

Homework 2: x86 Control Flow, Stacks and Procedure Calls

Assigned	Wednesday, April 24, 2013
Due Date	<i>Monday, May 6, 2013 at 17:00</i>

Introduction

The purpose of written homework assignments is to get you thinking about the topics being covered in lecture and in readings in the textbook which are not represented in the hands-on, programming lab assignments. These written assignments also better prepare you for course examinations. It is worth noting that the book contains many practice problems similar to the problems we ask on these written assignments. The solutions for those practice problems are located at the end of each chapter and should give you a feel for the kind of answers we expect you to turn in for these kind of assignments.

Logistics

Since these written homeworks are not programming lab assignments, you will turn in your assignment online as electronic documents in PDF format. We will not accept any paper submissions.

Grading

Due to the large number of students in the class, we reserve the right to grade only a subset of the problems assigned in any written homework assignment for correctness. However, we expect you to answer all of the questions in an assignment and therefore will take that into account when calculating your grade for an assignment. For example, if we choose only to grade the 1st and 4th questions in this assignment, you would receive full credit for the assignment by answering these problems correctly. However, if you were not to answer all of the questions in an assignment, we would scale your score by a factor of $\text{num_questions_answered} / \text{num_questions_assigned}$. So in this example, if you only submitted answers to the 1st, 3rd and 4th questions, you would

receive only 3/4 of your score. In conclusion, try your best and be sure to answer all questions in each written homework assignment.

We will provide solutions to all of the problems in the written homework assignments in a timely fashion after the assignment is due. Since the late policy affords you a maximum of three late days, we cannot release solutions until the Wednesday following the assignment's due date, at the earliest.

Questions

Answer the following problems from the textbook. If a practice problem is listed, try to solve the problem on your own first, then check your answer at the end of the chapter. Make sure you understand the solution provided, then complete the additional questions below. Your write-up only needs to contain the information necessary to understand your answer to the additional questions - you do NOT need to turn in the answer to the practice problem in its entirety.

1. Practice Problem 3.30. Is the stack affected after executing these two instructions? If so, how? If not, why not?
2. Practice Problem 3.31
3. Practice Problem 3.33. Review the Aside on p. 226 to understand why GCC allocates unused space on the stack. If we wanted to eliminate the unused space in `proc`'s stack frame regardless, how would you change the assembly code to do this?
4. Practice Problem 3.42: What was your strategy (if any) to reduce wasted space? Would this always work? If not, can you describe a general strategy such that the space the struct uses is minimized?
5. Practice Problem 3.51. What value is returned if the function is called with `i=6`?
6. Homework Problem 3.59 (Looking at the previous problem may be helpful)
7. Homework Problem 3.64

Notes

Make **sure** you are using the 2nd edition of Computer Systems: A Programmer's Perspective. If you're not using the right book, you might be doing the wrong problems!

Submitting Your Work

Please turn in a PDF file containing your answers to the **Catalyst Drop Box for this assignment**. *We will not accept submissions that are not in PDF format.*