

THE HONG KONG POLYTECHNIC UNIVERSITY
Department of Electronic and Information Engineering

Computer Programming (ENG236) Homework 1

(Note: the format of Programming Test 1 is very similar to this homework.)

A. Background

Sorting is one of the most common operations in computing. There are many studies on the methods for sorting and many fast algorithms have been devised. Nevertheless, if the number of items to be sorted is not that many, some simple approaches can also be very effective. The following is one of them. Assume that A, B, C, D, E are 5 variables storing 5 numbers, respectively, and we would like to show the numbers on the screen in descending order. It can be done using the procedure as follows.

1. Initialize a variable F that keeps a very large number (must be larger than A, B, C, D, E)
2. Search among A, B, C, D, E for the biggest number, which is smaller than F
3. Show that number on the screen
4. Save that number to F
5. Repeat steps 2, 3, and 4 until all 5 numbers are shown on the screen.

B. The Programming Task

By using C++ and the Visual C++ .NET environment, implement a simple sorting application program with details as follows.

Q1. Start a new project with name “partQ1” to do this question. The project should be a console application that shows the following main menu:

1. Input data
2. Select operation
3. Quit

Please enter your choice (1, 2, and 3 to quit):

Users are expected to enter an integer of value 1, 2 or 3 only. When any other numbers are entered, the program will display “Invalid input..... Please enter again!” and the main menu will be shown again.

If the user selects 3, the program will show a message “Goodbye!” and then end (return to the command prompt).

If the user selects 1, the program will show a message “Please enter 10 floating-point numbers”. Your program should then allow the user to enter 10 floating-point numbers and store them into 10 variables. Get back to the main menu when the user finishes entering the numbers.

If the user selects 2, the program will show another message “Please select the desire operation” and get back to the main menu.

----- PASS line -----

Q2. Start a new project namely “partQ2” to do the following. Modify the program developed for Q1 to perform the following tasks:

If the user selects 2 in the main menu, rather than showing the message as mentioned in Q1, a sub-menu should be shown as follows.

- a. Find the maximum
- b. Find the minimum
- c. Show the numbers in descending order
- d. Show the numbers in ascending order
- q. Return

Please enter your choice (a, b, c, d, and q to return):

- a. The user is expected to enter a character of ‘a’, ‘b’, ‘c’, ‘d’ or ‘q’ only. If any other characters are entered, the program will display “Invalid input..... Please enter again!” and then show this sub-menu again.
- b. If the user chooses ‘a’, the biggest of the 10 entered numbers should be shown on the screen. Get back to this sub-menu when the number is shown.
- c. If the user chooses ‘b’, the smallest of the 10 entered numbers should be shown on the screen. Get back to this sub-menu when the number is shown.
- d. If the user chooses ‘c’, show a message “Numbers in descending order: ” and get back to this sub-menu.
- e. If the user chooses ‘d’, show a message “Numbers in ascending order: ” and get back to this sub-menu.
- f. If the user chooses ‘q’, do nothing but return to the main menu.

----- CREDIT line -----

Q3. Start a new project namely “partQ3” to do the following. Modify the program developed for Q2 such that when user chooses ‘c’ or ‘d’ in the sub-menu of Q2, the numbers entered by user will be shown on the screen in descending or ascending order, respectively. Note that it is mandatory to use the method as described in Section A to do sorting in descending order. For displaying the data in ascending order, the method in Section A should be slightly modified. Get back to the sub-menu in Q2 when the required operation has been performed.

----- DISTINCTION line -----

C. Instructions

1. Your program should be well commented. Try to explain your program as clear as possible using comments.
2. The program structure will be an important part of your work. Never try to write your program using a single `main()` function.
3. Though this homework is NOT assessed, you are strongly encouraged to finish it yourself and test your results using Visual Studio .NET. It offers a good chance for you to prepare your Programming Test 1. Please post any of your difficulties in the Forum, and we’ll help you. Suggested solution will be released to you before Programming Test 1.