Essential Elements of Computer Hardware

A System Architecture Guide for Junior Technologists

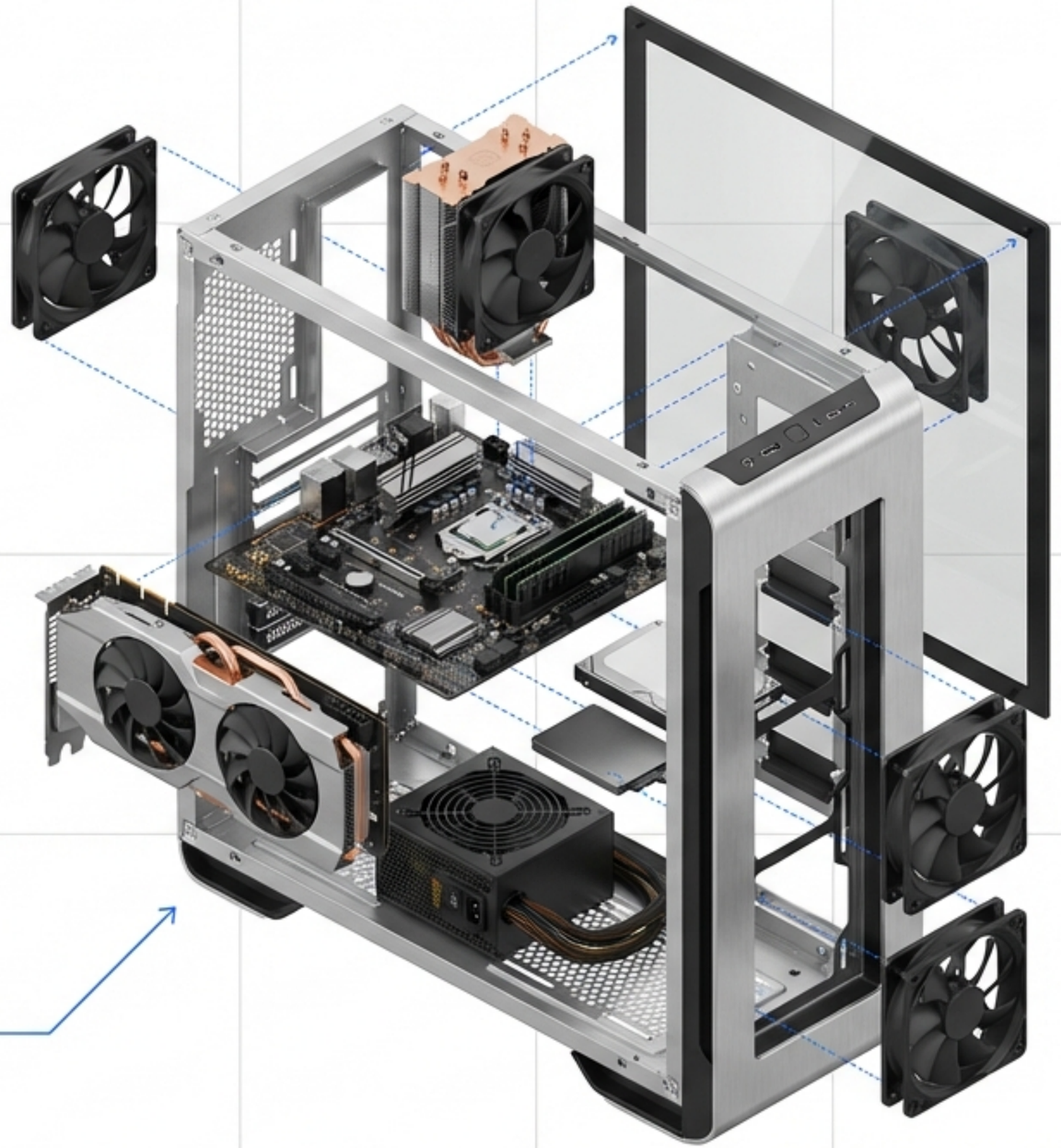
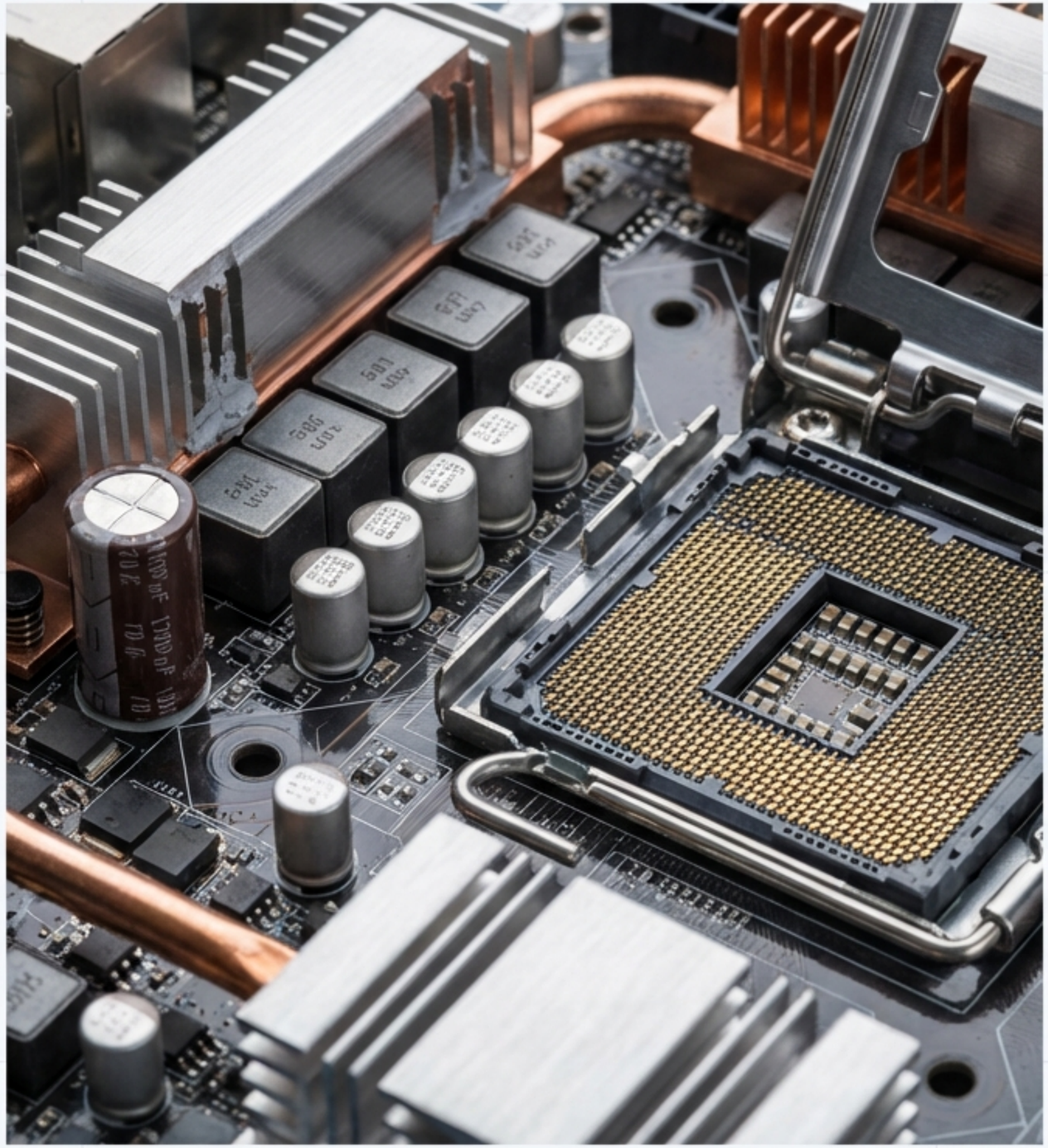


FIG 1.0: SYSTEM CHASSIS ASSEMBLY

REFERENCE MANUAL: YEAR 7 EDITION



Defining the Physical Reality

Hardware is the physical parts of a computer that you can touch.

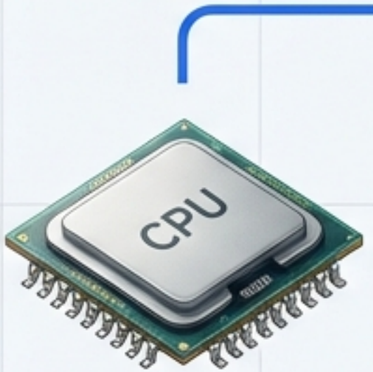
> `Contextual Note:`
> While software and data are digital and intangible, hardware forms the chassis and engines that make computing possible.

System Architecture Overview

1. Input Devices

Receive data

Processing & Storage



- Process data
- Store data

2. Output Devices

Present results

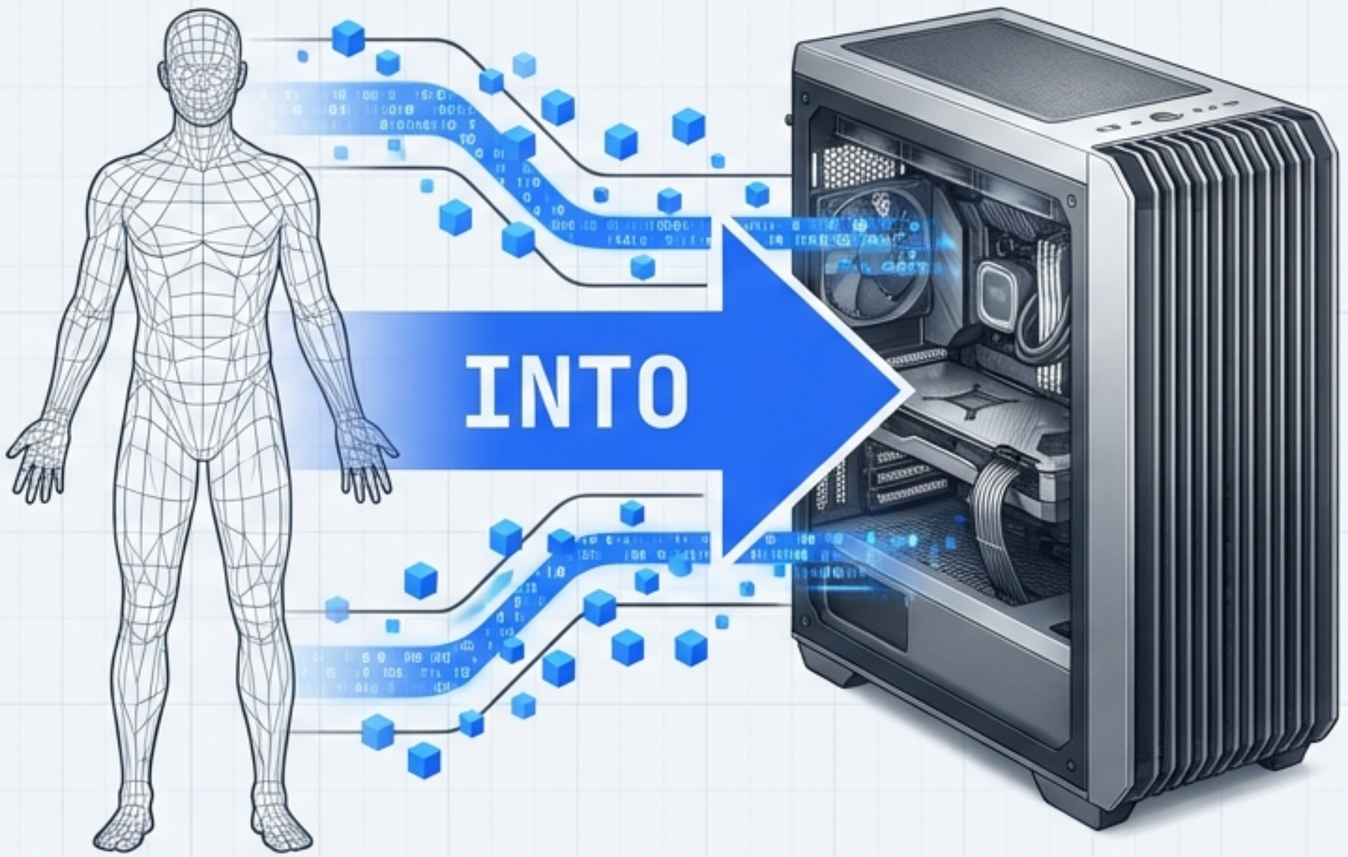
SYSTEM OPERATIONS MAP: RECEIVE > PROCESS > STORE > PRESENT

The Input Interface

DIRECTION: USER -> COMPUTER

Definition: An input device is hardware that sends data into the computer. Input allows the user to communicate with the machine.

Data Types Transmitted:
- Text
- Sound
- Images
- Movement
- Commands



Common Input Hardware Specifications

Keyboard
Transmits: Text & Commands

Mouse
Transmits: Movement & Clicks

Microphone
Transmits: Sound

Scanner
Transmits: Images & Documents

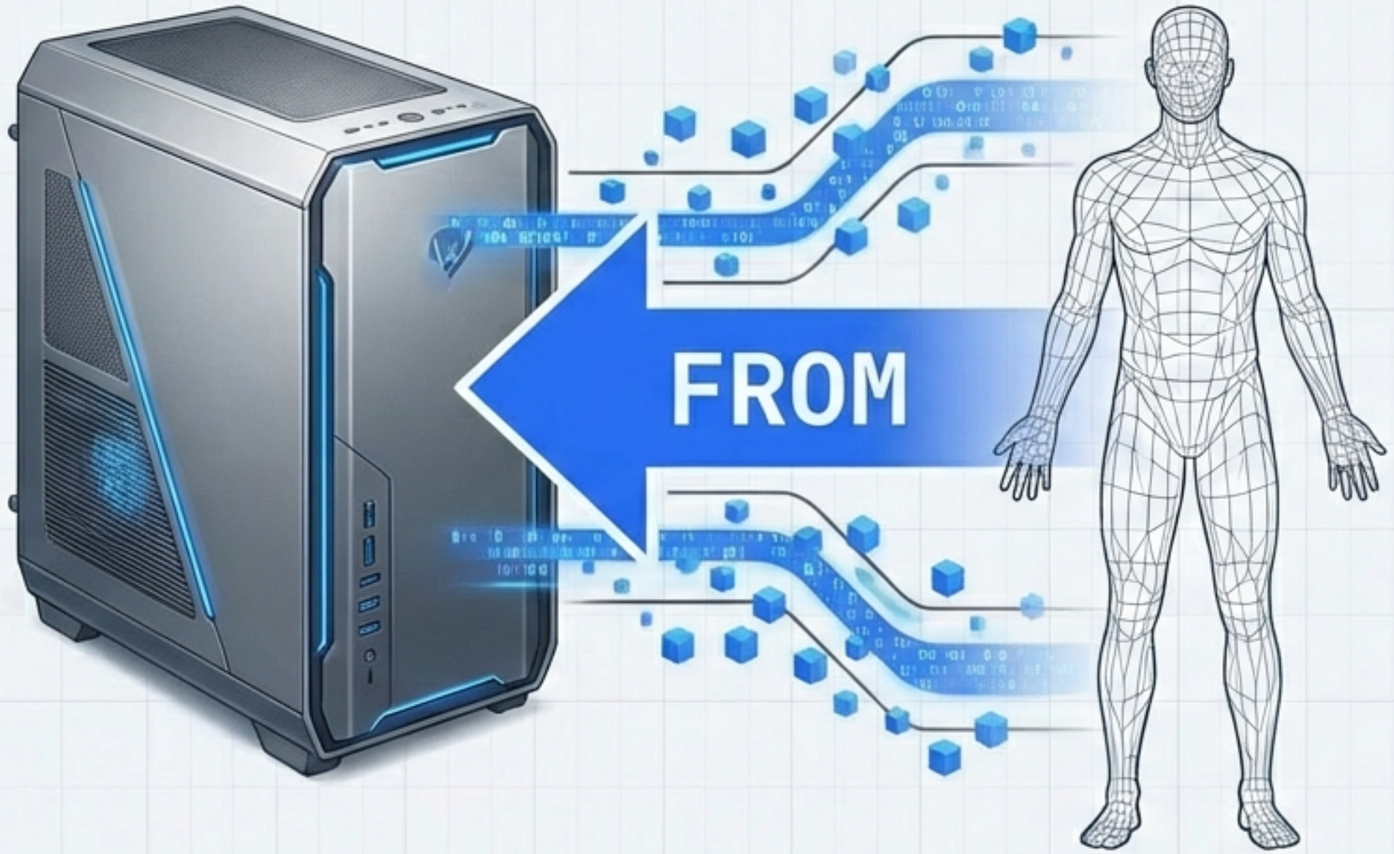
Webcam
Transmits: Video & Images

Game Controller
Transmits: Movement & Button Commands

Touchscreen
Transmits: Touch Position & Gestures

The Output Interface

DIRECTION: COMPUTER -> USER



Definition: An output device is hardware that receives data from the computer and shows the result of processing. Output devices allow the computer to communicate with the user.

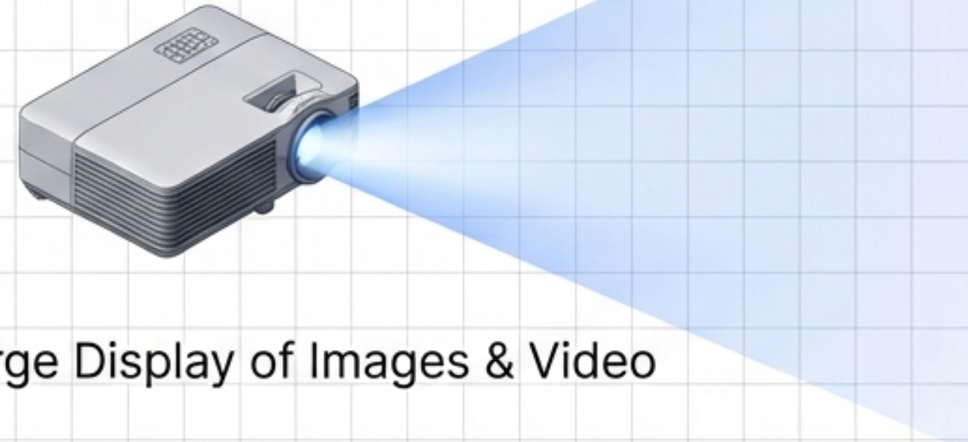
Common Output Hardware Specifications

Monitor
Displays: Images, Text, Video

Speakers
Emits: Sound

Headphones
Emits: Sound (Personal)

Printer
Produces: Printed Documents & Images



Projector
Creates: Large Display of Images & Video

The Critical Role of Storage

DIRECTION: PERSISTENCE & PRESERVATION

The Problem
Without storage, a computer would forget everything when turned off.

// DATA LOSS = POWER OFF //

The Function
Storage devices keep data so it can be used again later.

// DATA PERSISTENCE = STORAGE //

Inventory of Stored Data:

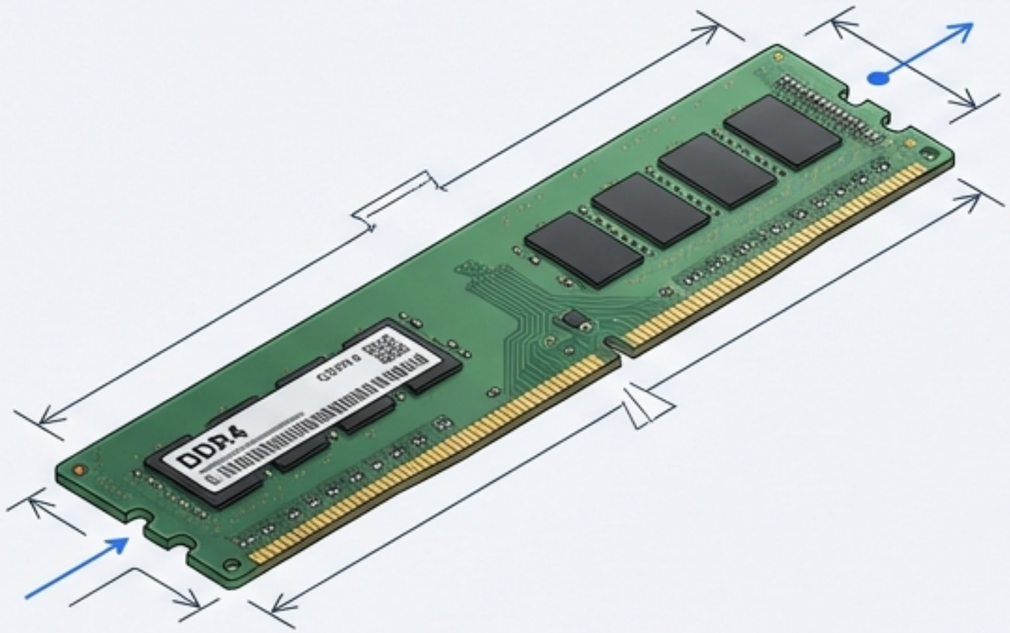
- Files
- Programs
- Operating System
- Photos/Videos
- Games

The Storage Hierarchy

Divided by speed and permanence.

Tier 1: Primary Storage

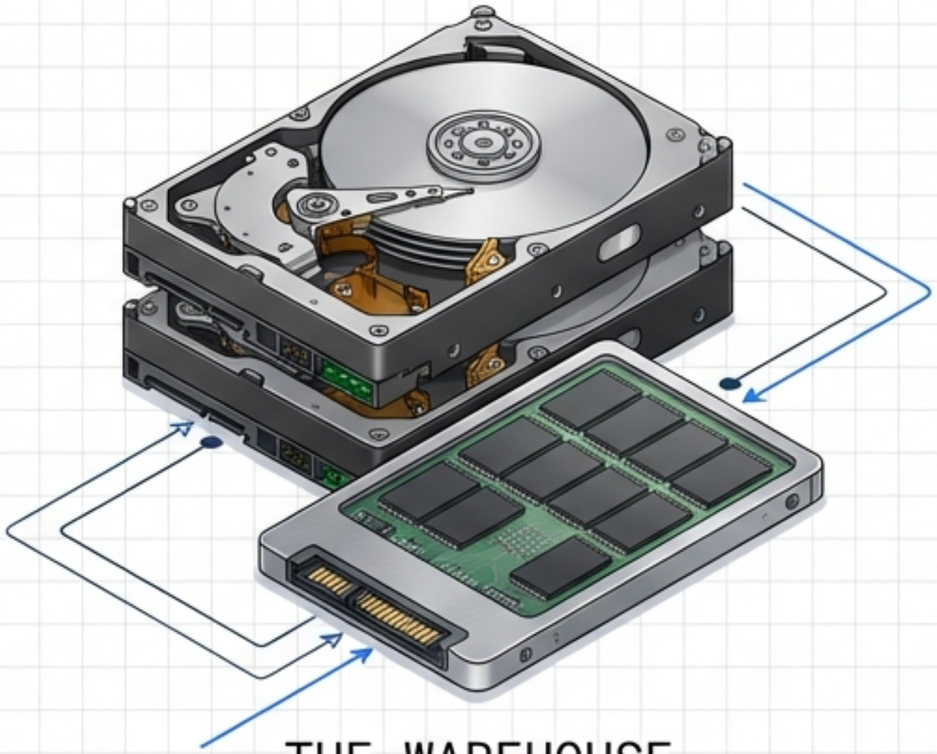
(Main Memory)



THE WORKBENCH

Tier 2: Secondary Storage

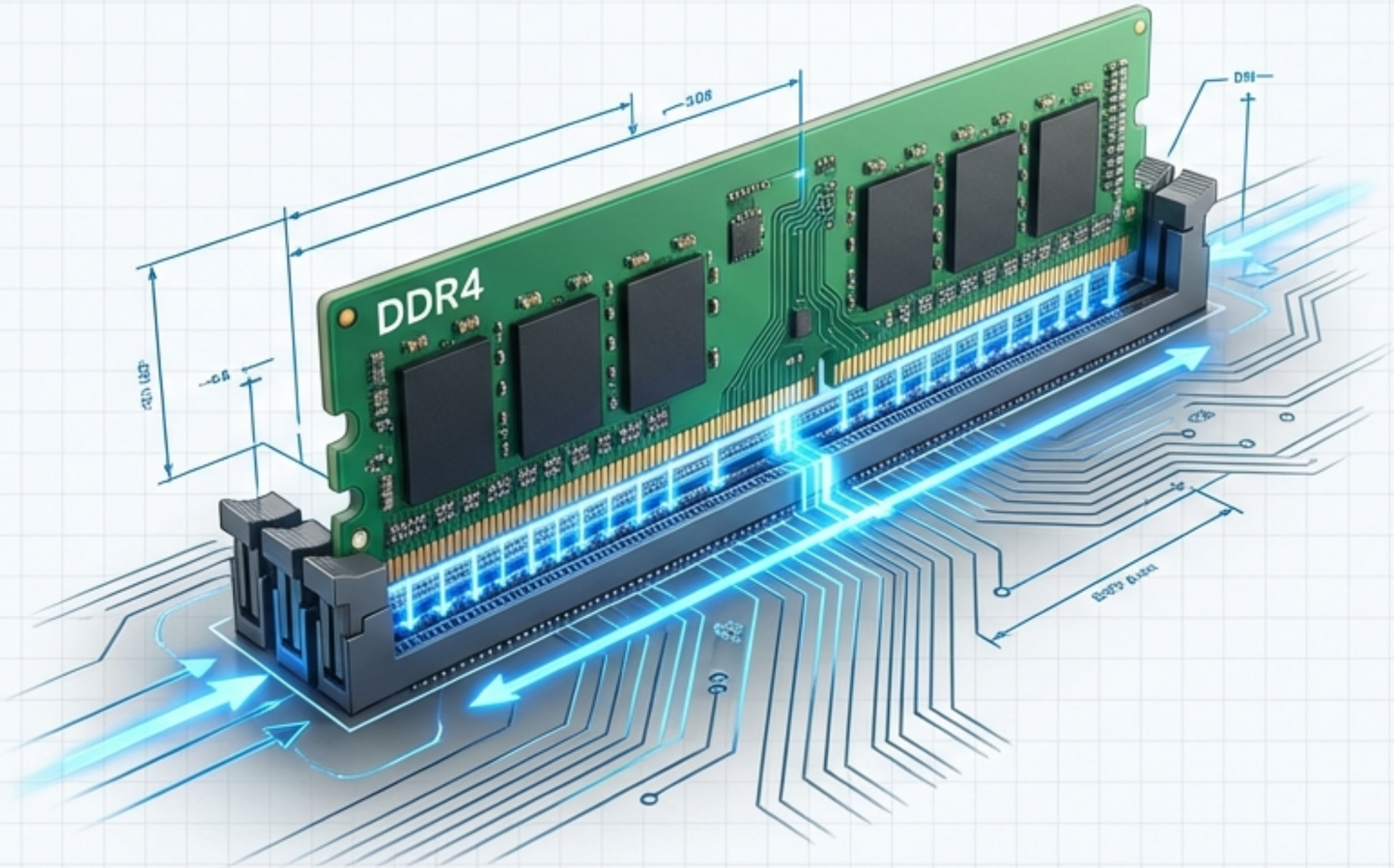
(Backing Storage)



THE WAREHOUSE

Primary Storage (Main Memory)

Location: Inside the computer.
Hardware Examples: RAM (Random Access Memory), Cache memory.



Core Characteristics

- Very fast.
- Temporary (Volatile).
- Used while programs are actively running.
- **Core Function:** Holds data and instructions the CPU is currently using.

ALERT: When power is cutt, this storage is cleared.

Secondary Storage (Backing Storage)

Core Characteristics

- Permanent (Non-volatile).
- Slower than primary storage.
- Used to store files long-term.
- Core Function: Keeps the OS, programs, and files safe when the computer is off.

Location: Can be inside or outside the computer.

Hardware Examples: Hard Disk Drive (HDD), Solid State Drive (SSD), USB memory stick, Memory card.

Comparative Analysis: Primary vs. Secondary

Metric	Primary Storage	Secondary Storage
Purpose	Current Use (The Workbench)	Long-term Keep (The Warehouse)
Speed	Very Fast	Slower
Permanence	Temporary (Volatile)	Permanent (Non-volatile)
Location	Inside Computer	Inside or Outside
Examples	RAM, Cache	HDD, SSD, USB

System Workflow: Opening a Game

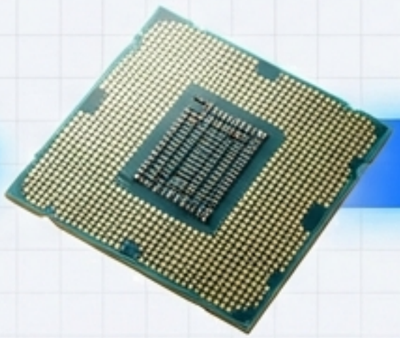
1. STORAGE

Game sits on Secondary Storage.

2. LOAD

Computer loads game into Primary Storage (RAM).

3. PROCESS



CPU processes data from RAM.

4. OUTPUT

Game presented to player.

System Workflow & Technical Accuracy

Workflow: Saving a File

Keyboard (Input)
Data Entry

CPU (Process)
Compute & Execute

SSD/HDD (Secondary Storage)
Long-term Non-volatile

Technical Accuracy Check

RAM is NOT for long-term storage.

Primary Storage is Volatile (Temporary).

The Monitor is NOT storage. (It is Output).

Display Device for Visualization.

The Keyboard is NOT output. (It is Input).

Human Interface Device for Entry.

The SSD/HDD is NOT primary storage.

Secondary Storage is Non-volatile.

Essential Technical Vocabulary

Precision in language is required for system architecture.

Core Terms

- Hardware
- Input
- Output
- Storage
- CPU

Storage Types

- Primary Storage
- Secondary Storage
- RAM
- SSD
- HDD

States

- Temporary
- Permanent
- Volatile
- Non-volatile