North South University
Department of Electrical and Computer Engineering
CSE 115L: Programming Language I Lab
Week 08 – Structures

Structure is the collection of variables of different types under a single name for better handling

Declaring Structure Variables Separately

```
struct book_data {
    char title[100];
    char author[100];
    char topic[100];
    int id;
};


int main()
{
   struct book_data b;
   strcpy(b.title, "Title");
   strcpy(b.author, "Author");
   strcpy(b.topic, "Topic");
   b.id = 12;
}
```

Declaring Structure Variables with Structure Definition

```
struct book_data {
    char title[100];
    char author[100];
    char topic[100];
    int id;
}b;


int main()
{

   strcpy(b.author, "Author");
   strcpy(b.title, "Title");
   strcpy(b.topic, "Topic");
   b.id = 12;
}
```

Example of structure definition using typedef

```
struct book_data {
    char title[100];
    char author[100];
    char topic[100];
    int id;
};

typedef struct book_data Book;

int main()
{
   Book b;
   strcpy(b.author, "Author");
   strcpy(b.title, "Title");
   strcpy(b.topic, "Topic");
   b.id = 12;
}
```

Ex- (array of structure)

```
#include<stdio.h>
typedef struct person
{
   char name[50];
   int id;
}student;

int main()
{
   int i;
   student stu[2];
   for(i=0; i<2; i++)
   {
      printf("Enter student %d name and id:\n",i+1);
      gets(stu[i].name);
      scanf("%d",&stu[i].id);
      fflush(stdin);
   }
 for(i=0; i<2; i++)
   {
      printf("Print student %d name and id:\n",i+1);
      printf("Name: %s\n", stu[i].name);
      printf("ID: %d\n", stu[i].id);
   }

   return 0;
}
```

Tasks:

1. Create a structure named **Student** with the following components and appropriate data types: *Name, ID, CGPA*

    i. Create an **Array of Students** of size **three** and take user input to fill the array.

    ii. Now find the student with the **least** CGPA and display his or hers Name, ID and CGPA.

2. Create a structure named **Player** with the following components and appropriate data types: *Name, Age, Country, Ranking*

    I. Create an **Array of Players** of size n (user input) and take user input to fill the array.

    II. Now prompt the user to enter a player's name. Search the whole array and print the corresponding age, country and ranking if the name is found. Print "not found" otherwise.

3. Write a program to add two complex numbers using structure. Create a structure called **Complex** with two components, **real** and **imaginary**. Write a function that takes two structure variables as input, then return the sum of the two complex number.

4. Manhattan distance between two points P(x1,y1) and Q(x2,y2) is defined as follows:

$$M.D. = |x1-x2| + |y1-y2|$$

    (i) Write down a structure that will model a point in 2-dimensional space.
    Using the above structure take input of two locations and calculate Manhattan distance between them.