

1/Networks

◆ Definitions

- **Network:** A system of interconnected computer devices or nodes, allowing information or resources to be shared by many users.
- **Network Protocol:** A set of rules that defines how data is transmitted and received over a network.
- **LAN (Local Area Network):** A network typically located within a small geographical area, such as an office.
- **WiMAX:** A wireless network technology used for providing long-range, high-speed internet access, particularly in remote or rural areas.
- **Wireless LAN:** A network that connects devices using electromagnetic waves (like radio waves), without physical cables.
- **Broadband Modem:** A device used to connect to the Internet via a high-speed connection (such as DSL or fiber).
- **Router:** A device that routes data between different networks and allows multiple computers to share an Internet connection.
- **Wireless Access Point:** A device that provides wireless (Wi-Fi) network access to compatible devices.
- **Satellite:** A device that receives and amplifies signals, transmitting them to workstations over long distances, such as between networks in different cities.
- **Cables:** Physical media (like copper or fiber optic) used to connect devices in a network.
- **Broadband Modem:** A device that connects to the Internet via a high-speed connection (e.g., DSL or fiber).
- **Router:** A device that routes data between different networks and shares an Internet connection.
- **Wireless Access Point (or Wireless Router):** A device that provides wireless (Wi-Fi) network access to compatible devices.
- **Mixed Network:** A network that combines different types of topologies (e.g., bus, star, ring).
- **Peer-to-Peer Network:** A network where all computers are independent and no dedicated server is required.
- **Ring Topology:** A network topology where all devices are connected to the same circuit, forming a continuous loop.

◆ Types of Network Topologies

1. Bus Topology

- All devices connect to a single central cable called the bus.
- **Advantages:** Simple and low cost.
- **Disadvantages:** If the bus cable fails, the entire network goes down.
- **Example:** Legacy Ethernet (10BASE2).

2. Star Topology

- Devices connect individually to a central hub or switch.

- **Advantages:** Easy to troubleshoot; failure of one device doesn't affect others.
- **Disadvantages:** If the central hub fails, the whole network stops working.
- **Example:** Home Wi-Fi networks.

3. Ring Topology

- Devices are connected in a closed loop, each connected to two neighbors.
- **Advantages:** No data collisions; predictable performance.
- **Disadvantages:** Failure of one device breaks the entire ring.
- **Example:** IBM Token Ring networks.

4. Mesh Topology

- Devices are interconnected, either fully or partially.
- **Advantages:** Highly fault-tolerant due to multiple redundant paths.
- **Disadvantages:** Expensive and complex to set up.
- **Example:** Military networks, IoT systems.

5. Tree Topology

- A hierarchical combination of star and bus topologies.
- **Advantages:** Scalable for large networks.
- **Disadvantages:** Failure of root nodes can disrupt parts of the network.
- **Example:** Corporate or university networks.

6. Hybrid Topology

- Combines two or more topologies (e.g., star and ring).
- **Advantages:** Flexible and customizable.
- **Disadvantages:** Complex design and maintenance.
- **Example:** Enterprise networks with mixed setups.

♦ Advantages and Disadvantages of Wireless Networks

- **Advantages:**
 - Mobility and flexibility
 - Easy installation (no cables)
 - Easy access for multiple devices
- **Disadvantages:**
 - Slower speeds than wired networks
 - Signal interference or loss
 - Lower security if not properly protected

♦ Acronym

- **FAQ:** Frequently Asked Questions
- **TCP/IP:** Transmission Control Protocol/Internet Protocol
- **ADSL:** Asymmetric Digital Subscriber Line
- **ISP:** Internet Service Provider

- **PDA:** Personal Digital Assistant
- **Wi-Fi:** Wireless Fidelity
- **GSM:** Global System for Mobile Communications
- **IBM:** International Business Machines Corporation
- **PAN:** Personal Area Network
- **LAN:** Local Area Network
- **WAN:** Wide Area Network
- **MAN:** Metropolitan Area Network

♦ Practical Example: Integrated WAN

The diagram depicts a **Wide Area Network (WAN)** connecting two networks via satellite. In **Barcelona**, a wired network consists of a desktop PC and a PDA connected by Ethernet cables, with a central computer acting as a file server. In **Los Angeles**, a wireless network uses a wireless access point (router) to connect multiple devices, including a central computer, laptop, and PDA. Barcelona's network is connected via a modem to fiber optic cables, while Los Angeles uses ordinary telephone lines. The satellite receives signals from a dish antenna, amplifies them, and transmits them to workstations in both cities. This integrated network enables transcontinental communication services, allowing large organizations to exchange data, transfer files, and conduct video conferences.

2/GUI operating systems

♦ Definitions

- **User Interface (UI):** The method (visual or text-based) allowing a user to interact with a computer.
- **GUI (Graphical User Interface):** A visual user interface that uses windows, icons, and menus instead of text commands.
- **WIMP (Windows, Icons, Menus, Pointer):** A system of interaction with a computer using windows, icons, menus, and a pointer (mouse).
- **Desktop:** The background screen area that displays icons, folders, and application windows.
- **Window:** A resizable, scrollable viewing area that displays application content or file directories.
- **Icon:** A graphical representation of an object like an application, file, folder, or storage device.
- **Folder:** A digital container used to organize and store files and other folders (subfolders).
- **Menu Bar:** The horizontal bar at the top of the screen containing dropdown menus for application functions.
- **Drop-down Menu:** A contextual list of options that appears when clicking a menu item in the menu bar.
- **Scroll Bar:** An interactive control (vertical or horizontal) for navigating through content that extends beyond the visible area.

- **Dock:** A customizable toolbar (typically at the screen bottom) providing quick access to frequently used apps and files.

◆ Questions & Answers

1. **What does WIMP stand for?**
 - Windows + Icons + Menus + Pointer (e.g., a mouse).
2. **What was the main goal of the first Macintosh (1984)?**
 - To simplify computer interaction with a mouse and GUI, making computers accessible to the general public.
3. **What are the elements of a WIMP environment?**
 - Desktop, icons, windows, menus, and a pointer (cursor).
4. **Name 3 modern operating systems.**
 - Windows, macOS, Linux, Android, iOS, etc.
5. **What is multitasking?**
 - The ability of an OS to run multiple programs simultaneously.
6. **Why is Linux considered open-source?**
 - Because its source code can be freely copied, modified, and redistributed (GNU license).
7. **Which OS do BlackBerry devices use?**
 - RIM (developed by Research In Motion).
8. **What is the difference between Unix and Linux?**
 - Unix is proprietary (often used in enterprises), while Linux is open-source and more flexible.

◆ Acronym

- **GUI:** Graphical User Interface
- **WIMP:** Windows, Icons, Menus, Pointer
- **OS:** Operating System
- **PC:** Personal Computer
- **PDA:** Personal Digital Assistant
- **GNU:** GNU's Not Unix (recursive acronym for the open-source license)
- **RIM:** Research In Motion (BlackBerry's developer)

3/Databases

◆ Definitions

1. **Database (DB):** An organized collection of structured data stored electronically.
2. **Database Management System (DBMS):** Software that interacts with databases (e.g., MySQL, Oracle, SQL Server).
3. **Field:** A single data element within a record (e.g., "First Name").

4. **Record:** A complete set of related fields (e.g., all information about one customer). Also called a row or tuple in relational databases.
5. **Relational Database:** A database where data is organized in tables with relationships between them.
6. **Query:** A request for specific data from the database.
7. **Search:** Locating records that match specific criteria (e.g., exact match, pattern matching, range queries).
8. **Sort:** Arranging records in a particular order (alphabetical, numerical, chronological). Can be ascending or descending.
9. **Security Devices:** Mechanisms to protect database integrity and confidentiality.
10. **Spreadsheet Program:** Software that organizes data in tables (rows/columns) and performs calculations.
11. **Worksheet:** A single page/tab within a spreadsheet file.
12. **Column:** Vertical data arrangement labeled with letters (A, B, C...).
13. **Row:** Horizontal data arrangement labeled with numbers (1, 2, 3...).
14. **Cell:** Intersection point of a row and column (e.g., B3).
15. **Formula (Formulas):** User-created equations for calculations.
16. **Functions:** Built-in formulas for specific operations.
17. **Sales:** Total revenue from goods/services.
Example Formula: =SUM(D2:D100)
18. **Share:** Market percentage or stock units.
Example Formula: =(CompanySales/TotalMarket)*100
19. **Expense:** Business operation costs.
Example Formula: =SUM(ExpensesColumn)
20. **Interest:** Cost of borrowing money.
Example Formula: =PrincipalRateTime
21. **Revenue:** Total income before expenses.

♦ **Acronym**

- **DB:** Database

- **DBMS:** Database Management System
- **Fld:** Field
- **RDB:** Relational Database
- **Qry:** Query
- **SUM:** Built-in function for summing values in a range

4/Computer languages

♦ Definitions

1. **Standalone:** A system or program that operates independently; autonomous.
2. **Features:** Characteristics or functionalities of a program or system.
3. **Machine Code:** The lowest-level programming language, consisting of binary (0s and 1s), directly understood by a computer's CPU.
4. **Assembly Language:** A low-level programming language using mnemonics (e.g., ADD, MOV) instead of binary.
5. **Assembler:** A tool that converts assembly language into machine code.
6. **Low-Level Languages:** Programming languages that are close to machine code (e.g., assembly language), offering less abstraction.
7. **High-Level Languages:** Programming languages designed to be more human-readable, abstracting away hardware-level details (e.g., Python, Java, C++).
8. **Interpreter:** A program that executes code line-by-line without compiling the entire program first.
9. **Compiler:** A program that translates the entire source code into machine code before execution.
10. **Object Code:** The compiled machine code output from a compiler, ready to be executed.
11. **Object-Oriented Programming (OOP):** A programming paradigm based on the concept of "objects" that contain data and methods.
12. **Applets:** Small Java applications that can run inside a web browser or Java environment.
13. **Flash Files / Flash Movies:** Multimedia files created with Adobe Flash, used for animations, games, and video playback (now largely obsolete).

14. **Virtual Machine:** A software-based emulation of a computer system, enabling programs to run independently of the underlying hardware.
15. **Multithread:** The ability of a program to execute multiple threads (independent sequences of instructions) concurrently.
16. **Platform-Independent:** A property of software that allows it to run on multiple operating systems without modification (e.g., Java via JVM).
17. **Plug-in:** A software component that adds specific features to an existing application.
18. **Visual Basic:** A high-level programming language developed by Microsoft, designed for building Windows applications with a graphical user interface (GUI). It allows rapid application development using a drag-and-drop interface and simplified code syntax.
19. **VoiceXML:** A markup language designed for creating voice user interfaces, such as voice-driven applications or interactive voice response (IVR) systems. It allows users to interact with systems through spoken commands.

♦ Acronym

- **ADD:** Addition
- **SUB:** Subtraction
- **MPY:** Multiply
- **COBOL:** Common Business-Oriented Language
- **BASIC:** Beginner's All-purpose Symbolic Instruction Code
- **HTML:** HyperText Markup Language
- **XML:** eXtensible Markup Language
- **VoiceXML:** Voice eXtensible Markup Language
- **PDA:** Personal Digital Assistant
- **Fortran:** Formula Translation
- **Java ME:** Java Platform, Micro Edition (used for embedded and mobile devices)

♦ Programming Languages (Mentioned)

- **Pascal:** Used historically to teach structured programming.
- **Python, Scratch:** Modern educational languages.
- **Visual Basic:** High-level language developed by Microsoft.
- **Java:** Object-oriented, platform-independent programming language.

♦ Potential Questions & Answers

1. **Do computers understand human languages? Why/Why not?**
→ No, computers only understand machine code (binary: 1s and 0s) because CPUs process electrical signals corresponding to these binary instructions. Human languages are too complex and ambiguous for direct interpretation by hardware.
2. **What is the function of an assembler?**
→ An assembler converts assembly language (low-level code with mnemonics like MOV or ADD) into machine code that the computer can execute.
3. **Why did software developers design high-level languages?**
→ To make programming more human-readable and efficient. High-level languages (e.g., Python, Java) use English-like syntax, abstracting away hardware complexity and reducing development time.
4. **Which language is used to teach programming techniques?**
→ Historically Pascal; now also Python or Scratch.
5. **What is the difference between a compiler and an interpreter?**
→
 - **Compiler:** Translates the entire program into machine code before execution (e.g., C++, Java).
 - **Interpreter:** Translates and executes code line-by-line at runtime (e.g., Python, JavaScript).
6. **Why are HTML and VoiceXML called markup languages?**
→ They “mark up” content with tags (e.g., `<p>`, `<voice>`) to define structure or presentation rules rather than performing logical operations.

5/Security privacy on the internet

♦ Definitions

- **Hackers:** Individuals who use technical skills to access computer systems illegally or ethically (white hats vs black hats).
- **Firewall:** A security system (hardware or software) that controls incoming and outgoing network traffic based on predetermined security rules.
- **Passwords:** Secret words or phrases used to authenticate users and grant access to systems or data.

- **Encryption:** The process of converting data into a coded form to prevent unauthorized access.
- **Decryption:** The process of converting encrypted data back into its original readable format.
- **Malware:** Malicious software designed to damage, disrupt, or gain unauthorized access to computer systems.
- **Viruses:** Malware programs that attach themselves to files or programs and spread when executed.
- **Worms:** Self-replicating malware that spreads across networks without the need to attach to files.
- **Trojans (Trojan Horses):** Malware disguised as legitimate software that, once installed, provides unauthorized access or causes harm.
- **Spywares:** Programs that secretly monitor and collect user information without consent.
- **Antivirus Software:** Programs designed to detect, block, and remove viruses and other malware.
- **Cracker:** A malicious hacker who breaks into systems to steal or destroy data, unlike ethical hackers.
- **Cookies:** Small data files stored on a user's computer by websites to remember preferences or track behavior.
- **Digital Certificates:** Electronic documents used to prove the ownership of a public key, often used in secure communications.
- **Email Privacy:** Measures and technologies that protect email content and communication from unauthorized access.
- **Freeware:** Software that is available for use at no cost but may come with limitations or hidden risks (e.g., bundled spyware).

◆ Acronym

- **SSL :** Secure Sockets Layer (security protocol for encrypted internet connections)
- **PGP :** Pretty Good Privacy (email encryption software)
- **VPN :** Virtual Private Network (secure encrypted connection over the internet)
- **PC :** Personal Computer
- **HTTP :** Hypertext Transfer Protocol
- **HTTPS :** HTTP Secure (HTTP + SSL/TLS for encryption)
- **ISP :** Internet Service Provider

- **SSN** : Social Security Number
- **FW** : Firewall
- **AV** : Anti-Virus
- **OS** : Operating System
- **RAT** : Remote Access Trojan
- **DDoS** : Distributed Denial of Service
- **ID** : Identification
- **DL** : Download
- **POP** : Post Office Protocol (email retrieval)
- **SMTP** : Simple Mail Transfer Protocol (email sending)
- **IMAP** : Internet Message Access Protocol (email access)
- **IoT** : Internet of Things
- **BYOD** : Bring Your Own Device (user-owned devices used at work)
- **WHT** : White Hat Hacker (ethical hacker)
- **BHT** : Black Hat Hacker (malicious hacker)
- **GCHQ** : Government Communications Headquarters (UK cyber intelligence agency)

6/New Technologies

◆ Questions

1. **What do you think a trend is?**
→ A trend is a general direction in which something is developing or changing.
2. **What trends in ICT do you think will affect our lives in the future? Make a list.**
→ Examples: Artificial Intelligence (AI), Robotics, Smart Homes, Nanotechnology, Biometric security, Ubiquitous Computing, Voice Assistants, Smart Devices, Internet of Things (IoT), Expert Systems.

◆ Definitions

- **Nanotechnology**: The science of manipulating materials on an atomic or molecular scale (usually under 100 nm).
- **Nanometres**: A unit of length equal to one billionth of a meter ($1 \text{ nm} = 10^{-9} \text{ m}$).
- **Nanocomputers**: Extremely small computers using nanotechnology, often microscopic and integrated into other systems.
- **Nanotransistors**: Very small transistors used in modern computer chips built using nanotechnology.
- **Nanomedicine**: The use of nanotechnology in medical applications (e.g., targeted drug delivery).
- **Nanobots**: Microscopic robots capable of performing specific tasks inside the human body or machinery.
- **Nanomaterials**: Materials engineered on the nanoscale for enhanced properties like strength, lightness, or conductivity.
- **Nanotubes**: Cylindrical nanostructures made from carbon with remarkable strength and conductivity.

- **AI (Artificial Intelligence):** The science of creating machines or software that can simulate human intelligence (e.g., reasoning, learning, problem-solving).
- **Expert Systems:** AI programs designed to simulate the decision-making of a human expert in a specific domain.
- **Android:** A robot with a human appearance or the operating system used in mobile devices.
- **Robotics:** The branch of technology dealing with the design, construction, and use of robots.
- **Biometrics:** The measurement and statistical analysis of people's physical and behavioral characteristics (e.g., fingerprints, facial recognition).
- **Ubiquitous Computing (UC):** A computing model where computers are embedded in everyday objects and environments, making them "invisible".
- **Pervasive Computing:** Another term for ubiquitous computing; computing integrated seamlessly into daily life.
- **Ubiquitous Devices:** Devices that are always present and connected to a network (e.g., smart sensors, wearables).
- **Smart Devices:** Electronics capable of processing data and connecting to networks to interact with users or other devices.
- **Embedded:** Integrated into hardware systems (e.g., microchips inside appliances or machines).
- **Smart Home:** A home equipped with smart devices that automate and optimize domestic activities (e.g., lighting, heating, security).
- **Appliances:** Electrical devices used at home, such as washing machines, refrigerators, etc., increasingly equipped with smart features.

◆ Acronym

- **ICT:** Information and Communication Technology
- **AI:** Artificial Intelligence
- **IoT:** Internet of Things
- **nm:** Nanometer
- **ES:** Expert System
- **HAN:** Home Area Network
- **ATM:** Automated Teller Machine
- **UC:** Ubiquitous Computing
- **NPU:** Neural Processing Unit
- **CV:** Computer Vision
- **API:** Application Programming Interface
- **NEMS:** Nano-Electro-Mechanical Systems
- **AGI:** Artificial General Intelligence
- **VPA:** Voice Personal Assistant
- **WSN:** Wireless Sensor Network
- **Embedded** = Integrated (used to describe devices with built-in systems)

7/Chat and conferencing

◆ Questions

1. **Why is videoconferencing so useful for visual workgroups?**
Because it allows participants to see each other and share visual information in real time, improving communication and collaboration.
2. **What special hardware and software do you need for videoconferencing?**
A webcam, microphone, speakers/headphones, and videoconferencing software (e.g., Zoom, Microsoft Teams).
3. **Which technology enables people to make phone calls over the internet?**
VoIP (Voice over Internet Protocol).
4. **What is the difference between web chat rooms and instant messaging?**
Chat rooms involve multiple users communicating simultaneously in a shared space, while instant messaging usually involves direct, real-time communication between individuals or small groups.
5. **How do you log on to an IM server?**
By using an instant messaging client software with your username and password to connect to the server.

◆ Definitions

- **Conferencing:** The process of holding meetings or discussions via electronic communication.
- **Videoconference:** A live video call between two or more participants, allowing both audio and visual communication.
- **Internet Telephony:** Making phone calls over the internet instead of traditional telephone networks.
- **VoIP (Voice over Internet Protocol):** Technology that enables voice calls over the internet.
- **Chat Conferencing:** Real-time text-based communication between multiple users in a shared online space.
- **Bulletin Board Systems (BBS):** Online forums where users post messages for others to read and respond to asynchronously.
- **Chat Rooms:** Virtual spaces where multiple users can communicate via instant messages simultaneously.

- **Instant Messaging (IM):** Real-time text communication between two or more users, often with presence awareness.
- **3-D Worlds:** Virtual environments that simulate three-dimensional spaces for interaction.
- **Virtual Reality Environments:** Computer-generated immersive spaces that users can interact with via special hardware.

♦ Acronym

- **VoIP:** Voice over Internet Protocol
- **BBS:** Bulletin Board System
- **IL:** Instant Messaging (sometimes used as shorthand)

♦ Common Chat Abbreviations

- **ASAP** – As soon as possible
- **BBS** – Be back soon
- **BFN** – Bye for now
- **BTW** – By the way
- **F2F** – Face to face
- **GL** – Good luck
- **H&K** – Hug and kiss
- **IC** – I see
- **ILU** – I love you
- **IMO** – In my opinion
- **IOW** – In other words
- **LOL** – Laughing out loud
- **TIA** – Thanks in advance

♦ Letter/Number Chat Abbreviations

- **msg** – Message
- **ur** – your / you're
- **2** – to
- **4** – for
- **b** – be
- **c** – see
- **r** – are
- **u** – you

8/Graphics Software Terms

◆ Definitions

- **Pixel** : Smallest unit of a digital image.
- **Icons** : Small images representing files or apps.
- **Images** : Visual content like photos or graphics.
- **Shading** : Technique to show light and shadow.
- **Designer** : Person who creates digital visuals.
- **Interface (UI)** : How users interact with software.
- **Palette** : Set of colors or tools in a program.
- **Graphs** : Visual representations of data.

◆ Language Work : The -ing Form

1. Gerund (-ing used as a noun)

- Function: Acts as a noun (subject, object, or complement).
- Clue: Answers the question “**What activity?**”
- Examples:
 - "Smoking is bad for your health." (Subject)
 - "She enjoys programming." (Object)
 - "His favorite hobby is painting." (Complement)

2. Present Participle (-ing used in continuous tenses or clauses)

- Function:
 - Forms continuous verb tenses.
 - Used in reduced relative clauses (replaces "who/which + verb").
- Clue: Follows auxiliary verbs (is, are, was, were) or describes ongoing action.
- Examples:
 - "He is coding a website." (Present continuous)
 - "The woman carrying books is our teacher." (Reduced clause for “who is carrying”)

3. Adjective (-ing as a descriptor)

- Function: Describes the state or quality of a noun.
- Clue: Answers “**How?**” or “**What kind?**”
- Examples:
 - "This game is exciting." (Describes "game")
 - "The depressing news made her sad." (Describes "news")

Quick -ing Form Identification Guide

Form	Test Question	Example
Gerund	What activity?	"Swimming keeps me fit."
Participle	What is happening?	"She is swimming."
Adjective	How is it?	"The movie was boring."

♦ Language Work : Adverbs

1. Roles of Adverbs

Adverbs have **three main functions**:

- **a. Describe Actions**
→ They tell **how, where, or when** something happens.
Examples:
 - She works **quickly** (how)
 - They went **outside** (where)
 - He arrived **yesterday** (when)
- **b. Modify Adjectives or Other Adverbs**
→ They **intensify or soften** the meaning.
Examples:
 - This program is **extremely** useful
 - He runs **very** fast
- **c. Connect Sentences (Conjunctive Adverbs)**
→ They link ideas or complete thoughts.
Examples:
 - **However, therefore, moreover**
 - "It's expensive; **however**, it's powerful."

2. Adjective vs. Adverb

Test	Adjective	Adverb
Describes	a noun (What kind?)	a verb, adjective, or adverb (How?)
Form	often unchanged (fast, hard)	often ends in -ly (quickly, carefully)
Exceptions	good, bad, early, late, fast, hard	some words can be both

Examples:

- "Marina works **hard**." → adverb (describes *works*)
- "She is a **hard** worker." → adjective (describes *worker*)

3. Adverbs of Manner (How?)

These adverbs answer the question "**How is the action done?**"

Examples:

- **Clearly** – She explained the problem clearly.
- **Carefully** – Drive carefully in the rain.
- **Loudly** – Don't speak loudly in the library.
- **Easily** – Spreadsheets easily calculate data.

Common -ly Adverbs:

- Quickly / Slowly / Politely / Badly
- **Well** (irregular)

4. How to Spot Adverbs

Ask the right questions:

- *How? Where? When?* → It's an **adverb**
- *What kind?* → It's an **adjective**

Test it:

- "He sings **beautifully**." → How does he sing? → **Adverb**
- "This is a **beautiful** song." → What kind of song? → **Adjective**

Practice: Adjective or Adverb?

Is the bold word an **adjective (Adj)** or an **adverb (Adv)**?

- The **daily** mail arrives. → **Adj** (modifies *mail*)
- She exercises **daily**. → **Adv** (modifies *exercises*)
- That's a **lovely** dress! → **Adj**
- She smiled **sweetly**. → **Adv**

MAGUEMOUN SAMY