Combinational Logic with MSI and LSI

Logic Design of Digital Systems (300-1209) section 1

LECTURE 06

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Combinational Logic with MSI and LSI

What we have learned from the previous lecture was about the design of logic from the truth table. Since such a method uses a small number of transistors, we call this circuit a Small-Scale Integration **(SSI)**. However, later circuits were built with more complexity and required an increasing number of transistors. These circuits are called Medium-Scale Integration **(MSI)**, Large-Scale Integration **(LSI)**, and Very Large-Scale Integration **(VLSI)**.

Small-Scale Integration	SSI
Medium-Scale Integration	MSI
Large-Scale Integration	LSI
Very-Large Scale Integration	VLSI

*** Microprocessor chips produced in 1994 contained more than three million transistors. ULSI refer to “Ultra-Large-Scale Integration” and correspond to more than 1 million of transistors. However, there is no qualitative leap between VLSI and ULSI, hence normally in technical texts the “VLSI” term cover ULSI.

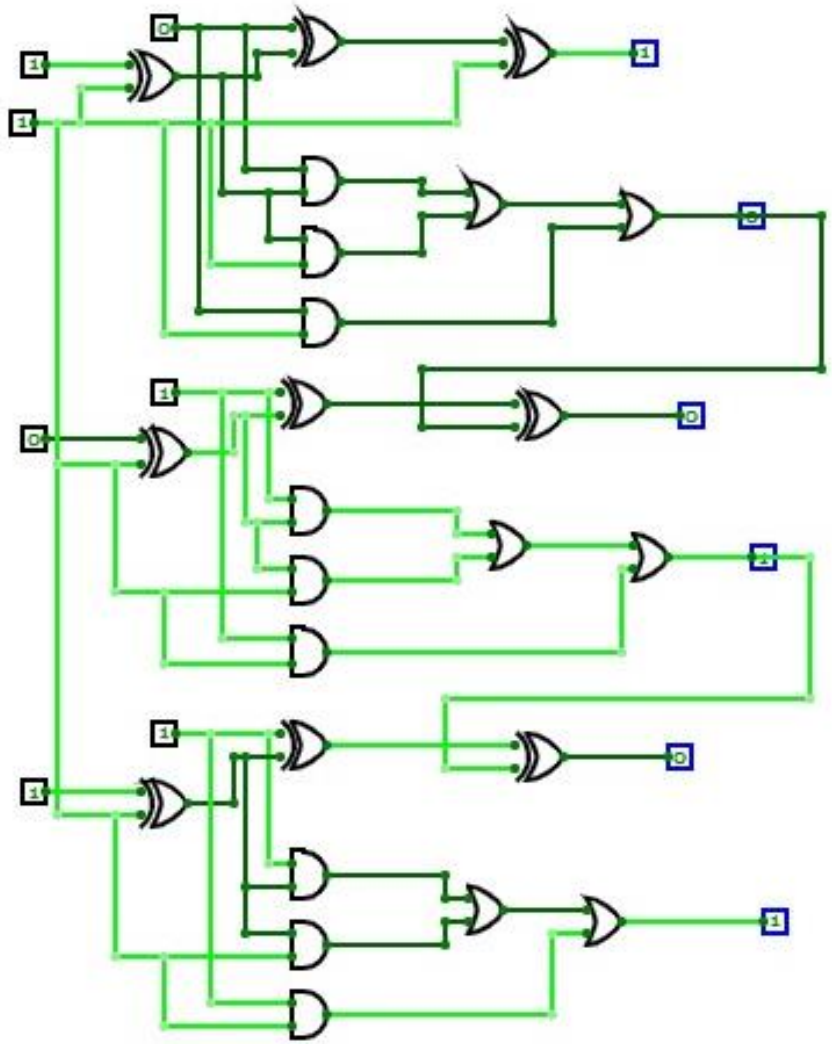
Combinational Logic with MSI and LSI

Why do we have to learn this chapter?

We want to do complicate things with…

- ❑ Less number of Symbol
- ❑ Less number of Connection

0	1	1	1	0	0	0
0	0	1	0	1	0	1
0	0	0	1	1	1	0
0	1	0	0	0	1	1



Binary Parallel Adder

Review: Full-Adder

Binary Parallel Adder

Example: Design a circuit for addition of two 2-bit binary number

Binary Parallel Adder

Example: 4-bit binary parallel adder

Binary Parallel Adder

Example: 8-bit binary parallel adder or more

Magnitude Comparator

Example: Design a circuit for comparison of two binary digits

Number of Input:

Number of Output:

Magnitude Comparator

Example: Design a circuit for comparison of two binary digits

Magnitude Comparator

Example: 3-bit binary comparator

Magnitude Comparator

Example: 3-bit binary comparator

Take a Break

REST YOUR MIND

BCD Adder

(Decimal Adder)

Decimal	BCD	Binary
0	0000	0000
1	0001	0001
2	0010	0010
3	0011	0011
4	0100	0100
5	0101	0101
6	0110	0110
7	0111	0111
8	1000	1000
9	1001	1001

Decimal	BCD		Binary
10	0001	0000	1010
11	0001	0001	1011
12	0001	0010	1100
13	0001	0011	1101

BCD Adder

Dec	Binary Sum					BCD Sum				
	K	B_3	B_2	B_1	B_0	C_y	S_3	S_2	S_1	S_0
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

BCD Adder

Dec	Binary Sum					BCD Sum				
	K	B_3	B_2	B_1	B_0	C_y	S_3	S_2	S_1	S_0
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

BCD Adder

BCD Adder

Excess-3 Code

Example: Design converter circuit from BCD to Excess-3 Code

Decimal	BCD	Excess-3
0	0000	0011
1	0001	0100
2	0010	0101
3	0011	0110
4	0100	0111
5	0101	1000
6	0110	1001
7	0111	1010
8	1000	1011
9	1001	1100

Decoder

Decoder

Encoder

Encoder

Multiplexer

Multiplexer


If you want to live a
happy life, tie it to a goal,
not to people or things.
Albert Einstein
quotefancy

Extra page (Note)