data transmission speeds. Can daisy-chain connect up to 63 devices to one FireWire port.

- **Connectors** – a connector joints a cable to a peripheral.
9. User Interface

- **Command-line user interface**
  - requires user to type commands or press special keys on the keyboard to enter data and instructions that instruct the operating system what to do. It has to be typed one line at a time.

- **Menu driven Interface**
  - provides menus as means of entering commands.

- **Graphical User Interface (GUI)**
  - provides interface by means of clicking icon that represent computer resources.

10. Function of operating system

- **Starting a computer** – warm boot, cold boot
- **Proving a user interface** – Command line, Menu Driven, GUI
- **Managing data and programs**
- **Managing memory**
- **Configuring Devices**

9. Screen Design Principle

- **Screen Design**
  - how the multimedia program will look when it is displayed on the computer screen.

- **Contrast**
  - the usage of different types of multimedia elements

- **Alignment**
  - the arrangement of multimedia elements on the screen. For example, graphics or text should be arranged at the most suitable position

- **Simplicity**
  - the simple and easy way of presenting the multimedia program

- **Proximity**
  - the concept of grouping a similar or related element

- **Emphasis**
  - to creating the focus point on the screen

- **Repetition**
  - repeating the same texture, colour, size of font and style in the multimedia program.

**USER INTERFACE PRINCIPLES**

User interface is a way a computer program communicates with the person who is using it. There are eight main principles of the user interface.

1. Consistency
2. Clarity
3. Context
4. Navigation
5. Search
6. Personalisation
7. Learnability
8. Flexibility

**CASPER SCREEN DESIGN PRINCIPLES**

Screen design refers to how the multimedia program will look when it is displayed on the computer screen. In screen design, CASPER design principles are used.

1. Contrast
2. Alignment
3. Simplicity
4. Proximity
5. Emphasis
6. Repetition
7. Multimedia production team

- **Project Manager**
  - Define the scope of the project and discuss with the client
  - Search for financial resources, equipment and facilities
  - Coordinate the production team

- **Subject Matter Expert**
  - Do the research on the content of a multimedia program
  - Provide content for the multimedia content

- **Graphics Artist**
  - Develop the graphic elements of the program such as background, buttons, photos collages, 3D objects, logo and animation.

- **Audio-Video Technician**
  - Record voice, capture, edit and digitize the video

- **Instructional Designer**
  - Decide on the best educational strategies and practices to present the information.

- **Programmer**
  - Write the program code lines or scripts using the authoring tool

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8. Multimedia Production Phases

- **Analysis** – developers interview the clients to find out their needs and write the problem statement and a proposal.

- **Design** – developer design a flow chart and storyboard

- **Implementation** – developers convert a design plan such as storyboard into a multimedia project

- **Testing** – to ensure the program runs correctly without errors.

- **Evaluation** – focuses on overall presentation and effectiveness of the multimedia.

- **Publishing** – package the presentation/project multimedia using suitable software

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Chapter 3: Computer Networks and Communications

1. **Introduction to computer network & communications**

   - **Computer network** - a system of interconnected computers and peripheral devices. It may connect computers, printers, scanners and cameras.

   - In a network, computers can exchange and share information and resources.

   - **Communications** is about the transfer of information from a sender, across a distance, to a receiver.

2. **Computer Network**

   - **LAN** – covers a small region of space, typically a single building

   - **MAN** – is a collection of LANs with the same geographical area (e.g., same city)

   - **WAN** – can be collections of LANs and/or MANs (e.g., a country or even beyond the border)

**Differences between LAN, MAN & WAN**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>LAN</th>
<th>MAN</th>
<th>WAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Low</td>
<td>High</td>
<td>Higher</td>
</tr>
<tr>
<td>Network Size</td>
<td>Small</td>
<td>Larger</td>
<td>Largest</td>
</tr>
<tr>
<td>Speed</td>
<td>Fastest</td>
<td>Slower</td>
<td>Slowest</td>
</tr>
<tr>
<td>Transmission media type</td>
<td>Twisted pair</td>
<td>Twisted pair &amp; fiber-optic</td>
<td>fiber-optic, radio wave &amp; satellite</td>
</tr>
<tr>
<td>Number of computers</td>
<td>smallest</td>
<td>large</td>
<td>largest</td>
</tr>
</tbody>
</table>
3. Network Architecture

**Client/Server**
- Network in which the shared files and applications are stored in the **server** but network user (client) can still store files on their individual PCs.
- A **server** is a computer that shares information and resources with other computers on a network.
- A **client** is a computer which requests services or files from a server computer.

**Peer-to-Peer (P2P)**
- network with all the nodes are acting as both serves and clients.
- All computers in the peer-to-peer network have **equal responsibilities and capabilities** to use the resources available on the network.
- **no server is needed**
- each computer in the network is called a **peer**
- Examples : Limewire, Bearshare & Kazaa

**Differences between client/server & P2P**

<table>
<thead>
<tr>
<th>Client/server</th>
<th>Peer-To-Peer (P2P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- server has control ability while client don’t</td>
<td>- all computers have equal ability</td>
</tr>
<tr>
<td>- used in small and large networks</td>
<td>- used in small networks with less than 10 computers</td>
</tr>
<tr>
<td>- with server</td>
<td>- no server is needed</td>
</tr>
</tbody>
</table>

4. Network Topology

**Bus Topology** – main physical pathway or central cable where all other devices are connected to it.

![Bus Topology Diagram](image)

5. Web editor

**What You See Is What You Get (WYSIWYG)**
- Provide an editing interface that shows how the pages will be displayed in web browser.
- More user friendly
- No junk HTML
- No HTML knowledge needed
- Easy to insert a specific tag
- Easy to visualize the design
- E.g.: Microsoft FrontPage, Macromedia Dreamweaver

**Text-based**
- An editor where you work with HTML tags to create a web page.
- Less user friendly
- No junk HTML
- Requires HTML knowledge
- Difficult to insert a specific tag
- Cannot visualize the design
- E.g.: Notepad, PSPad

6. User Interface

**Principle**
- User interface is a way a computer program communicates with the person who is using it.

**Consistency** – the interface design is in harmony and same applied to all screen in a software program.

**Clarity** – clearness of labels on all icons

**Context** – relevant to a particular title and ideas

**Navigation** – user can move around the menu, help files or other screens

**Search** – enables user to search keywords or glossary

**Personalisation** – user can make their own personal or individual learning

**Learnability** – system provides support information and help files to make system easy to understand

**Flexibility** – user has the authority to navigate through all the sections
Chapter 4 : Multimedia

1. Definition of Multimedia
   Presentation of information by using a combination of text, audio, graphics, video and animation.

2. Interactivity
   **Linear interactivity** – the user is a passive receiver. User cannot control over the multimedia content. Only one way communication

   **Non-linear interactivity** – the user is an active receiver. User can control over the multimedia content. Two way communication occurs

3. Medium of delivery
   **Web-based**
   - Limited in picture size and low resolution video
   - Information can be changed, damaged or deleted by irresponsible individuals
   - Information can be updated easily and cheaper
   - It’s cheaper

   **CD-based**
   - Can store high end multimedia elements
   - Information permanently stored and are not changeable
   - Information can be outdated

4. Multimedia Elements and File formats
   **Text:** *.doc, *.txt, *.rtf
   **Graphics:** *.jpg, *.gif, *.tiff, *.bmp, *.png, *.psd
   **Audio:** *.wav, *.midi, *.aiff/aiff, *.au, *.wma, *.mp3
   **Video:** *.avi, *.mov, *.mpeg, *.wmv
   **Animation:** *.swf, *.gif, *.swi

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### Differences between Bus, Ring & Star topologies

<table>
<thead>
<tr>
<th>Criteria</th>
<th>BUS</th>
<th>RING</th>
<th>STAR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>a single central cable (backbone) and all the nodes connect to it</td>
<td>all nodes connected in a circle</td>
<td>all nodes connect to the central host</td>
</tr>
<tr>
<td>Host failure</td>
<td>network can still run</td>
<td>network will fail</td>
<td>network will fail</td>
</tr>
<tr>
<td>Node failure</td>
<td>network can still run</td>
<td>network will fail</td>
<td>network can still run</td>
</tr>
<tr>
<td>Ease of add or remove nodes</td>
<td>easy</td>
<td>difficult</td>
<td>average</td>
</tr>
</tbody>
</table>

---

**Ring Topology** – all computers and other devices are connected in a loop (circle)

**Star Topology** – a central host (a hub or a switch) which acts as the centre and all nodes connect to the host.
5. Network Standard

- **802.3** – Ethernet LAN: physical cabling
- **802.7** – Broadband LAN: provides specifications for the design, installation and testing needed for broadband transmission.
- **802.8** – Fiber-Optic LAN and MAN
- **802.11** – Wireless LAN: uses the 2.4 GHz frequency to transmit data up to 2 Mbps

6. Protocols

- **HTTP**: used to access, send and receive Hypertext Markup Language files (HTML) on the internet
- **SMTP**: used for transferring e-mail between computers
- **FTP**: for allowing files to be copied between devices
- **TCP**: ensures the delivery of information packets across network.
- **IP**: providing logical addressing called IP address to route information between network

7. Network Communication Technologies

- **Internet** – world largest computer network which connect millions computers all over the world
- **Intranet** – internal network that uses Internet technologies. It is a small version of the internet that exist within an organization
- **Extranet** – private network that uses Internet protocols to securely share part of a business’s information.

### Differences between Intranet, Extranet & Internet

<table>
<thead>
<tr>
<th>Intranet</th>
<th>Extranet</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>- private network</td>
<td>- private network</td>
<td>- public network</td>
</tr>
<tr>
<td>- accessible by employees</td>
<td>- accessible by registered</td>
<td>- accessible by anyone,</td>
</tr>
<tr>
<td>within an organization</td>
<td>or authorised users</td>
<td>anytime and anywhere</td>
</tr>
<tr>
<td>- with firewall</td>
<td>- with firewall</td>
<td>- with or without firewall</td>
</tr>
<tr>
<td>- tight security</td>
<td>- tight security</td>
<td>- low security</td>
</tr>
</tbody>
</table>

![Cable stripper](image)

**Straight Cable**
- Used to connect computers through a hub
- use 568B schematic

**Crossed Cable**
- Used to connect computers without using any hub
- use 568A schematic
8. Communication Devices

<table>
<thead>
<tr>
<th>Network Interface Card (NIC)</th>
<th>- enables the computer to access the network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless Network Interface Card (WNIC)</td>
<td>- network card that provides wireless data transmission</td>
</tr>
<tr>
<td>Modem</td>
<td>- convert analog signal to digital signal and vice-versa.</td>
</tr>
<tr>
<td>Hub or switch</td>
<td>- to connect segments of a LAN</td>
</tr>
<tr>
<td>Router</td>
<td>- connects multiple computers or other routers together and transmits data to the correct destination</td>
</tr>
<tr>
<td></td>
<td>- forwards data packets across a network toward their destinations</td>
</tr>
<tr>
<td>Wireless Access Point</td>
<td>- connects wireless communication devices together to form a wireless network.</td>
</tr>
</tbody>
</table>

9. Transmission medium

<table>
<thead>
<tr>
<th>Physical transmission medium (guided)</th>
<th>- waves are guided along a solid transmission medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples</td>
<td>Examples: twisted-pair cable, coaxial cable and fibre optic cable</td>
</tr>
</tbody>
</table>

**Twisted-Pair (UTP & STP)**

It consists of two wires or conductors twisted together, each with its own plastic insulation.

**Coaxial Cable**

It consists of a single copper wire surrounded by at least three layers.
**Wireless transmission medium (unguided)**
- uses air to transmit data
- waves are unguided and the transmission and reception are by means of antennas

**Range of Data transmission**
- short range: Bluetooth or Infrared
- Medium range: WiFi or wireless LAN
- long range: 3G

**Wireless transmission** - radio waves, microwaves, infrared

**Radio Waves**
- frequencies between 3 KHz and 1 GHz
- omnidirectional
- interference by another antenna that is sending signals of the same frequency

**Microwaves**
- frequencies between 1 GHz to 300 GHz
- unidirectional
- cannot penetrate walls

**Infrared**
- frequencies between 300 GHz to 400 THz
- high frequencies and cannot penetrate walls

**Network operating System (NOS)**

**Network Operating System**
- an operating system that has been specifically written to keep networks running at optimal performance.
- allows it to connect computers and peripherals to a network

**Peer-to-peer Network Operating Systems**
- allow users to share resources and files located on their computers.
- Examples: AppleShare and Windows for Workgroups

**Client/Server Network Operating Systems**
- allow the network to centralise functions and applications in one or more dedicated file servers.
- Examples: Novell Netware and Windows 2000 Server

**Client Software**

**Types of Client Software**
- **Web browser**
- **Email client**
- **File transfer protocol (FTP)**

**Web browser**
- a software application that enables a user to display and interact with HTML documents hosted by web servers or held in a file system.
- a user to quickly and easily access information provided on many web pages at many websites by surfing these links
- used to access information provided by web servers in private networks or content in file systems
- Examples: Microsoft Internet Explorer, Safari, Netscape and Opera

**Email client**
- a computer program that is used to read and send email

**File Transfer Protocol**
- used to connect two computers over the Internet so that the user of one computer can transfer files and perform file commands on the other computer