

**Intended Learning Outcomes:**

At the end of the class the students should be able to:

- To learn how to use Structures and typedef in C++ programs.
- To learn the usage of pointers in Structures in C++ programs.

*Structure is a collection of variables referenced under one name.*

*The variables that make up the structure are called members/ elements.*

**Exercise 01:** The following program shows structure declaration and initialization using dot operator. Compile and run the program. Save the program with the name of **Ex01.cpp**.

```
#include <iostream>
using namespace std;

struct Students {
    int student_id;
    string name;
    int age;
};

int main()
{
    struct Students Student1;

    Student1.student_id = 64;
    Student1.name = "Amal";
    Student1.age = 22;

    cout<<"Student Id is : "<< Student1.student_id << endl;
    cout<<"Student name is : "<< Student1.name << endl;
    cout<<"Student age is : "<< Student1.age << endl;

    return 0;
}
```

**Exercise 02:** The following program shows structure declaration using typedef and initialization list. Compile and run the program. Save the program with the name of **Ex02.cpp**.

```
#include <iostream>
using namespace std;
```

```
typedef struct Students {
    int student_id;
    char name[50];
    int age;
}Stu;
```

*name variable is declared as char  
type array*

```
int main()
{
    Stu Student1={64, "Nimal" ,22};
    cout<<"Student Id is : "<<Student1.student_id<<endl;
    cout<<"Student name is : "<< Student1.name<<endl;
    cout<<"Student age is : "<< Student1.age<<endl;

    return 0;
}
```

**Exercise 03:** The following program shows the use of **strcpy()** function to assign strings using char arrays. Save the program with the name of **Ex03.cpp**.

```
#include <iostream>
#include <cstring>
using namespace std;
```

```
struct Books {
    int book_id;
    string name;
    char author[50];
};
```

*Using strcpy() to assign the string to  
the char array*

```
int main()
{
    struct Books Book1;
    Book1.book_id = 64;
    Book1.name = "Oliver Twist";
    strcpy(Book1.author, "Charles Dickens");

    cout<< "Book Id is : "<<Book1.book_id<<endl;
    cout<< "Book name is : "<<Book1.name<<endl;
    cout<< "Author is : "<< Book1.author <<endl;
    return 0;
}
```

**Exercise 04:** The following program shows pointers to structures. Compile and run the program. Save the program with the name of **Ex04.cpp**.

```
#include <iostream>
#include<cstring>
using namespace std;

struct dog {
    string name;
    int age;
    string color;
};

int main()
{
    struct dog my_dog = {"Benji",5, "Brown"};

    /* declaring pointer to dog structure */
    struct dog *ptr_dog;

    /* assigning the starting memory address of the
    instance my_dog to the ptr_dog pointer */
    ptr_dog = &my_dog;

    /* changing the value pointed by the pointer to a new value */
    ptr_dog -> name = "Tommy";

    cout<<"Dog's name: "<< ptr_dog->name <<endl;
    cout<<"Dog's age: "<< ptr_dog->age <<endl;
    cout<<"Dog's color:"<< ptr_dog->color <<endl;

    return 0;
}
```