

L07-CS8421-9-10-08

Simple Devices

CS8421

Computing Systems

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Class

Will

Start

Momentarily...

- Comparator
- Multiplexor
- Demultiplexor
- Simple Memory Device
- Programmable Logic Array
- Adder

- Use to select bits from alternate sources
- Used in bus design, communications sharing
- Time Division Multiplexing

$$\overline{AB} = \overline{A} + \overline{B}$$

$$\overline{A + B} = \overline{A} \overline{B}$$

| A | B | A AND B | A NAND B | A' | B' | A' OR B' |
|---|---|---------|----------|----|----|----------|
| 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 |

- Convert multiplexor to all NAND gate implementation.

$$\overline{AB} = \overline{A} + \overline{B}$$

$$\overline{A + B} = \overline{A} \overline{B}$$

- Separate two signals that are combined.

- Convert to NOR implementation.

$$\overline{AB} = \overline{A} + \overline{B}$$

$$\overline{A+B} = \overline{A}\overline{B}$$

- Convert to NOR implementation.

$$\overline{AB} = \overline{A} + \overline{B}$$

$$\overline{A + B} = \overline{A} \overline{B}$$

- How to combine a multiplexor and demultiplexor.
- Issue is synchronizing the clock
- Ways to do this:
 - Separate clock signal line along with data
 - Somehow combine clock signal with data (data comm)
 - Have two clocks, but synchronized them before transmitting (by?: bit, byte, word, packet, frame, connection)

- One of many ways to build memory.
- Other constructions with gates.
- Store small charge with a capacitor.

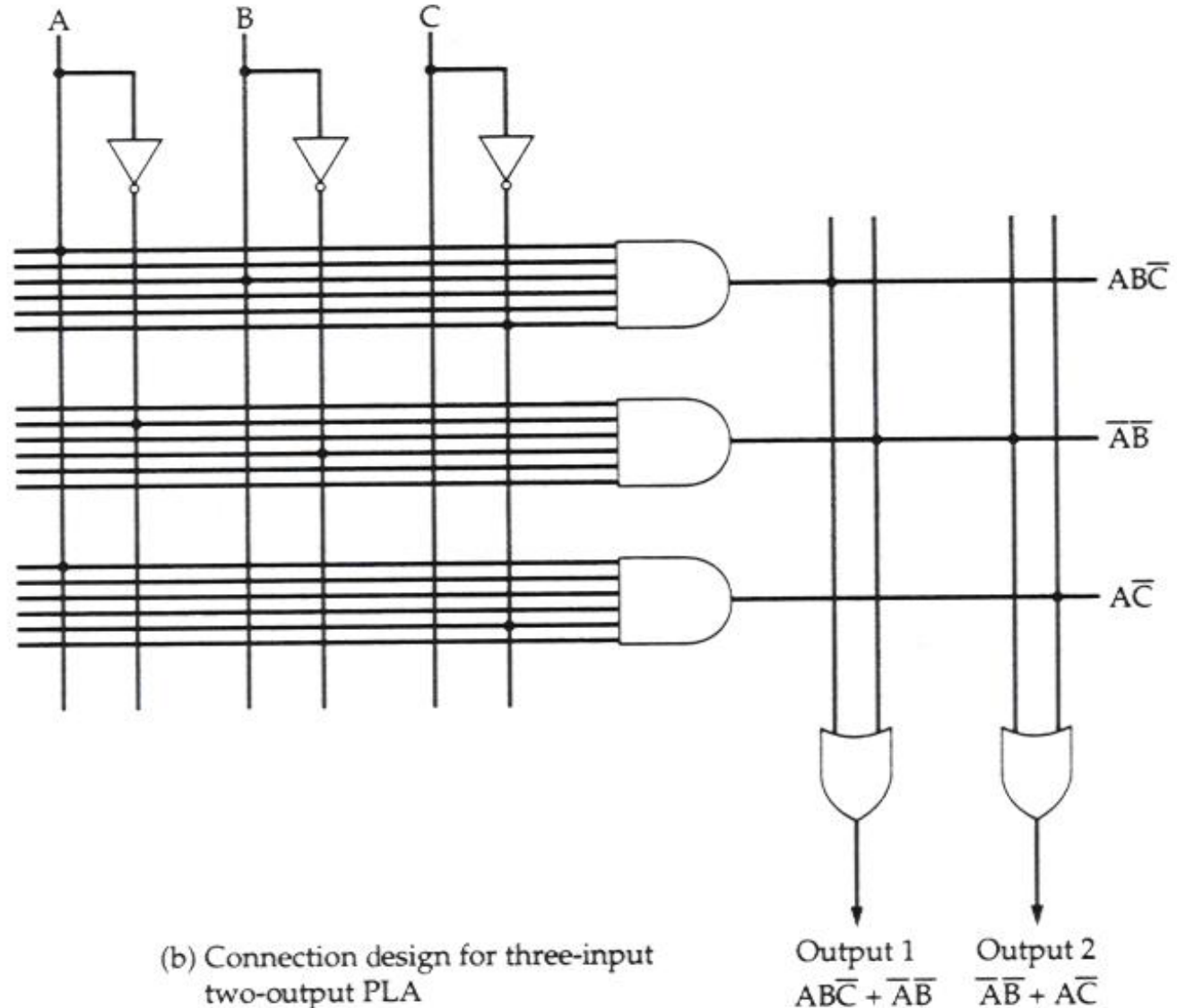
- Convert to NAND implementation

$$\overline{AB} = \overline{A} + \overline{B}$$

$$\overline{A + B} = \overline{A} \overline{B}$$

Implementing
boolean functions
in hardware.

(Combinations of
boolean variables)



CPU must do (at a minimum) ADD, AND, COMPLEMENT. All other operations can be made from these fundamentals (but slow).

Half-Adder: adds two bits together without a carry-in.

Easy way to do the SUM part of the H-A.

**End
Of
Today's
Lecture.**

