

Computer Fundamentals - PDF Note - ComputerOperatorExam.com

Part 1 — Computer: Definition, History & Generations

Computer: Electronic device that accepts input → processes it → produces output → stores data.

Nepal's Computer History (must-memorize timeline):

Year	Event
1961 AD (2018 BS)	"Facit" calculator used for census
1971 AD (2028 BS)	First computer: IBM 1401 — for population census
1975 AD (2031 BS)	Yantrik Sarinikaran Kendra (Electronic Data Processing Centre) established → later renamed NCC
2038 BS	ICL 2950/10 (64 terminals) by UNDP
2039 BS	Apple, Vector, Sirius microcomputers introduced
1995 AD	Internet (email-only) introduced by Mercantile Communications

5 Generations (quick recap):

Gen	Era	Tech	Language
1st	1940s–50s	Vacuum Tubes	Machine (binary)
2nd	1950s–60s	Transistors	Assembly
3rd	1960s–70s	ICs (Integrated Circuits)	FORTRAN, COBOL
4th	1970s–now	VLSI / Microprocessor	C, Java, Python
5th	1980s–now	AI / ULSI / Parallel	Natural language

3 Types of Computer Buses:

- **Data Bus** — carries data (bidirectional)

- **Address Bus** — carries memory addresses (unidirectional, CPU → RAM)
 - **Control Bus** — carries control signals (bidirectional)
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Part 2 — Computer System Overview

Block Diagram:

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Input Devices → CPU (ALU + CU + MU) → Output Devices
                ↓
            Storage Devices
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4 Main Categories of Hardware:

1. Input Devices — keyboard, mouse, scanner
 2. CPU — ALU + Control Unit + Registers/Cache
 3. Output Devices — monitor, printer, speakers
 4. Storage — RAM (primary), HDD/SSD (auxiliary)
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Part 3 — Data and Data Processing

Data = raw facts | **Information** = processed, meaningful data

IPO Cycle: Input → Processing → Output (+ Storage)

Data storage units:

Bit → Nibble (4 bits) → Byte (8 bits) → KB → MB → GB → TB

Types of data processing: Batch, Real-time, Online, Distributed

Part 4 — Hardware Components

Input Devices (key ones)

Device	Type	Use
Keyboard	Text	Typing
Mouse	Pointing	Cursor control

Device	Type	Use
Scanner	Image	Digitizing docs
Microphone	Audio	Voice input
OMR	Marks	MCQ answer sheets
Barcode Reader	Optical	Product scanning

CPU Components

Part	Role
ALU	Arithmetic (+-×÷) and logical (AND/OR/NOT) operations
Control Unit	Fetch → Decode → Execute cycle
Registers	Accumulator, PC (Program Counter), IR (Instruction Register)

Output Devices (key ones)

Device	Output Type
Monitor (CRT/LCD/LED/OLED)	Visual (softcopy)
Printer (Inkjet/Laser/Dot-matrix/3D)	Physical (hardcopy)
Projector	Large-surface visual
Plotter	Large-format drawings

Storage

Memory	Type	Volatile?	Speed
RAM	Primary	Yes	Very fast
ROM (BIOS)	Primary	No	Fast
Cache (L1/L2/L3)	Primary	Yes	Fastest
HDD	Auxiliary	No	Slow
SSD	Auxiliary	No	Fast
USB/SD Card	Auxiliary	No	Medium

Part 5 — Software

Two main types:

1. **System Software** — OS, Utility programs, Language Translators
2. **Application Software** — Word processor, Spreadsheet, Database, Browser

OS Functions: Process mgmt, Memory mgmt, File system mgmt, Device mgmt, User interface, Security

Programming Languages:

- Machine Language (1GL) → Assembly (2GL) → High-level (3GL: C, Java, Python) → 4GL (SQL) → 5GL (AI/natural)
 - Translator types: **Compiler** (entire program at once) vs **Interpreter** (line by line) vs **Assembler** (assembly → machine)
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Part 6 — Firmware, BIOS & Cache

BIOS: First program to run at power-on. Performs POST → loads OS. Stored in EEPROM on motherboard.

- **Legacy BIOS** → text interface, MBR, limited to 2.1 TB
- **UEFI** → graphical interface, GPT, supports large drives, Secure Boot

Firmware: Permanent software embedded in hardware (hard drive, router, printer). Controls specific device.

Cache:

- L1 (8–64 KB, fastest, in CPU core) → L2 (256 KB–8 MB) → L3 (2–32 MB, shared across cores)
 - Cache hit = found in cache (fast) | Cache miss = must go to RAM (slower)
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Part 7 — Multimedia & Hypermedia

Multimedia: Combines text + audio + images + animation + video + interactivity.

6 components: Text, Audio, Images, Animation, Video, Interactivity

Hypermedia: Multimedia + **hyperlinks** for non-linear navigation. Example: World Wide Web.

	Multimedia	Hypermedia
Navigation	Linear	Non-linear (via links)
Example	Video presentation	Website

Part 8 — File Management

Disk structure: Platter → Track → Sector (512 bytes) → Cluster → Cylinder

File: Named data collection. Has name, extension, size, date attributes.

Folder: Container for organizing files. Creates hierarchical directory tree.

Key file extensions to know:

Type	Extensions
Documents	.docx, .xlsx, .pptx, .pdf, .txt
Images	.jpg, .png, .gif, .bmp
Audio	.mp3, .wav
Video	.mp4, .avi, .mkv
Executable	.exe, .com
Web	.html, .css, .js
Archive	.zip, .rar

Part 9 — ASCII & Unicode

Standard	Bits	Characters	Languages
ASCII	7-bit	128	English only
Extended ASCII	8-bit	256	+ European accents
Unicode (UTF-8)	8–32-bit variable	143,000+	All languages

Key ASCII values: A=65, a=97, 0=48 (difference between A and a = 32)

UTF-8 = most common encoding on the web; backward-compatible with ASCII

Devanagari Unicode block: U+0900–U+097F (covers Nepali/Hindi script)