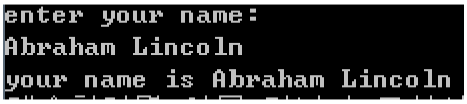
Lab 1: Review on C Programming

During the data structure class, you will be given some practice problems (and homework) that need C programming. In this first class, you will practice 4 programming problems by using array and pointer in order to refresh your C programming skills. In addition, you need to know a fundamental file I/O, and how to use command line arguments.

You should finish the first problem (1-1) during the lab session and confirm it with the TA. For the other 3 problems (1-2, 1-3, 1-4), you can submit it to the course website (https://portal.hanyang.ac.kr) (Due on 3/6 11:59PM). Your report should include the description of your own implementation. No email submission.

1-1. Array of characters

Obtain a user name from the standard input, and put it on the standard output.



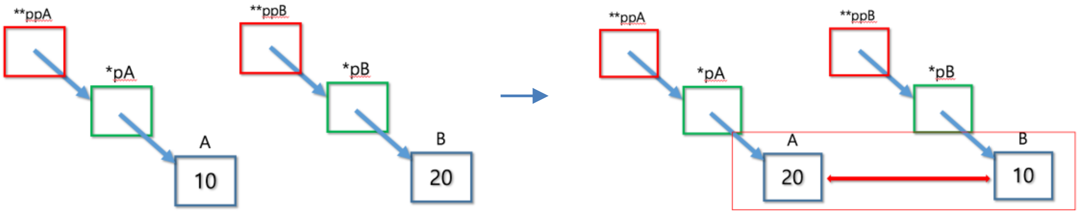
```
enter your name:
Abraham Lincoln
your name is Abraham Lincoln
```

- program name: p1_1.c
- data structure : array of characters
- input : a user name (string)
- output : a user name (string)
- conditions :
  - the length of the user name should be up to 30 characters
  - blank spaces should also be part of the name (e.g. Abraham Lincoln)

1-2. Pointer for integers

Obtain 2 integers from the the standard input, and swap two integers as follows. Use the concepts of pointer in your work. Print your result on the standard output.

```
>p1_2
enter 2 integers
2 3
you entered
2, 3
after swapping
3, 2
```

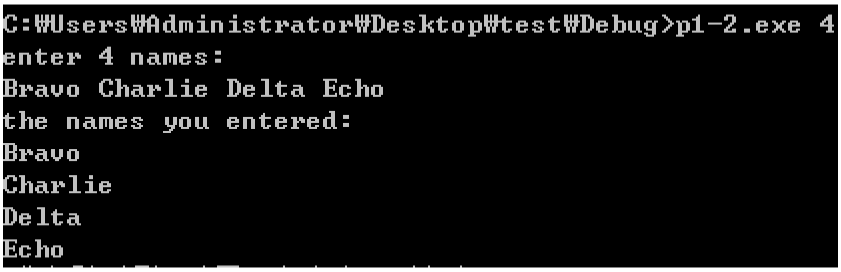


- program name: p1_2.c
- data structure : array of integers
- input : 2 integers separated by space
- output : 2 integers swapped
- condition : use pointers to swap two numbers

  make a function for

1-3. Dynamic allocation

Use a command line argument for the total number of students (>2). In the standard input, get *n* (the number you input) names in a single line when the instruction “enter n names:” is given. Use 2D dynamic allocation to store all names in one variable. Print your result in standard output.



```
C:₩Users₩Administrator₩Desktop₩test₩Debug>p1-2.exe 4
enter 4 names:
Bravo Charlie Delta Echo
the names you entered:
Bravo
Charlie
Delta
Echo
```

- program name: p1_3.c
- data structure : array of pointers
- input : n names
- output : n names
- condition :
  - the number of students should be more than two
  - use dynamic allocation to store names (malloc())
  - the length of the user name should be up to 30 characters
  - no blank space is allowed in the name

command line sample

```
> filename.exe arg1 arg2 arg3
```

int main(void) => int main(int argc, char *argv[])

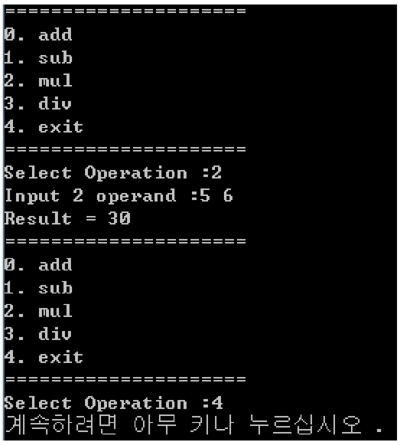
filename.exe	arg1	arg2	arg3
argv[0]	argv[1]	argv[2]	argv[3]

argc = 4

1-4. Function pointer

Implement a calculator for addition, subtraction, multiplication, and division. Use a command line argument for the operator of your choice, and two numbers. You use the following array to assign operator functions.

```
int add(int x, int y);
int sub(int x, int y);
int mul(int x, int y);
int div(int x, int y);
int (*pf[4])(int, int) = { add, sub, mul, div };
```



```
=====================
0. add
1. sub
2. mul
3. div
4. exit
=====================
Select Operation :2
Input 2 operand :5 6
Result = 30
=====================
0. add
1. sub
2. mul
3. div
4. exit
=====================
Select Operation :4
계속하려면 아무 키나 누르십시오 .
```

- program name: p1_4.c
- data structure : array of function pointer
- input : the number for the choice of operator (1, 2, 3, or 4),
  two integers for the operand
- output : the result of operation