



CSC 103: How Computers Work

Spring 2016
Smith College
Prof. Sheehan

Class 4: March 30

Outline

- Introduction to computer processing
- Parts of a computer and terminology
- Moore's Law
- Lab 2: memory in Logisim

Computer Instructions

```
01 Hello
02 How are you?
03 Did you enjoy...
04 Was it good?
05 Have you finished...
06 Do you like...
```

```
00 No
01 Yes
02 Good
03 Bad
04 A tiny bit
05 A lot
06 Homework
07 Wiki
08 Apples
09 Cereals
10 Bugs
11 Breakfast
12 PC Lab
13 Hello!
```

```
00: 01 02
01: 02
02: 03 06
03: 01 05
```

Computer Instructions

```
01 Hello
02 How are you?
03 Did you enjoy...
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05 Have you finished...
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```
20 Go back to...
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00: 01 02
01: 02
02: 03 06
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```


Computer Instructions

01 Hello
02 How are you?
03 Did you enjoy...
04 Was it good?
05 Have you finished...
06 Do you like...

20 Go back to...

30 Start with Person...
31 Move to next person

00 No
01 Yes
02 Good
03 Bad
04 A tiny bit
05 A lot
06 Homework
07 Wiki
08 Apples
09 Cereals
10 Bugs
11 Breakfast
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13 Hello!

00: 30 00 (*Start with Person 0*)
01: 01 02 (*Hello, how are you*)
02: 03 06 (*Did you enjoy homework*)
03: 31 (*Move to next person*)
04: 20 00 (*Go back to Line 00*)

Computer Program

- Each line was an **instruction**
- A **computer program** is a collection of instructions

Computer Processor

- Central Processing Unit (**CPU**)
- Carries out the instructions of a computer program
- A processor contains registers
- A **register** is a memory word inside the processor

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- Central Processing Unit (**CPU**)
- Carries out the instructions of a computer program
- A processor contains registers
- A **register** is a memory word inside the processor
- We care about... how fast the CPU is!
 - GHz = giga hertz
 - 1.6GHz means 1,600,000,000 cycles per second

Computer Instructions

01	Hello	00	No
02	How are you?	01	Yes
03	Did you enjoy...	02	Good
04	Was it good?	03	Bad
05	Have you finished...	04	A tiny bit
06	Do you like...	05	A lot
		06	Homework
		07	Wiki
		08	Apples
		09	Cereals
20	Go back to...	10	Bugs
		11	Breakfast
30	Start with Person...	12	PC Lab
31	Move to next person	13	Hello!

register → 00: 30 00 (*Start with Person 0*)
01: 01 02 (*Hello, how are you*)
02: 03 06 (*Did you enjoy homework*)
03: 31 (*Move to next person*)
address → 04: 20 00 (*Go back to Line 00*)

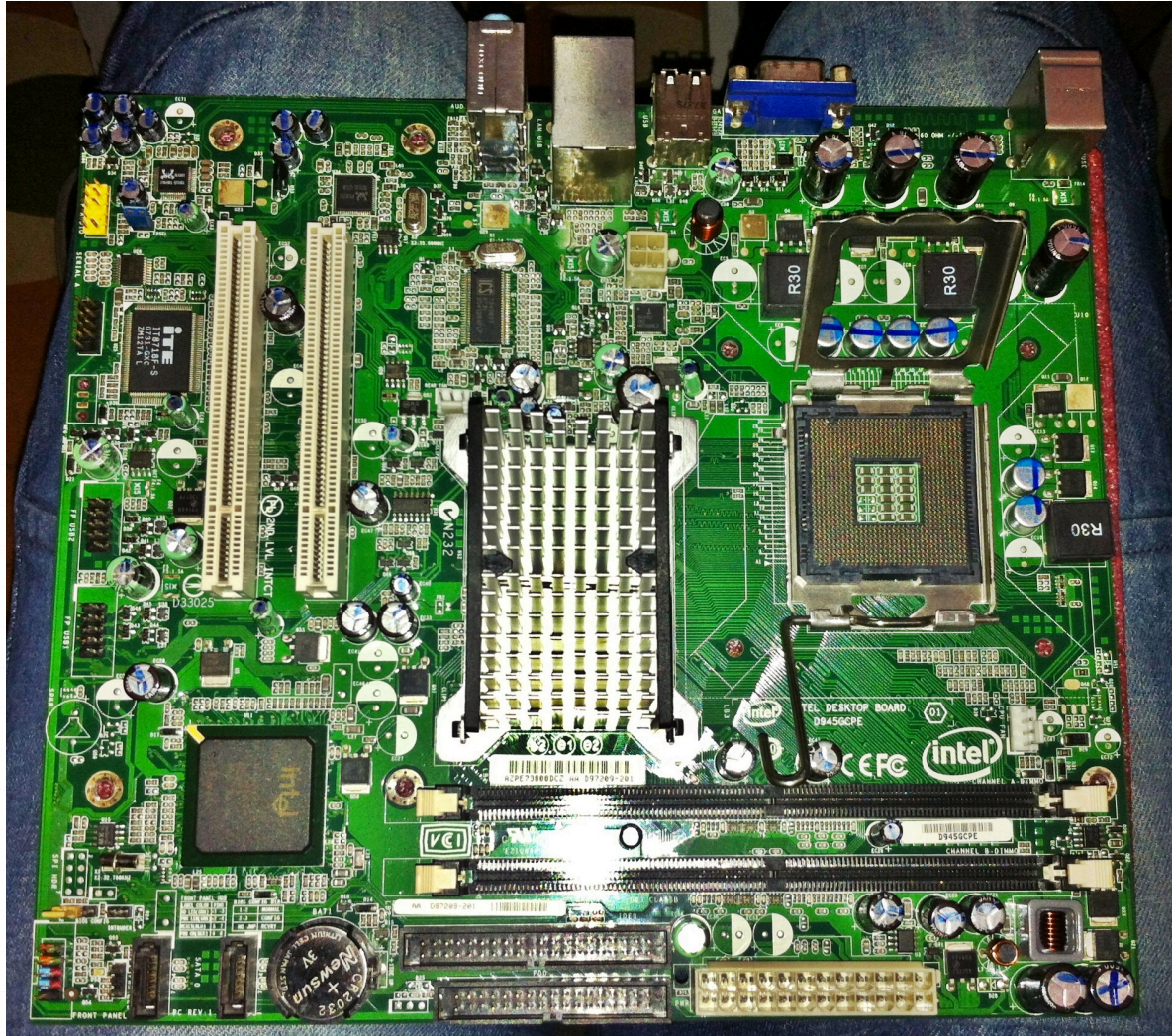
Processing Graphics

- To display images, special processing units are necessary
- These are called **GPUs: Graphical Processing Units**
 - Good for: computer games, watching videos, animations
- Extremely parallel (serial vs. parallel?)
- Good at linear algebra

Motherboard

- Where everything comes together
 - CPU
 - Memory
 - Peripherals: sound card, hard disk drive
- Allows additional components to be connected (external storage, graphics cards, extra memory, etc)

Motherboard



Credit: Julianprescott2604juuly, wikipedia

Computer Cooling

- All the bit flipping makes computers very hot!
- All modern computers need some form of cooling
- Excess heat can damage delicate circuitry
- Most have fans, some have heat sinks or water

Question

Suppose a lily is in the middle of a pond, and every day it doubles in size. In 30 days the lily has covered half of the pond. How long will it take it to cover the whole pond?

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Answer

More more day!
(day 31)

Moore's Law

