CSC 103: How Computers Work

Spring 2016
Smith College
Prof. Sheehan
Class 5: April 4
Outline

- Recap Lab 2 (Memory)

- Introduction to Assembly Language
Assembly Simulator

MOV B, 7 ; move the number 7 to register B
MOV A, 5 ; move the number 5 to register A

CPU & Memory

Registers / Flags

RAM

by Marco Schweighauser (2015)
Assembly Simulator

Instruction Area
(code)

MOV B, 7 ; move the number 7 to register B
MOV A, 5 ; move the number 5 to register A

by Marco Schweighauser (2015)
Assembly Simulator

Instruction Area (code)

Central Processing Unit (CPU)

by Marco Schweighauser (2015)
Assembly Simulator

Instruction Area (code)

Central Processing Unit (CPU)

Random Access Memory (RAM), 256 bytes

by Marco Schweighauser (2015)
Assembly Simulator

General Purpose Registers

MOV B, 7 ; move the number 7 to register B
MOV A, 5 ; move the number 5 to register A

by Marco Schweighauser (2015)
Assembly Simulator

- **General Purpose Registers**
- **Instruction Pointer (IP)** (where are we in the code)

**Code (Instruction Set)**

MOV B, 7 ; move the number 7 to register B
MOV A, 5 ; move the number 5 to register A

**Output**

**CPU & Memory**

<table>
<thead>
<tr>
<th>Registers / Flags</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SP</th>
<th>Z</th>
<th>C</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>231</td>
<td>FALSE</td>
<td>FALSE</td>
<td>FALSE</td>
</tr>
</tbody>
</table>

**RAM**

[RAM content details]
Assembly Simulator

General Purpose Registers
(Where are we in the code)

Instruction Pointer (IP)
(Where are we in the code)

Stack Pointer (SP)
(Where are we in the stack)
Assembly Simulator

- **General Purpose Registers**
- **Instruction Pointer (IP)** (where are we in the code)
- **Stack Pointer (SP)** (where are we in the stack)
- **Zero (Z) and Carry (C) and main (F) Flags**

Example Code:
```
MOV B, 7 ; move the number 7 to register B
MOV A, 5 ; move the number 5 to register A
```
MOV: “move” command

- MOV C, A ; copy whatever is in A to C
- MOV C, [21] ; copy whatever is in address 21 to C
- MOV C, 15 ; put 15 in register C
- MOV [58], A ; copy whatever was in A to address 58
- MOV [58], 15; put 15 at address 58
Assembly Simulator

MOV B, 7 ; move the number 7 to register B
MOV A, 5 ; move the number 5 to register A

MOV B, 7
"6" "1" "7"
Assembly Simulator

MOV A, 5
“6” “B” “5”