CSC 3320: System-Level Programming

Week of 02/24/2025

Lab 7

© Instructor: Dr. Md. Mahfuzur Rahman

100 Points

Objectives:

Today we will be covering the following topics:

1. Practice function calls in a C program.
2. Practice recursion in a C program.

Instructions:

- Attendance is mandatory.
- Labs must be completed individually.
- If you have any questions, please do not hesitate to ask TA.
- Follow submission instructions in the deliverable section.
- Lab assignments are due by 5:00 PM the next day after your lab session.

1. Write a program that asks the user to enter a series of integers (which it stores in an array), then sorts the integers by calling the function `selection_sort`. When given an array with n elements, `selection_sort` must do the following:

   (i) Search the array to find the largest element, then move it to the last position in the array.

   (ii) Call itself recursively to sort the first n - 1 elements of the array.

   Use the `vi` editor to create your program and save it as `lab7.c`. For example, when you run your program, it may look like the following on the terminal:

```
How many integers: 12       (e.g., 12 integers to input)

Enter 12 integers:10 3 34 21 13 10 13 9 20 39 45 68       (user input)
After the next call:  10   3  34  21  13  10  13   9  20  39  45  68
After the next call:  10   3  34  21  13  10  13   9  20  39  45
After the next call:  10   3  34  21  13  10  13   9  20  39
⋮
After the next call:   9   3  10
After the next call:   3   9
Sorted Array:   3   9  10  10  13  13  20  21  34  39  45  68
```

   Now, do the following tasks:

   (a) (20 points) Make sure you are using the same input prompt as suggested.

   (b) (20 points) Make sure you are using recursion to solve the problem.

   (c) (20 points) Make sure you are able to locate the largest element and its index within the array.

   (d) (15 points) Make sure you swap the largest element with the last position and were able to display.

   (e) (05 points) Start recording your session using the `script` utility.

   (f) (05 points) Show the contents of lab7.c using the `cat` command.

   (g) (05 points) Compile lab7.c with required flags for the object file name `[use -o]` and C version `[-std=c99]`.

(h) (05 points) Run your program using appropriate command.

(i) (05 points) Finish your recording (use the `exit` command).

Deliverables

For today's lab, clean the text file (.txt) you recorded during your terminal session, if there are unwanted control characters. In other words, make it as you observed during your terminal session. Please name your text file as **lastname_firstname_lab07.txt**. You will need to submit the text file (terminal session record) and your C file (lab7.c) to the **Lab 07** dropbox in iCollege.

Broader Grading Criteria

- If no C (`.c`) file is submitted (regardless if `.txt` file submitted or not), a student will receive only 40% for attendance. Submission will not be graded.
- If a C file is given but no `.txt` file (terminal session) is given, a submission will receive a maximum 70% (will vary between 40% and 70% based on the correctness of the C program).
- If a `.txt` file is given along with the `.c` file, but the `.txt` file is not clean and not comprehensible to the TA, a submission will receive a maximum 80% (which will vary from 40% to 80% depending on the accuracy of the C program).
- If both a clean `.txt` file and the `.c` file are given, your submission will normally be evaluated based on the tasks and the corresponding point distributions.
- Screenshots are not substitutes for code and/or the .txt files submission.