TRANSISTOR

NAYEEM PART FOR EXPLAINATION

What is a Transistor?

A **transistor** is an **electronic switch**.
It either **connects** or **disconnects** electricity between two points: the **source** and the **drain** — controlled by a third point called the **gate**.

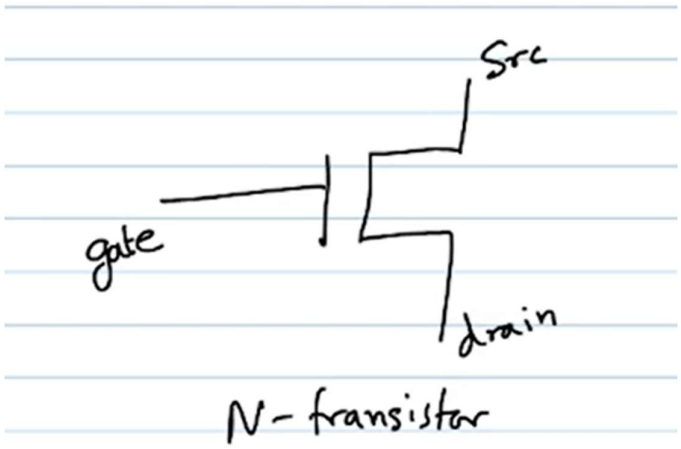
Think of it like a water tap:

- **Gate** = handle
- **Source** = water tank
- **Drain** = pipe output
  Turning the handle (gate) decides whether water (electricity) flows or not.

Types of Transistors

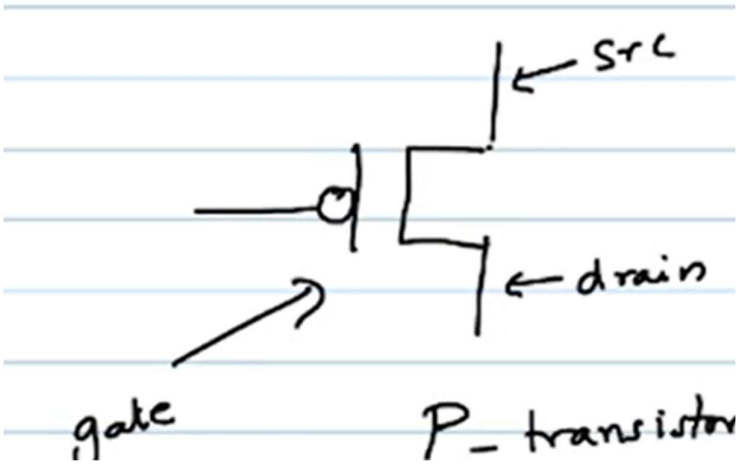
There are **two main types** of transistors used in computer systems:

1. **N-Transistor (N-type)**



- **ON** when gate = 1 (supply voltage)
- **OFF** when gate = 0 (ground)
- **Works normally**: 1 = ON, 0 = OFF
- Symbol has **no circle** on the gate.

2. **P-Transistor (P-type)**



- **ON** when gate = 0 (ground)
- **OFF** when gate = 1 (supply voltage)
- **Opposite behaviour** to N-transistor.
- Symbol has a **small circle** on the gate.

BHARATH PART TO EXPLAIN

WHY IS IT IMPORTANT?

- It helps computers **store data**, **do calculations**, and **make decisions**.
- Modern computer chips have **billions of transistors**!
- Without transistors, computers would not work.

WHAT CAN A TRANSISTOR DO?

Function	Meaning in Simple Terms
Switch	Turns current on or off
Amplifier	Makes weak signals stronger (like in radios)
Logic Gate	Helps make decisions using 0s and 1s

EXAMPLE:

If a **bit** (0 or 1) is like a light (on/off),
then a **transistor** is the **switch** that turns that light on or off.

Fun Fact:

- The **first computer** had **just a few thousand** transistors.

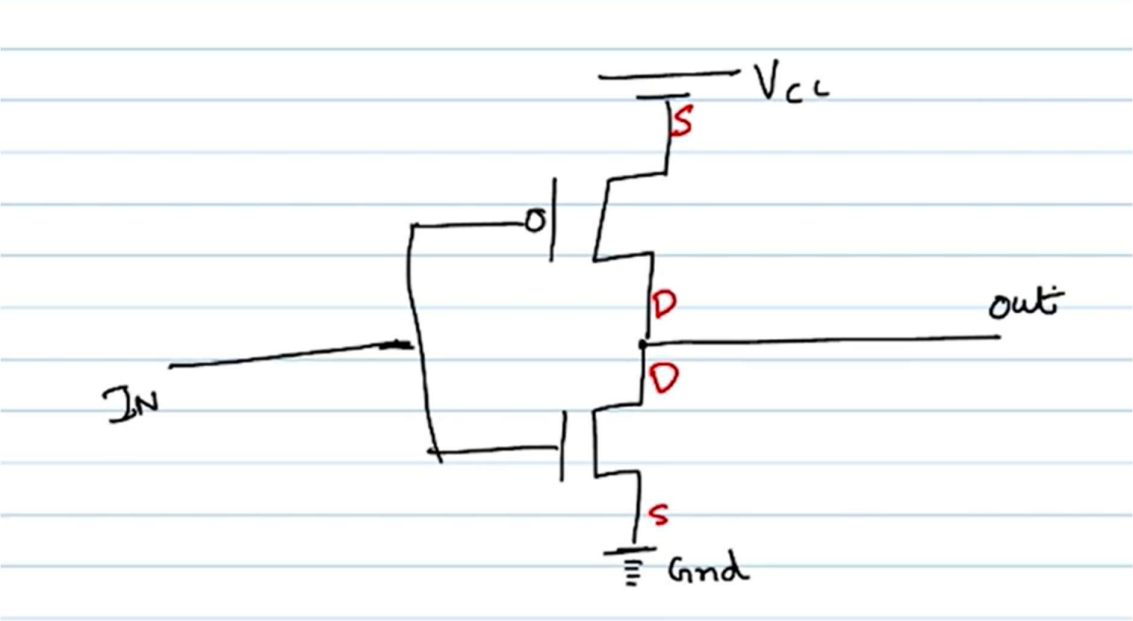
Today's smartphones have **over 10 billion transistors** in one chip

HOW THEY WORK TOGETHER

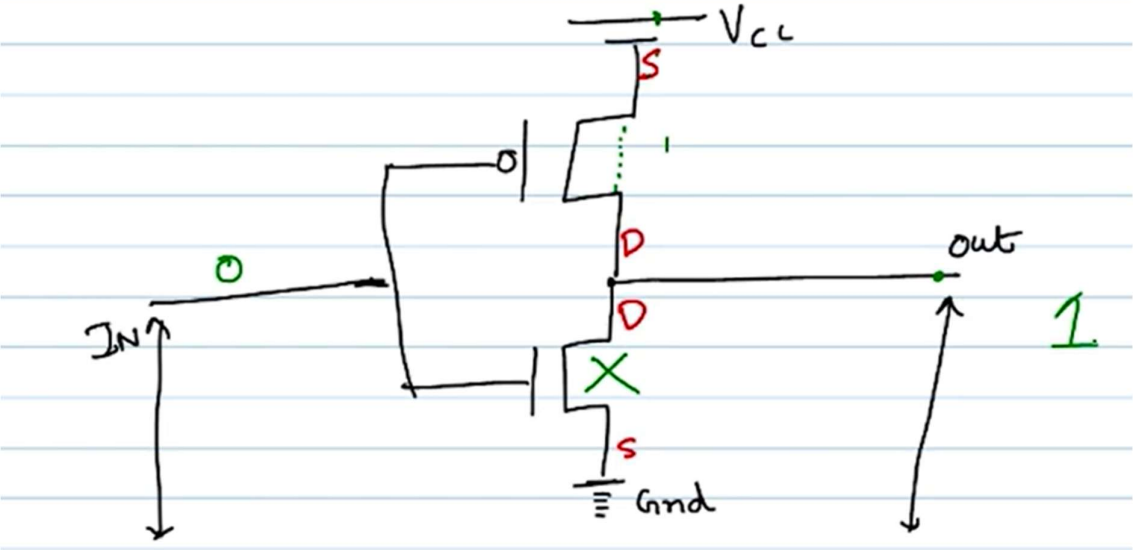
Transistors are used to build **logic gates**, like:

NOT GATE (INVERTER):

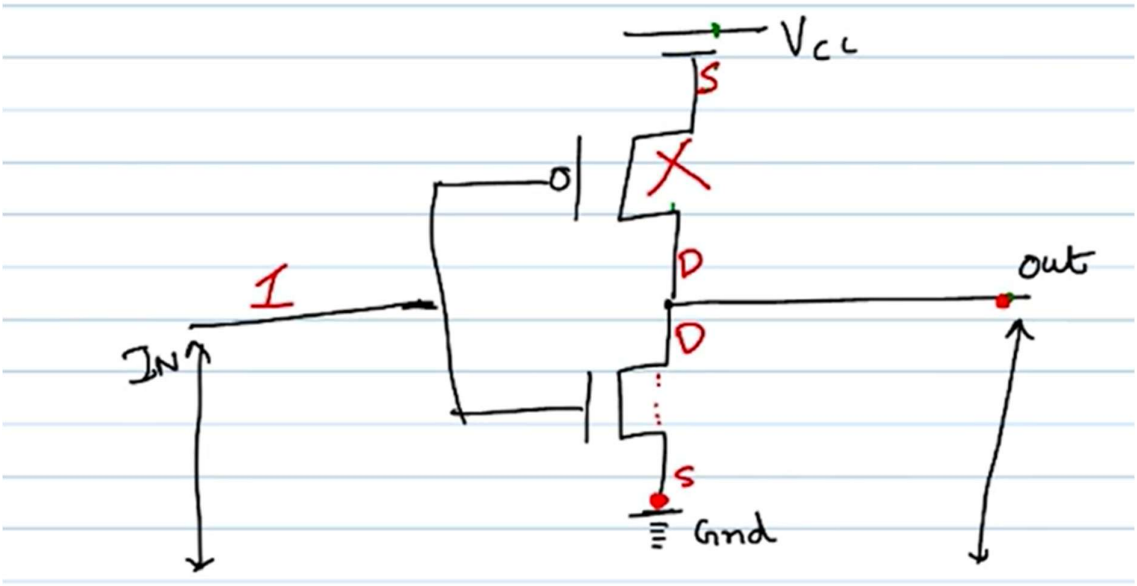
- Built using **1 N-transistor and 1 P-transistor**



- **Input = 0 → Output = 1**



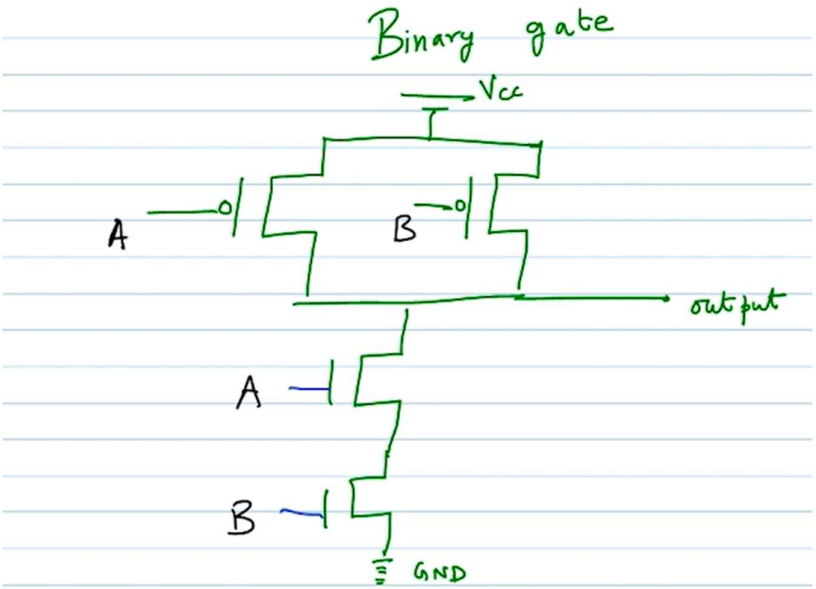
- Input = 1 → Output = 0



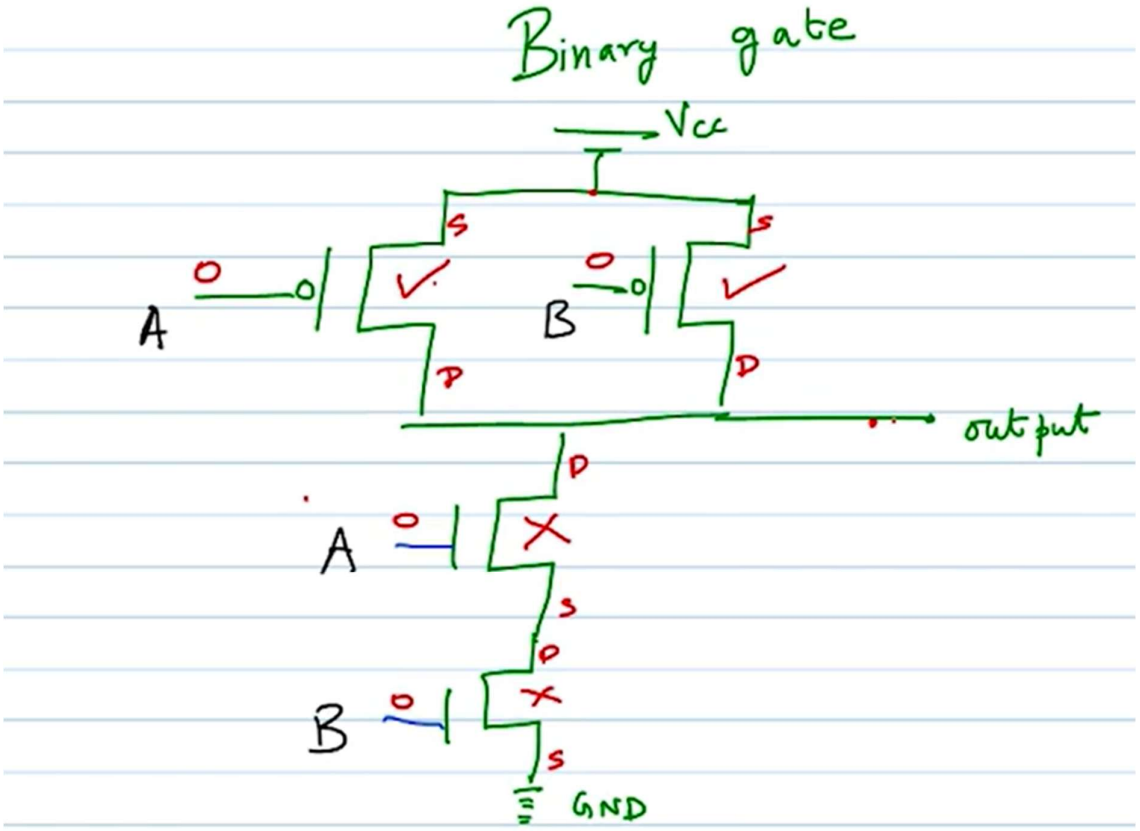
IN	OUT
0	1
1	0

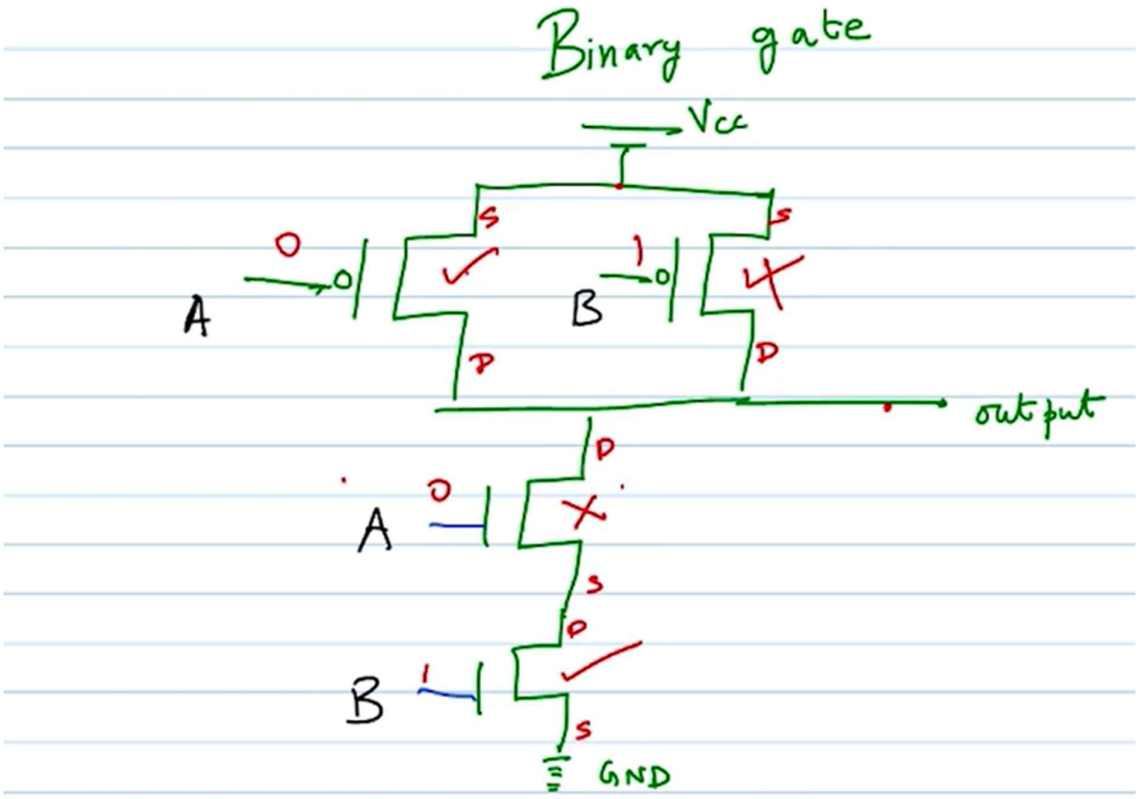
NAND GATE:

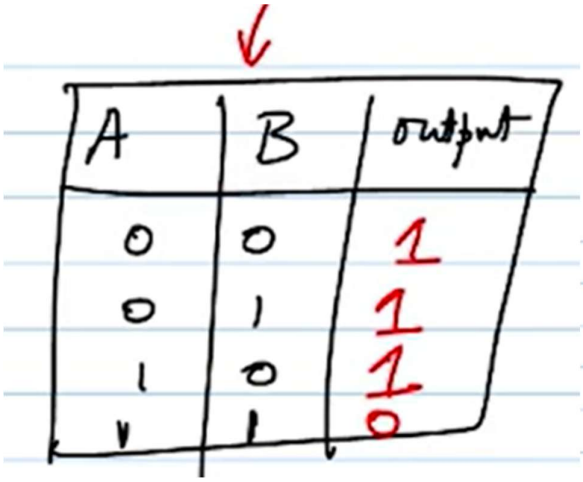
- Built using **2 P-transistors** (in parallel) and **2 N-transistors** (in series)



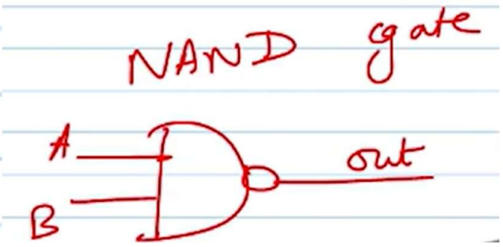
- Gives output **1 in all cases**, **except** when both inputs are **1**.







A	B	output
0	0	1
0	1	1
1	0	1
1	1	0



These logic gates are the **foundation of all digital circuits** — including CPUs, memory, and software logic.

Note:

Term	Simple Meaning
Transistor	Electronic switch
N-Transistor	ON at 1, OFF at 0

P-Transistor	ON at 0, OFF at 1
Logic Gate	Small circuit made using transistors
NAND Gate	Key gate used to build entire computers