Computers, Software, and Data

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1 Administrivia

Announcements

First quiz in one week. See sample quiz.

Assignment

Read 1.6–10.

Be able to answer these questions from pp. 40–42: 12, 21, 25, 28, and 31.
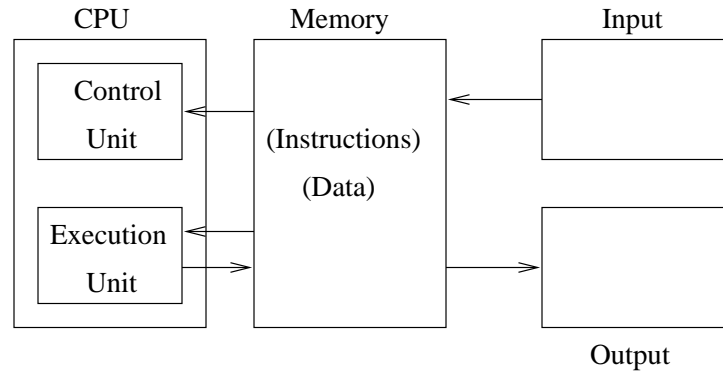
From Last Time

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  │ │   │          │      │          │
   │ │  Unit    │←┼───│(Instructions)    └──────────┘
   │ └──────────┘ │   │  (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?