Lecture - 6

function & problem statement

Functions:

function is defined a well defined task

Q. Why we want to use function?

Ans: When we want to use the code snippet again & again.

If we copy paste same code again again then code will be more buggy & buggy code.

So we can use function because when we want to that particular function then we can call it & use it.

```
Ex:- void printName ()
     int n;
     cout << "Enter n" << endl;
     cin >> n;
     for(int i=0; i<5; i++){
     cout << "Hello";
     }
```

- Function has it's return type

Syntax:

```
returnType ();
```

- When we use void function then it provide no output.

Function Syntax:-

Return type function name ( ) → Input param

{

- - - -

- - body -

- - - -

- - - }

function name use name of function which should be understandable & meaningful.

Return type are:- void, int, float

Return type → function name

Ex:- int main (/) → No input parameter

{ → syntax

- - - ?

- - -

return 0;

}

Q- What is return 0 & why we used it?

Ans:- Return 0 means that main function is successfully executed. & did what is was intended to do.

Can I create two main functions?

We can't no create two main function. It shows an error one main function is previously defined

Can I give input parameters?

Yes, we can give input parameters. A parameter is a special kind of variable used in function to refer to one piece of data provided as input to the function.

Can I return 1?

A return 1 means that there is some error while executing the program it is not performing what it was intended to do.

Can I return -1?

Same as return(1).

---

* Function Overload:-

function overload means

① we have to first declare the function.

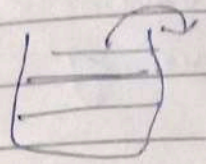
② Where we function invoke atleast the function declared firstly by its

Function call stack:-

Stack is type of data structure which store specific data.

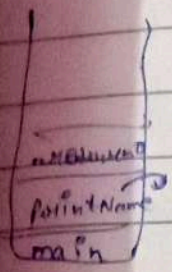
∴ Memory location :- Address of variable

stack follow LIFO (Last In First out).



Stack give an information of :-

① function call
② which function call another function
③ Function local variable's.
④ Function Return value.



Function Return 0 to the operating system.

Q- How to print address of a?

```
int a = 5
cout << "Address of a" << &a ; endl;
```

& → operator use to find address of a.

Q- Write function to add 2 numbers?

Ans :-

```
int add (int a, int b)
{ int sum = a+b;
  return sum;
}
int main (){
  int a,b;
  cin >> a;
  cin >> b;
  int sum = add(a,b)
  cout << "Add is :" << sum << endl;
```

function declare

Function define

It create a copy It called Pass by value.

Imp Topic for Interview

Pass by Value :-

It create a copy of the variable
It not pass the actual value of main function.

Ex:-

```
main ()
{ int num=12;
  num++;
  ++num;
  print (num);
  --num;
  cout << num;
}
```

```
void print (int num)
{
  ++num;
  num++;
  cout << num;
  --num;
}
```

Q. Find Max of 3 no. ?

Ans:-

```
int find max (int a, int b, int c){
  if (a>b && a>c); {
    return a; }
  else if (b>a && b>c) {
    return b; }
  else (c>a && c>>b) {
    return c;
  }
}
```

```
int main() {
  cin >> a >> b >> c;
  int max = find Max (a, b, c);
  cout << "max" << max << endl;
```

Q: Counting 1 to N?

Ans:

```
void print Counting (int n) {
  for (int i=1; i<=n; i++) {
    cout << i << " ";
  }
  cout << endl;
}
int main() {
int n;
cout << "Enter number" << endl;
cin >> n;
print Counting (n);
return 0;
}
```

We (void) using because we only print the value but not return any value.

Q: Write function of student & Grade Problem?

Ans:

marks >= 90 → A

>= 80 → B

>= 70 → C

>= 60 → D

< 60 → F

```
char get Grade (int marks) {
  if (marks >= 90)
    return 'A';
```

```
else if (marks >= 80)
    return 'B';
else if (marks >= 70)
    return 'C';
else if (marks >= 60)
    return 'D';
else
    return 'E';
}
int main (){
cout << "Enter marks" << endl;
cin >> marks;
char Grade = getGrade(marks);
cout << "Grade" << Grade << endl;
return 0; }
```

Q-1 What diff^n b/w Parameter & Argument?

Ans:- Where (n) is declare called parameter
Where (n) is declare in int main function called argument.

Q- Find sum of even no upto N?

Ans:-

```
int getSum(int n){
    int sum=0;
    for (int i=2; i<=n; i++){
        if (i%2 == 0){
            sum = sum + i;
        }
    return sum;
}
```

```
int main(){
int n;
cout << "Enter n" << endl;
cin >> n;
int ans = get sum(n);
cout << "Sum" << ans << endl;
```

→ Homework ←

1. Write a function to display area of circle
2. Find number is Even or Odd
3. Find factorial of number
4. Check number is prime or not
5. Print all prime number from 1 to N.
6. Reverse an Integer
7. Set ith bit n: 8 → 1000 → set 0 bit = 1001 → 9
8. Convert celsius to fahrenheit.
9. Print all digit in an integer.
10. Create a number using digit
11. Print number of set bits.
12. Print binary equivalent of a decimal Number.
13. Convert distance in KMS to Miles.

Q: Can be write any expression inside the case of switch statement?

Ans: The expression used in switch must be integral type (int, char & enum). Any other type of expression is not allowed.

Q- Why we can not find factorial of negative numbers 13?

Ans:- Because since singed integers overflow is in undefined behaviour in c/c++, you can assume that the result of the factorial does not exceed INT_MAX which is 2147483647 for 32 bit signed integers.

→ Weekly connect 2 →

⊙ x = x/5
x/=5

⊙ x = x*8
x* = 8

conditional / ternary operators:-

```
if (age >= 18)
    cout << "Can vote";
else
    cout << "Cannot vote";
```

→ Condⁿ ? statement 1 : statement 2

* Ex:- int a = 5;
int b = 10;

int ans1 = (++a) * (--b) — 54 - o/p
int ans2 = (++a) * (b--) — o/p - 50
int ans3 = (a++) * (--b) — o/p - 49
int ans4 = (a++) * (b--) — o/p - 50

⑨ Print all digit of number?

n = 623

o/p - 6, 2, 3

623 % 10 → 3
↓ /10
62 % 10 → 2
↓ /10
6 % 10 → 6
↓ /10
0 out gya

```
int n = 623;
if( n > 0){
  while ( n != 0){
    int rem = n % 10;
    cout << "Rem" << rem << endl;
    n = n / 10;
  }
}
cout << endl;
return 0;
}
```

⊙
```
for (int i = 1; i <= 10; i++){
    cout << "Babbar";
}
int i = 1;
while ( i <= 10){
  cout << "Babbar";
    i++;
}
```

⑩ Create a number of digit?

Ans. i/p ⇒ 8, 2, 3

o/p ⇒ 823

8 2 3

10^2 10^1 10^0

800 + 20 + 3 = 823

formula :- [ans * 10 + digit]

[8][2][3][7] → digit[3]
digit[0] digit[2] digit[2]

```
int digit = {8, 2, 3};
int ans = 0;
for (int i=0; i<3; i++){
    ans = ans * 10 + digit;
}
cout << ans << ~~digit~~ endl;
```

(11) Print number of set bits?

Ans:

```
int n = 3;
int ans = 0;

while (n != 0){
    if (n & 1){
    // found one set bit, so increment
bit bit count
    ans++;
}
// right shift
n = n >> 1;
}
cout << "Num of set bits" << ans << endl;
```

11 → 0000 1011
& 1

1 → 1 set bit

>> Right shift by 1

0000 101
& 1

1 → 1 set bit

>> Right shift by 1

0000 10
& 1

0

>> Right shift

0000 1
& 1

1 → 1 set bit

>> Right shift

0000 → 0 (Ruk gya)

(12) Convert km into miles?

Ans:- 1 km = $\frac{1}{1.6}$ miles

1 miles = 1.6 km

```
int km;
cout << "Enter the value of km" << endl;
cin >> km;
cout << "value in miles is " << (1/1.6)*km
     << endl;
```

Q- Why there are infinite no. of set bits in the negative number?

Ans:- There are infinite no. of set bits in the negative number because it has no last element. These element cannot be counted. A infinite set that can be placed into a one-to-one correspondence with a proper subset of itself.

Q- Why negative no. of set bits getting in supply of bits in loop?

Ans:-

(12) # Number System - Binary & Decimal

1- Method to represent numeric value or quantities using diff^n digits, →

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Ex:- 10, 17, 121

2- Decimal System:-

- The decimal number system has base
- It uses digit from 0 to 9.

- **Base :-** It is the number of symbols (digit) a number system uses.

3. Binary Number System :-
   - Number system using base 2.
   - It uses only two digit is 0 & 1.

Decimal	Binary	Decimal	Binary
0	0	12	1100
1	1	13	1101
2	10	14	1110
3	11	15	1111
4	100	16	10000
5	101	17	10001
6	110	18	10010
7	111	19	10011
8	1000	20	10100
9	1001	21	10101
10	1010	22	10110
11	1011	23	10111

Rule - 8 4 2 1

→ Decimal to Binary Conversion :-

Division Method :-

1. Divide by 2
2. Store remainder (that will be a in binary no)
3. Repeat above step with quotient until quotient less than 2
4. Reverse the bits so obtained.

Ex:- n = 10

Division	Rem
10/2 → 5	0
5/2 → 2	1
2/2 → 1	0
1/2 → 0	1

1010

Neeche se upar Read karte hai

```
#include <cmath>
#include <iostream>
using namespace std;
int decimalToBinary Method1(int n){
    // Division Method
    while(n>0){
        int bit = n%2;
        cout << bit << endl;
        binaryno = bit * pow(10,i++) + binaryno;
        n = n/2;
    }
return binaryno;
}
int main(){
int n;
cin >> n;
int binary = decimalToBinary Method1(n);
cout << binary << endl;
}
```

int binaryno = 0;
int i = 0;

Bitwise Method :-

1. obtain bit with bitwise AND operation (ex - (N & 1))
2. Right shift N by 1. (N = N >> 1)
3. Repeat above steps till N > 0.
4. Reverse the bits so obtained.

```
int decimalToBinary Method2 (int n){
    // Bitwise Method
    int binary no = 0;
    int i = 0;
    while (n > 0){
        int bit = (n & 1);
        binary no = bit * pow (10, i++) + binary no;
        n = n >> 1;
    }
    return binary no;
}

int main ()
{
```

} this function same as method 1

```
call the function
}
```

Binary to Decimal Conversion:-

① Multiple each digit with this place value.
② Add up all place values.
③ Sum is the Decimal value.

Ex:- 1010 → 10

~~1×10⁴ + 0×10³ + 1×10² + 0×10¹ + 0×10⁰~~

$1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0$

$8 + 0 + 2 + 0$

10

```
int binaryToDecimal(int n){
    int decimal = 0;
    int i = 0;
    while(n){
        int bit = n%10;
        decimal = decimal + bit * pow(2,i++);
        n = n/10;
    }
    return decimal;
}

int main()
{
    } Same as method1

Call the function & print it
}
```

Q-1 Function to display Area of Circle?

Ans:-

```
int getarea(int w){
    int area = 3.14 * w * w;
    return area;
}
int main(){
    int w;
    cout << "Enter the Radius: ";
    cin >> w;
    int area = getarea(w);
    cout << "Area of circle: " << area << endl;
    return 0;
}
```

Q-2 Find numbers is Even or Odd?

Ans:-

```
bool checkEven(int n){
    if(n%2 == 0){
        return true;
    }
    else{
        return false;
    }
}
int main(){
    int n;
    cin >> n;
    bool isEven = checkEven(n);
    if(isEven){
        cout << "Numbers is Even";
}
```

Other code in VS code

```
else {
cout << "Number is odd" << endl;
}
}
```

→ Four Bitwise method

```
bool checkEven(int n){
    if(n&1 == 0){
    return true;
    }
    else {
    return false;
    }
}
```

main function same method 2.

Q.3- Find the factorial of Number?

Ans/-

```
int getFactorial(int n){
    int ans = 1;
    for(int i=1; i<=n; i++){
        ans = ans * i;
    }
    return ans;
}

int main(){
    int n;
    cout << "Enter number";
    cin >> n;
```

```
int fact = getfactorial(n);
cout << "factorial is : " << fact << endl;
```

We can use at place (int) → (long long int) for the large number of values.

Q-4- Given Number is prime or Not?

Ans/-

```
bool checkPrime(int n){
    for(int i=2; i<n ; i++){
        if (n%i ==0){
        return false;
        }
    }
    return true;
}
int main(){
    int n;
    cout << "Enter number";
    cin >> n;
    bool isPrime = getPrime(n);
    if (isPrime){
        cout << "Number is Prime" << endl;
    }
    else {
        Cout << "Number is not Prime" <<
            endl;
    }
}
```

Q-5- Print all prime from 1 to N?

Ans/-

```
bool checkPrime(int n){
    for(int i=2; i<n; i++){
        if(n%i==0){
            return false;
        }
    }
    return true;
}
int main(){
    int n;
    cout<<"Enter Number: "<<endl;
    cin>>n;

    for(int i=2; i<=n; i++){
        bool isPrime = checkPrime(i);
        if(isPrime){
            cout<<i<<" ";
        }
    }
}
```

Interview Imp

Q-6- Reverse an Integer?

Ans/-

I/P → 123, -123

O/P → 321, -321

```
int reverse(int x){
  int ans = 0, rem = 0;
  bool isNeg = false;
  if (x <= INT_MIN){
    return 0;
  }
  if (x < 0){
    isNeg = true;
    x = -x;
  }
  while (x > 0){
    if (ans > INT_MAX / 10){
      return 0;
    }
    int digit = x % 10;
    ans = ans * 10 + digit;
    x = x / 10;
  }
  return isNeg ? -ans : ans;
};
```

Question of leetcode
Question 8.

Link :- https://leetcode.com/problems/reverse-integer/

~~Interview Imp.~~

Q-7- Set the kth bit?

Ans/- N = 10 → 1010

Set K = 2 → 1110 → 14 //

Step 1 - 2's compliment

1010 1<<K

0100 (Check set kth bit

Step -2 → Do Bitwise OR N & value

1010

0100

1110 → 14

```
int setKthBit (int N, int K)
{
    int mask = 1 << K;
    int ans = N | mask;
    return ans;
}
};
```

OR

```
int setKthBit(int N, int K)
{
    return N | (1 << K);
}
```

Q 8. Celcius to Farahneit?

Ans. Celcius → Kelvin → Farahneit

```
double k = celsius + 273.15;
double f = celsius * 1.80 + 32.00;

vector <double> v;
v.pushback(k);
v.push_back(f);
return v;
};
```

→ C++ Quiz 2 → Done

→ Debugging Exercise 2 → Done