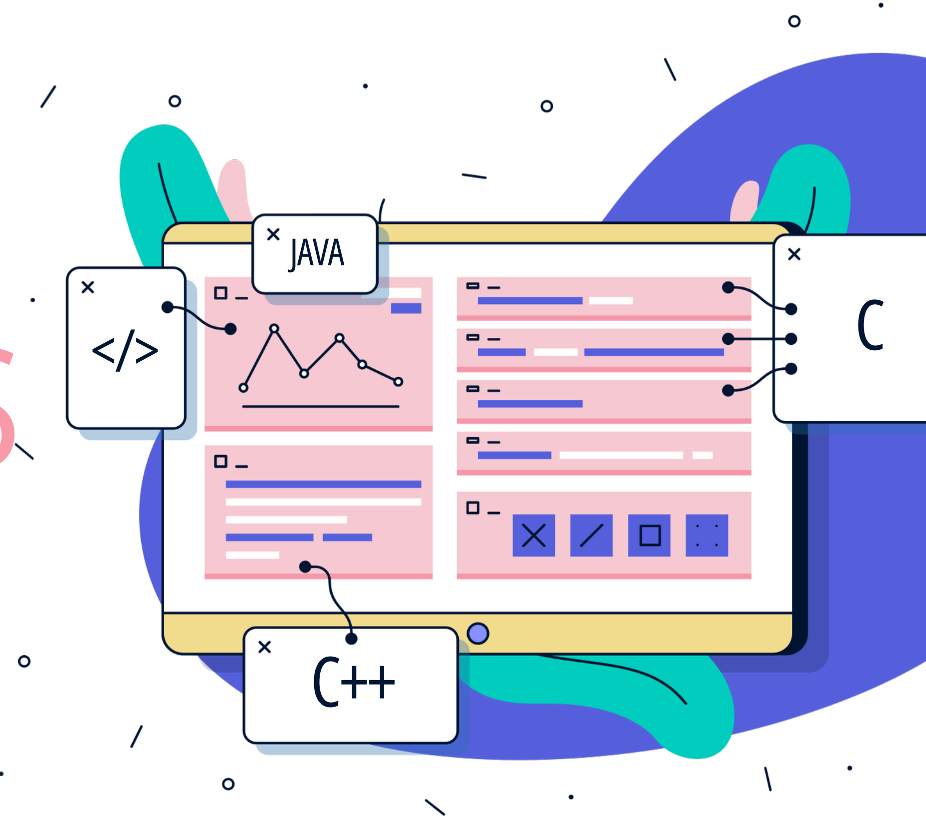
Welcome,
PROGRAMMERS



01.

What is Structure?

What is Structure?

Structure

A structure is a **user-defined data type** that allows you to **group together variables of different data types** under a single name.

It provides a way to **represent** a **record** or a **collection of related data items**.

The structure allows you to define a composite data type that

contains members with different data types.

Syntax of how to create a Structure

```
struct structureName
{
    dataType  variable1;
    dataType  variable2;
    // many more …
};
```

Example of creating a structure

```
struct Car
{
    int carId;
    char carName[50];
    char carModel[50];
    char carColor[50];
};
```

Accessing members of a Structure

Using
Simple Object

```
struct Car c1;

// c1.name
```

Using
Pointer Object

```
struct Car *c1;

// c1->name
```

Accessing members of a Structure

```
void main()
{
    struct Car c1; // create a variable/object of a structure

    c1.id = 1;
    strcpy(c1.name, “Tata”);
    strcpy(c1.model, “Harrier”);
    strcpy(c1.color, “Black”);
}
```

Print members of a Structure

```
void main()
{
    printf("%d\n",       c1.id); // 1
    printf("%s\n",     c1.name); // Tata
    printf("%s\n",    c1.model); // Harrier
    printf("%s\n", c1.color);   // Black
}
```

We can create a variable/object of a structure by using two different approaches...

Creating a variable/object of a structure

```
struct Car
{
    int carId;
    char carName[50];
    char carModel[50];
    char carColor[50];
}c1, c2;
```

OR

```
void main()
{
    struct Car c1, c2;
}
```

Let’s see the **Array of Objects** in structure…

Creating an Array of Objects

```
struct Car
{
    int carId;
    char carName[50];
    char carModel[50];
    char carColor[50];
};
```

```
void main()
{
    struct Car cars[100];
    // cars[0], cars[1], cars[2], …,
    cars[99]
}
```

Let’s see how many memory space acquired by a structure…

Knowing a size acquired by Structure

```
struct Car
{
    int carId;
    char carName[50];
    char carModel[50];
    char carColor[50];
};
```

RAM				
	carId	carName	carModel	carColor
Memory Space	4 bytes	50 bytes	50 bytes	50 bytes

```
struct Car c1;

printf("%d", sizeof(c1));
```

Output:
154

02.

What is Union?

What is

Union?

UNION

A **union** is a **user-defined data type** that allows you to **store different data types** in the **same memory location**.
Unlike structures, where each member has its own memory

space, **members of a union share the same memory location**.

This means that a **union variable** can **hold values** of **only one member at a time**.

Syntax of how to create an Union

```
union unionName
{
    dataType  variable1;
    dataType  variable2;
    // many more …
};
```

Example of creating an union

```c
union Car
{
    int carId;
    char carName[50];
    char carModel[50];
    char carColor[50];
};
```

Accessing members of an Union

```
void main()
{
    union Car c1; // create a variable/object of an union

    c1.id = 1;
    strcpy(c1.name, "Tata");
    strcpy(c1.model, "Harrier");
    strcpy(c1.color, "Black");
}
```

Print members of an Union

```
void main()
{
    printf(“%d\n”,      c1.id);
    printf(“%s\n”,    c1.name);
    printf(“%s\n”,   c1.model);
    printf(“%s\n”, c1.color);
}
```

Note: When you assign a value to one member of the union, the values of the other members become indeterminate.

Difference between Structure & Union

Parameters	Structure	Union
Keyword	A user can deploy the keyword **struct** to define a Structure.	A user can deploy the keyword **union** to define a Union.
Internal Implementation	The implementation of Structure in C occurs internally- because it contains separate memory locations allotted to every input member.	In the case of a Union, the memory allocation occurs for only one member with the largest size among all the input variables. It shares the same location among all these members/objects.
Accessing Members	A user can access individual members at a given time.	A user can access only one member at a given time.

Difference between Structure & Union

Parameters	Structure	Union
Syntax	The Syntax of declaring a Structure in C is: struct [structure name] { type element_1; type element_2; } variable_1, variable_2, …;	The Syntax of declaring a Union in C is: union [union name] { type element_1; type element_2; } variable_1, variable_2, …;
Size	A Structure does not have a shared location for all of its members. It makes the size of a Structure to be equal to the sum of the size of its data members.	A Union does not have a separate location for every member in it. It makes its size equal to the size of the largest member among all the data members.

Difference between Structure & Union

Parameters	Structure	Union
Value Altering	Altering the values of a single member does not affect the other members of a Structure.	When you alter the values of a single member, it may affects the values of other members.
Storage of Value	In the case of a Structure, there is a specific memory location for every input data member. Thus, it can store multiple values of the various members.	In the case of a Union, there is an allocation of only one shared memory for all the input data members. Thus, it stores one value at a time for all of its members.
Initialization	In the case of a Structure, a user can initialize multiple members at the same time.	In the case of a Union, a user can only initiate the first member at a time.

What is Enumeration?

03.

What is Enumeration?

Enumeration

Enumeration (enum) is a **user-defined data type** that consists of a **set of named integral constants**, known as **enumerators**. It provides a way to **associate names with numbers**, making the

code more readable and understandable.

Syntax of how to create an Enumeration

```
enum enumName
{
    enumerator1,  enumerator2,
    // additional enumerators

};
```

Example of creating an enumeration

```
enum Days
{
    Sunday,         // 0
    Monday,         // 1
    Tuesday,        // 2
    Wednesday       // 3
};
```

Example of creating an enumeration

```
enum Days
{
    Sunday,          // 0
    Monday = 5,      // 5
    Tuesday,         // 6
    Wednesday        // 7
};
```

Note: The numbering starts from 0 by default, but you can explicitly assign values to enumerators if needed.

Variable/Object of an Enumeration

```
void main()
{
    enum Days today;

    today = Wednesday; // Assigning the value Wednesday (7) to
    the variable today
}
```

Language

Let's start now…