CS200 - Computer Organization

Logic Design - 2

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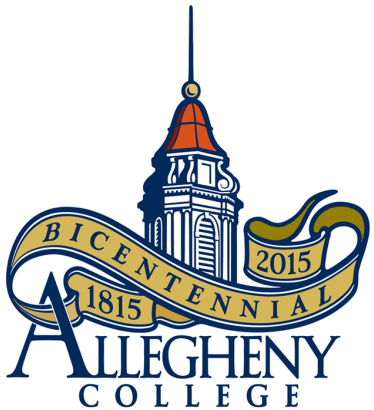
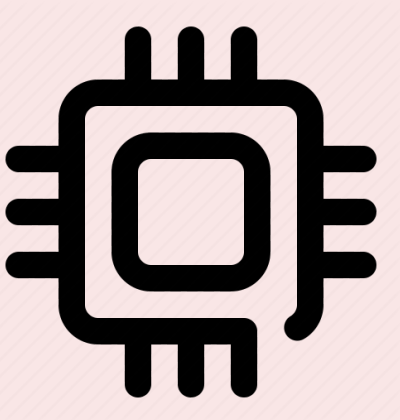
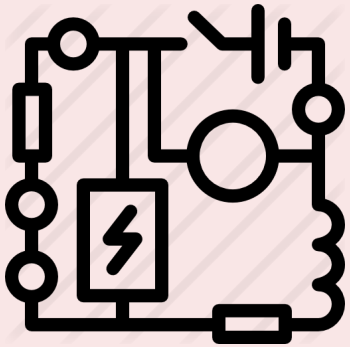


Motivation to learn logic design



- How is data processed and stored at the hardware level?

Adders



- At the digital logic level, addition is performed in binary.
- Addition operations are carried out by special circuit called adders.
- There are two types of adders:
  1. Half adder
  2. Full adder

Half Adder

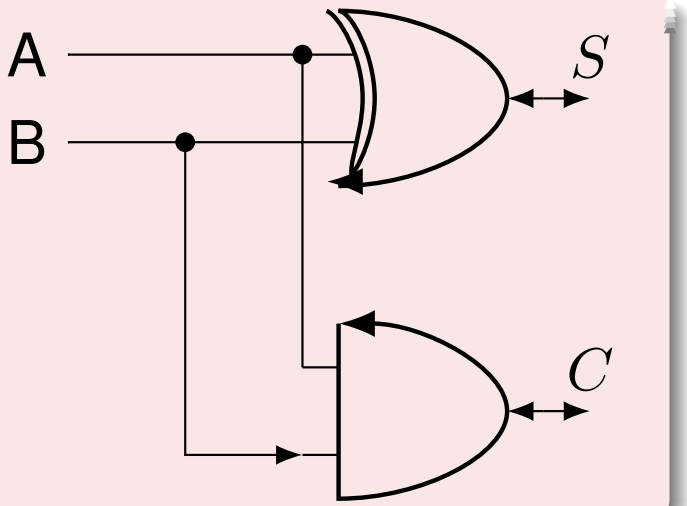
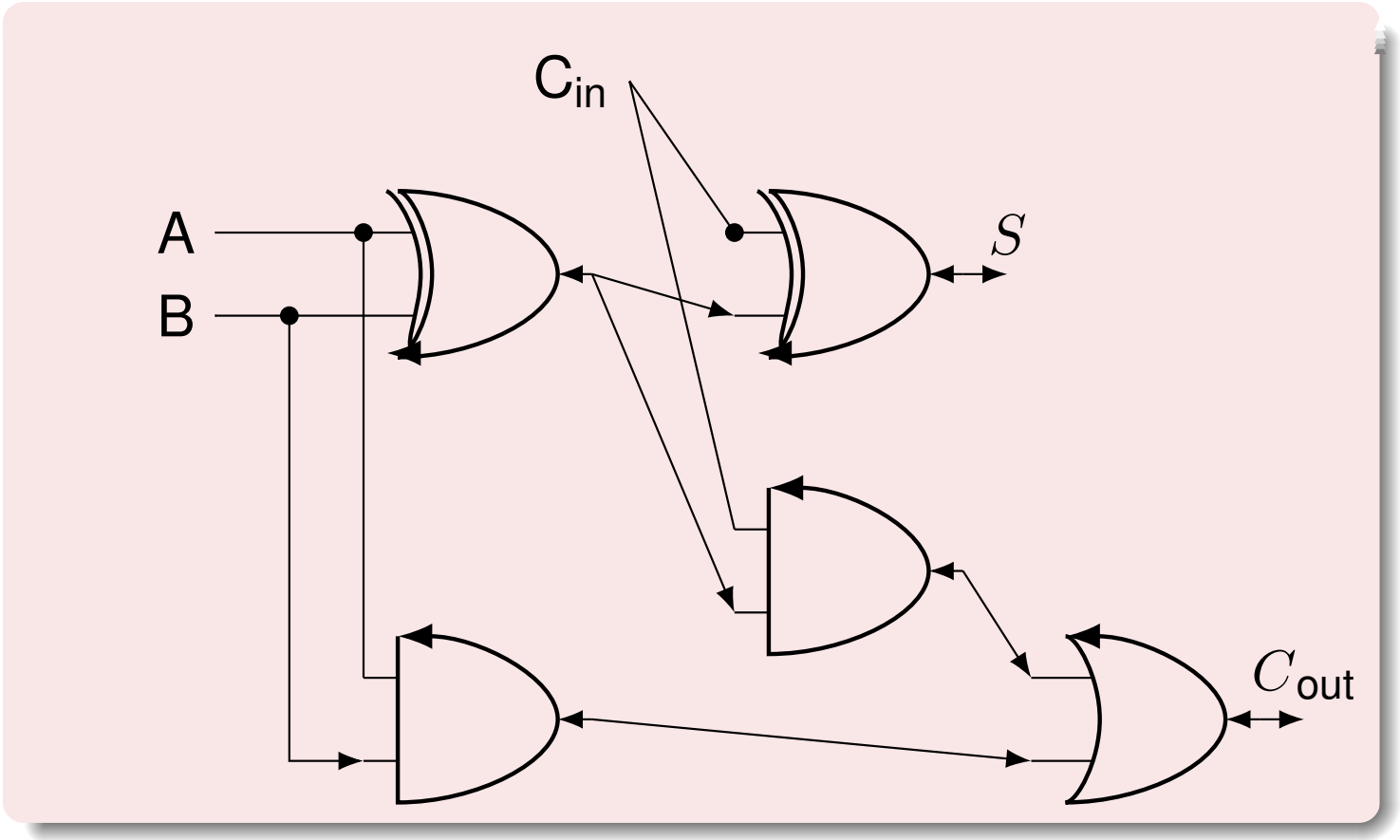


Table 1: Truth table for Half Adder

A	B	C	S
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

Half adder adds only two input bits.

Full Adder



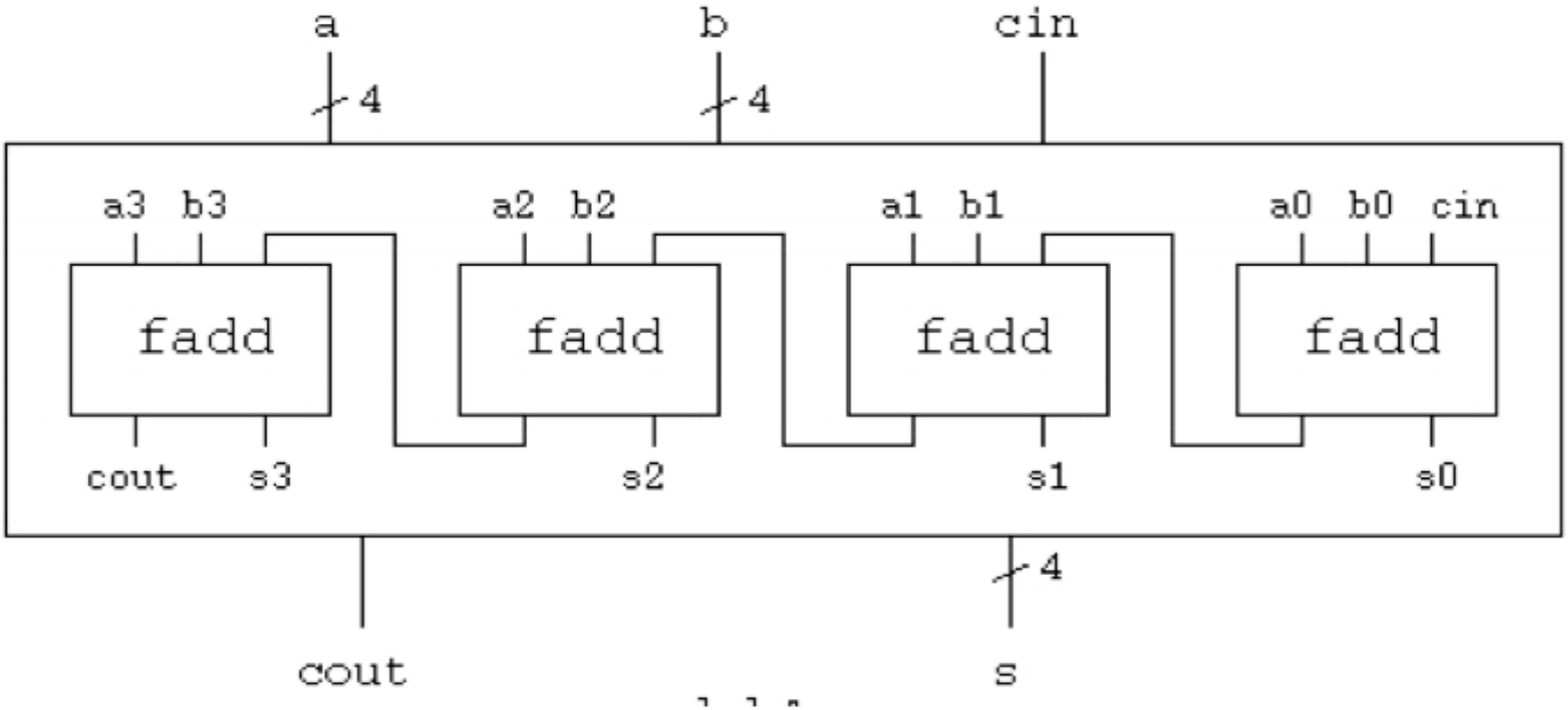
Full adder adds three input bits (including carry bit).

Full Adder (cntd)

Table 2: Truth table for Full Adder

A	B	C_{in}	C_{out}	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

4 bit Adder


a
b
cin
4
4
a3 b3
a2 b2
a1 b1
a0 b0 cin
fadd
fadd
fadd
fadd
cout
s3
s2
s1
s0
4
cout
s

Practice Exercise

Implement the 4 bit adder using logicly.

Reading Assignment

- Principles of computer hardware by Alan Clements - Chapter 02 - 2.6;
- Computer Organization and Design by Patterson and Hennesssy - Appendices Section B - B.3;

Questions

Do you have any questions from this class discussion?