CSC231-Assembly

Week #1
Fall 2019

Dominique Thiébaut
dthiebaut@smith.edu
Outline

• Syllabus
• The Programming Environment
• First Program
• Hello World in Assembly
• Wednesday's lecture/lab
Syllabus

How to Find It…

• http://cs.smith.edu

• faculty

  • Dominique F. Thiebaut

  • More Info

  • CSC231 Assembly Language and Microprocessors

http://www.science.smith.edu/dftwiki/index.php/CSC231_2019
What Will You Learn?
What Will You Learn?

Processor
Memory
What Will You Learn?

Processor
Memory
Disk - Files
What Will You Learn?

- Processor
- Memory
- Disk - Files
- Instructions
- Python
- Java
What Will You Learn?

Processor
Memory
Disk - Files
Instructions
Python
Java

10101
What Will You Learn?

Processor
Memory
Disk - Files
Instructions
Python
Java
-32
10101
What Will You Learn?

Processor
Memory
Disk - Files
Instructions
Python
Java

-32
10101
0.1
What Will You Learn?

- Processor
- Memory
- Disk - Files
- Instructions
- Python
- Java

-32  10101

- Slow… Fast

0.1
Your Environment
The Social Network
Columbia Pictures
David Fincher, Director
Staring Jesse Eisenberg and Andrew Garfield
Programming Tools

- PHP
- emacs
- Perl script
- redirect
- Apache
- Terminal
- HTML
Your Tools This Semester

Emacs

Terminal
Your Tools This Semester

Assembly (nasm, ld)

Emacs

Terminal
Your Tools This Semester

Assembly (nasm, ld)

Emacs

b ash

Terminal
Your Tools This Semester

- Assembly (nasm, ld)
- bash
- C
- Emacs
- Terminal
First Assembly Language Program
This program prints descending rows of stars using loops

Example of output:

```
********************
********************
*******************
******************
*****************
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***************
**************
*************
************
***********
**********
*********
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*******
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***
**
*
```

to assemble, link and run:

```
nasm -f elf -Fstabs firstProg.asm
ld -melf_i386 -o firstProg firstProg.o
./firstProg
```
;;; printstars: prints the row of stars with a given length
;;; REGISTERS MODIFIED: EAX, EBX, ECX, EDX
printstars:
    section .bss
    .temp   resd 1    ; temporary var to store ecx

    section .text
    mov     eax, SYS_WRITE
    mov     ebx, STDOUT
    mov     edx, dword [len]   ; get VARIABLE message length
    mov     dword [.temp], ecx ; save ecx
    lea     ecx, [stars]       ; message to be output
    int     0x80
    mov     ecx, dword [.temp] ; restores original ecx
    ret

;;; printline: prints the new line
;;; registers modified: eax, ebx, ecx, edx
printline:
    section .bss
    .temp   resd 1    ; temporary var to hold ecx

    section .text
    mov     eax, SYS_WRITE
    mov     ebx, STDOUT
    mov     edx, line_len      ; CONSTANT message length
    mov     dword [.temp], ecx ; stores ecx in temp before it is changed
    lea     ecx, [newline]     ; message to be output
    int     0x80
    mov     ecx, dword [.temp] ; restores original ecx
    ret
Demo Time

Run firstProg.asm
Hello World!
HelloWorld.asm

;;; Display "Hello there!" on the screen

;;; To assemble, link, and run:
;;;     nasm -f elf  helloWorld.asm
;;;     ld -melf_i386 -o helloWorld helloWorld.o
;;;     ./helloWorld

section .data
Hello     db     "Hello there!", 10, 10
HelloLen  equ     $-Hello

section .text
_start:

;;; print message
        mov     eax, 4        ; write
        mov     ebx, 1        ; stdout
        mov     ecx, Hello    ; address of message to print
        mov     edx, HelloLen ; # of chars to print
        int     0x80

;;; exit
        mov     ebx, 0
        mov     eax, 1
        int     0x80
The Assembly, Link, and Run Process

```
cs231a@marax ~/handout $ nasm -f elf hello.asm
cs231a@marax ~/handout $ ld -melf_i386 hello.o -o hello
cs231a@marax ~/handout $ ./hello
Hello there!
```
Wednesday's lecture
Wednesday's lecture

Lab 1: 2:45 - 3:45 p.m.

Lab 2: 4:00-5:00 p.m.
Bring camera or phone for taking pictures!

You’ll be working in groups of 3 to 4 students
We stopped here last time...
• TA Page (link at bottom of syllabus)

Hafsah Hanif
Grace Moore
Georgina Xu
Chris Tan
Annika Miller
Asmita Gautam
Logistics

• Form teams of 3 people
• Move all the chairs to the side
• Get a PC (not dead, but soon to be)
• Fill out sign-up sheet
• Take apart the PC
• Recognize important components, take photos
Logistics (Cont'd)

- Remove processor from motherboard
- Remove motherboard from computer
- Remove disk drive from computer
- Take apart disk drive (if you have time)
- Keep any of the components you like
- Put everything back in the case for **EXTRA CREDITS**
Logistics (Cont'd)

• You need to document:
  
  • The open computer case
  • The motherboard
  • The power supply
  • The processor. You need to indicate the name of the manufacturer, and the name of the processor, as written on it.
  • The memory (RAM). Try to figure out what the manufacturer of the RAM is. How much RAM (in Gigabytes) was in the computer?
  • The hard disk. Indicate its capacity, in Gigabytes.
  • One of the crystals that generate the high frequency signal to the computer. Can you read the frequency written on its case?
  • The optical drive, or DVD drive (if there's one)
  • The connectors in the back of the computer (including USB connectors)
  • Some of the cables connecting the motherboard to various peripherals.

• You are ready for Homework #1!
http://www.science.smith.edu/dftwiki/index.php/CSC231_Homework_1_2019
Homework 1
Extra Credits!!!!

For putting everything back in the case! No need to put the parts back in the right place, just return a closed case to your instructor!