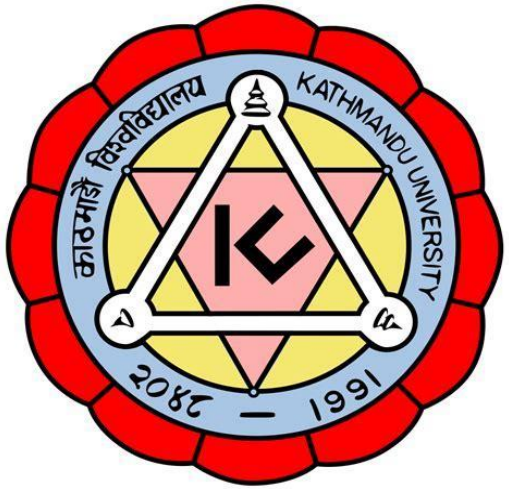
# KATHMANDU UNIVERSITY SCHOOL OF MANAGEMENT

BBIS

COM 102 : 3 Credit Hours




# 7. Functions

# Outlines

## Functions (6 hrs)

- 8.1 Defining Function
- 8.2 Use of function
- 8.3 Function Prototypes
- 8.4 Passing Argument to a Function
- 8.5 Recursive function
- 8.6 Storage Class

# Introduction

- A function is a collection of statements that work together to complete a task.
- Every C program contains at least one function, main(), and even the simplest programs can specify more functions.
- divide up our code into separate functions.
- The division is such that each function performs a specific task.
- A function declaration tells the compiler about a function's name, return type, and parameters.
- A function definition provides the actual body of the function.

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- A function is a set of statements enclosed within curly brackets ({}) that take inputs, do the computation, and provide the resultant output.
- You can call a function multiple times, thereby allowing reusability and modularity in C programming.

The function main() in the program is executed first.

```
main()
{
//statements
}
```

- All other functions are executed from main which calls them directly or indirectly

# Need of Functions???

- Enables reusability and reduces redundancy.
- Makes a code modular.
- Provides abstraction functionality.
- The program becomes easy to understand and manage.
- Breaks an extensive program into smaller and simpler pieces.

# Types of Functions

1. Built-in Functions or Library functions
2. User defined functions

## 1. Built-in Functions or Library functions

- Also referred to as predefined functions, library functions are already defined in the C libraries.
- do not have to write a definition or the function's body to call them.
  - simply call them
- need to include the library at the beginning of the code for calling a library function.
- Printf(), scanf(), ceil(), and floor() are examples of library functions.

# 2. User-defined functions

- These are the functions that a developer or the user declares, defines, and calls in a program.
- Increases the scope and functionality, and reusability of C programming as we can define and use any function we want.
- can add a user-defined to any library to use it in other programs.

# Local and Global Variable

- Local variable
  - A local variable is a variable that is declared inside a function.
  - local variable can only be used in the function where it is declared.

- Global variable
  - A global variable is a variable that is declared outside all function.
  - A global variable can be used in all function

# Defining a Function

- General form:

```
return_type function_name ( parameter list ) {
   body of the function
}
```

- **Return Type** − A function may return a value. The **return_type** is the data type of the value the function returns.
  - Some functions perform the desired operations without returning a value. In this case, the return_type is the keyword **void**.

- **Function Name** − This is the actual name of the function.
  - The function name and the parameter list together constitute the function signature.

…

- **Parameters** − A parameter is like a placeholder. When a function is invoked, you pass a value to the parameter.
  - This value is referred to as actual parameter or argument.
  - The parameter list refers to the type, order, and number of the parameters of a function.
  - Parameters are optional; that is, a function may contain no parameters.
- **Function Body** − The function body contains a collection of statements that define what the function does.

# Example

```
/* function returning the max between two numbers */

int max(int num1, int num2) {
   /* local variable declaration */
   int result;

   if (num1 > num2)
      result = num1;
   else
      result = num2;

   return result;
}
```

# More…

```
int add(int x, int y);

void main()
{
   int c, a=10, b=20;

   c= add(a, b);

   printf("Sum=%d", c);

}
int  add (int x , int y)
{
   int sum;
   sum =x+y;
   return sum;
}
```

Function declaration / function prototype

Function call

Function declarator

Function body

Function definition

# Functions

| SN | C function aspects | Syntax |
|---|---|---|
| 1 | Function declaration | 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 declaration / function prototype

- A function declaration tells the compiler about the number of parameters function takes, data-types of parameters, and return type of function.
- Putting parameter names in function declaration is optional in the function declaration, but it is necessary to put them in the definition.

```
// A function that takes two integers as parameters
// and returns an integer
int max(int , int );

// A function that takes an int pointer and an int variable as parameters
// and returns a pointer of type int
int *swap(int*,int);
```

```
// A function that takes a charas parameters
// and returns a pointer of type char
char *call(char b);

// A function that takes a char and an int as parameters
// and returns an integer
int fun(char, int);
```

# Example

```
int sum(int, int);  // function prototype

int sum(int x, int y) {  // function definition
        z = x + y;
        return z;
}

Int main () {
        int a=5,b=5,c;
        c = sum(a,b);  // calling function
}
```

# Classwork

- Program to calculate maximum of three numbers using function.
  - You will learn:
    - Functions
    - Decision making statements (if else)

# The main function

- The main function is a special function. Every C++ program must contain a function named main.
- It serves as the entry point for the program. The computer will start running  the code from the beginning of the main function.

- **Types of main Function:**

1) The first type is – main function without parameters :

```
// Without Parameters
    int main()
    {
      ...
      return 0;
    }
```

…

2) Second type is main function with parameters :

```
// With Parameters
int main(int argc, char * const argv[])
{
   ...
   return 0;
}
```

- The reason for having the parameter option for the main function is to allow input from the command line.
- When you use the main function with parameters, it saves every group of characters (separated by a space) after the program name as elements in an array named argv.
- Since the main function has the return type of int, the programmer must always have a return statement in the code. The number that is returned is used to inform the calling program what the result of the program's execution was.
- Returning 0 signals that there were no problems.

# Functions

- Depending on argument and the return value function can be classified as:
  - Function with no argument and no return value.
    - Eg ;void Print()
  - Function with argument but no return value.
    - Eg: void add(int x, int y);
  - Function with no argument but return value.
    - Eg: int add();
  - Function with both arguments and return value.
    - Eg: int add(int , int);

# Function with no argument and no return value.

```
void display() {
        printf(“Hello world”);
}

Void main() {
        display();
}
```

# Function with argument but no return value.

```
void addition(int x, int y) {
        printf(“The sum is: %d”, x+y);
}

Void main() {
        addition(2,3);
         addition(10,20);
}
```

# Function with no argument but return value.

```
int addition() {
        int x=5,y=10;
        return x+y;
}

Void main() {
        int sum;
        sum = addition();
        printf(“The addition is: %d”, sum);

}
```

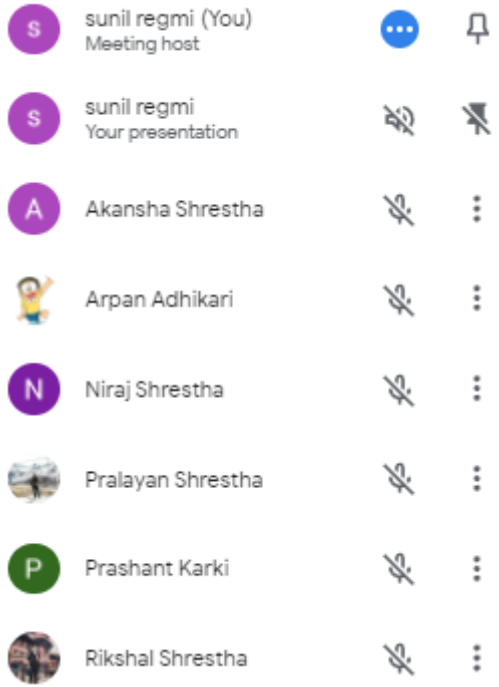
# Function with both argument and return value.

```
int addition(int x, int y) {
        int add;
        add = x+y;
        return add;
}

Void main() {
        int sum;
        sum = addition(10,20);
        printf("The addition is: %d", sum);

}
```

# Nesting functions

```
void first_func();
void second_func();
void third_func();
void main()
{
    first_func();
}
void first_func()
{
   printf("I am in first");
   second_func();
}
```

```
void second_func()
{
   printf("I am in second ");
    third_func();
}
void third_func()
{
   printf("I am in third");
}
```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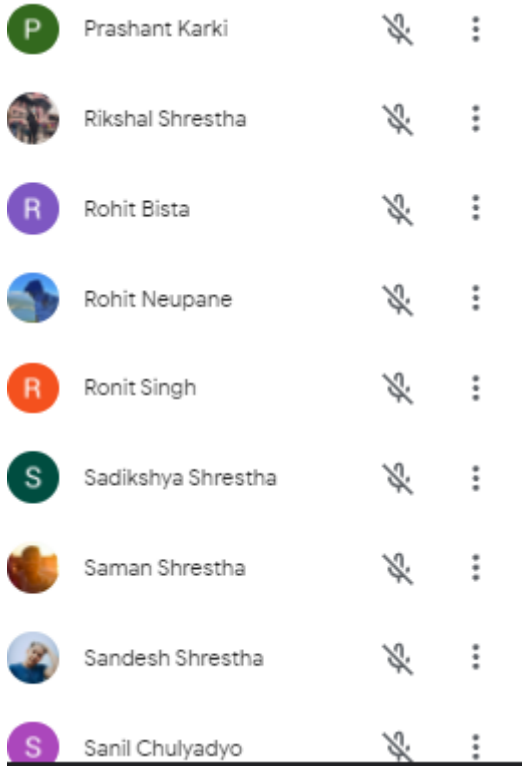
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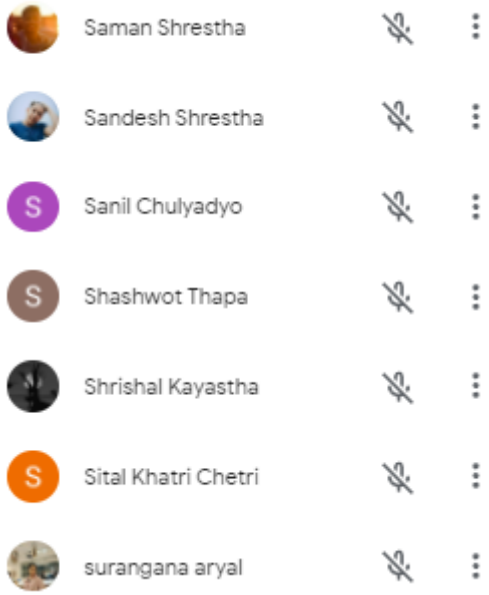
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