

Homework #5

C Programming

Mission



- Solve problem 1~2
- Submission
 - Submit a hw5_<student_ID>.zip file containing hw5_1_<student_ID>.c and hw5_2_<student_ID>.c on LMS.
 - Source files hw5_*.c should contain the followings:
 - Algorithm in pseudo code as comments preceded by “//”.
 - See the next page.
 - C program code that implements the pseudo code

Cf. Submit only source files (.c files)

 - All variables should be initialized by zero.
 - The code should be properly indented.
- Due date: PM 11:00, Nov. 13th

Code Example (add.c)

```
#include <stdio.h>

int main()
{
    int a = 0, b = 0;    // all variables should be initialized
    int sum = 0;

    // read two integer numbers
    printf("Input two numbers: ");
    scanf("%d %d", &a, &b);

    // add the two numbers
    sum = a + b;

    // print the result
    printf("%d + %d = %d\n", a, b, sum);

    return 0;
}
```

Indentation is Crucial for Readability



■ Properly indented code (Good)

```
int main()
{
    int height = 0;
    int i = 0, j = 0;

    do {
        printf("Input the height of triangle: ");
        scanf("%d", &height);
    } while (height % 2 == 0);

    for(i = 1; i <= height; i++){
        int start = height - i;
        int end = height + i - 1;

        for(j = 0; j < start; j++)
            putchar(' ');
        for(; j < end; j++)
            putchar('*');
        putchar('\n');
    }

    return 0;
}
```

■ Not indented code (Bad)

```
int main()
{
    int height = 0;
    int i = 0, j = 0;

    do {
        printf("Input the height of triangle: ");
        scanf("%d", &height);
    } while (height % 2 == 0);

    for(i = 1; i <= height; i++){
        int start = height - i;
        int end = height + i - 1;

        for(j = 0; j < start; j++)
            putchar(' ');
        for(; j < end; j++)
            putchar('*');
        putchar('\n');
    }

    return 0;
}
```

Rules of Indentation

- Start function header from the first column
- Use tab to represent indentation level.
- The body of functions, blocks, selection (if, switch), or repetition (while, for, do-while) statements should be indented one more level.

Ex) if(x % 2 == 0)

↔ printf("x is an even number.\n");

Ex) do {

↔ printf("Input a positive number:");

↔ scanf("%d", &x);

} while(x <= 0);

Honor Code Guidelines (English)



■ “Assignment”

- Assignments are educational activities necessary to fully understand the lecture, and to apply the materials to practical problems. Students should complete all assignments with honesty and sincerity to develop the knowledge and skills intended in the assignment.
- Submitting assignments or program codes written by others or acquired from the internet without explicit approval of the professor is regarded as cheating.
- Showing or lending one's own homework to other student is also considered cheating that disturbs fair evaluation and hinders the academic achievement of the other student.
- It is regarded as cheating if two or more students conduct their homework together and submit it individually when the homework is not a group assignment.
- It can be suspected or regarded as cheating if the similarity between assignments submitted by different students is beyond an acceptable degree that can be considered as a coincidence or when the student is not able to explain in detail about their homework.

Honor Code Guidelines (Korean)

■ “과제”

- 과제는 교과과정의 내용을 소화하여 실질적인 활용 능력을 갖추기 위한 교육활동이다. 학생은 모든 과제를 정직하고 성실하게 수행함으로써 과제에 의도된 지식과 기술을 얻기 위해 최선을 다해야 한다.
- 담당교수가 명시적으로 허락한 경우를 제외하고 다른 사람이 작성하였거나 인터넷 등에서 획득한 과제물, 또는 프로그램 코드의 일부, 또는 전체를 이용하는 것은 부정행위에 해당한다.
- 자신의 과제물을 타인에게 보여주거나 빌려주는 것은 공정한 평가를 방해하고, 해당 학생의 학업 성취를 저해하는 부정행위에 해당한다.
- 팀 과제가 아닌 경우 두 명 이상이 함께 과제를 수행하여 이를 개별적으로 제출하는 것은 부정행위에 해당한다.
- 서로 다른 학생이 제출한 제출물간 유사도가 통상적으로 발생할 수 있는 정도를 크게 넘어서는 경우, 또는 자신이 제출한 과제물에 대하여 구체적인 설명을 하지 못하는 경우에는 부정행위로 의심받거나 판정될 수 있다.

Console Control Functions



■ Display functions

- `void clrscr(void);` // clear screen
- `void gotoxy(int x, int y);` // move cursor to (x, y) coordinate
 - In the console window, (1, 1) is the coordinate of the upper left corner
- `int getWindowWidth();` // get width of current console window
- `int getWindowHeight();` // get width of current console window
- `void EnableCursor(int enable);` // show or hide cursor

■ Key input functions

- `int kbhit();` // check if there is a key in the key buffer
- `int getch();` // read a key not waiting for the Enter key

■ Utility functions

- `void MySleep(int msec);` // wait for msec milliseconds
- `void MyPause();` // wait for the Enter key

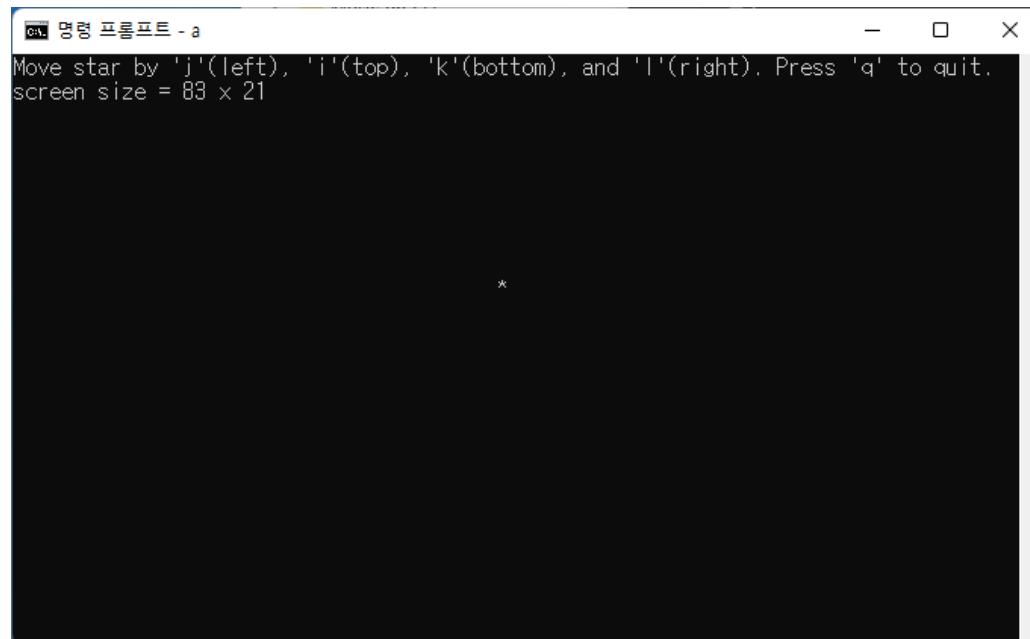
Console Control Functions



- Console.c, Console.h contain functions to control the console window
 - Non-standard functions
 - Put Console.c and Console.h into the current directory.
 - Include Console.h in your source file
 - #include "Console.h"
- Compilation
 - Windows: gcc hw5_1.c Console.c -D_WINDOWS
 - MAC: gcc hw5_1.c Console.c -D_MAC

Problem 1

- Write a C program that moves a star according to the input key following the instructions in the skeleton code
 - Use the switch statement to update the coordinate of the star according to the input key



```
명령 프롬프트 - a
Move star by 'j'(left), 'i'(top), 'k'(bottom), and 'l'(right). Press 'q' to quit.
screen size = 83 x 21
*
```

Problem 1



■ Updating the coordinate of the star

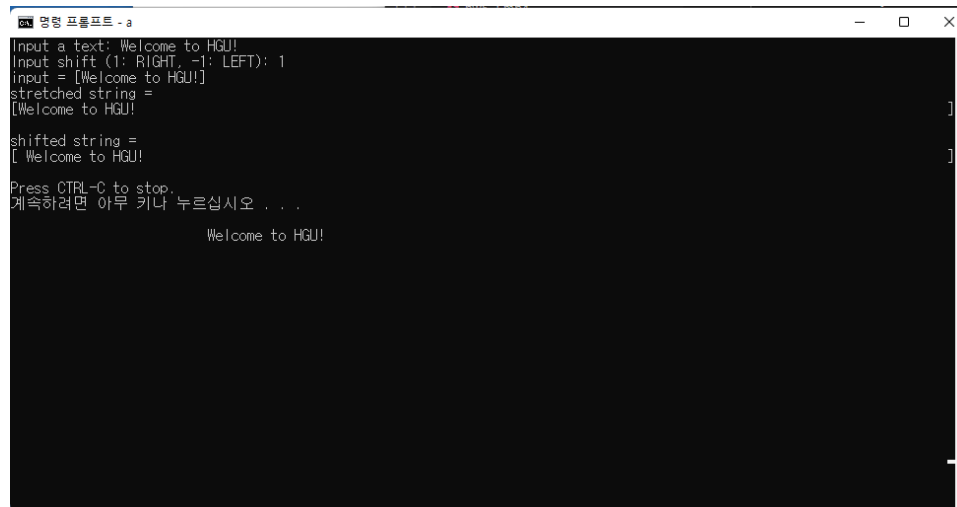
- Moving left: $x--$
- Moving right: $x++$
- Moving up: $y--$
- Moving down: $y++$

■ Moving the star

- Erase star at the previous coordinate
 - Use `gotoxy()` and `putchar(' ')`
- Draw star at the new coordinate
 - Use `gotoxy()` and `putchar('*')`

Problem 2

- Write a C program that reads a text line and scrolls on the console window, following the instructions in the skeleton code.



```
명령 프롬프트 - a
Input a text: Welcome to HGU!
Input shift (1: RIGHT, -1: LEFT): 1
input = [Welcome to HGU!]
stretched string =
[Welcome to HGU!

shifted string =
[ Welcome to HGU!

Press CTRL-C to stop.
계속하려면 아무 키나 누르십시오 . . .

Welcome to HGU!
```

Problem 2



- Implement the following functions
 - `void StretchString(char str[], int target_len)`
 - Stretches string by adding space so that its length is `target_len`
e.g., if `str` is "hello",
 - `StretchString(str, 10)` modifies `str` to "hello "
 - `void ShiftString(char str[], int shift)`
 - If `shift` is +1, shift `str` in the right
 - If `shift` is -1, shift `str` in the left
 - e.g., if `str` is "hello ",
 - `ShiftString(str, 1);` modifies `str` to " hello "
 - `ShiftString(str, -1);` modifies `str` to "ello h"