

X86 Assembly Language - Programming Exercise

Assignment 04 (Ch08)

Practice in Chapter 8

- ▶ Stack Frames
- ▶ Recursion

Recursive Fibonacci Numbers

The goal of this assignment is to learning X86 assembly language. By the end of this assignment, you should be able to:

1. read a string from standard input
2. write an algorithm in pseudocode
3. translate that pseudocode into assembly
4. implement recursion by calling procedure with passing parameters

Requirements

- ▶ This assignment asks you to write an X86 assembly program to implement ***Recursive Fibonacci numbers***. (Check Recursive Factorial example in Ch08)
Specifically, your program should be divided into the following four sections, which must perform several specific tasks.
 - *Section 1: Introduction*
 - *Section 2: Get and validate n*
 - *Section 3: Calculate and print the Fibonacci numbers recursively*
 - *Section 4: Conclusion*

Requirements (Cont'd)

Section 1: Introduction

- ▶ Print an introduction that includes your name, a title, and (optionally) a description of the program.
- ▶ Prompt the user to enter their name and read in the string input.
- ▶ Print a greeting that includes the user's name.

Section 2: Get and validate n

- ▶ Prompt the user to enter a number between 1 and 25; read in the input (Let us call this n).
- ▶ Check that n is within the range. If not, print an error message and prompt the user again.
- ▶ Repeat until the user enters a valid number.

Requirements (Cont'd)

Section 3: Calculate and print the Fibonacci numbers recursively

- ▶ Calculate and print the Fibonacci numbers during recursive calls.
- ▶ The first several numbers should be: 0, 1, 1, 2, 3, 5, 8, 13, 21, ...
- ▶ Note that you do not need to store the Fibonacci numbers in memory. You may just print them as they are computed

Section 4: Conclusion

- ▶ Print a farewell message that again refers to the user's name.
- ▶ Use the exit system call to end your program.

Example

Fibonacci Numbers by, Andy

What is your name?: *June*

Hi, June

How many Fibonacci numbers should I display?

Enter an integer in the range [1..25]: *50*

That number was out of range, try again.

How many Fibonacci numbers should I display?

Enter an integer in the range [1..25]: *3*

$F(3) = F(2) + F(1) =$

$F(2) = F(1) + F(0) =$

$F(1) = 1$

$F(0) = 0$

$F(2) = 1$

$F(1) = 1$

$F(3) = 2$

Goodbye, June

Submission Format

- ▶ Turn in your report **in group**
- ▶ Observe the changes of registers and memory while executing. **Screenshot when needed.**
- ▶ Pack (archive) the following files
 - ▶ xxxx.asm
 - ▶ Report (file format: .doc/.docx/.pdf)
 - ▶ Follow the given programming exercise report format
 - ▶ Please include screenshots, the source code with comments, and your feedback about the assignment in one file.
- ▶ Upload to Tronclass