Lecture one

Computer organization & Architecture

Yarmouk University College

Dept. of Cybersecurity Engineering

2^{nd} Stage

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System

It is a set of rules, an arrangement of things, or a group of related things that work toward a common goal.

A system is an arrangement in which all its units assemble a work together according to a set of rules. It can also be defined as a way of working, organizing or doing one or many tasks according to a fixed plan.

For example, a watch is a time displaying system. Its components follow a set of rules to show time. If one of its parts fails, the watch will stop working. So, we can say, in a system, all its subcomponents depend on each other.

Embedded System

An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor-based system which is designed to perform a specific task. For example, a fire alarm is an embedded system; it will sense only smoke.

An embedded system has three components:

• It has hardware.

• It has application software.

• It has Real Time Operating system (RTOS) that defines the way the system works. It sets the rules during the execution of application program. So, we can define an embedded system as a Microcontroller based, software driven reliable real-time control system

Examples of embedded systems are: Industrial machines, agricultural and process industry devices, automobiles, medical equipment, cameras, household appliances, airplanes, toys, as well as mobile devices.



What are Logic Gates?

A logic gate is a basic digital circuit that takes one or more binary inputs and produces a binary output.

Computers use only two basic states:

0 → OFF / LOW / False

1 → ON / HIGH / True

The most important logic gates are:

AND

OR

NOT

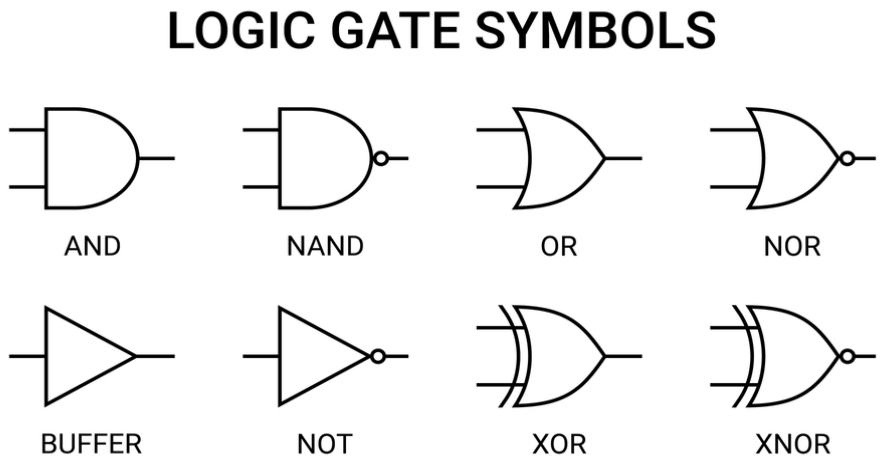
NAND

NOR

XOR

XNOR

BUFFER



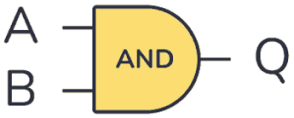
what is truth table?

A truth table is a table that shows all possible input combinations of a logic circuit and the corresponding output for each combination.

1. AND Gate

The AND gate produces 1 only when all inputs are 1.

$$Q=A\cdot B$$

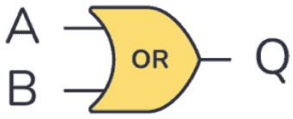


A	B	Q
0	0	0
0	1	0
1	0	0
1	1	1

2.OR Gate

The OR gate produces 1 when at least one input is 1.

$$Q=A+B$$



A	B	Q
0	0	0
0	1	1
1	0	1
1	1	1

3.NOT Gate

The NOT gate has only one input.

$$Q=\overline{A}$$



A	Q
0	1
1	0

4.XOR Gate

XOR means Exclusive OR.



A	B	Q
0	0	0
0	1	1
1	0	1
1	1	0

5.NAND Gate

NAND is:

NOT AND

First perform AND, then invert the result.



$$Q = \overline{A \cdot B}$$

A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

H.W.



A	B	Q
0	0	1
0	1	0
1	0	0
1	1	1

For an 8086-assembly lecture, it is useful to understand how decimal, binary, and hexadecimal represent the same number and how they appear in assembly code.

Number system	Base	Digits used	Example
Decimal	10	0–9	25
Binary	2	0, 1	11001B
Hexadecimal	16	0–9, A–F	19H

Binary :

Bit	Power	Value
1	2^4	16
1	2^3	8
0	2^2	0
0	2^1	0
1	2^0	1

Decimal: **255**

Binary: **11111111**

Hexadecimal: **FF**