창의적 소프트웨어 프로그래밍 Lab 6

Handed out : Fri, Sep 30, 2022

Due : Tue, Oct 4, 2022, 14:59 (NO SCORE for late submissions!)

Submit your file on LMS.

HY-ON LMS will be unavailable during the conversion period of Hanyang Cloud Center System.

System outage period : September 30, 2022 (Fri) 18:00 ~ October 4, 2022 (Tue) 06:00

You can submit by Email, if necessary.

1. Write a program that works as follows.
   A. Define a structure named Person that can store the name and age of a person.
   B. Take an integer N from the user and create a Person type array of length N.
   C. Take N names and ages from the user and stores them in each element of the array.
   D. Print out the contents of the array.
   E. Input: N pairs of name and age
   F. Output: The stored name and age in the array
   G. Files to submit:
      i. A C++ source file

```
$./print_people
3
John 20
Amy 20
Emma 21
Name:John, Age:20
Name:Amy, Age:20
Name:Emma, Age:21
```

2. Write a program to sort integers.
    A. See https://en.wikipedia.org/wiki/Bubble_sort for the sorting algorithm.
    B. Take an integer N from the user and allocate an integer array of length N.
        i. if N <=0, just exit your program.
    C. Take N integers from the user and fill the array.
    D. Call your own sort function to sort the array in ascending order.
    E. Note that
        i. main() should only perform dynamic allocation / deallocation and minimal I/O.
    F. Input: One integer (N), and N integers
    G. Output: Sorted array
    H. Files to submit:
        i. A C++ source file

```
$ ./sort_int
3
3 1 2
1 2 3
$ ./sort_int
5
-1 3 4 100 2
-1 2 3 4 100
$
```

3. Write a program that creates a "magic square" of odd order..
    A. A magic square is a n × n square grid filled with distinct positive integers in the range 1 , 2 , . . . , n^2 such that each cell contains a different integer and the sum of the integers in each row, column and diagonal is equal [wikipedia].
    B. How to create a magic square of odd order:
        i. https://en.wikipedia.org/wiki/Magic_square#A_method_for_constructing_a_magic_square_of_odd_order

C. Take an integer N from the user.

   i. If N is not an odd number greater than or equal to 3, just exit your program.

D. The magicSquare() function should take an n x n matrix or (n * n) array and fills each element with the value of the magic square.

E. Print out the magic square in the main()

F. Note that

   i. An array (or matrix) to pass to the magicSquare() function must be dynamically allocated.

G. Input: One odd number greater than or equal to 3

H. Output: The magic square of the given size N

I. Files to submit:

   i. A C++ source file

```
$ ./magic_square 3
8 1 6
3 5 7
4 9 2
$ ./magic_square 5
17 24 1 8 15
23 5 7 14 16
4 6 13 20 22
10 12 19 21 3
11 18 25 2 9
$
```