Programming Software Systems

Lab 4

Structures, Union and Recursive Functions

Exercise 1

What is the expected output of this program?

```
#include <stdio.h>
void func() {
    static int x = 5;
    int y = 5;
    while (y < 10 && x < 10) {
        printf("x = %d, y = %d\n", x, y);
        x++;
        y++;
        func();
    }
}
int main() {
    func();
}
```

Exercise 1: Solution

What is the expected output of this program?

```
#include <stdio.h>
void func() {
    static int x = 5;
    int y = 5;
    while (y < 10 && x < 10) {
        printf("x = %d, y = %d\n", x, y);
        x++;
        y++;
        func();
    }
}
int main() {
    func();
}
```

```
x = 5, y = 5
x = 6, y = 5
x = 7, y = 5
x = 8, y = 5
x = 9, y = 5
```

Exercise 2

Write a program that will contain 2 structures: ***student*** and ***exam_day***. The first structure should contain information about student's *name*, *surname*, *groupNO* and variable for the second structure. The second structure should contain *day*, *year* and *month* of exam. Month has to be in letter representation (For example, May), not numbers.

Note: Program should require to print all fields for a student and its exam via console

Exercise 3

Using union write a program that will read the **unsigned long long integer** via console and then encrypt it replacing each odd byte by its neighbour even byte beginning with the most significant byte. The program must contain encryption(…) function

Standard output should contain 3 strings:

Original message: *xxx*

Encrypted message: *yyy*

Decrypted message: *xxx*

Exercise 4

Using structure with bit fields pack your *day*, *month* and *year* of birthday into 2 bytes, considering that all fields consist of numbers. Initialize numbers inside code, print structure field values in console. Print the size of structure in console

Exercise 5

Write a program with array of structures for cookbook with recipes. Each recipe should contain its name, [2;10] ingredient names and amount of those ingredients. In the output all the cookbook with recipes should be printed.

PSP

Understanding How You Spend Time

1. Categorize your major activities
2. Record the time spent on each major activity
3. Record time in a standard way
4. Keep the time data in a convenient place