Computers, Software, and Data

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1 Administrivia

Announcements

How do I switch printers in the Lab?

Assignment

Read 1.6–10.

Know the "Things to Remember" and "Important Concepts" material on pp. 37 and 38.

Be able to answer these questions from pp. 39–42: 1, 2, 4, 7, 11, 12, 21, 25, 28, and 31.
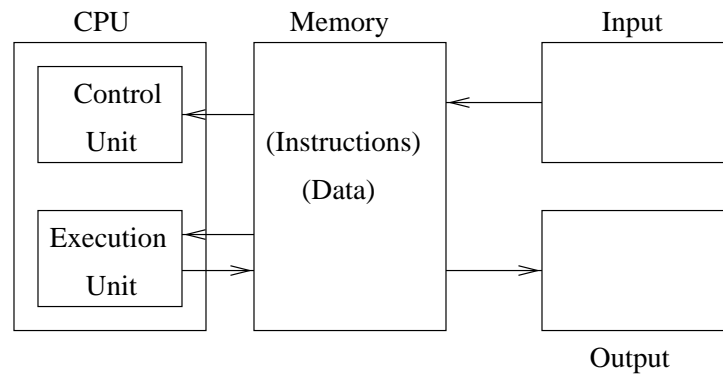
From Last Time

Syllabus, survey.

Outline

1. Computers, Software, and Data.

Coming Up

Inside a computer.

1.1   What's a Computer?

A block diagram:

```
   CPU              Memory              Input
 ┌──────────┐    ┌──────────┐      ┌──────────┐
 │ ┌──────┐ │    │          │      │          │
 │ │Control│◄────│(Instructions)◄──│          │
 │ │ Unit │ │    │          │      │          │
 │ └──────┘ │    │ (Data)   │      └──────────┘
 │ ┌──────┐ │    │          │      ┌──────────┐
 │ │Execution◄────│          │      │          │
 │ │ Unit │ ├────►│          ├─────►│          │
 │ └──────┘ │    │          │      │          │
 └──────────┘    └──────────┘      └──────────┘
                                      Output
```

1. What is memory? How does it differ from storage?

2. What parts of a PC are considered input devices? Output devices? Both?

1.2   How is Software Run?

Consider the following simple program:

```
 1:    let sum = 0
 2:    print "How many numbers? "
 3:    read count
 4:    let loopCount = count
 5:    if loopCount equals 0 goto 11
 6:    print "Next number: "
 7:    read input
 8:    let sum = sum + input
 9:    let loopCount = loopCount - 1
10:    goto 5
```

```
11:    let average = sum / count
12:    print "The average is:", average, "."
13:    end
```

1. Where do we begin?

2. After completing one step, where do we proceed?

3. Operations: assignment, arithmetic, decision, branch, I/O.

4. Operands: Variables, constants (numeric and string).

1.3 How is Data Kept?

1. Computers use the binary system. Why?

2. Binary digits.

   Conversion between binary and decimal is fairly simple, but tedious — write/use a program.

3. Bits, bytes, words.

4. Memory locations: cells with addresses.

5. How do we represent characters? ASCII code:

   (a) A: `01000001`

   (b) 4: `00110100`

6. How does the computer know if a memory location contains numbers, characters, variables, or instructions?