Programming with C and C++

CSC-101 (Lecture 17)

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2-D character Array

</> source code

```c
#include <stdio.h>

int main(void) {
    const int ROWS = 3;
    const int COLS = 30;

char grid[3][30] = {
    {"Hello"},
    {"I am in the Dept. of CSE"},
    {"IIT Roorkee"}
};

char searchChar = 'I';
int count = 0;

```

```
15
16  // Searching for the character and counting its occurrences
17  for (int i = 0; i < ROWS; i++) {
18      for (int j = 0; j < COLS; j++) {
19          if (grid[i][j] == searchChar) {
20              count++;
21          }
22      }
23  }
24  printf("Occurrences of '%c ': %d", searchChar,count);
25      return 0;
26  }
27
```

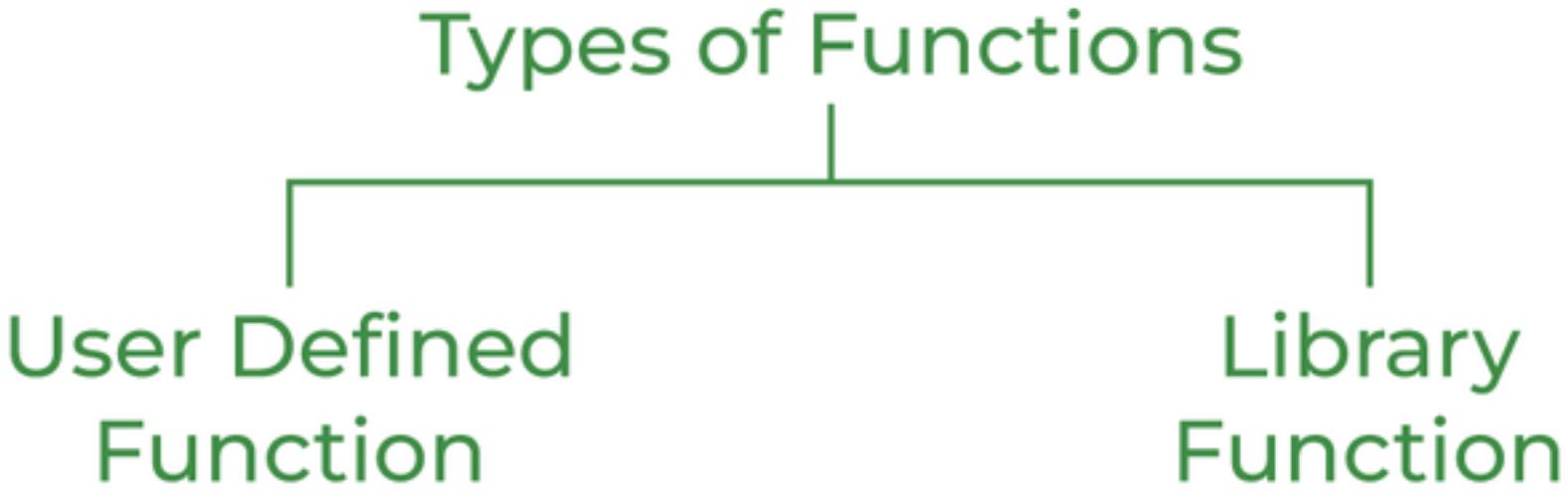
Success #stdin #stdout 0s 5516KB

```
Occurrences of 'I ': 3
```

https://ideone.com/vRXDgv

C Functions

- In C, we can divide a large program into the basic building blocks known as ***function***.
- The function contains the set of programming statements enclosed by { }.
- A function can be called multiple times to provide reusability and modularity to the C program.
- In other words, we can say that the collection of functions creates a program.
- The function is also known as procedure or subroutine or method in other programming languages.


Types of Functions
User Defined Function
Library Function

Function Aspects

SN	C function aspects	Syntax
1	Function declaration/function prototype	`return_type function_name (argument list);`
2	Function call	`function_name (argument_list)`
3	Function definition	`return_type function_name (argument list) {function body;}`

Function Prototype

</> source code

```c
// C program to illustrate the function prototye
#include <stdio.h>

// Function prototype
float calculateRectangleArea(float length, float width);

int main()
{
    float length = 15.0;
    float width = 3.0;

    // Function call
    float area = calculateRectangleArea(length, width);

    printf("The area of the rectangle is: %.2f\n", area);

    return 0;
}

```

```
19
20  // Function definition
21  float calculateRectangleArea(float length, float width)
22  {
23      return length * width;
24  }
25
```

https://ideone.com/qPmD2c

input Output

Success #stdin #stdout 0s 5564KB

```
The area of the rectangle is: 45.00
```

Syntax

```
return_type function_name(parameter_list);
```

```
4   // Function prototype
5   float calculateRectangleArea(float length, float width);
```

Arguments

```
// Function call
float area = calculateRectangleArea(length, width);
```

Function Definition

```c
// C program to illustrate the function definition
#include <stdio.h>

// Function definition
float calculateRectangleArea(float length, float width)
{
    return length * width;
}

int main()
{
    float length = 5.0;
    float width = 3.0;

```

```
15      // Function call
16      float area = calculateRectangleArea(length, width);
17
18      printf("The area of the rectangle is: %.2f\n", area);
19
20      return 0;
21  }
22
```

input Output

Success #stdin #stdout 0.01s 5436KB

```
The area of the rectangle is: 15.00
```

https://ideone.com/2AlaPi

Function Declaration

```c
// C program to illustrate the function declaration
#include <stdio.h>

// Function declartion
float calculateRectangleArea(float, float);

int main()
{
    float length = 20.0;
    float width = 3.0;

    // Function call
    float area = calculateRectangleArea(length, width);

    printf("The area of the rectangle is: %.2f\n", area);

    return 0;
}
```

```
19
20  // Function definition
21  float calculateRectangleArea(float length, float width)
22  {
23      return length * width;
24  }
25
```

https://ideone.com/TwJtef

stdout

```
The area of the rectangle is: 60.00
```

Function without return type and without arguments

```
1   #include<stdio.h>
2   void printName();  //prototype
3   void main ()
4   {
5       printf("Hello ");
6       printName();
7   }
8   void printName()
9   {
10      printf("Welcome to CSC-101 at IITR");
11  }
12
```

stdout

```
Hello Welcome to CSC-101 at IITR
```

https://ideone.com/m1jkcp

- Write a c program to calculate nc_r using functions.

```c
#include <stdio.h>

// Function to calculate the factorial of a number
unsigned long long factorial(int num) {
    unsigned long long fact = 1;

    for (int i = 1; i <= num; i++) {
        fact *= i;
    }

    return fact;
}

```

https://ideone.com/aS8KyR

```
14  // Function to calculate n choose r (nCr)
15  unsigned long long nCr(int n, int r) {
16      if (n < 0 || r < 0 || r > n) {
17          return 0; // Invalid input
18      }
19
20      unsigned long long numerator = factorial(n);
21      unsigned long long denominator = factorial(r) * factorial(n - r);
22
23      return numerator / denominator;
24  }
25
```

```
26  int main() {
27      int n, r;
28
29      printf("Enter the value of n: ");
30      scanf("%d", &n);
31
32      printf("Enter the value of r: ");
33      scanf("%d", &r);
34
35      unsigned long long result = nCr(n, r);
36
37      printf("%dC%d = %llu\n", n, r, result);
38
39      return 0;
40  }
```

stdin

```
10 3
```

stdout

```
Enter the value of n: Enter the value of r: 10C3 = 120
```

Maximum of two numbers

</> source code

```c
#include <stdio.h>

// Function to find the maximum of two numbers
int findMaximum(int num1, int num2) {
    if (num1 > num2) {
        return num1;
    } else {
        return num2;
    }
}

```

https://ideone.com/STvwQQ

```c
int main() {
    int num1, num2;

    // Input the two numbers
    printf("Enter the first number: ");
    scanf("%d", &num1);

    printf("Enter the second number: ");
    scanf("%d", &num2);

    // Call the function to find the maximum and print the result
    int max = findMaximum(num1, num2);

    printf("Maximum number is: %d\n", max);

    return 0;
}
```

Enter the first number: 20
Enter the second number: 40
Maximum number is: 40

Call by or Pass by Value

```c
#include <stdio.h>

// Function to swap two integers using call by value
void swapByValue(int num1, int num2) {
    int temp = num1;
    num2 = num1;
    num2 = temp;
}

int main() {
    int num1, num2;

    printf("Enter the first integer: ");
    scanf("%d", &num1);

```

```
16      printf("Enter the second integer: ");
17      scanf("%d", &num2);
18
19      printf("Before swapping: num1 = %d, num2 = %d\n", num1, num2);
20
21      // Call the swapByValue function to swap num1 and num2 (but it won't work)
22      swapByValue(num1, num2);
23
24      printf("After swapping (call by value): num1 = %d, num2 = %d\n", num1, num2);
25
26      return 0;
27  }
28
```

https://ideone.com/BAr1zQ

```
Enter the first integer: 100
Enter the second integer: 50
Before swapping: num1 = 100, num2 = 50
After swapping (call by value): num1 = 100,
num2 = 50
```

Thank You!