



**University of Engineering and Technology,
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CSE 102: Computer Programming

Lecture 07 Structures

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Need for Structure

- Basic data type: single element
- Array: multiple elements of same type
- Task: store name, age, salary of employees
 - Different Data Types
- Structure is a collection of related elements or data items.
- Elements of the structure are called *members of the structure*.

Struct Data Type

- Treat different data types as one group
- Create new data type as a composition of existing data types
- Field
 - each element is called a “field”
 - can be a basic data type or an array or another struct
 - accessed using dot (.) operator

Defining Structures

```
struct st_name
{
    type 1; //data types
    type 2;
    type 3;
};
```

Declaring Structures

- Once the structure is defined, you can declare a structure variable by preceding the variable name by the structure type name

```
struct address
```

```
{
```

```
    char city[15];
```

```
    int postcode;
```

```
};
```

```
address first_var, second_var;
```

Accessing Members of a Structure

- Dot operator (.) is used to access the members of a structure.
- To access a member of a specific structure, the structure variable name, the dot operator and then the member of the structure is written.
- Syntax;
`struct_variable.struct_element`

Initializing of Structure Variables

Struct address

{

char city[15];

int pcode;

};

address taq = { "Peshawar" , 25000};

Array Type Members of Structure

```
struct result
```

```
{
```

```
    char name[15];
```

```
    int sub[4];
```

```
    int total;
```

```
};
```

```
result student= { "Kaleem" , {62,69,70,40}, 0};
```


Structure Variable as Arrays

```
struct result
{
    char s_name[15];
    int sub[4];
    int total;
};
result arts[10];
```

Initialization of Arrays of Structure

```
struct marks
```

```
{
```

```
    char code[10];
```

```
    char name[15];
```

```
    float marks;
```

```
};
```

```
marks rec[3]={{"man-1", "Kashif", 85.9},  
              {"acc-1", "Waqas", 89.6},  
              {"fac-1", "Javed", 55.9}};
```

Nested Structure

- When members of a structure are defined as structure type, these are called nested structure.

Struct info

```
{  
    char s_name[15];  
    char f_name[15];  
    char city[15];  
    int age;  
};
```

Struct p_data

```
{  
    info s1;  
    info s2;  
    float x;  
};  
p_data rec;
```

Initialization of Nested Structure

```
p_data rec={{“M. Waqas”, “Haq Nawaz”, “Peshawar”,20},  
            {“M. Zeeshan”, “Fida Khan”,  
            “Islamabad”,30},6.9};
```

Accessing Members of Nested Structure

```
Rec.s1.age=20;
```