I/O controllers

- Controls the device itself and translates data to and from bus formats
- Direct Memory Access (DMA)
    - Allows data from I/O controllers to be written directly into main memory
    - The CPU is free to do other things while waiting for data
    - When the transfer is complete, the CPU is notified with an interrupt

Interrupts

- A notification that the CPU needs to do something else
- CPU performs a context switch
    - The currently running process is suspended
    - Contents of registers are written to main memory
    - An interrupt handling process (provided by the OS) starts running to figure out what to do with the interrupt

Motherboard

- Contains the buses which connect the CPU, memory, and other devices
- Components are plugged in to the motherboard's slots + sockets

Digital Logic

- 0's and 1's are represented by voltages
    - Low voltage (0 to 0.5 Volts) is 0
    - High voltage (1 to 1.5 volts) is 1

- Gate
    - Electronic device which computes a Boolean function
    - One or more binary inputs
    - One binary output
    - Simplest gates
        - NOT (inverter), NAND, NOR

Boolean Functions

- One or more binary inputs
- One binary output
- Truth table

NOT

A	X
0	1
1	0

AND

A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

NAND

A	B	X
0	0	1
0	1	1
1	0	1
1	1	0

OR

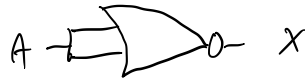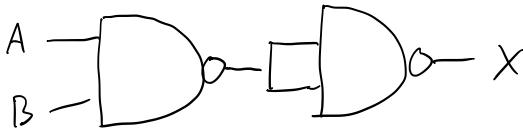| A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

Shows the output for all combinations of input

Functional completeness

- NAND and NOR are both functionally complete
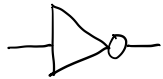- All Boolean functions can be computed with a combination of NAND gates or NOR gates

NOT is simply NAND (or NOR) with both inputs the same

A —[⊃o— X   A —[⊃o— X

AND

A —
B —[⊃o—[⊃o— X

NOT

NAND

AND

OR

NOR

OR

A —
B —
         X

A —
B —
         X