CO222: Programming Methodology

Memory allocation.

Aim: The aim of this laboratory class is to understand the memory layout of an application.

Question:

When it comes to variables there are number of different types. For example;

1. Global variables (which can be accessed by all the functions)
2. Local variables (which are accessible only within the function)
3. Variables which are allocated via *malloc*.
4. In addition you can also think about variables which are passed as arguments to a function.

Task0: You need to complete this part during the laboratory class and show it to an instructor.

Design a program so that you can answer the following questions;

1. Which of the above 4 variables types have the smallest value.
2. Which of the above 4 variable types have the highest value.
3. Show that, when you call the same function again you get a different set of local variables (by considering their addresses)

Task1: You are required to develop a program which would do the following;

1. Prompt the user to input a (integer) number (lets call this *s*).
2. Allocate an array which is large enough to hold *s* integer elements.
3. Populate the allocate array with random integers.
4. Sort the array using bubble sort (algorithm given below).
5. Display the array.

You are required to break the above problem into small manageable parts which can be implemented in different functions. You will be given marks for this.

Bubble sort:

1. Compare the 1st element with the 2nd. Swap the two if the first element is large.
2. Compare the 2nd element with the 3rd and swap if 2nd element is large.
3. Continue until you compare the last element of the array with the previous element and swap if required.
4. If you did any swaps, then repeat from step 1.
5. If no swaps were done, the array is sorted.

Submission: Submit your answer to task1 via Moodle. Deadline is 11th September 2359.