

## 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](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  $N \leq 0$ , 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  $n \times n$  square grid filled with distinct positive integers in the range  $1, 2, \dots, n^2$  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](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
$
```