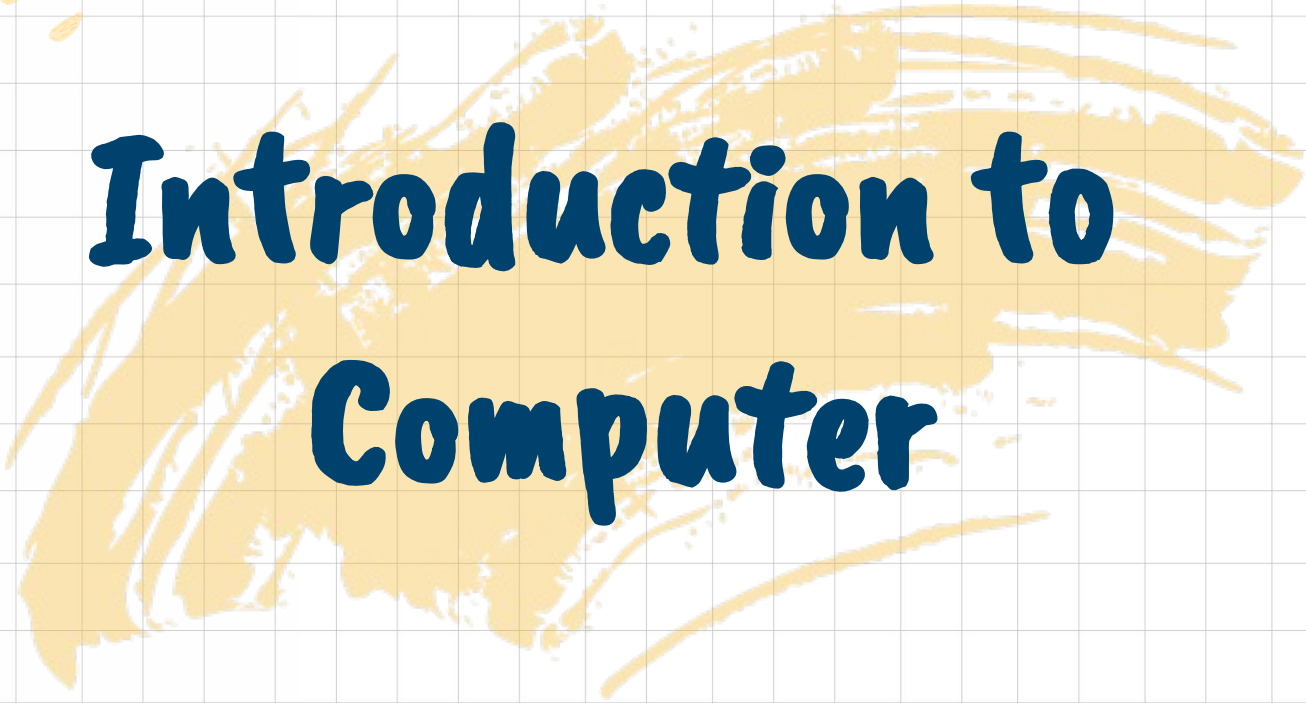




Introduction to Computer

Contents

1. Introduction to Computer
2. Evolution of Computer
3. Generation of Computer
4. Types of Computer
5. IT gadget
6. Mobile Application
7. Hardware and Software
8. CPU
9. Types of Memory Units
10. Open and Closed Source
11. Data Units



01 Introduction To Computer

Before 1945 - Mechanical Era

Introduction to Computer

- Programmable machine for data processing.
- Performs Input, Processing, and Output.
- Essential in Education, Business, Medical Science, and Entertainment.



Full Form and Derivation of Computer

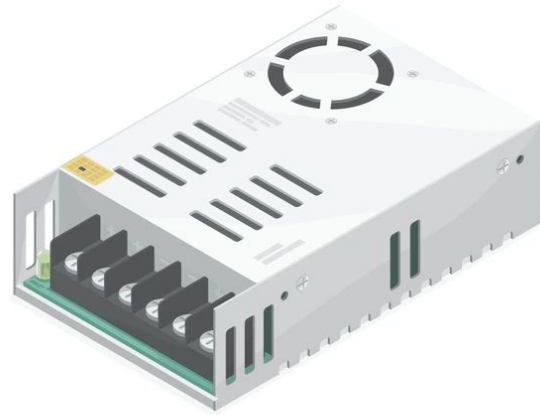
- **Full Form:** Common Operating Machine Purposely Used for Technological Educational Research.
- **Derived from Latin** "Computare", meaning "to calculate".

Why Computer is Called an Electronic Device?

- Operates using Electricity and Binary System (0 & 1).
- Contains Electronic Circuits and Chips.
- Depends on SMPS for Power Regulation (AC to DC).

SMPS (Switch Mode Power Supply)

- Converts AC (Alternating Current) to DC (Direct Current).
- Regulates Voltage for Components like CPU, RAM, and Hard Disk.
- Provides Over-voltage and Short-circuit Protection.



Functions of Computers

01

Input

Collecting data
(keyboard,
mouse).

02
Processing

CPU processes
instructions.

03
Output

Results via
monitor or
printer.

04

Storage

Temporary
(RAM) and
permanent
(hard drive).

Advantages of Computers

01 Speed

Perform millions of calculations in seconds.

02 Accuracy

Provides error-free results if data is correct.

03 Storage

Store large amounts of data digitally.

04 Connectivity

Enables global communication via the internet.

05 Automation

Simplifies repetitive tasks and increases productivity.

Disadvantages of Computers

01 Over-dependency

Reduces human problem-solving skills.

02 Cyber Threats

Vulnerable to hacking, viruses, and data breaches.

03 Health Issues

Long screen time causes eye strain and posture problems.

04 Job Loss

Automation replaces manual jobs.

05 High Costs

Expensive to buy, maintain, and upgrade.

Applications of Computers

Education

Online learning and research.

Healthcare

Medical diagnosis and surgeries.

Entertainment

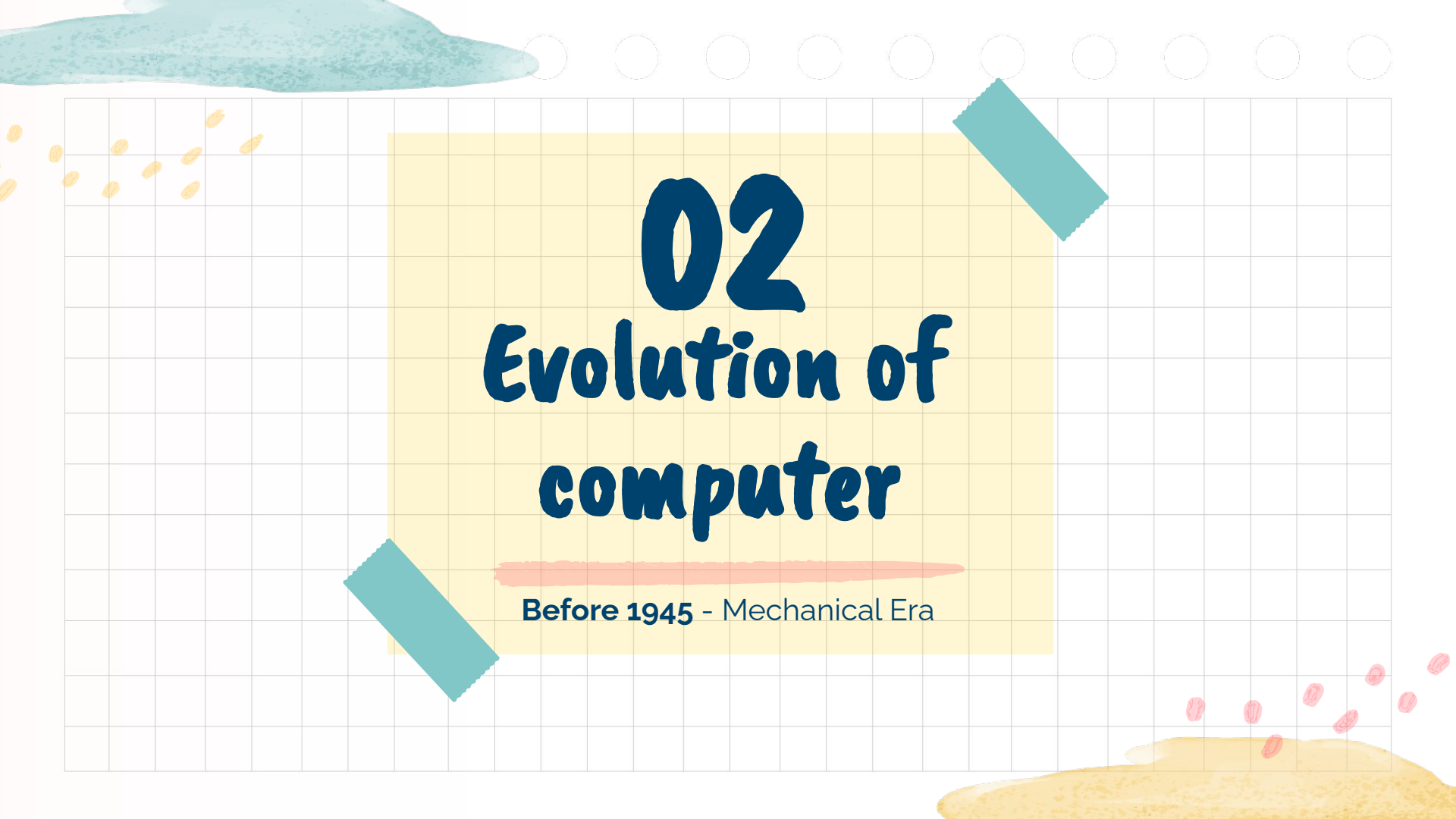
Gaming, movies, and music streaming.

Banking

Online transactions and ATMs.

Government

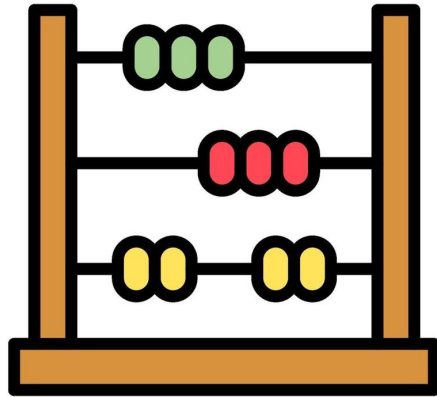
E-governance and data management.



02

Evolution of computer

Before 1945 - Mechanical Era



ABACUS-Abundant Beads Addition Calculation Utility System.

Definition :- It is also known as counting frame which is used for basic arithmetic calculations.

Inventor :- Mesopotamians

Date :- Around 2700 - 2300 BC .

Note :- For worldwide calculation, it was presented by China around 600 BC .

NAPIER'S BONES

Definition :- A device which is used for multiplication & division using rods .

Inventor :- John Napier

Date :- 1617





PASCALINE

Definition :- It is a mechanical calculator for addition & subtraction .

Inventor :- Blaise Pascal

Date :- 1642

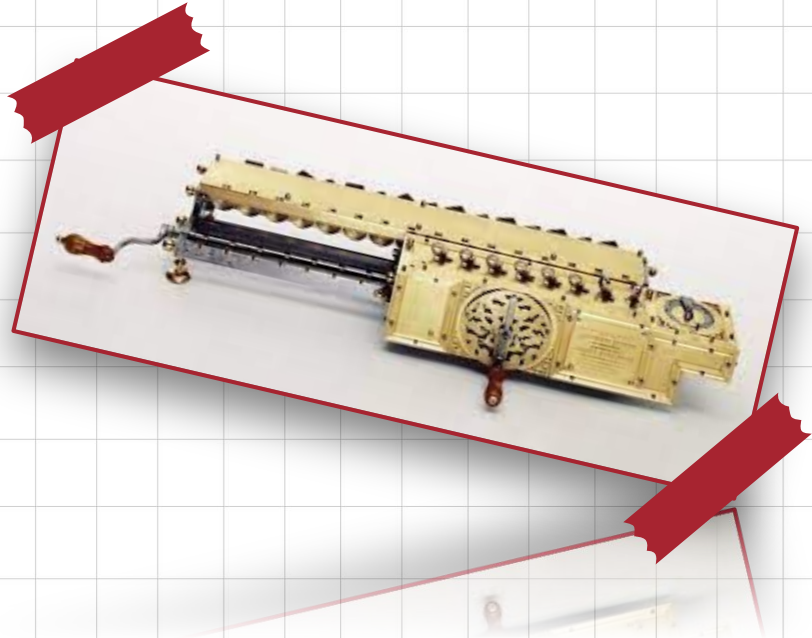
LEIBNIZ WHEEL

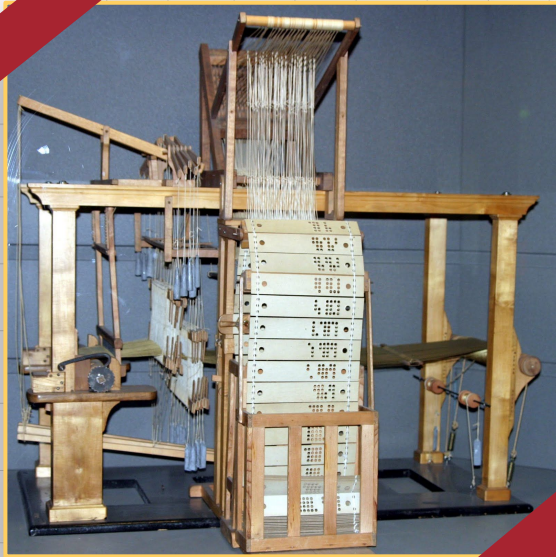
Definition :- It is also capable of multiplication & division .

Inventor :- Gottfried Wilhelm Leibniz

Date :- 1673

Note :- Father Of Binary System .





JACQUARD LOOM

Definition :- It is an automated weaving machine using punch cards for controlling the weaving pattern .

Inventor :- Joseph Marie Jacquard

Date :- 1804

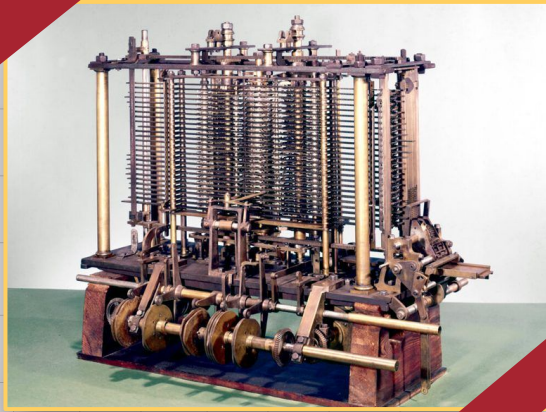
CENSUS MACHINE

Definition :- It was used for data processing in census activities, utilizing punch cards for the data input .

Inventor :- Herman Hollerith

Date :- 1890



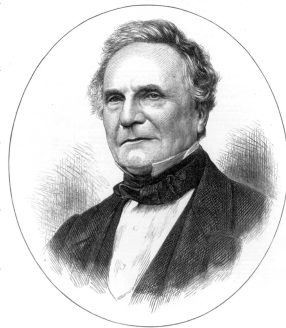


DIFFERENCE ENGINE

Definition :- It is a mechanical calculator designed to compute fundamental function .

Inventor :- Charles Babbage

Date :- 1822



ANALYTICAL ENGINE

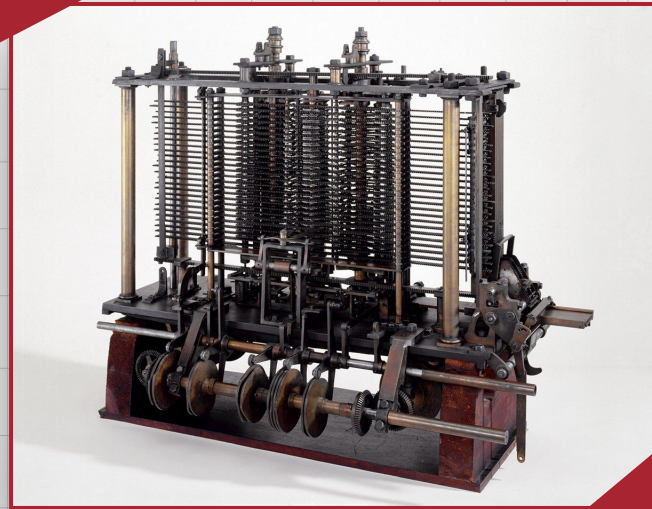
Definition :- It is a general purpose computer capable of performing calculation .

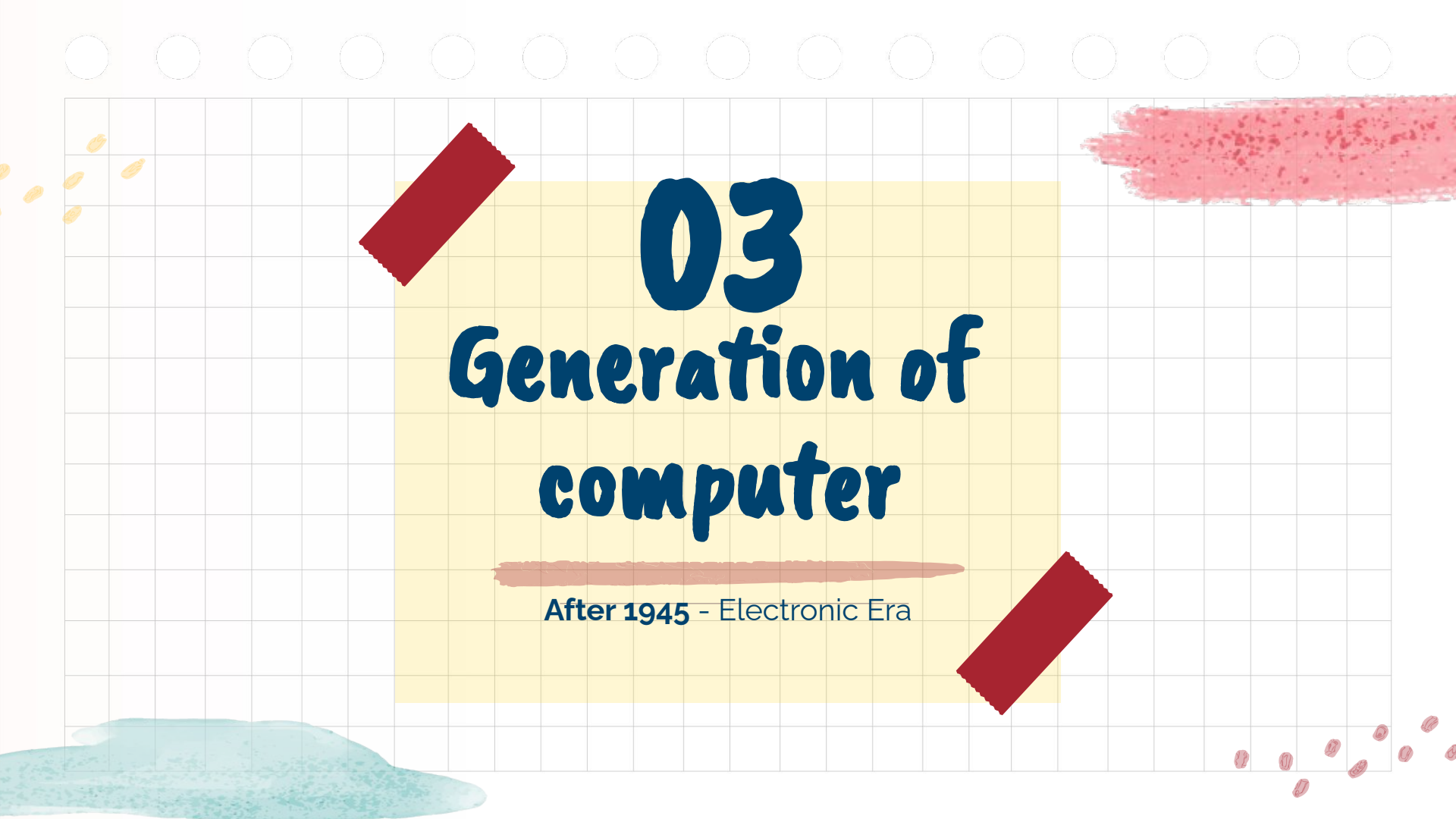
Inventor :- Charles Babbage

Date :- 1837

Note :- For this invention, he was called the "Father Of Computer" .

Ada Lovelace:- she is credited with creating the algorithm intended to be processed by a machine. She is also known as a first lady programmer.



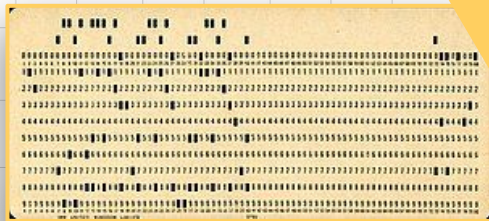


03 Generation of computer

After 1945 - Electronic Era



Vacuum Tube



Punch Card

FIRST GENERATION

TIMELINE	1945-1955
COMPONENT	VACUUM TUBE
LANGUAGE	MACHINE LANGUAGE
STORAGE	PUNCH CARD
SPEED	MILLISECOND
EXTRA	ENIAC, UNIVAC

MARK 1

It is the first Electromechanical Computer used for mathematical calculation & scientific research .

Inventor :- Howard Aiken & IBM .

Date :- 1944

Note :- IBM(International Business Machine Corporation)

Established on 16 July 1911 by "Charles Ranlett Flint" .



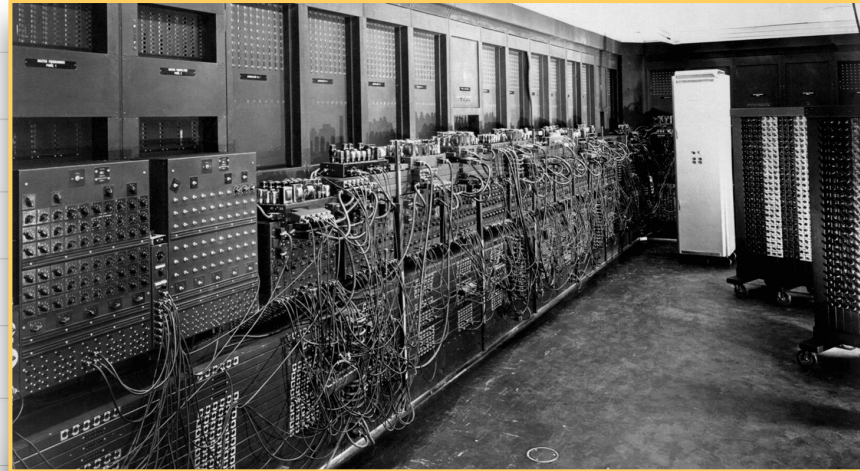
ENIAC(Electronic Numerical Integrator And Computer)

It is a general purpose electronic digital computer .

Inventor :- John Presper Eckert & John William Mauchly .

Date :- 10 December 1945

It was developed during World War II .



UNIVAC(Universal Automatic Computer)

It is the first Commercial purpose computer .

Inventor :- John Presper Eckert & John William Mauchly .

Date :- 1951



SECOND GENERATION

TIMELINE

1955 - 1964

COMPONENT

Transistors

LANGUAGE

Assembly language

STORAGE

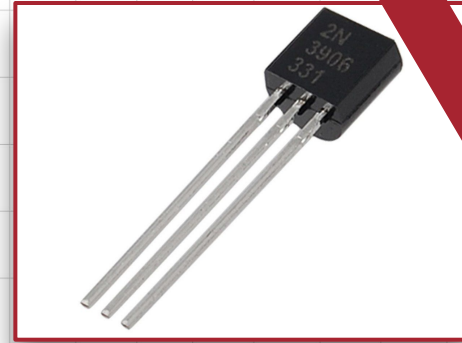
Punch card, Magnetic
Tape

SPEED

Microsecond

EXTRA

IBM - 1401



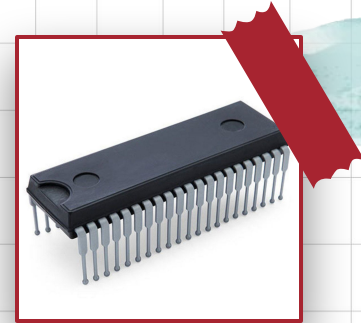
Transistor



Magnetic Tape

THIRD GENERATION

TIMELINE	1964 - 1975
COMPONENT	IC(Integrated circuits)
LANGUAGE	High level language
STORAGE	Magnetic Tape
SPEED	Nanosecond
EXTRA	IBM - 360



Integrated Circuit



IBM - 360

FOURTH GENERATION

TIMELINE	1975 - 1989
COMPONENT	Microprocessor , VLSIC(very large scale integrated circuit)
LANGUAGE	C- LANGUAGE
STORAGE	Optical Disk (CD , DVD, BRD)
SPEED	PicoSecond
EXTRA	IBM PC , APPLE PC



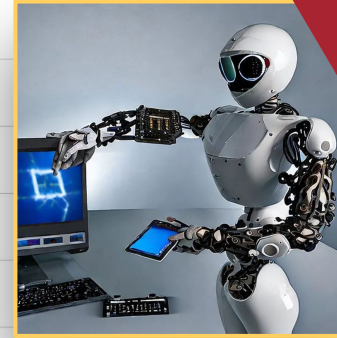
Microprocessor



Optical Disc

FIFTH GENERATION

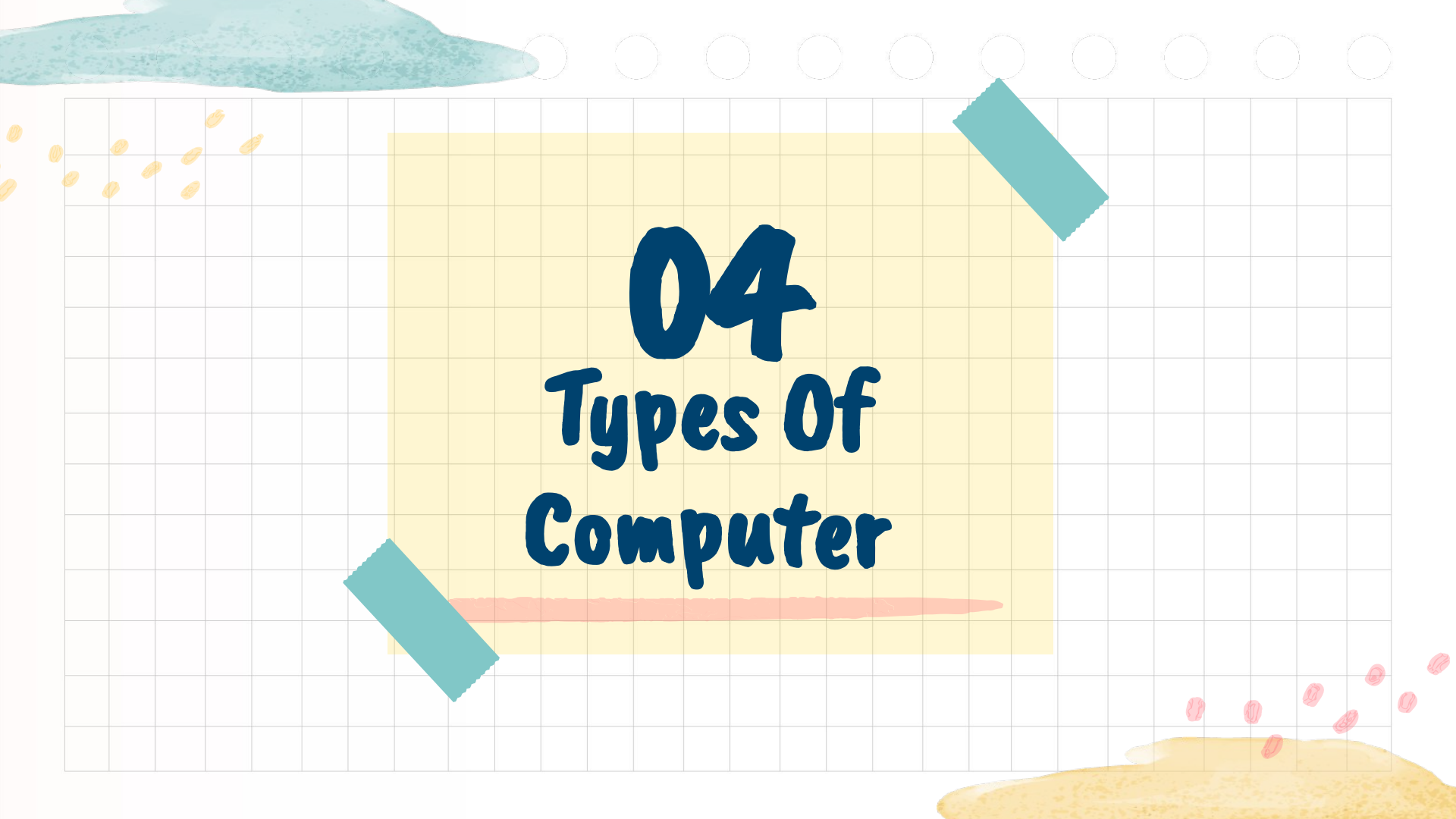
TIMELINE	1989 - Till Now
COMPONENT	Microprocessor , AI, ULSIC(Ultra Large Scale Integrated Circuit)
LANGUAGE	Python, Java, C++,etc.
STORAGE	HDD , SSD , Pendrive , etc.
SPEED	PicoSecond
EXTRA	PC, Desktop, Laptop, Smartphones, etc.



Artificial Intelligence



HDD



04 Types Of Computer

Types of Computer

By Type

1

Analog

2

Digital

3

Hybrid

By Size

1

Micro

2

Mini

3

Mainframe

4

Super

By Purpose

1

Special

2

General

By Purpose



Special-Purpose Computer:

A special-purpose computer is designed and optimized to perform a specific set of tasks or functions.

Example: Embedded System in a Digital Camera



General-Purpose Computer

A general-purpose computer is designed to perform a wide range of tasks and applications.

Example: Personal Computer (PC)

By Type

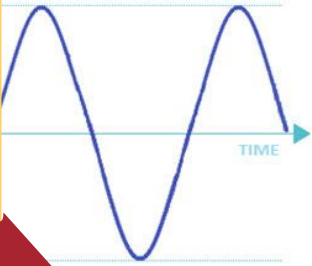
1

Analog Computer

that work on the continuous analog signals.

Ex:- Thermometer

ANALOG



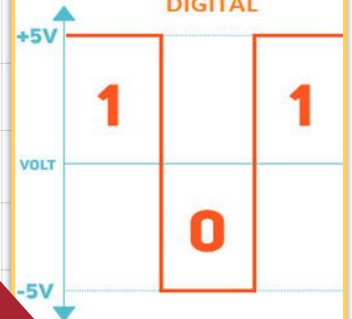
2

Digital Computer

computers that work on the discrete signals. Computers that use this binary system of counting using electrical pulses of ON and OFF are known as digital computers.

Ex:- Personal Pc, Smartphone etc

DIGITAL



Types Of Digital Computer



Micro

These computers are built for light use such as listening to music, or playing movies or accessing the internet.

Mini

advance functionable computer



Mainframe

large storage capacity. Ex: server

Super

large processing capacity



Imp Points on Supercomputer

Param 8000	1st supercomputer in India
cdc-6600	1st supercomputer in world
AIRAWAT	Latest supercomputer in India
Frontier	World latest supercomputer
Fugaku (Japan)	World fastest supercomputer

By Type

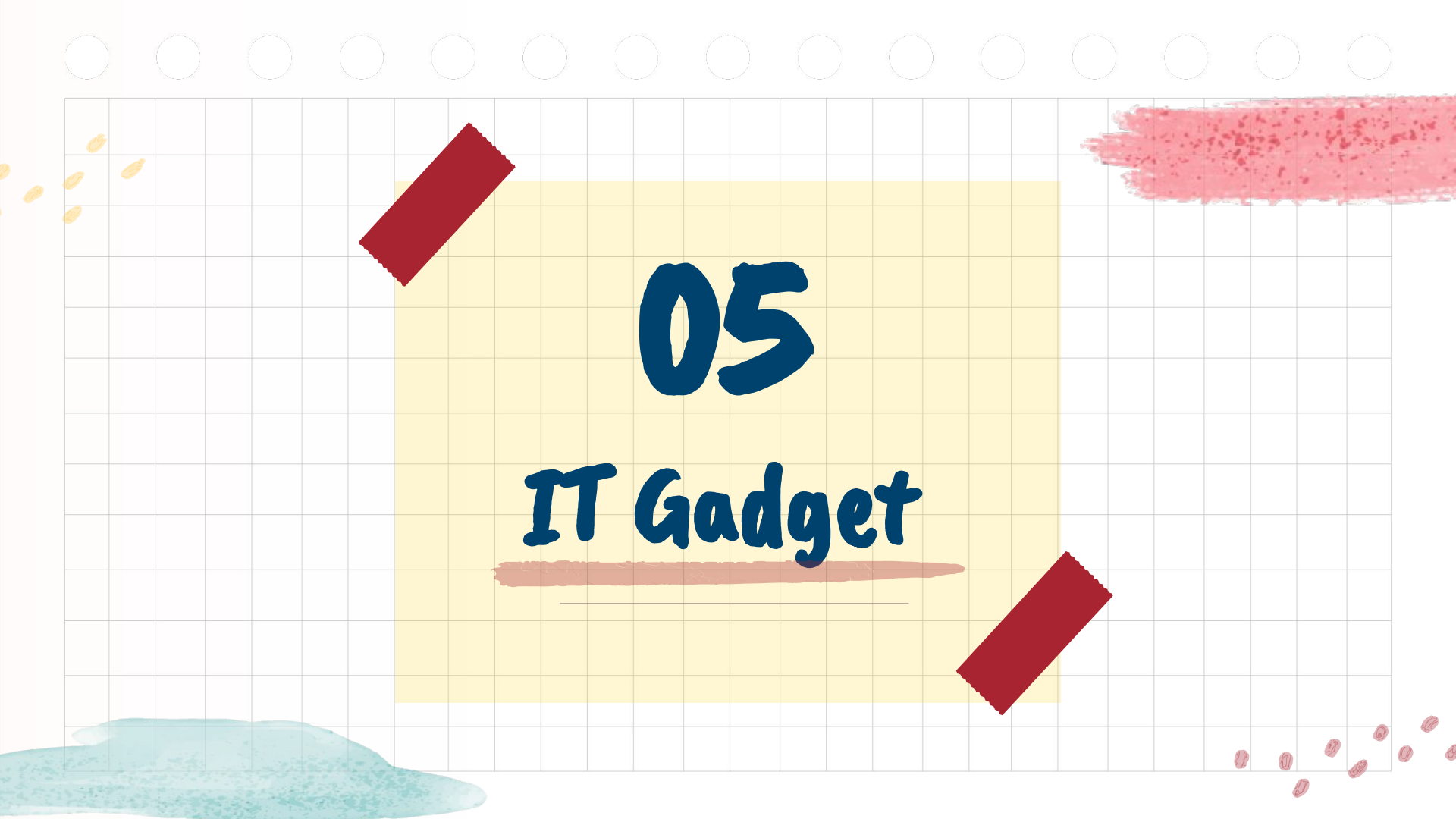
3

Hybrid Computer

Computers that have features of both digital and analog computers are known as hybrid computers.

Ex:- Gasoline Station





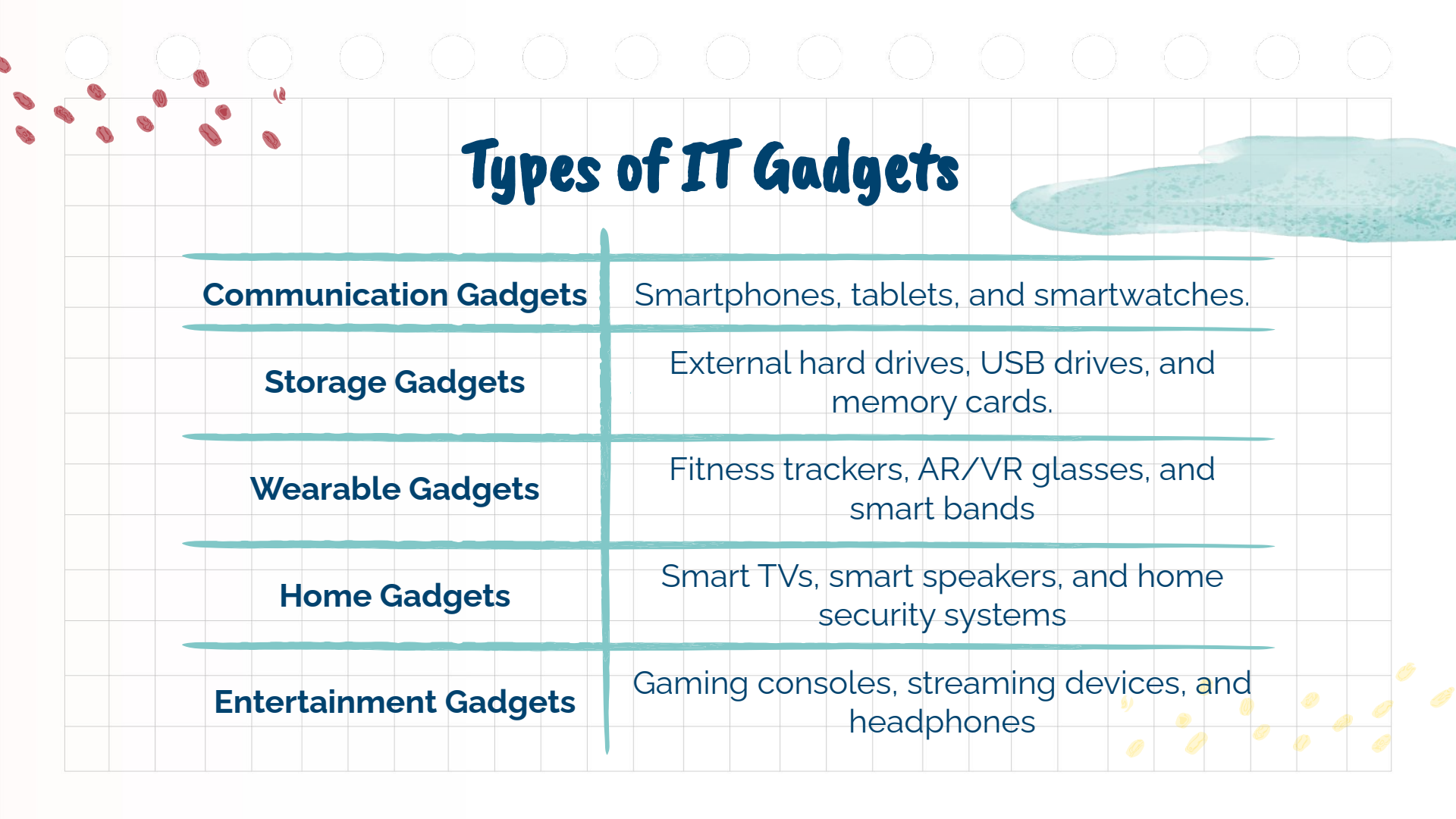
05

IT Gadget

It Gadgets

An IT gadget is a small electronic device designed to make tasks easier, faster, or more convenient.





Types of IT Gadgets

Communication Gadgets

Smartphones, tablets, and smartwatches.

Storage Gadgets

External hard drives, USB drives, and memory cards.

Wearable Gadgets

Fitness trackers, AR/VR glasses, and smart bands

Home Gadgets

Smart TVs, smart speakers, and home security systems

Entertainment Gadgets

Gaming consoles, streaming devices, and headphones

Overview of Programming Languages and Translators

- **Utility Programs:** Tools like text editors and compilers that help run programs.
- **Low-Level Language:** Includes Machine Language (binary) and Assembly Language (uses mnemonics like MOV, ADD).
- **High-Level Language:** Easier for humans to read and write (e.g., Python, C++).
- **Source Code:** The original code written by the programmer.
- **Object Code:** The translated code that can be executed by the computer.
- **Language Translators:** Convert source code into object code.
 - **Interpreter:** Translates code line-by-line at runtime.
 - **Compiler:** Translates the entire code at once.
 - **Assembler:** Converts Assembly Language into Machine Code.



06 Mobile Application

BHIM

Definition: BHIM is a UPI-based mobile payment app enabling secure, fast, and cashless transactions.

Full Form: Bharat Interface for Money.

Launch Date: December 30, 2016.





MyGov

Definition: MyGov is a citizen engagement platform for participatory governance in India.

Full Form: My Government.

Launch Date: July 26, 2014.

mAadhaar

Definition: mAadhaar is a mobile application for accessing Aadhaar services and information on-the-go.

Full Form: Mobile Aadhaar.

Launch Date: July 19, 2017.



UMANG



Definition: UMANG is a unified platform providing access to multiple government services through a single app.

Full Form: Unified Mobile Application for New-age Governance.

Launch Date: November 23, 2017.

Language support: 23

DigiLocker

Definition: DigiLocker is a platform for storing and sharing official documents digitally.

Full Form: Digital Locker

Launch Date: July 1, 2015

Storage Capacity: 1 GB





IRCTC

Definition: IRCTC is a government-owned company that manages online train ticket booking, catering services, and tourism-related services for Indian Railways passengers.

Full Form: Indian Railway Catering and Tourism Corporation

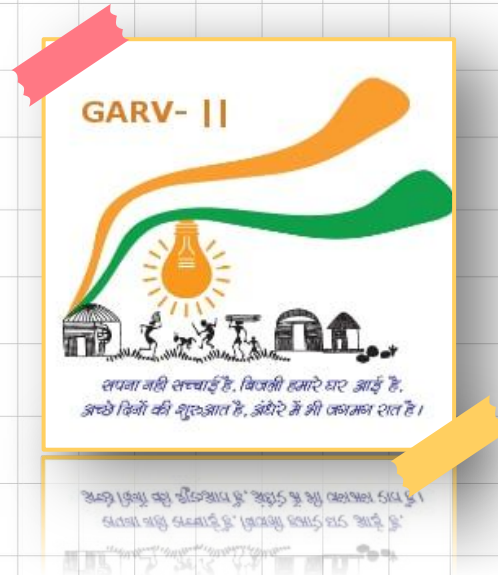
Launch Date: January 10, 2017 (for the mobile app)

GARV

Definition: Rural electrification initiative to provide electricity to villages in India.

Full Form: Gramin Vidyutikaran

Launch Date: Oct,14,2015



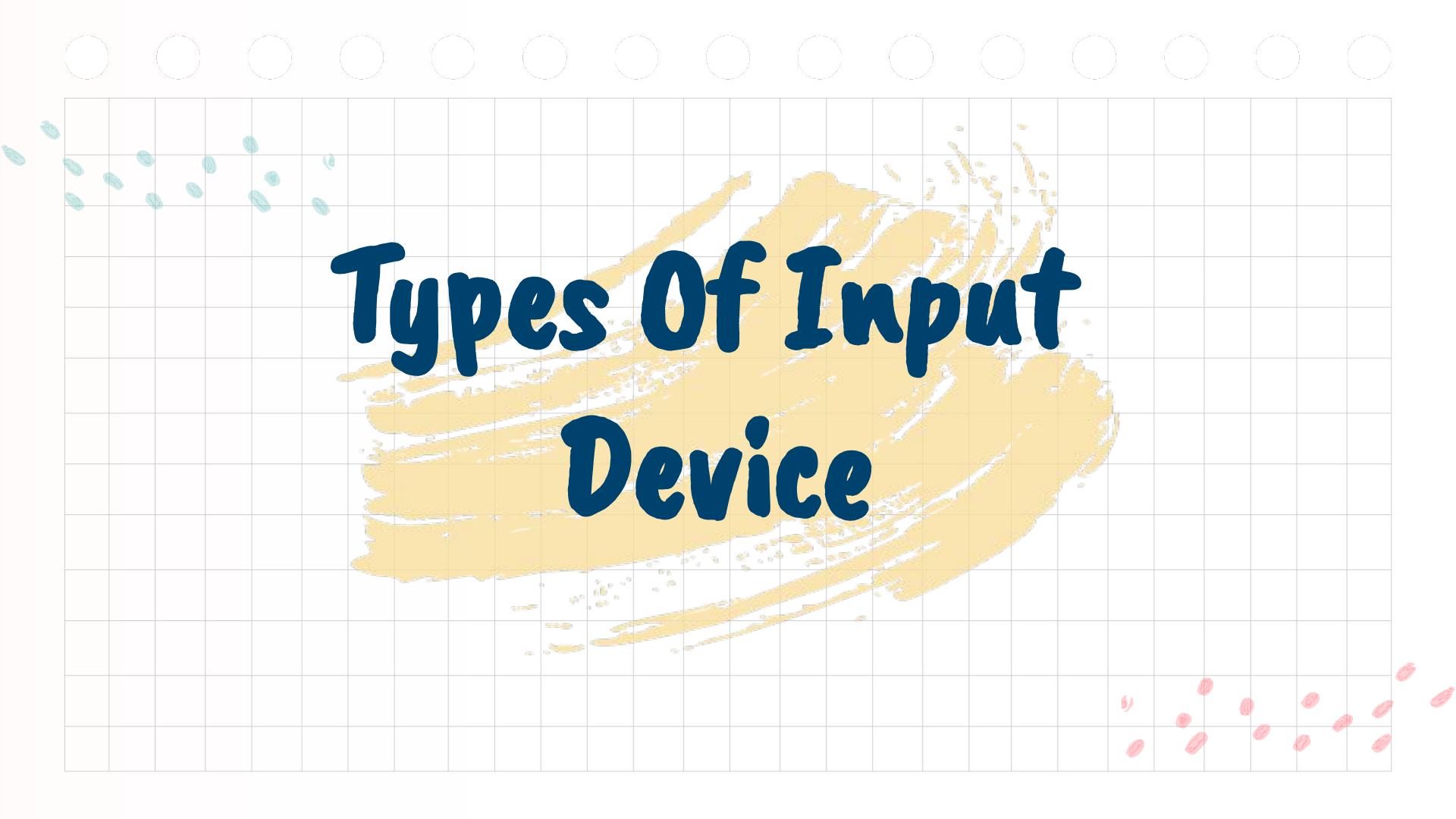
07
Hardware and
Software

Hardware

- **Definition:** Hardware refers to the physical parts of a computer system that you can touch and interact with.
- **Types of Hardware**
 1. Input hardware
 2. Output hardware

Input Device

- An input device is any hardware used to send data to a computer for processing, allowing users to interact with the system.
- **Two Main Input Devices**
 1. Keyboard
 2. Mouse



Types Of Input Device

Keyboard

Definition: Used for typing text and commands into the computer.



Features of Keyboard

- **Modifier Key:** Keys like Shift, Ctrl, and Alt used with others for actions.
- **Alphanumeric Keys:** Letters (A-Z) and numbers (0-9) for input.
- **Layout:** Key arrangement, commonly QWERTY.
- **Standard Keys:(101- 104)** Basic keys like Enter, Backspace, and Spacebar.
- **Toggle Key:** Keys like Caps Lock and Num Lock that switch states.
- **Navigation Keys:** Arrow keys, Home, End, Page Up, and Page Down for navigation.
- **Numeric Keypad:(17 key)** Number keys (0-9) for quick input.
- **Function Keys:** Keys F1 to F12 for specific functions.



Mouse

Definition: A mouse is a pointing input device used to interact with a computer by moving a pointer on the screen and selecting items.

Types of Mouse



Mechanical Mouse

Uses a ball to detect movement.



Wireless Mouse

Works without wires, using Bluetooth or radio frequency.



Optical Mouse

Uses light sensors to detect movement.



Trackball Mouse

A stationary mouse with a movable ball for controlling the pointer.

Features of Mouse

Buttons

- **Left Button:** Used for selecting items and executing commands.
- **Right Button:** Used for opening context menus.
- **Middle Button:** Often used for scrolling or other customizable actions.

DPI (Dots Per Inch)

- DPI refers to the sensitivity of the mouse. A higher DPI means the pointer moves faster on the screen.

Functionality

- **Pointing:** Moving the cursor on the screen.
- **Clicking:** Pressing a button to select items or perform actions.
- **Dragging:** Holding a button while moving the mouse to select or move objects.

MICR (Magnetic Ink Character Recognition)

Definition: MICR is a technology used to read and process documents that contain special magnetic ink characters, commonly used for processing checks and other financial documents.



OMR (Optical Mark Recognition)

Definition: OMR is a technology used to read marks made on paper, such as checkboxes or bubbles, typically used in surveys, exams, and questionnaires.



OCR (Optical Character Recognition)

Definition: OCR is a technology used to convert different types of documents, such as scanned paper documents, PDFs, or images, into editable and searchable data.





Scanner

Definition: A scanner is an input device that converts physical documents, images, or photos into digital format for storage or editing on a computer.

Touch Screen

Definition: A touch screen is an input device that allows users to interact with a computer or mobile device by touching the display screen.



Microphone

Definition: A microphone is an input device that captures sound, typically converting sound waves into electrical signals for recording or processing.



Output Device

- An output device is any hardware that receives data from a computer and converts it into a form that can be understood by the user, such as text, images, or sound.



Printer

Definition: A printer is an output device that produces a physical copy of digital documents, images, or graphics on paper.

Types of Printer

Impact

- A printer that prints by striking a ribbon against paper
- ex:-Dot matrix printer, Daisy wheel printer



Daisy wheel



Dot Matrix

Non-Impact

- A printer that prints without physically striking the paper
- Ex:- laser printer, Inkjet printer



Inkjet



Laserjet

Monitor

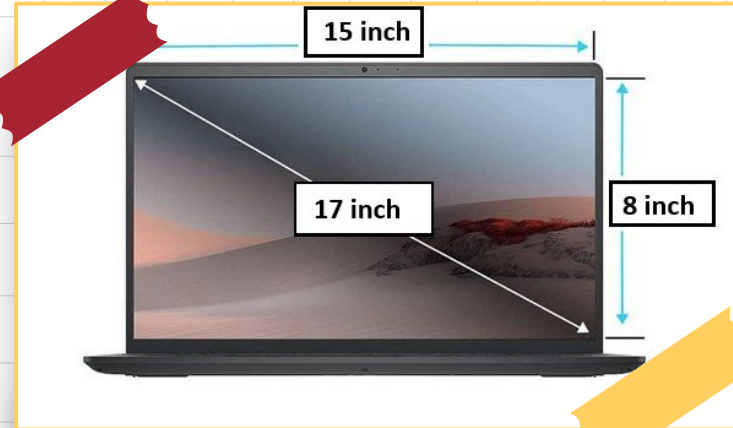
Definition: A monitor is an output device that displays visual content such as text, images, and videos from a computer or other devices.



Features of Monitor

- The first computer monitor was invented Ferdinand Braun in 1897.
- Which type of LED used in TV:-Organic light emitting diodes (OLED)
- Which type of LED used in phone:-AMOLED stands for Active-Matrix Organic Light-Emitting Diode.
- Pixel:- smallest unit of a picture is called pixel.
- Resolution:- How many number of pixels are there on a screen. we call it resolution.
- How to measure screen size.

$$\begin{aligned}H^2 &= B^2 + I^2 \\H^2 &= (15)^2 + (8)^2 \\H^2 &= 225 + 64 \\H^2 &= 289 \\H &= 17 \text{ inch}\end{aligned}$$



Types of Monitor

CRT (Cathode Ray Tube)

A type of monitor that uses electron beams to display monochrome or RGB images.



LCD (Liquid Crystal Display)

A monitor that uses liquid crystals and an external light source, typically TFT (Thin Film Transistor), for display.



LED (Light Emitting Diode)

A monitor that uses LEDs for both backlighting and display, having its own light system.





Speakers

Definition: Output sound from the computer, such as music or voice.

Projector

Definition: Displays images or videos onto a larger screen or surface.





Plotter

Definition: A plotter is an output device that produces large-scale drawings or graphics using pens.

VGA (Video Graphics Array)

Definition: VGA is a standard for displaying graphics on monitors, providing a resolution of 640x480 pixels, commonly used in older computer systems.



Software

- Software is a set of programs that tell a computer what to do.
- **How Software Works**
 1. **Running:** Executes instructions in the computer's memory.
 2. **Processing:** Handles data to perform tasks.
 3. **Interacting:** Communicates with hardware and other software.
 4. **Generating Output:** Produces results or output after processing.

Types of Software

Application

Software designed for users to perform specific tasks (e.g., Microsoft Word).



Utility

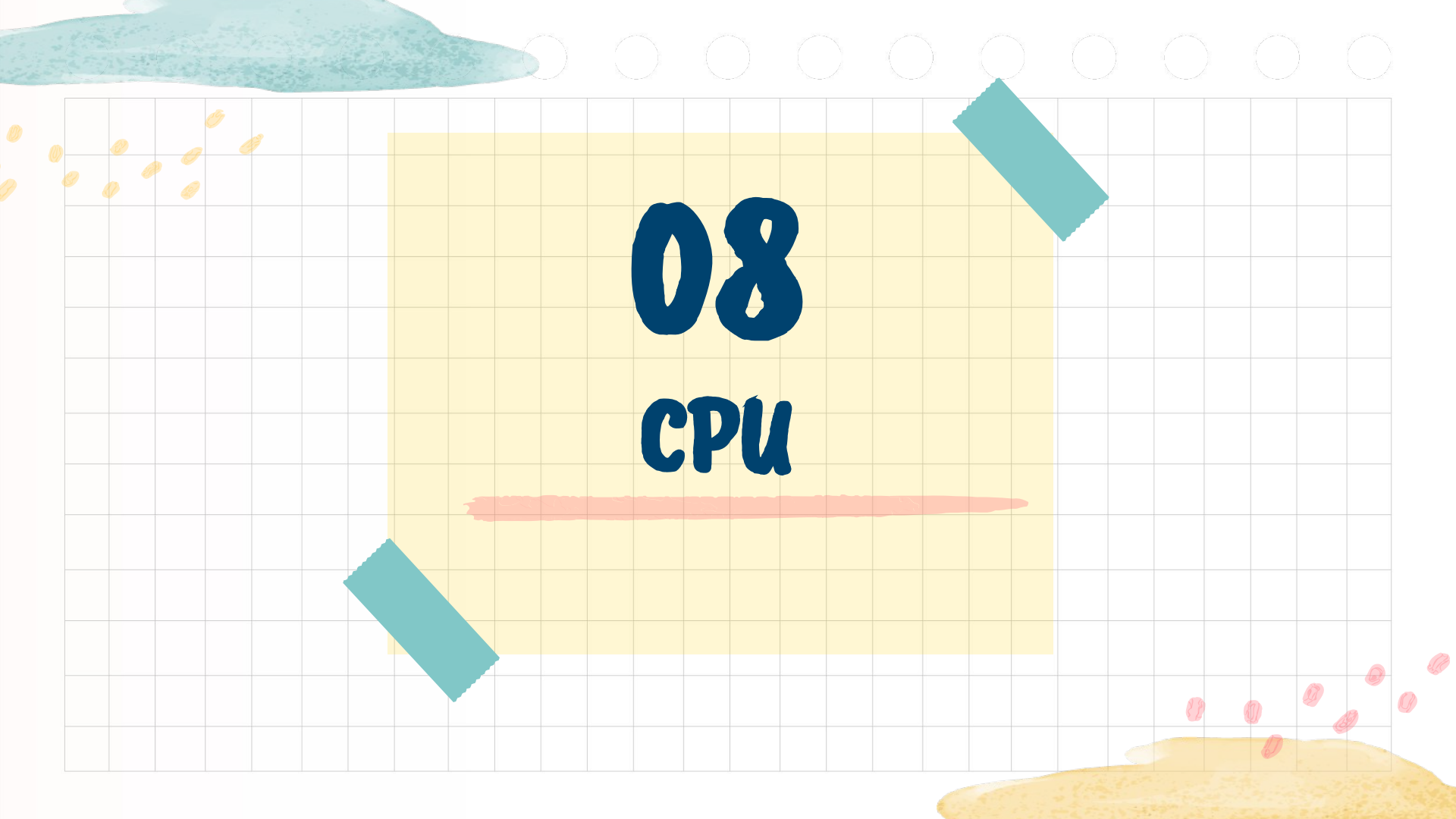
Software used for system maintenance and optimization (e.g., Antivirus).



System

Software that manages hardware and provides a platform for running application software (e.g., Windows OS).





08
CPU

CPU (Central Processing Unit)

The CPU is the "brain" of the computer. It performs all the calculations and processes the instructions given by software. It controls and manages all other parts of the computer.



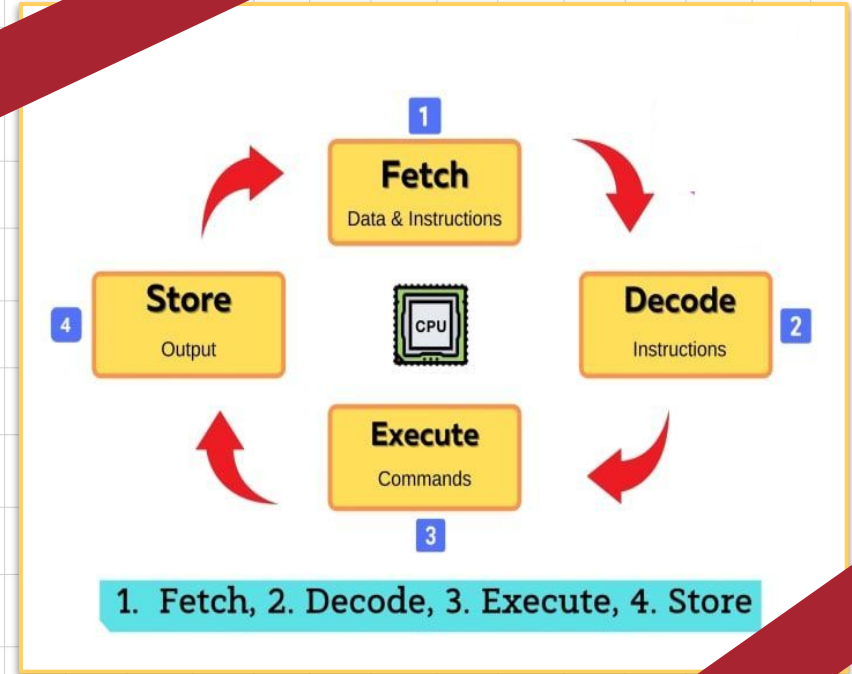
Function of CPU

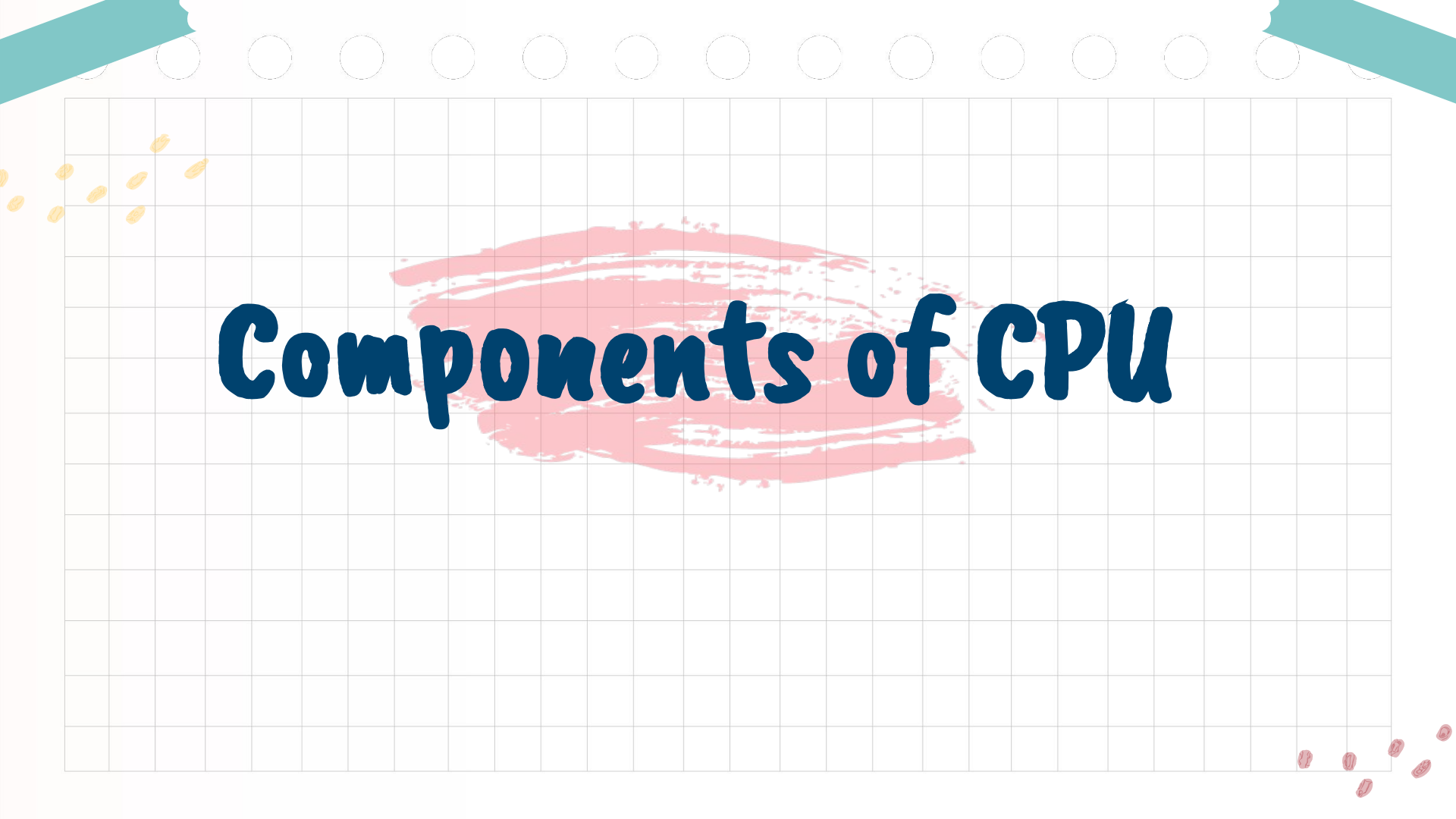
Fetching instructions from memory.

Decoding the instructions.

Executing the instructions to perform operations.

Storing the results of operations back into memory or registers.



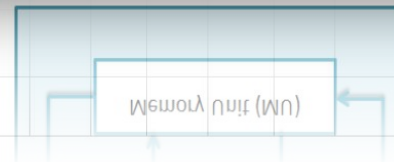
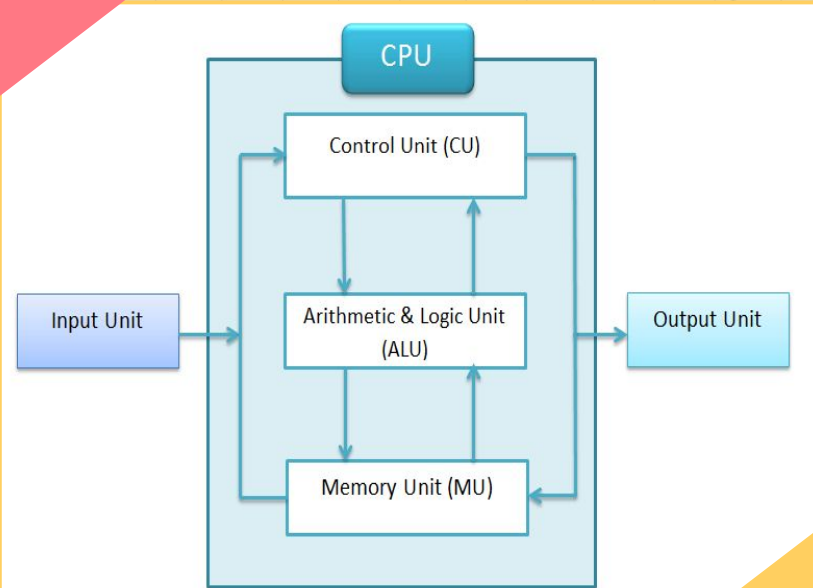


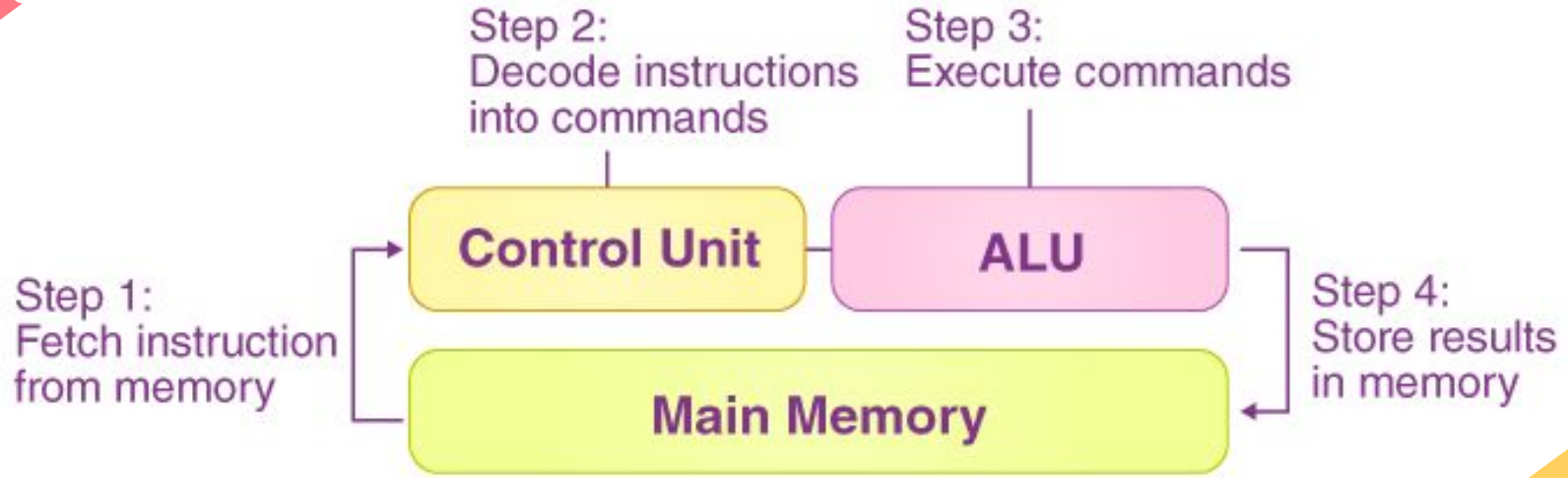
Components of CPU

ALU (Arithmetic Logic Unit)

Performs **mathematical operations** like addition (+), subtraction (-), multiplication (*), division (/)

Performs **logical operations** like comparison (>, <, >=, <=, ==, !=), and bitwise operations.





CU (Control Unit)

Directs the operation of the processor by fetching, decoding, and executing instructions. Coordinates the activities of all components in the CPU.



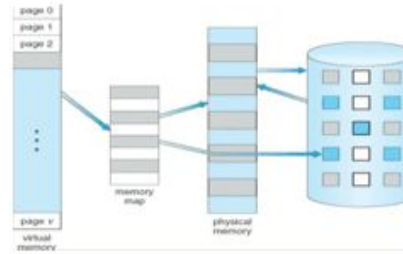
RAM



ROM



Cache Memory



Virtual memory



Flash Memory

MU (Memory Unit)

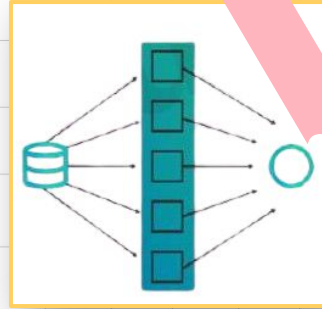
Stores data and instructions for processing.

Types of Processing



Serial Processing

Tasks run one by one, no instructions used.



Parallel Processing

Tasks run together on multiple processors.



Pipeline Processing

The processor executing second instruction before the first has been completed.

09
Types of
Memory unit

Types of Memory Unit

Primary /Internal

RAM

1

SRAM

2

DRAM

3

SDRAM

ROM

1

PROM

2

EPROM

3

EEPROM

Secondary /External

1

SSD

2

HDD

3

Flash Memory

4

Floppy disk

5

Optical disk

Memory Hierarchy (From Fastest to Slowest)

Level	Speed	Size	Location	Function
Registers	Fastest	Smallest (bytes)	Inside CPU	Holds temporary data and instructions.
Cache Memory	Very Fast	Small (KB to MB)	Close to or inside CPU	Stores frequently used data for fast access.
RAM (Main Memory)	Fast	Larger (GBs)	On the motherboard	Holds active data and instructions.
Secondary Storage	Slow	Very Large (GB to TB)	Connected via ports	Long-term storage (HDD, SSD).
Tertiary/Off-line Storage	Very Slow	Very Large (TBs)	External/Remote	Backup and archival storage.

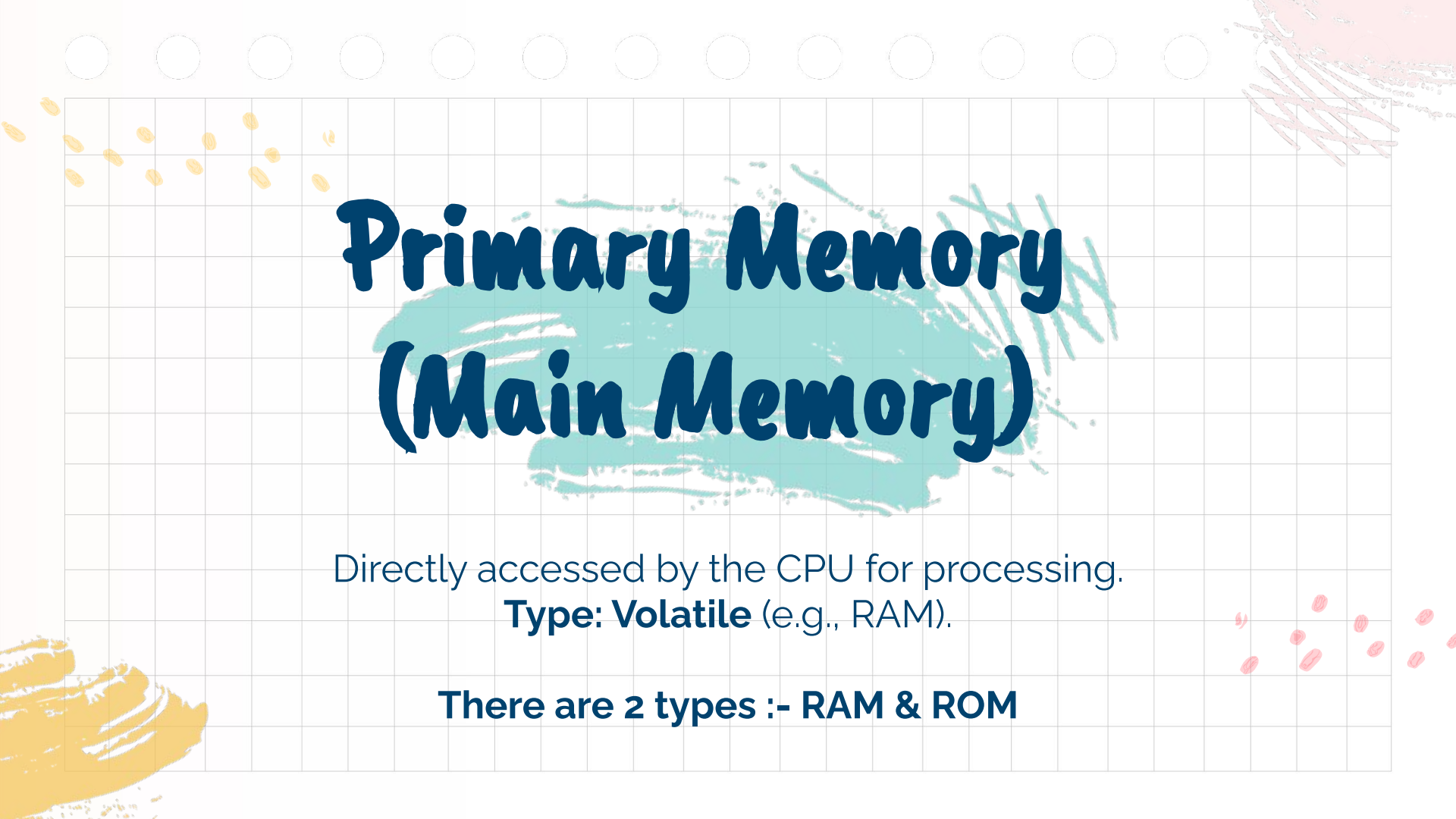
VOLATILE & NON-VOLATILE MEMORY

1

Volatile Memory: Data is lost when the power is turned off.
It is a temporary memory.

2

Non-Volatile Memory: Data is retained even when the power is off.
It is a permanent memory.



Primary Memory (Main Memory)

Directly accessed by the CPU for processing.

Type: Volatile (e.g., RAM).

There are 2 types :- RAM & ROM

RAM (Random Access Memory)

Temporary memory that loses data when power is off.

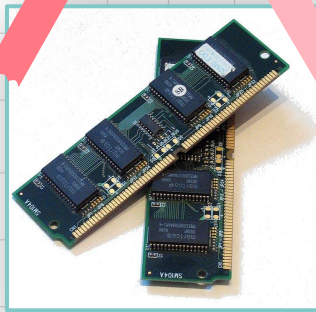
Types of RAM



SRAM (Static RAM)

Does not need a refreshing cycle.

Example: Cache memory in processors like Intel Core i7.



DRAM (Dynamic RAM)

Needs periodic refreshing to retain data.

Example: RAM in budget laptops or desktop PCs (4GB DDR3 RAM).



SDRAM (Synchronous DRAM)

Synchronizes with the CPU clock speed, making it faster than DRAM.

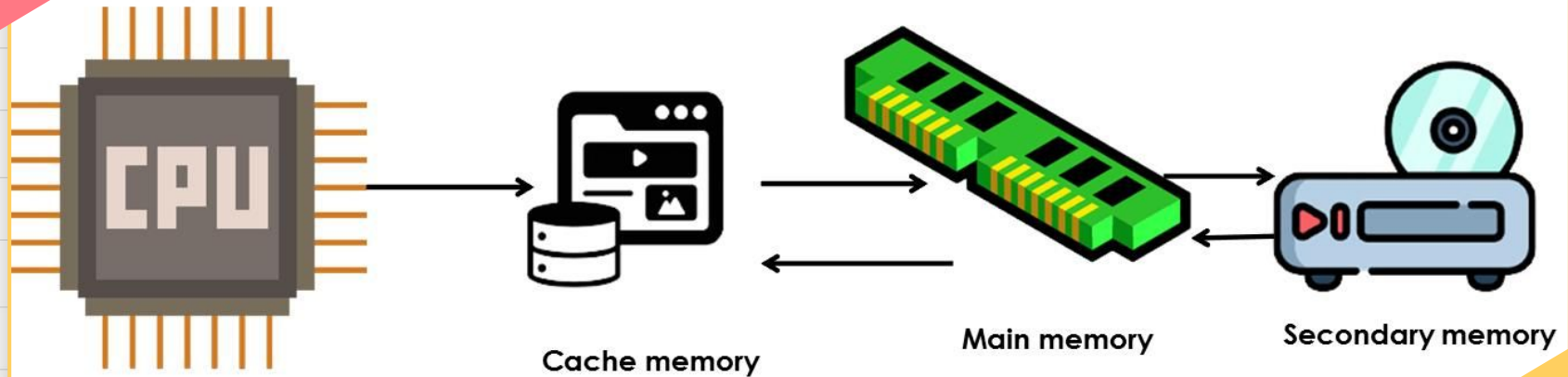
Example: DDR4 RAM used in gaming PCs (8GB DDR4).

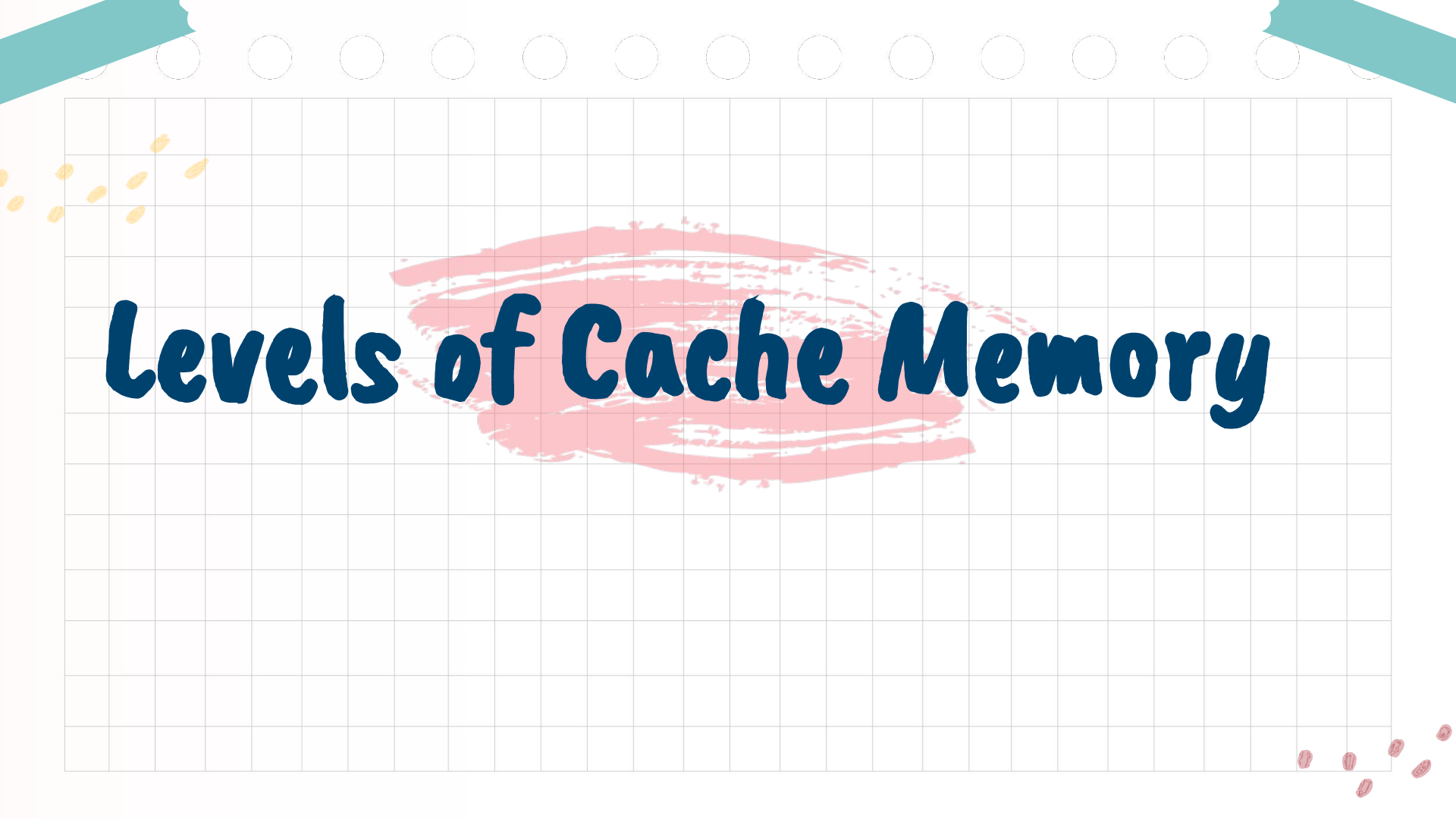
Cache Memory

Cache Memory is a small, high-speed memory **located** between the **CPU and RAM**.

It stores **frequently used data** and instructions, improving overall system speed.

Purpose: Reduces time taken for CPU to access data from RAM, boosting performance.





Levels of Cache Memory

L1 Cache (Level 1)

Location

Inside the CPU.



01

02



Size

Small (16KB - 128KB)

Speed

Fastest



03

04



Function

Stores frequently accessed data for quick access.

L2 Cache (Level 2)

Location

Near the CPU (may be external).

Speed

Slightly slower than L1.

01

02

03

04

Size

Larger than L1
(128KB - 2MB)

Function

Holds data missed by L1 for faster access.

L3 Cache (Level 3)

Location

External to the CPU,
on the motherboard.

Speed

Slowest among the
three, but faster than
RAM.

01

02

03

04

Size

Largest (2MB -
64MB).

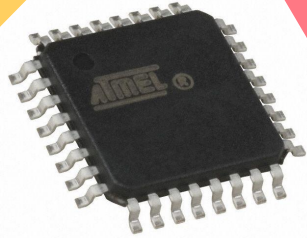
Function

Acts as a last-level
cache, helping the
CPU retrieve data
more efficiently.

ROM (Read-Only Memory)

Permanent memory that retains data even when power is off.

Types of ROM



PROM (Programmable ROM)

- Can be written once and not erased.
- Example: Microcontrollers in washing machines.



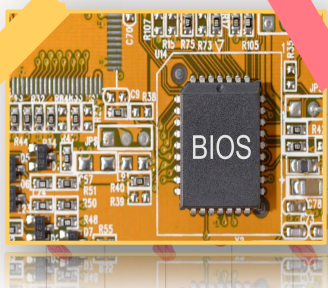
EPROM (Erasable PROM)

- Can be erased using UV light and reprogrammed.
- Example: Older TV remote controllers.



EEPROM (Electrically Erasable PROM)

- Can be erased and reprogrammed using electrical signals.
- Example: BIOS chip in modern desktops and laptops.



Chips in ROM

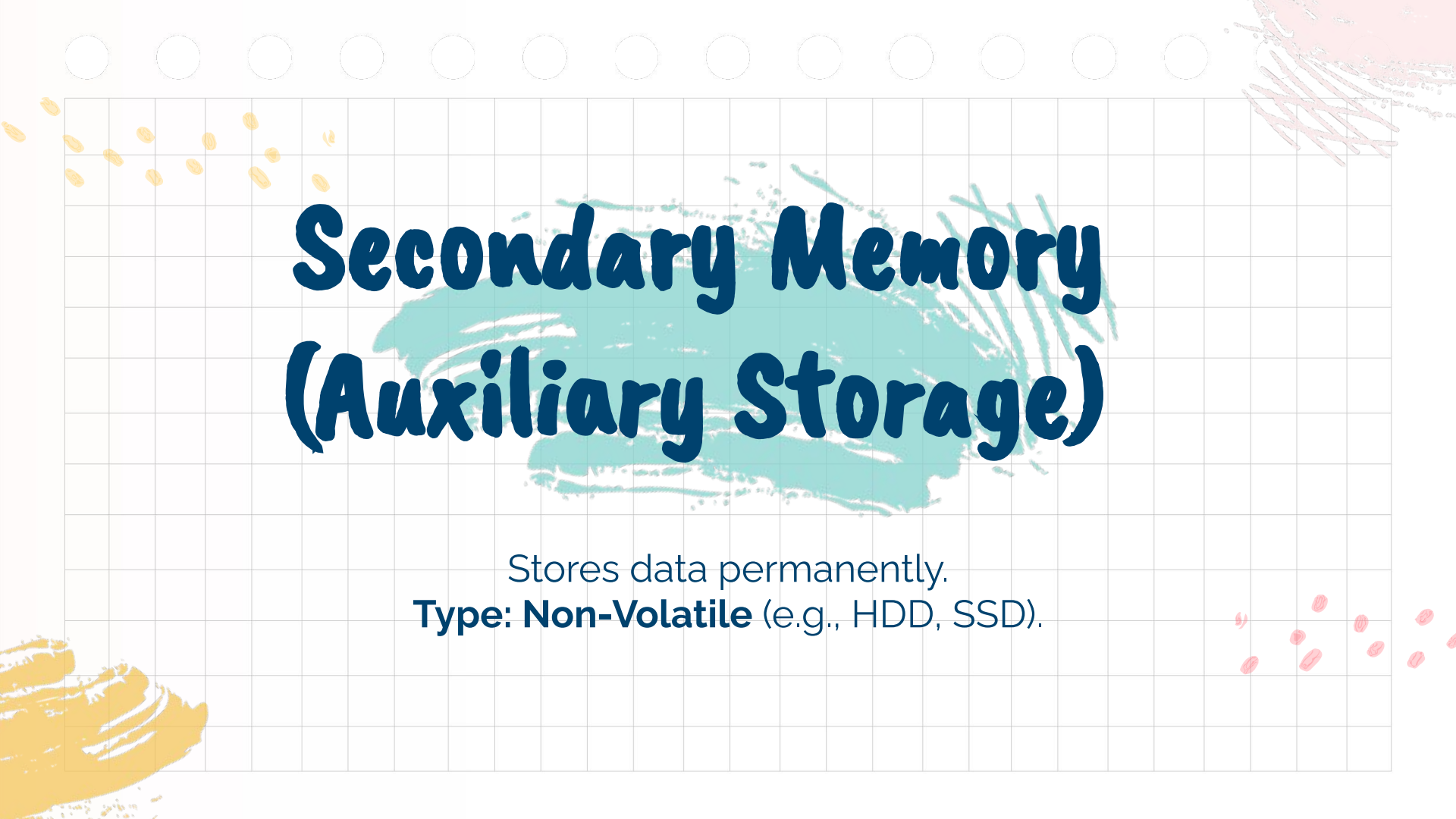
BIOS (Basic Input/Output System)

- Provides instructions for starting (booting) the computer.
- **Cold Boot:** Starting the computer from a completely powered-off state.
- **Warm Boot:** Restarting the computer without turning it off.

CMOS (Complementary Metal-Oxide Semiconductor)

- Stores system settings like date and time.
- Requires a battery to retain data.

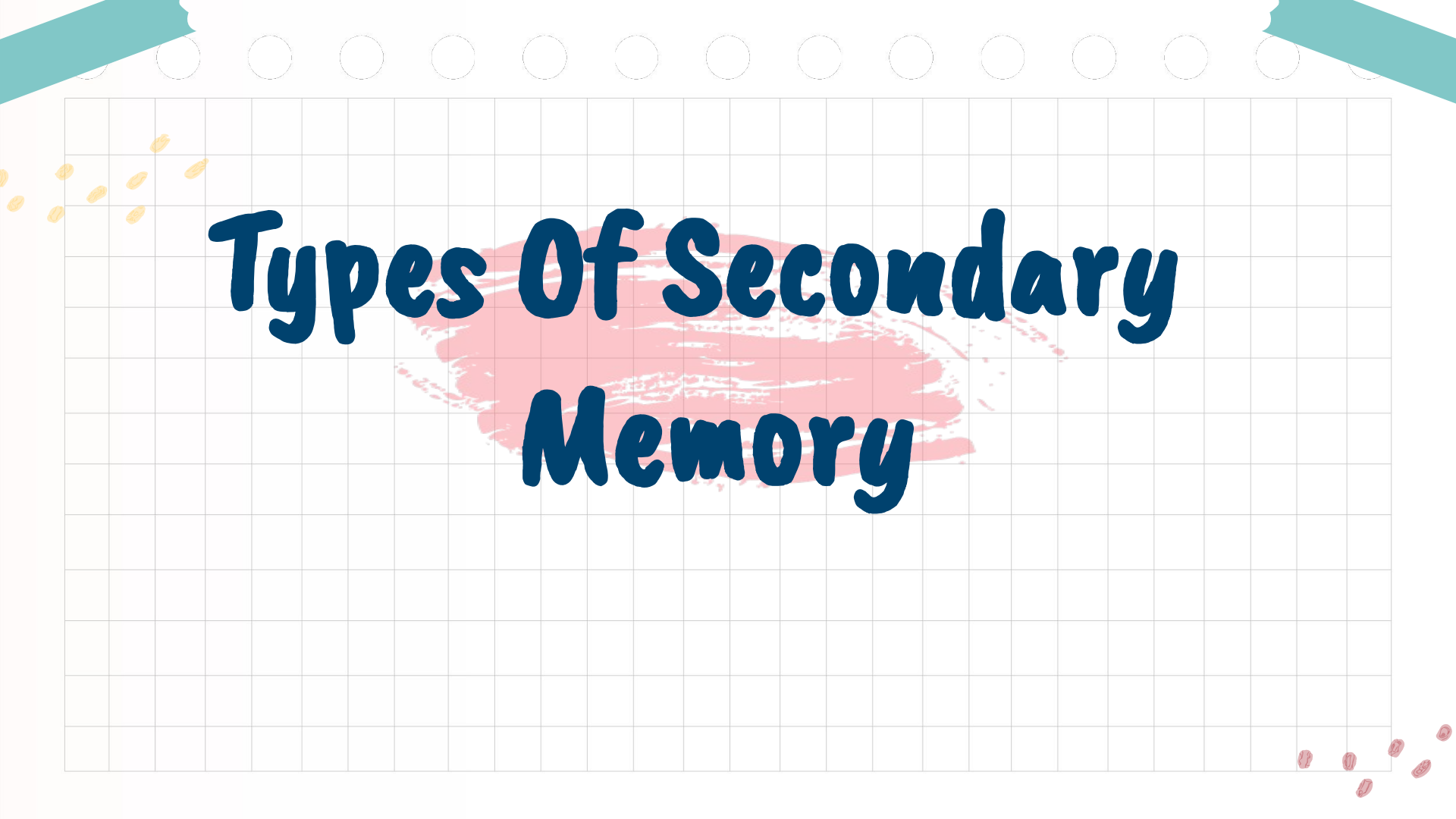




Secondary Memory (Auxiliary Storage)

Stores data permanently.

Type: Non-Volatile (e.g., HDD, SSD).



Types Of Secondary Memory



SSD (Solid State Drive)

A storage device that uses flash memory to store data, offering faster speeds and greater durability compared to traditional hard drives (HDDs), with no moving parts.

Floppy Disk

A portable storage device that uses a magnetic disk to store data, now outdated due to its low storage capacity and slow speed.





Flash Memory

A type of non-volatile storage that retains data without power. It is fast, durable, and used in devices like USB drives, SSDs, and memory cards.

Optical Storage

CD (Compact Disc):

Stores up to 700MB of data.

Used for music, software, and small files.

DVD (Digital Versatile Disc):

Stores up to 4.7GB of data.

Used for movies, games, and larger files.

Blu-ray Disc (BD):

Stores 25GB to 50GB of data.

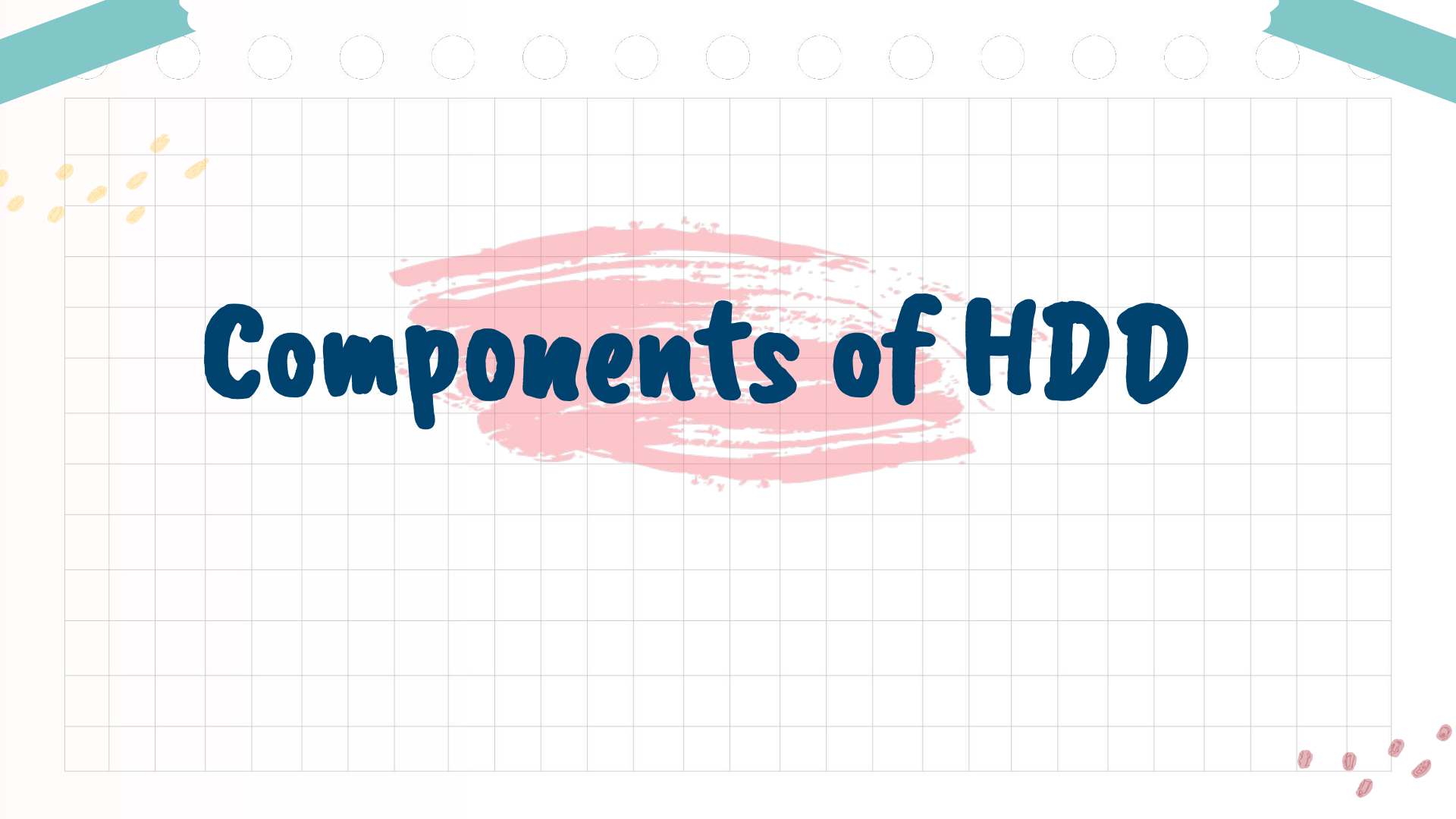
Used for high-definition movies and large data storage.



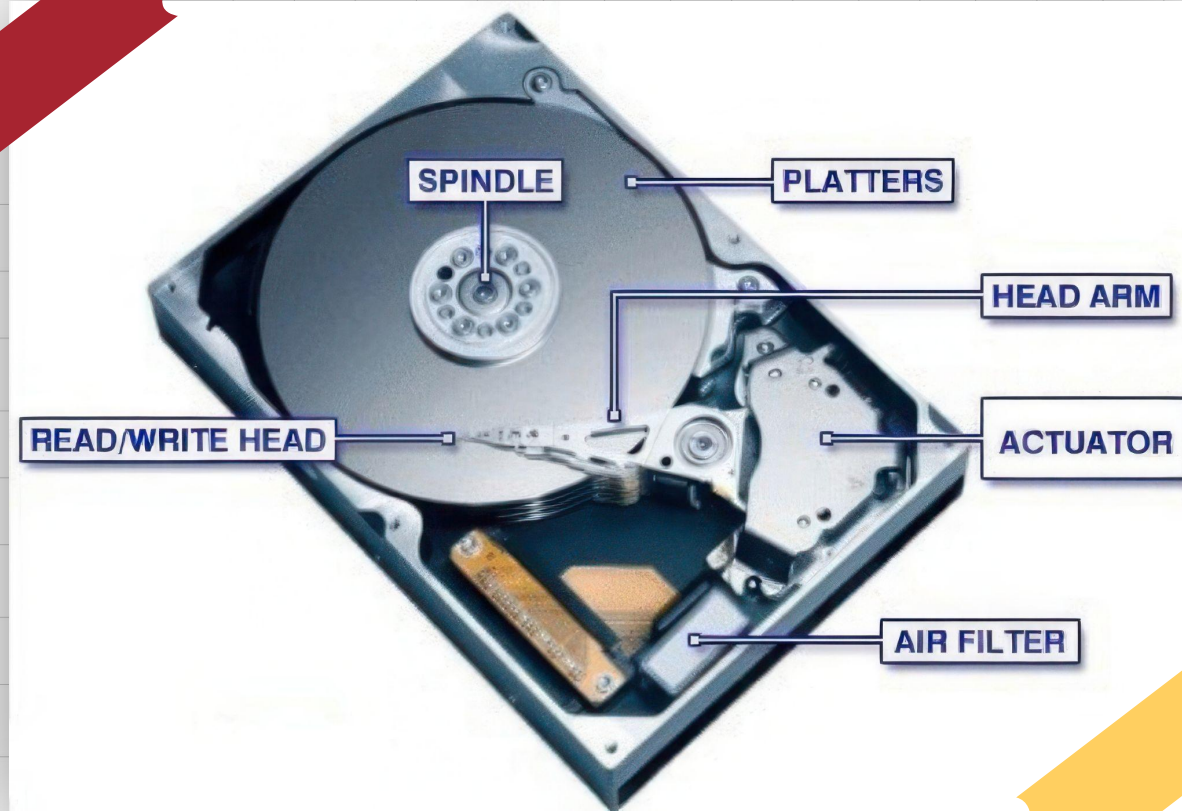


HDD (Hard Disk Drive)

A storage device that uses spinning magnetic disks (platters) to store data, commonly used for long-term data storage in computers.



Components of HDD



Components of HDD

01

Platters

Magnetic disks that store data; they spin at high speeds.

02

Spindle

The motor that rotates the platters.

03

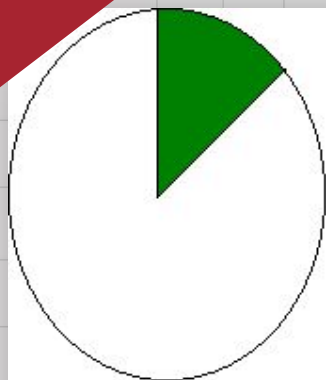
Actuator Arm

The part that moves the read/write heads across the platters.

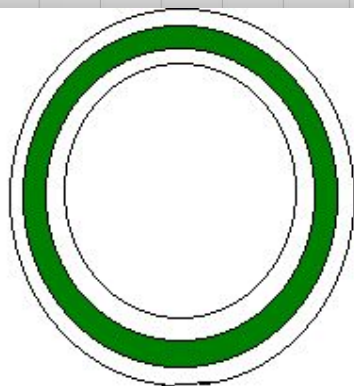
04

Read/Write Heads

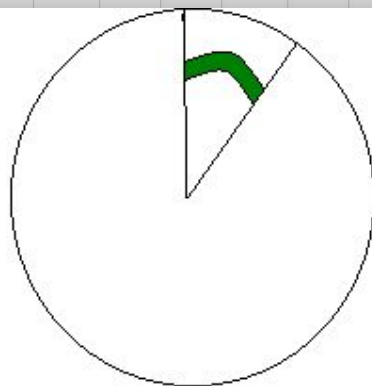
Tiny heads that read and write data on the platters.



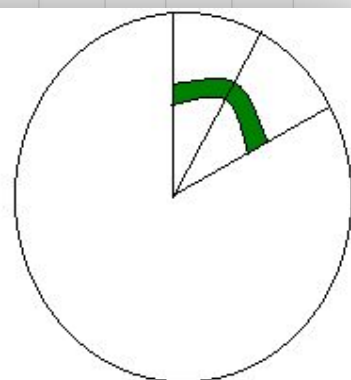
Sector



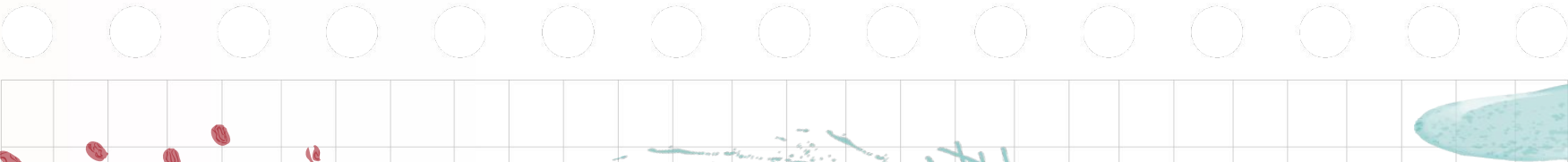
Track



Track-Sector



Cluster



Track

Circular paths on the platter
where data is stored.



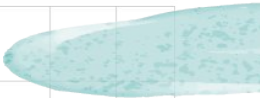
Sector

Smallest unit of storage on a
platter, where data is written.



Cluster

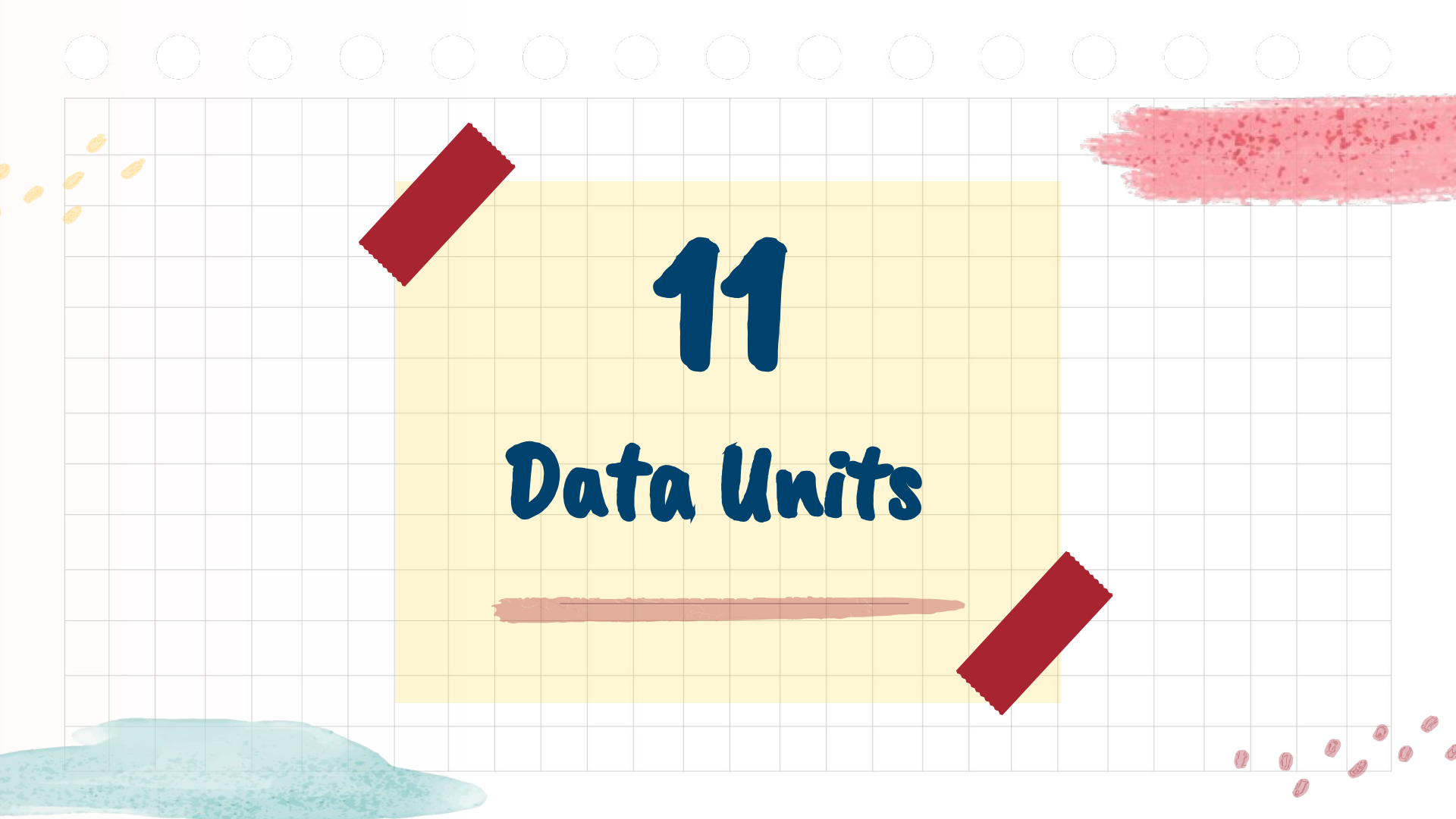
A group of sectors that
together form a storage unit.



10
Open Source vs
Closed Source

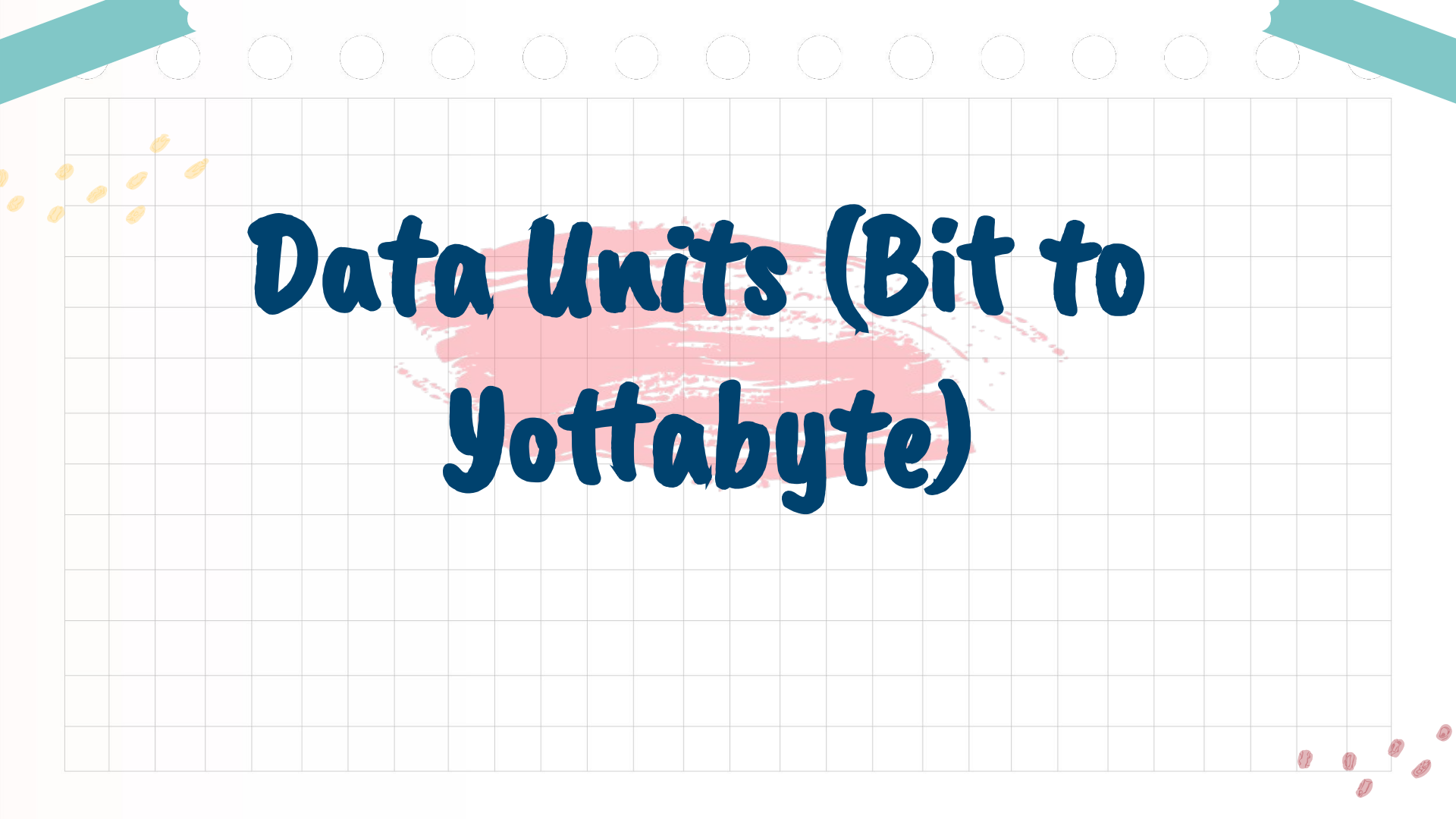
Open Source vs Closed Source

Point of Difference	Open Source	Proprietary (Closed Source)
Definition	Free and open to all.	Owned and restricted by a company.
Access to Source Code	Code is available to change.	Code is kept private.
Cost	Free to use.	Requires payment.
Customization	Can be changed by anyone.	Cannot be changed.



11

Data Units



Data Units (Bit to Yottabyte)

Unit	Abbreviation	Equivalent to
Bit	b	Smallest unit of data (0/1)
Nibble	N	1 Nibble = 4 bits
Byte	B	1 Byte = 8 bits = 2 Nibbles
Kilobyte	KB	1 KB = 1,024 Bytes
Megabyte	MB	1 MB = 1,024 KB
Gigabyte	GB	1 GB = 1,024 MB
Terabyte	TB	1 TB = 1,024 GB
Petabyte	PB	1 PB = 1,024 TB
Exabyte	EB	1 EB = 1,024 PB
Zettabyte	ZB	1 ZB = 1,024 EB
Yottabyte	YB	1 YB = 1,024 ZB