Experiment No. 7
FUNCTIONS, ARRAY and STRINGS in C++

I. OBJECTIVES

1. To employ different function statements in C++ programs.
2. To differentiate and use standard functions and programmer-defined functions in different applications.
3. To employ different stringfunction statements in C++ programs.
4. To be able to implement the two types of array.

II. LABORATORY EXERCISES

Encode the following program and compile them. Illustrate the output.
Note: if getch(); will not work on other C++ ide compiler replace it with _getch();
For www.onlinegdb.com editor and cxxdroid (mobile app) you may remove it.

Program no.1 (save as functionex1.cpp)

```
#include<iostream>
#include<conio.h>
#include<windows.h>
using namespace std;
void gotoxy ( short x, short y )
{
COORD coord = {x, y};
SetConsoleCursorPosition ( GetStdHandle ( STD_OUTPUT_HANDLE ), coord );
}
int main ()
{
// Set text color as Yellow with white background.
SetConsoleTextAttribute(
GetStdHandle( STD_OUTPUT_HANDLE ),
FOREGROUND_INTENSITY | 6|// Text color as Yellow.
BACKGROUND_INTENSITY                                                    |
BACKGROUND_RED|BACKGROUND_GREEN|BACKGROUND_BLUE );
// White Bg.
gotoxy(31,12);cout<<"OFFICIAL RECEIPT";
_getch();
return 0;
}
```

Program No. 2 (save as functionex2.cpp)

```
#include<iostream>
#include<conio.h>
using namespace std;
int funct(int x);
int main ()
{
int c;
        for (c=1; c<=5;c++)
{
```

```
cout<<"\n"<<funct(c);
}
_getch();
return 0;
}

int funct(int x)
{
int y;
y=x*x;
return y ;
}
```

Program No 3. (save as functionex3.cpp)

```
#include<iostream>
#include<conio.h>
using namespace std;
int subprog(int c);
int y;
int main ()
{
int c;
c=1; y=0;
while(c<=5)
{
                    cout<<" "<<subprog(c);
c++;
}
_getch();
return 0;
}
int subprog(int x)
{
y+=x;
return y ;
}
```

Program No 4. (save as string1.cpp)

```
#include<iostream>
#include<string>
usingnamespacestd;
intmain()
{
stringname("My true north");
stringcrush("Tara my love");
cout<< name <<"\n";
cout<< crush;
cout<<"\nThe length og string name is "<<name.length();
            cout<<"\nThe length og string crush is "<<crush.length();

name +=crush; // string
//name += '\n'; // character
cout<<"\n";
cout<<"The new content of string name: "<<name;
```

```
cout<<"\nThe new length of string name is "<<name.length();
cout<<"\n"<<crush.append(" of my life.")<<"\n";
system("pause");
return 0;
}
```

Program no.5 (save as string2.cpp)

```
#include<iostream>
#include<string>
usingnamespacestd;
intmain()
{
string word, temp;
                    intlen, i, x, upper = 0, lower = 0, number = 0, special = 0;;
cout<<"Enter any word/paragraph: ";
getline(cin,word);
len = word.length();
cout<<"The reverse form is: ";
for (x = len - 1; x >= 0;x--)
{
cout<<word[x];
}


for (i = 0; i<len; i++)
{
if (word[i]>= 'A'&& word[i]<= 'Z')
upper++;
elseif (word[i]>= 'a'&& word[i]<= 'z')
lower++;
elseif (word[i]>= '0'&& word[i]<= '9')
number++;
else
special++;
}
cout<<"\nUpper case letters: "<< upper;
cout<<"\nLower case letters : "<< lower;
cout<<"\nNumber : "<< number;
cout<<"\nSpecialcharacters : "<< special;

for (i = 0;word[i] != '\0';i++)
{
word[i] = toupper(word[i]);
}
cout<<"\nAll caps: "<<word<<endl;

system("pause");
return 0;
}
```

Program No.6 (save as array1.cpp)

```
#include<iostream>
#include<conio.h>
usingnamespace std;
int main ()
```

```
{
int a, b=0;
int c[10]={1,2,3,4,5,6,7,8,9,0};
for (a=0;a<10;a++)
if ((c[a]%2) == 0)
b+=c[a];
cout<<b;
getch();
return 0;
}
```

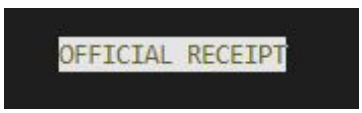
Program No 7. (save as array2.cpp)

```
#include<iostream>
#include<conio.h>
usingnamespace std;
int main ()
{
int r,c;
int num[2][3];
//loads the values
for(r=0;r<2;r++)
for(c=0;c<3;c++)
num[r][c]= (r*4)+(c+19);
//displays the previously loaded values
for(r=0;r<2;r++){
for(c=0;c<3;c++)
cout<<" "<<num[r][c];
cout<<"\n";
}
getch();
return 0;
}
```

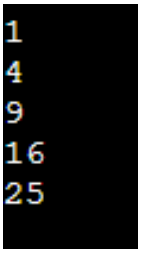
III. Summary of Program Outputs

Direction: Demonstrate the corresponding output for each of the given programs. Give your observation and analysis for each of the problems.

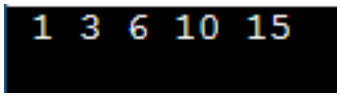
1. My analysis to this program, we took use of the void gotoxy(short x, short y) function to manipulate the position of the text(in this case "OFFICIAL RECEIPT") with the value of x and y axis. And we can see that in the main function, we manipulated the color of the background into white and the foreground or the characters into yellow with the use of SetConsoleTextAttribute.



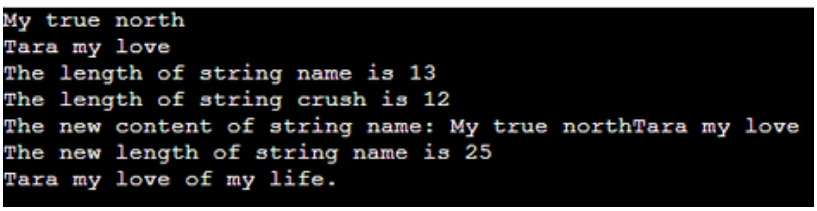
2. In this program, we used the int funct(int x) function which squares the value of x, we then call funct(c) inside a for loop which is indexed in c = 1, have a condition of c is less than or equal to 5, and is incremented by 1, so the first c value is squared which gives us 1, and then incremented by 1 which gives 2 and then squared which gives us an output of 4 , c again is incremented which gave it value of 3, square that and you get 9 and so on. Simply the outputs are square value of 1, 2, 3, 4, and 5.



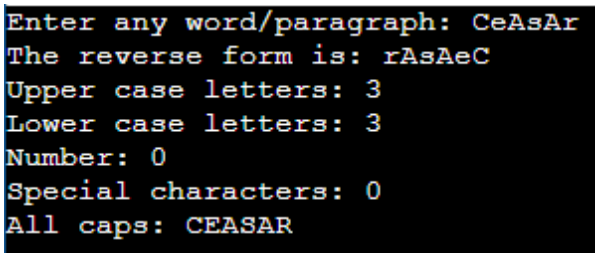
3. In this, we declared the function int subprog(int x) after the main function in which it equates the value of y is equals to value of y plus value of x. Then we called int subprog(int c) on top and initialize int y, then a simple while loop which has a condition of c is less than or equal to 5, while c has a value of 1, it will give five outputs overall because of the condition. First output is 1 because initially y doesn't have any value, and it is added to the value of c because of the parameter subprog(int c) which gave us the first output 1, so the value of y now is 1, because now, y is equals to y plus the value of c. and now that c is incremented by 1, y equals y plus c is 3 and so on.

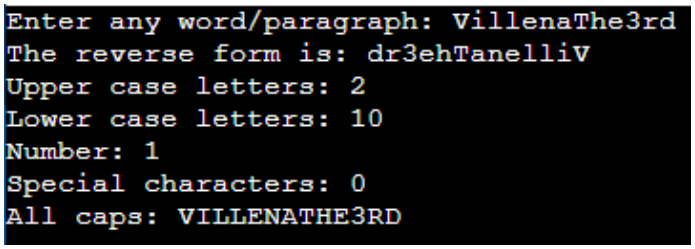


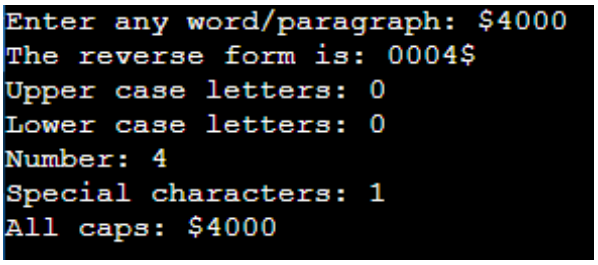
4. In this program we used the library header <string> , and we initialize the string name and crush sentences or characters. First we displayed name ("My true north") and in the next line crush ("Tara my love"). In the next line we retrieved the character length of both name and crush using the .length() which gave us a value of 13 for name and 12 for crush. We concatenated the content of crush into name which gave us My true northTara my love. Then we get the length of the new name which gave us the value of 25. Lastly, we appended the string " of my life" into crush which gave us "Tara my love of my life" using the .append() command.



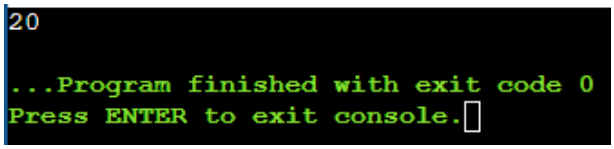
5. In this program we left the two string blank as we will input the value ourselves and we got the length of the inputted string by using .length and equated it to the integer len. And then we reversed the inputted string by using a for loop in which x is equals to len - 1 //len is decreased by 1 because of the index number 0, and a condition of x is greater than or equal to 0, and x is decremented by 1. The counter of lower case letters, upper case letters and numbers was achieved using a for loop that increments characters by characters testing it 1 by 1 if it falls into the categories and then incrementing the respected variables.
Lastly we have a for loop to turn lower case letters into upper case using a for loop and toupper command.







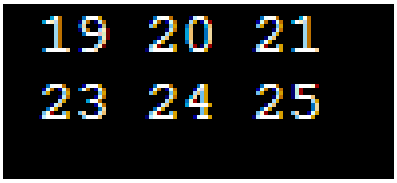
6. This program is very simple as we have a for loop that tests if c[a] is even, it equates b is equal to b plus c[a], basically, it only increments by the even numbers found in the array above. In simpler terms the program above looks like this 0+2+0+4+0+6+0+8+0+0 =20, thus giving us an output of 20



7. In this program we filled the two dimensional array num by using two for loop, one for the row and one for the column, with only having 2 rows and 3 columns due to the condition set in the for loops. Now num[0][0] = (4*0)+(0+19), num[0][1] = (4*0)+(1+19), num[0][2] = (4*0)+(2+19), that will be 19, 20, 21 and , num[1][0] = (4*1)+(0+19), num[1][1] = (4*1)+ (1+19), num[1][2] = (4*0)+(0+19), that will be 23, 24, 25. Again we used a for loop to display num[r][c]. The positioning will be

[0][0] [0][1] [0][2]
[1][0] [1][1] [1][2]

thus the output.



IV. Supplementary Problems

1. Write a function-oriented program that calculates the power value of the input base number and exponent number. Then display the power value. Write your input and output display statements at the main function and the process statement at the other function.
Sample output:

Enter base number: 5
Enter exponent number : 3
Power value: 125

```cpp
#include <iostream>
using namespace std;
int power_Value(int, int);
int main()
{
  int Base, Exponent;
  cout<<"Enter base number: ";
  cin>>Base;
  cout<<"Enter exponent number: ";
  cin>>Exponent;
  int finalVal = power_Value(Base, Exponent);
  cout<<"Power value: "<<finalVal;
  return 0;
}

int power_Value(int x, int y)
{
    int z = 1;
    for(int i = 0; i < y; i++){
        z*=x;
    }
    return z;
}
```

```
Enter base number: 3
Enter exponent number: 4
Power value: 81

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter base number: 10
Enter exponent number: 5
Power value: 100000

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter base number: 2
Enter exponent number: 6
Power value: 64

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter base number: 25
Enter exponent number: 4
Power value: 390625

...Program finished with exit code 0
Press ENTER to exit console.
```

IV. Supplementary Problems

2. Write a program using 3x4 array that searches a number and displays the number of times it occurs on the list of 12 input values.

Sample output:

Enter 12 numbers: 15 20 13 30 35 40 16 18 20 18 20 20
Enter a number to search: 20
Occurrence(s): 4

```cpp
#include <iostream>
#include <cstring>
using namespace std;
int main()
{
    int num [3][4];
    int searchNum;
    int r;
    int c;
    int occur = 0;
    cout<<"Enter 12 numbers: ";
    for(r=0;r<3;r++){
        for(c=0;c<4;c++){
        cin>>num [r][c];
        }
    }
    cout<<"Enter a number to search: ";
    cin>>searchNum;
    if(searchNum == num [0][0]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [0][1]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [0][2]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [0][3]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [1][0]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [1][1]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [1][2]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [1][3]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [2][0]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [2][1]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [2][2]){
        occur+=1;
    }else{
        occur+=0;
    }
    if(searchNum == num [2][3]){
        occur+=1;
    }else{
        occur+=0;
    }
    cout<<"Occurence(s): "<<occur;
    return 0;
}
```

IV. Supplementary Problems

2. Write a program using 3x4 array that searches a number and displays the number of times it occurs on the list of 12 input values.

Sample output:

Enter 12 numbers: 15 20 13 30 35 40 16 18 20 18 20 20
Enter a number to search: 20
Occurrence(s): 4

```
Enter 12 numbers: 12
12
14
13
15
16
18
12
21
22
21
31
Enter a number to search: 12
Occurence(s): 3

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter 12 numbers: 99
89
78
75
89
99
100
99
99
99
76
86
Enter a number to search: 99
Occurence(s): 5

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter 12 numbers: 20
20
20
21
29
28
27
25
24
26
26
21
Enter a number to search: 26
Occurence(s): 2

...Program finished with exit code 0
Press ENTER to exit console.
```

IV. Supplementary Problems

3. Write a program using string functions that accepts a price of an item and display its coded value. The base of the key is:

X C O M P U T E R S
0 1 2 3 4 5 6 7 8 9

Sample output:

Enter price: 489.50
Coded value: PRS.UX

```cpp
#include <iostream>

using namespace std;

int main()
{
    int priceValue;
    string x[10] = {"X","C","O","M","P","U","T","E","R","S"};
    cout<<"Enter Price: ";
    cin>>priceValue;
    cout<<"Coded Value: ";
    if (priceValue>999){
        cout<<x[priceValue/1000];
        priceValue=priceValue%1000;
    }
    if (priceValue>99 && priceValue<1000){
        cout<<x[priceValue/100];
        priceValue=priceValue%100;
    }
    if (priceValue<99 && priceValue>10){
    cout<<x[priceValue/10];
    priceValue=priceValue%10;
    }
    if (priceValue<10){
    cout<<x[priceValue%10];
    }
    return 0;
}
```

```
Enter Price: 23
Coded Value: OM

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter Price: 147
Coded Value: CPE

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter Price: 143
Coded Value: CPM

...Program finished with exit code 0
Press ENTER to exit console.
```

```
Enter Price: 197
Coded Value: CSE

...Program finished with exit code 0
Press ENTER to exit console.
```

V. Conclusion

I concluded that Functions, Arrays and Strings are one of the hardest topics covered in this course. We as a student need to give 100 percent of our effort to truly understand the lessons and concepts and practice from time to time so that we can naturally apply the learned concepts by heart and mind.