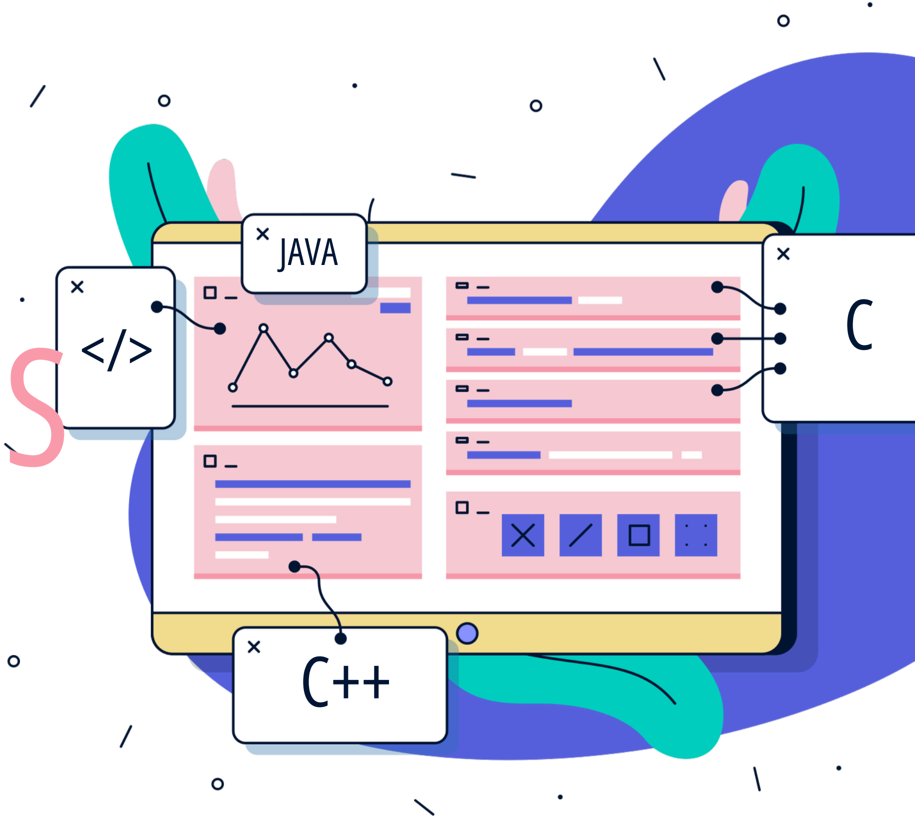
Welcome,
PROGRAMMERS



01.

What is Pattern?

What is

Pattern?

Pattern

A "pattern" is a **specific arrangement of characters or symbols in a systematic and predictable manner**.

Patterns are often used for various purposes, such as

- **creating shapes,**
- **printing formatted outputs, or**
- **recognizing specific sequences of characters**.

Categories of Patterns

Here are common categories of Patterns:

Number
Pattern

```
1
1 2
1 2 3
1 2 3 4
```

Character
Pattern

```
A
A B
A B C
A B C D
```

Symbol
Pattern

```
*
* *
* * *
* * * *
```

Types of Patterns

Here are common types of Patterns:

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Without Space
Pattern

```
            1
1           2
1           2
3
1           2
3           4
1           2
3           4
5
```

With Space
Pattern

```
* * * * *
* * * * *
* * * * *
*
```

Custom
Pattern

02.

What is Structures of Patterns?

What is

Structures of Patterns?

Structures of patterns

Any type of pattern can be done using the coding structure of Nested loop.

Generally, all patterns are done with **nested for loop**. But we can use any other loop also.

Let’s see the **pre-defined coding structures** for all types of **patterns**…

01

Without Space pattern

Coding Structure

```
// Outer Loop
for()
{
    // Inner Loop
    for()
    {
        // code
    }
}
```

02

With Space pattern

Coding Structure

```
// Outer Loop
for()
{
    // Inner Loop for space
    for()
    {
        // code
    }
    // Inner Loop
    for()
    {
        // code
    }
}
```

03

Custom pattern

Coding Structure

```
/*
 -   No any fixed coding structure

 -   We have to create as per the
     given pattern
*/
```

Note that,

- **Outer loop** always iterates for **Rows**

-**Inner loop** always iterates for **Columns**

How to Solve any Pattern

Any type of pattern can be easily solved by following steps:

1. **Divide a pattern into row and column**
2. **Analysis the given Pattern**
3. **Make a Code**

Let’s see **Without Space pattern** in detail with some examples…

01

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

Break down into row & column

		Columns				
		1	2	3	4	5
Rows	1	1	2	3	4	5
	2	1	2	3	4	5
	3	1	2	3	4	5
	4	1	2	3	4	5
	5	1	2	3	4	5

Analysis the given pattern

1. **Total 5 Rows**
   a. Outer loop iterates 5 times
   b. From **1 to 5**

2. **Total 5 Columns**
   a. Inner loop iterates 5 times
   b. From **1 to 5**

		Columns == Inner Loop				
		1	2	3	4	5
Rows == Outer Loop	1	1	2	3	4	5
	2	1	2	3	4	5
	3	1	2	3	4	5
	4	1	2	3	4	5
	5	1	2	3	4	5

Make a Code

```
for ( i=1; i<=5; i++ )
{
     for ( j=1; j<=5; j++ )
     {
          printf(“%d ”, j);
     }
     printf(“\n”);
}
```

		Columns == Inner Loop				
		1	2	3	4	5
Rows == Outer Loop	1	1	2	3	4	5
	2	1	2	3	4	5
	3	1	2	3	4	5
	4	1	2	3	4	5
	5	1	2	3	4	5

02

1

1 2

1 2 3

1 2 3 4

1 2 3 4 5

Break down into row & column

		Columns				
		1	2	3	4	5
Rows	1	1				
	2	1	2			
	3	1	2	3		
	4	1	2	3	4	
	5	1	2	3	4	5

Analysis the given pattern

1. **Total 5 Rows**
   a. Outer loop iterates 5 times
   b. From **1 to 5**

2. **Total i no. of Columns**
   a. Inner loop iterates **i times**
   b. From **1 to i**
   Where, **i == No. of row**

		Columns == Inner Loop				
		1	2	3	4	5
Rows == Outer Loop	1	1				
	2	1	2			
	3	1	2	3		
	4	1	2	3	4	
	5	1	2	3	4	5

Make a Code

```
for ( i=1; i<=5; i++ )
{
    for ( j=1; j<=i; j++ )
    {
        printf(“%d ”, j);
    }
    printf(“\n”);
}
```

		Columns == Inner Loop				
		1	2	3	4	5
Rows == Outer Loop	1	1				
	2	1	2			
	3	1	2	3		
	4	1	2	3	4	
	5	1	2	3	4	5

Language

Let’s start now…

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