Computer Awareness
Module - 2

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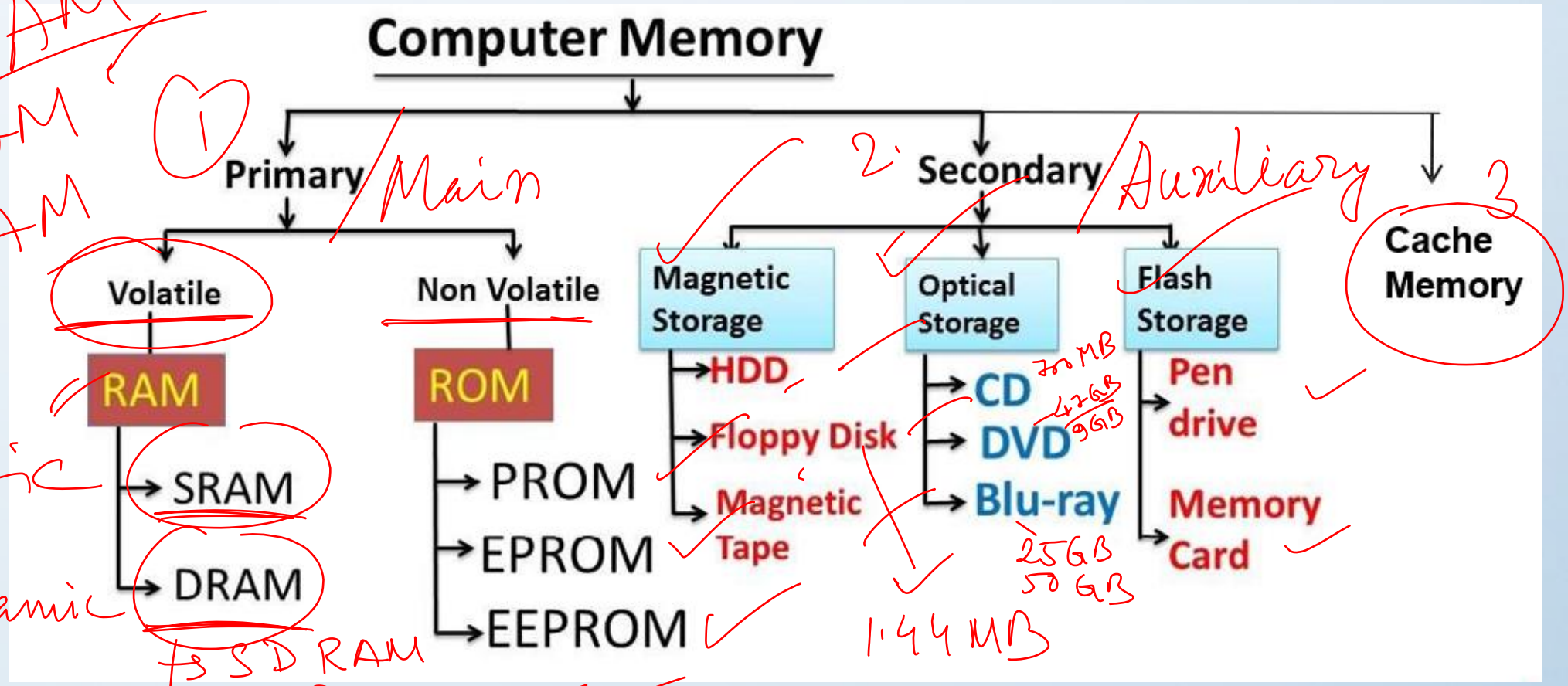
- Different types of computer memories
- Logic Gates
- Circuits
- Number System

Computer Memories

computer memory, device that is used to store data or programs (sequences of instructions) on a temporary or permanent basis for use in an electronic digital computer.

Types of Computer Memories



Primary Memory

What does primary memory do?

- Stores data and program instructions that the CPU is currently using or processing
- Provides fast access to data and instructions, which is important for program execution
- Plays a crucial role in the operation of the computer system

Types:

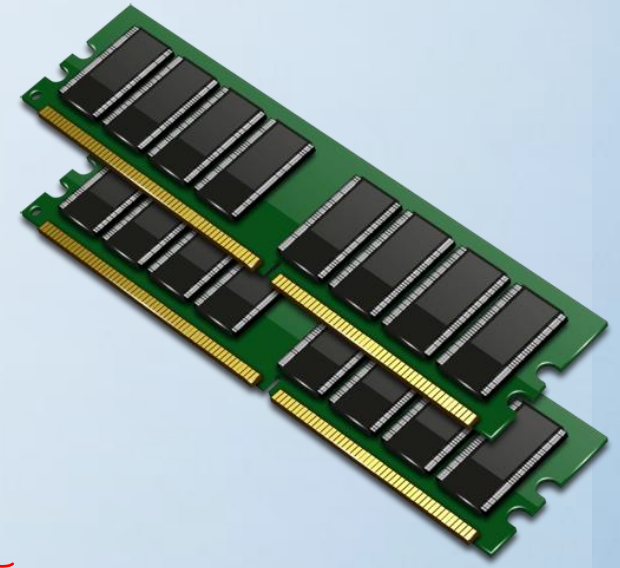
i. Random access memory (RAM) : Volatile memory that loses data when the computer is turned off. RAM is the main type of volatile memory.

ii. Read-only memory (ROM) : Non-volatile memory that retains data even when the computer is turned off.

What are the different types of RAM?

1. Dynamic random access memory (DRAM)

Dynamic RAM is one of the most common types of RAM used in computers. It stores each bit of data in a separate capacitor within an integrated circuit. However, DRAM needs to be constantly refreshed to retain data, which can impact its speed compared to other types.



2. Static random access memory (SRAM)

SRAM is faster than DRAM and doesn't require constant refreshing, as it stores each bit using a flip-flop circuit. Due to its faster access times, SRAM is often used in cache memory to provide quick access to frequently used instructions and data.

3. Synchronous dynamic random access memory (SDRAM)

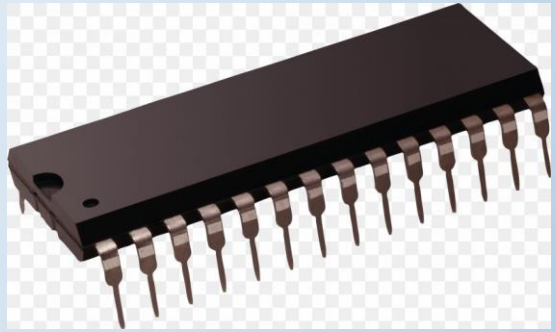
SDRAM synchronizes with the system's clock speed, allowing for more efficient data transfers. This synchronization enables a steady flow of data, reducing delays in accessing information. Various types of SDRAM, such as double data rate (DDR) SDRAM, have evolved to provide increased data transfer rates.

Types of ROM

1. PROM (programmable read only memory) - a blank chip which can be programmed only once using a special device called a programmer. Once it's programmed its contents cannot be modified or erased.

2. EPROM (erasable programmable read only memory) -can be programmed multiple times. Its contents can be erased by using UV (ultraviolet) light. Exposure to the UV light will erase all contents.

3. EEPROM (electrically erasable programmable read-only memory) - similar to EPROM but its contents can be electrically erased and re-written without having to remove it from the computer. PROM (programmable read only memory) - a blank chip which can be programmed only once using a special device called a programmer. Once it's programmed its contents cannot be modified or erased.



Secondary memory

Secondary memory, also known as auxiliary or external memory, is a type of computer memory that stores data and programs long-term. It's non-volatile, meaning it retains data even when the computer is turned off.

How it works

- Secondary memory is used to store data and programs that are not immediately accessible by the computer's processor.
- Data is saved in secondary memory in binary form, which is made up of tiny magnetized dots.
- Magnetic fields created by electromagnets are used to create, read, and erase these dots.

What it's used for

- Secondary memory is used to back up data, store critical data, and allow for disaster recovery.
- It's also used to store data that can be accessed and used by applications and services in real time.

Examples of secondary memory Hard disk drives, Floppy disks, Digital video discs (DVDs), and Flash drives.

Flash Memory :

- ✓ It can be erased and re-written to electrically.
- ✓ It is much faster than EEPROM.
- ✓ It is ideal for electronic devices such as mobile phones and digital cameras.

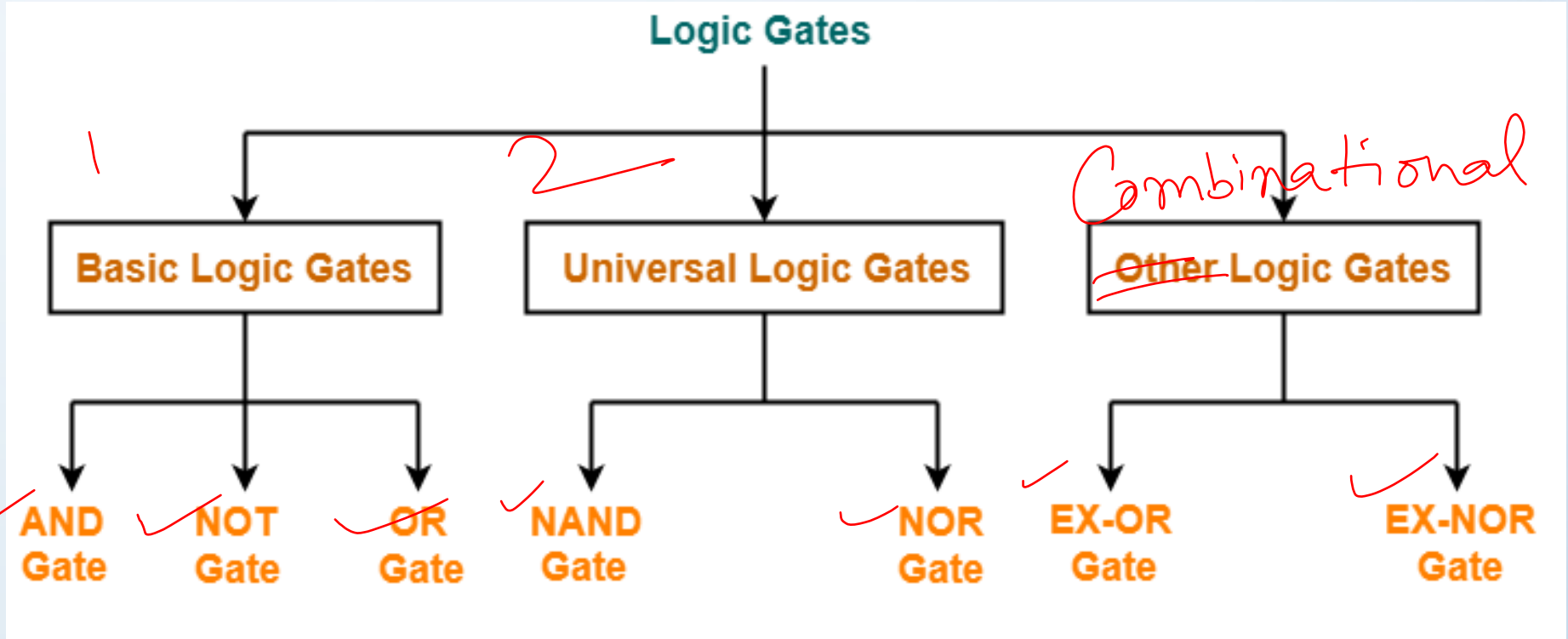
Cache memory

Cache memory is a type of temporary storage in a computer that stores frequently used data and instructions. It's a vital component of a computer system, improving its overall performance and speed.

How it works

- Cache memory is a small, fast chip that's integrated into the CPU or placed on a separate chip.
- It stores data that's likely to be accessed again soon.
- When the CPU needs data, it can access it from the cache instead of the main memory.
- This reduces the need to access the main memory multiple times for the same data.

Types of Logic Gates:



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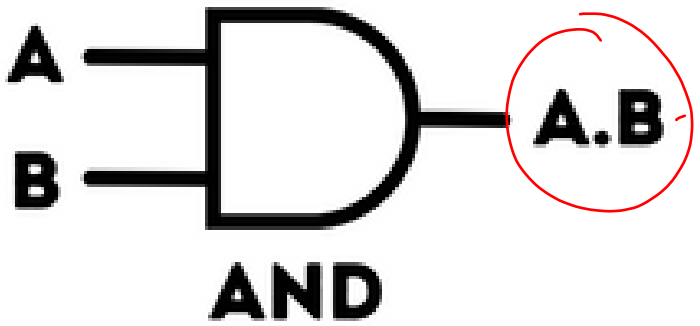
AND Gate → Multiplication

n no of inputs

Signal
↑ high → 1
↓ low → 0

2^n



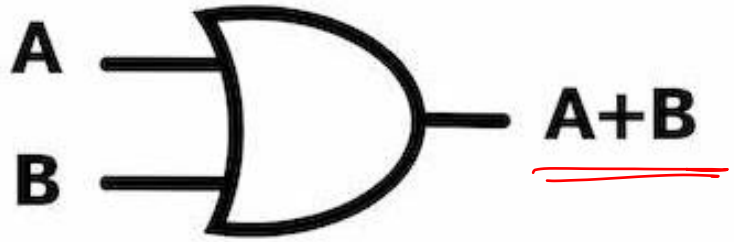
2 input AND Gate

A	B	A.B
0	0	0
0	1	0
1	0	0
1	1	1

Either/all inputs are low → low
n " " high → high

NAND
high
low

OR Gate / Addition



2 input OR gate

A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

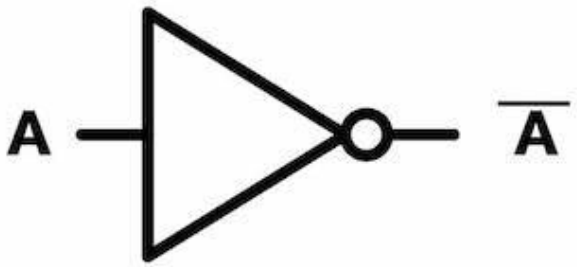
Either/all inputs are high → high

" " " low → low

NOT Gate

→ Complement/negation

Single input

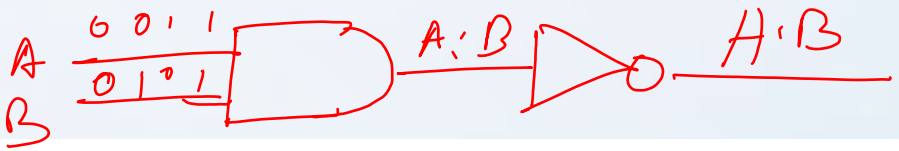


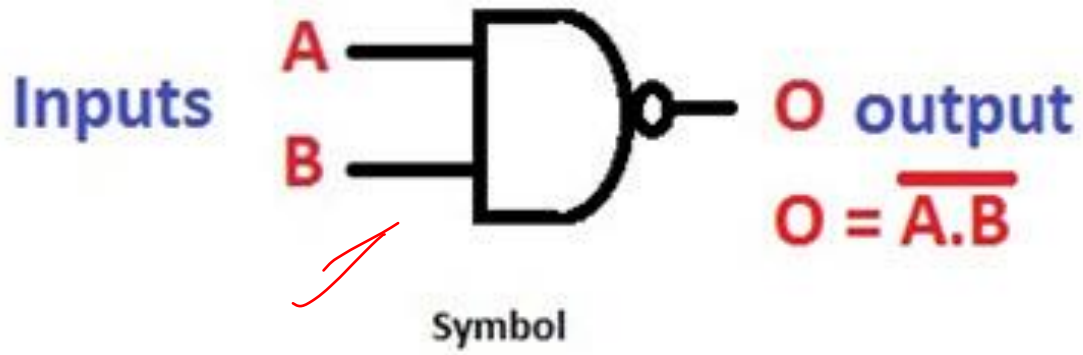
2 input NOT gate

A	$\overline{A}$
0	1
1	0

NAND Gate

AND + NOT

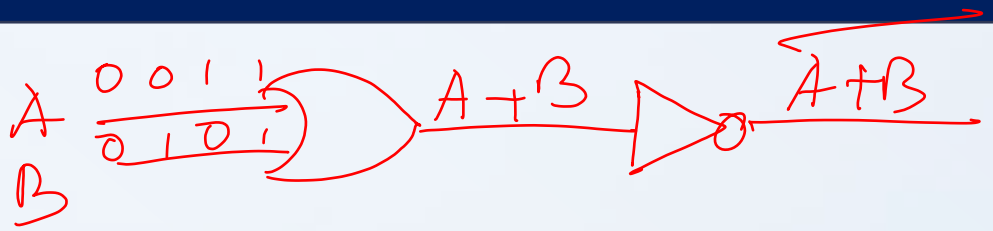




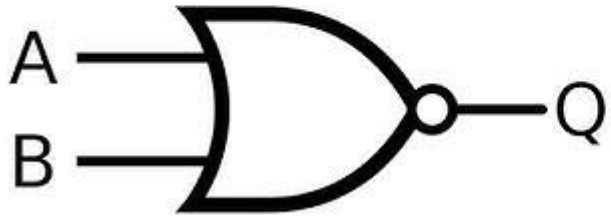
Symbol

Inputs		Output
A	B	O
0	0	1
0	1	1
1	0	1
1	1	0

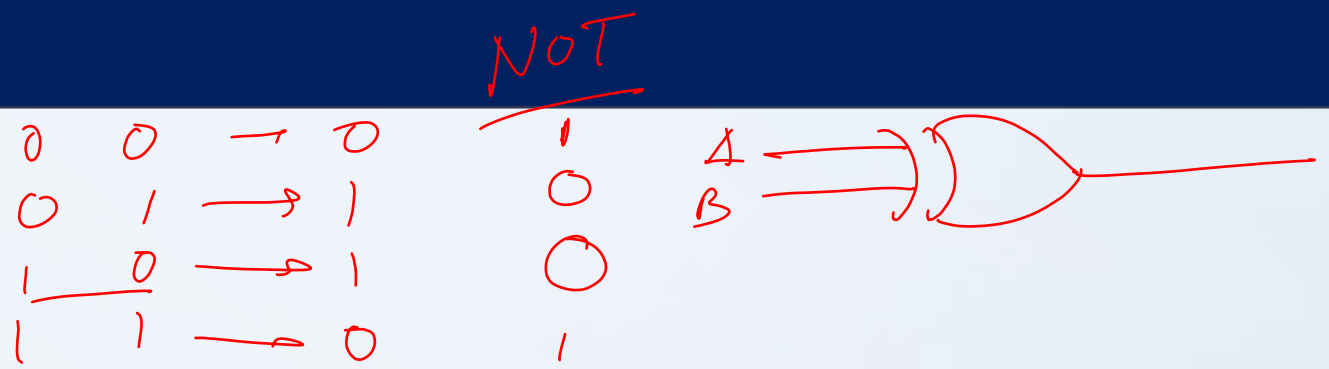
Truth table



NOR Gate



Input		Output
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0



Types of Logic Circuits:

There are two types of Digital circuits depending on their output and memory used:

(i) Combinational circuit, and

(ii) Sequential circuit

Combinational Circuits:

These circuits are developed using AND, OR, NOT, NAND, and NOR logic gates. These logic gates are building blocks of combinational circuits. A combinational circuit consists of input variables and output variables. Since these circuits are not dependent upon previous input to generate any output, so are combinational logic circuits.

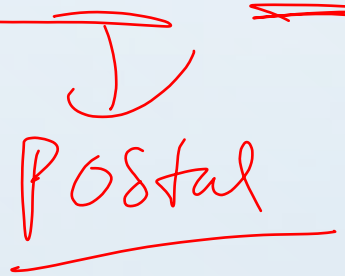
Examples are :

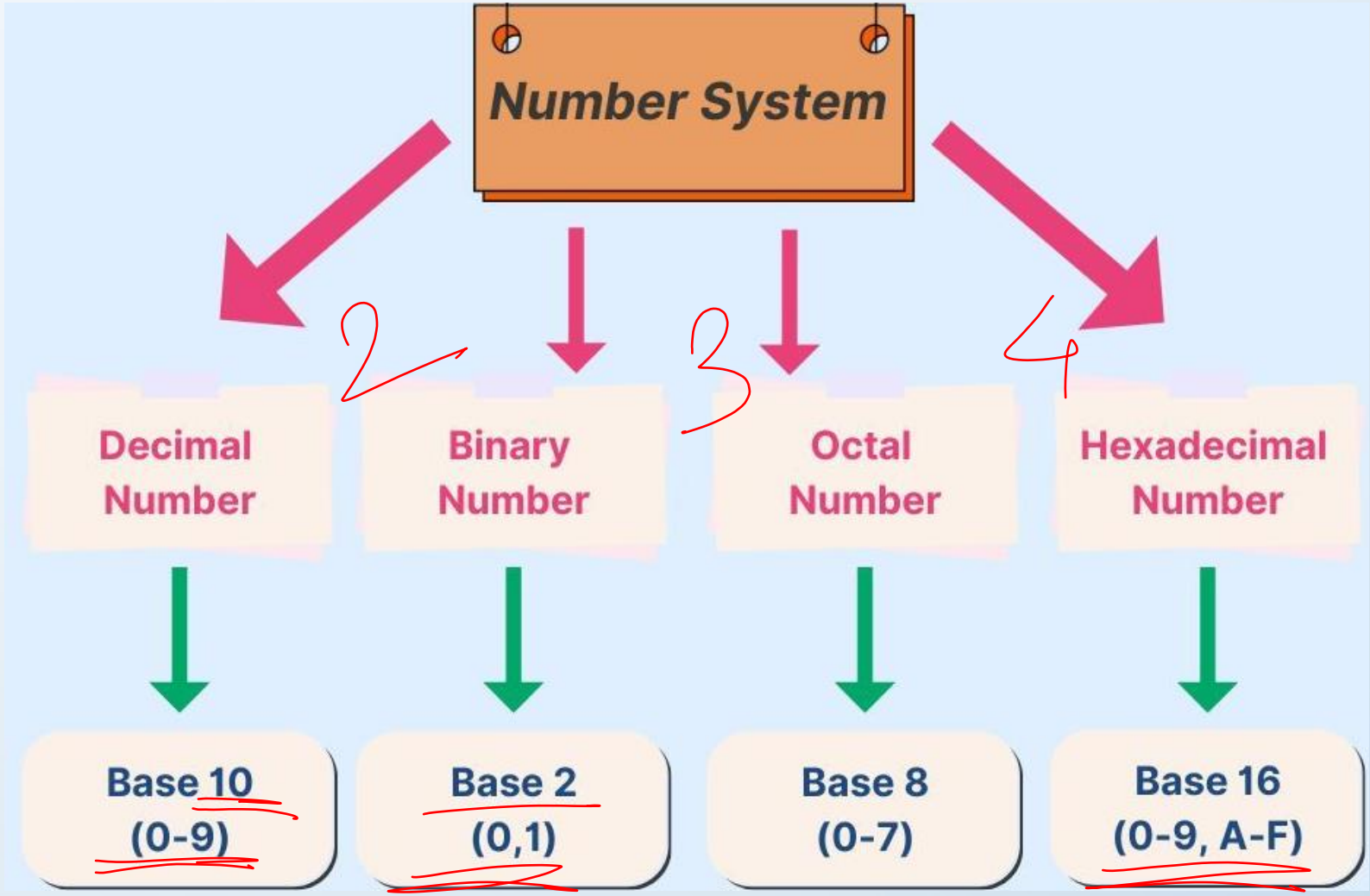
- Encoder
- Adder
- Decoder
- Multiplexers
- De- Multiplexers

Sequential Circuit

sequential logic is a type of logic circuit whose output depends not only on the present value of its input signals but on the sequence of past inputs, the input history. This is in contrast to combinational logic, whose output is a function of only the present input. That is, sequential logic has state (memory) while combinational logic does not. Or, in other words, sequential logic is combinational logic with memory.

Ex: Flip-Flop , Counter etc.





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Decimal to Binary Conversion

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$(27)_{10} = (?)_2$

a.

b.

c.

d.

$(142)_{10} = (?)_2$

256 128 64 32 16 | 8 4 2 1

27 → 1 1 0 1 1

3 → 1 1

4 → 1 0 0

5 → 1 0 1

9 → 1 0 0 1

10 → 1 0 1 0

14 → 1 1 1 0

15 → 1 1 1 1

27 → 1 1 0 1 1

8 4 2 1

Binary to Decimal Conversion

$(1011101)_2 = (?)_{10}$

1 0 1 1 1 0 1

64 32 16 8 4 2 1

64 + 16 + 8 + 4 + 1 = 93

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Decimal to Binary Conversion for fractional number

2020 WBCS

$(4.625)_{10} = (?)_2$

4

100

100.101 → C

$0.625 \times 2 = 1.250$ 1

$0.250 \times 2 = 0.500$ 0

$0.500 \times 2 = 1.000$

875555

$(48.375)_{10} = (?)_2$

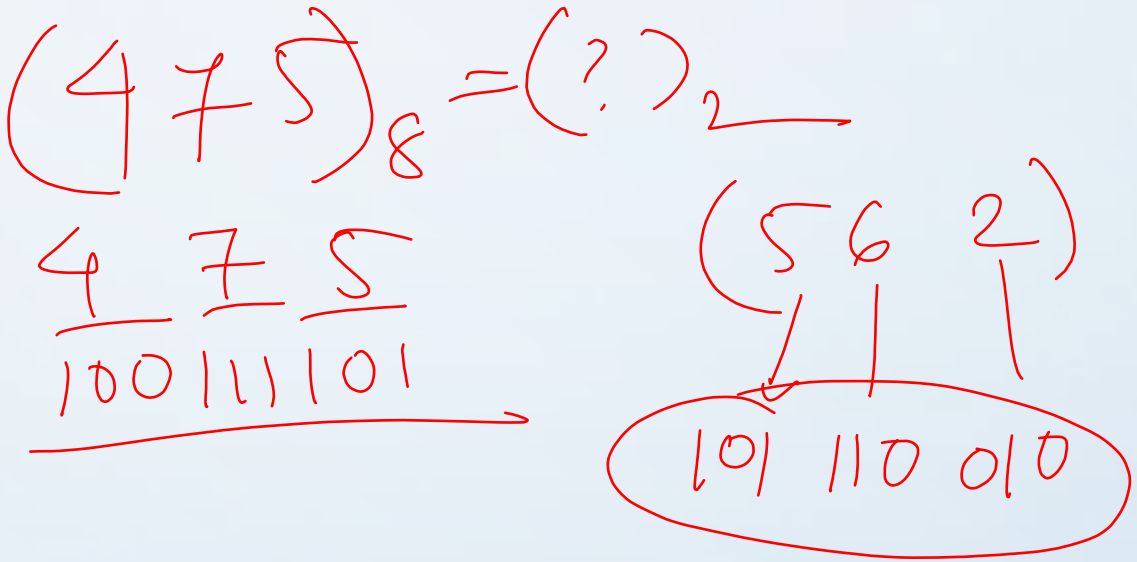
110000.011

$0.375 \times 2 = 0.750$ 0

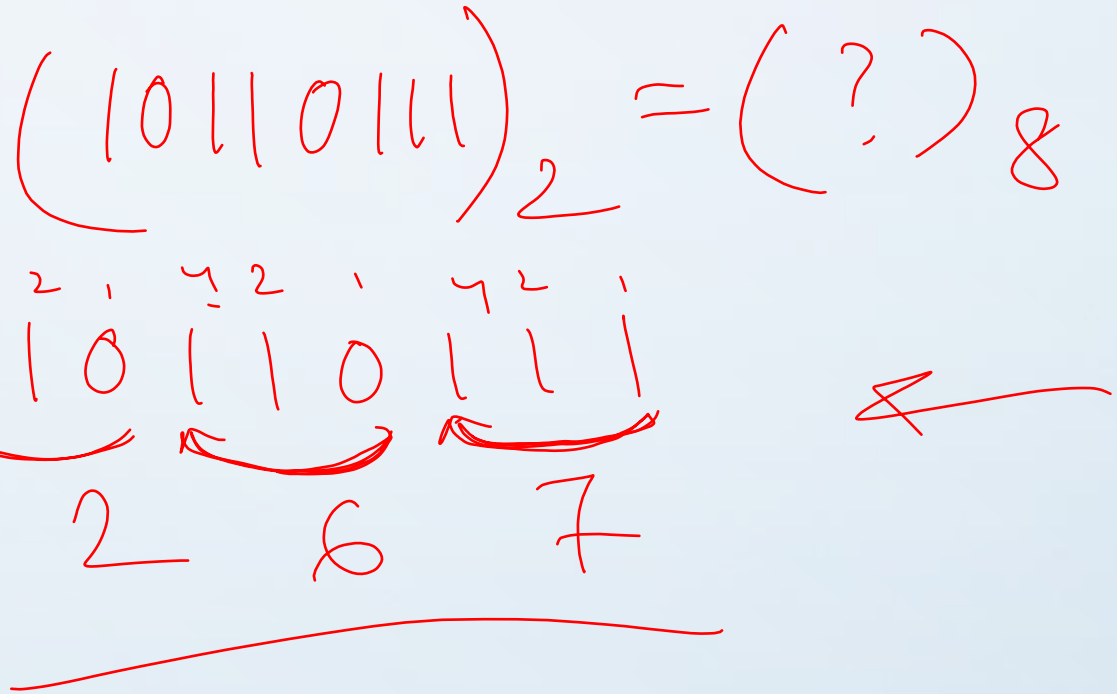
$0.750 \times 2 = 1.500$ 1

$0.500 \times 2 = 1.000$ 1

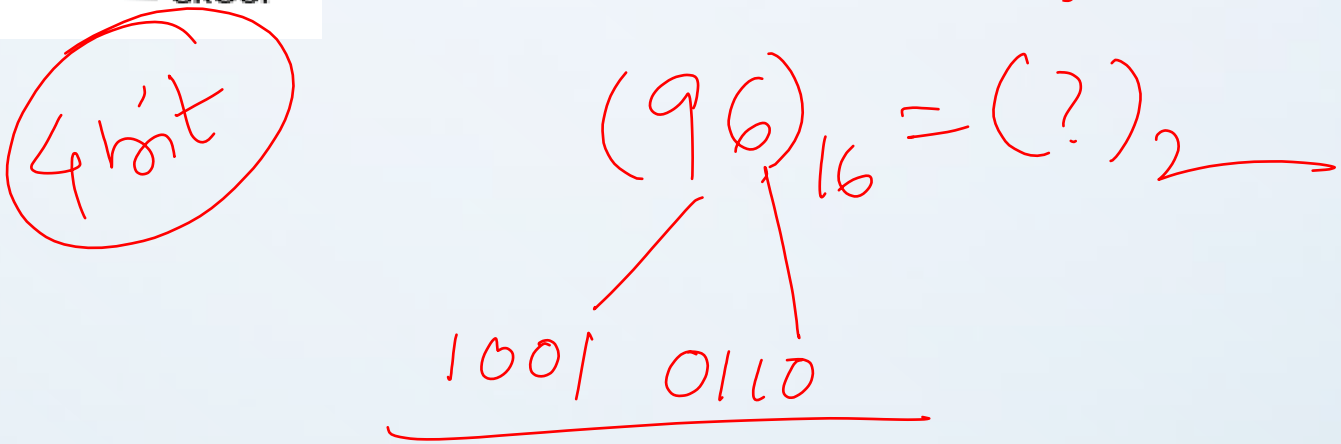
Octal to Binary Conversion



Binary to Octal Conversion



Hexadecimal to Binary Conversion



Binary to Hexadecimal Conversion

What type of information system would be recognised by digital circuits ? (SSC CGL)

(a) Hexadecimal system
(b) Binary system
(c) Both hexadecimal and binary system
(d) Only Roman system

PROM Stands for_____. (BANK)

(a) Programmable random-on memory
(b) Picture random memory
(c) Process read-only memory
(d) Programmable read-only memory

A special, high-speed storage area within the CPU in which all data must be represented before it can be processed is called _____. (SSC CHSL)

(a) BIOS
(b) Cache
(c) RAM
(d) Register

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Thank You

See you next day