School Of Mechanical & Manufacturing Engineering, NUST

Department of Mechanical Engineering

CS-114 - Fundamental of Programming

Lab Manual # 03

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Degree/ Syndicate: MECHANICAL ENGINEERING

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Objective:

This lab is about the selection structure and understanding the types of selection structures.

Description:

Selection: decisions, branching, when there are 2 or more alternatives. There are three types of selection structures:

- if
- if...else
- switch

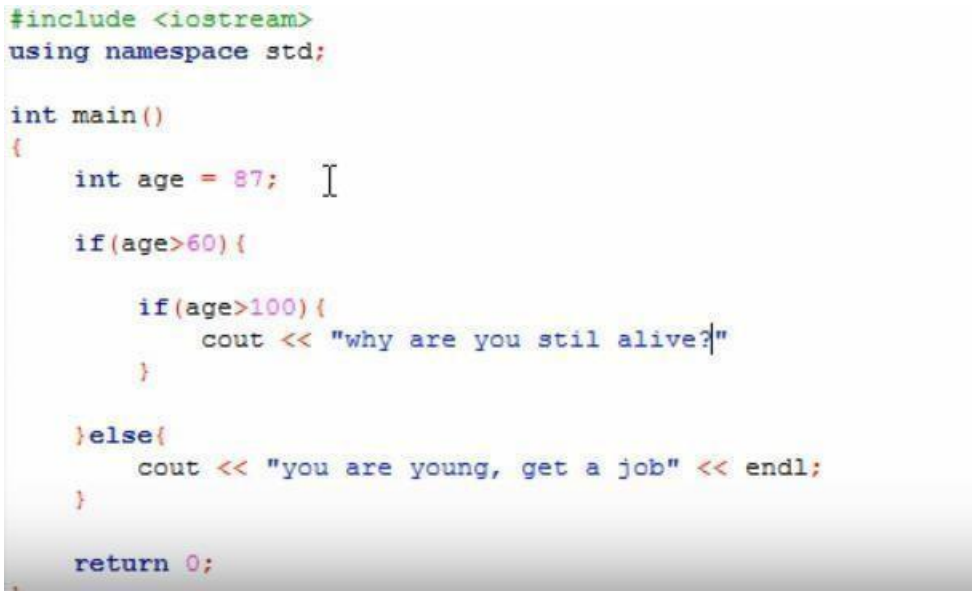
Nested if else:

In C++ we can use an if statement in another else block or we can also include an if block in another if block.

Syntax : C++ Nested If

```
if( boolean_expression 1)
{
      // Executes when the boolean expression 1 is true
      if(boolean_expression 2)
      {
            // Executes when the boolean expression 2 is true
      }
}
```


Example: Nested If



```
#include <iostream>
using namespace std;

int main()
{
    int age = 87;

    if(age>60){

        if(age>100){
            cout << "why are you stil alive?"
        }

    }else{
        cout << "you are young, get a job" << endl;
    }

    return 0;
```

We can nest else if…else in a similar way as you have nested the if statement.

Example: Nested If-else

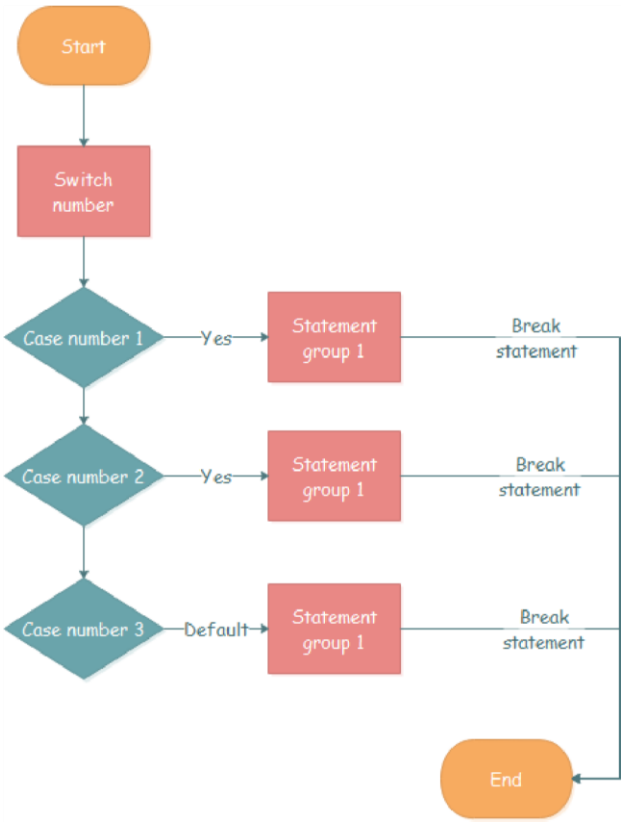
```
#include <iostream> using
namespace std;


int main ()
{
      int marks = 55;
      if( marks >= 80) {
            cout << "U are 1st class !!";
      } else
      {
            if( marks >= 60) {
                  cout << "U are 2nd class !!";
            } else
            {
```

```
                if( marks >= 40) {
                    cout << "U are 3rd class !!";
                } else
                {
                    cout << "U are fail !!";
                }
            }
        } return
        0;
}
```

Switch Statement:

Switch case statements are a substitute for long if statements. A switch statement allows a variable to be tested for equality against a list of values. Each value is called a case, and the variable being switched on is checked for each switch case.

```
switch (n)
{
    case 1: // code to be executed if n = 1;
        break;
    case 2: // code to be executed if n = 2;
        break;
    default: // code to be executed if n doesn't match any cases
}
```



Lab Task:

1. Write a C++ code for a basic calculator application, using switch...case, to carry out operations such as addition, subtraction, multiplication, or division.
2. Write a C++ program that prints the total number of days in a month, using a switch case.
3. Write a C++ program to take two integer values from the user. Check whether the values are equal. If they are not equal, determine and display the greater value using nested if-else statements.
4. Write a C++ program to read the value of an integer m and display the value of n is 1 when m is larger than 0, 0 when m is 0, and -1 when m is less than 0 using nested if-else.

Home Task:

1. Write a C++ program to print the total number of populations in Punjab, Sindh, KPK, and Balochistan using a switch case.
2. Write a C++ program to check whether an alphabet is a vowel or consonant using a switch case.

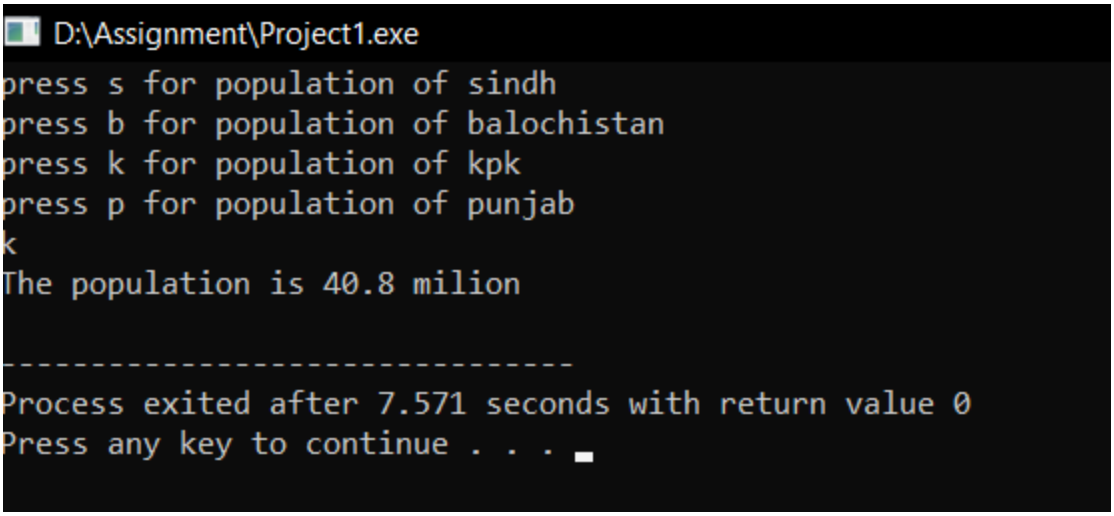
3. Write a C++ program to check whether a number is positive, negative, or zero using a switch case.
4. Write a C++ to find out whether a person is an adult, teenager, or child using nested if-else.
5. Write a C++ program that takes three number from the user and find the greatest number out of the three numbers using nested if-else statements.

6. Write a C++ program to check whether the alphabet entered by the user is Vowel or Consonant using nested if-else.

HOMEWORK TASKS

TASK 1

```
#include <iostream>
using namespace std;
int main()
{
char province;
cout<<"enter s for population of sindh"<<endl;
cout<<"enter p for population of punjab"<<endl;
cout<<"enter b for population of balochistan"<<endl;
cout<<"enter k for popuation of kpk"<<endl;
cin>>province;
switch (province){
case 's':
cout<<"the population of sindh is 54 million";
break;
case 'p':
cout<<"the population of punjab is 110 million";
break;
case 'b':
cout<<"the population of balochistan is 21.7 million";
break;
case 'k':
cout<<"the population of kpk is 40.8 million ";
break;
default :
cout<<"invalid response";
}
}
```



TASK 2

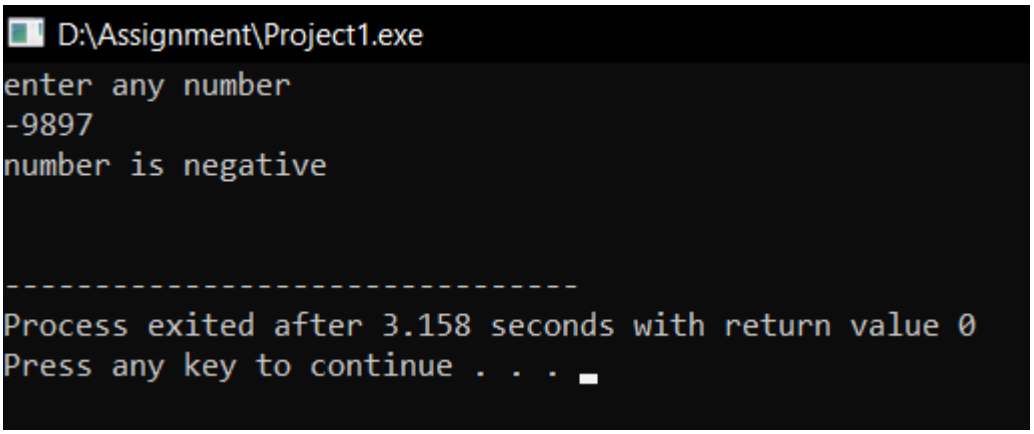
```
#include <iostream>
using namespace std;
int main()
{
char alphabet;
cout<<"enter your preffered alphabet ";
cin>>alphabet;
switch (alphabet){
case 'a':
case 'A':
case 'e':
case 'E':
case 'i':
case 'I':
case 'o':
case 'O':
case 'u':
case 'U':
cout<<"alphabet is a vowel ";
break;
default:
cout<<"your alphabet is a consonent ";
```

} }

```
D:\Assignment\Project1.exe
enter your preffered alphabet
s
your alphabet is a consonant

--------------------------------
Process exited after 2.879 seconds with return value 0
Press any key to continue . . .
```

TASK 3

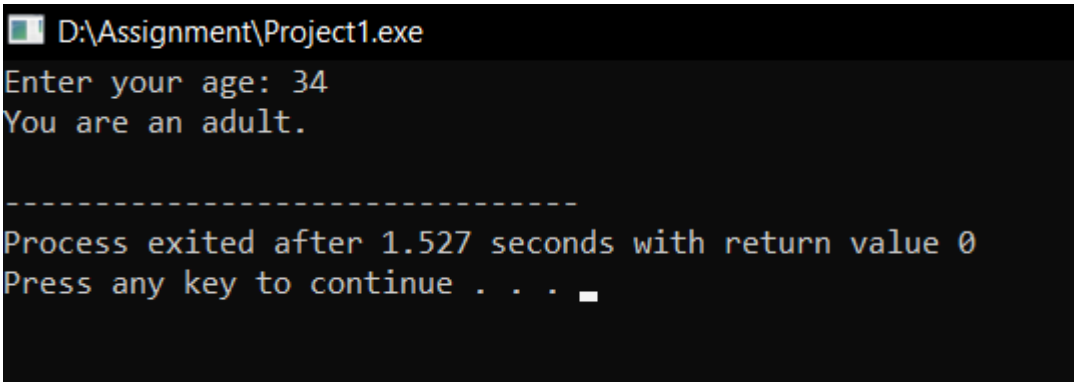
```
#include<iostream>
using namespace std;
int main()
{
int num,z,x,y;
cout<<"enter any number"<<endl;
cin>> num;
switch(num>0) {
	case 1:
		cout<<"number is positive"<<endl;
		break;
	case 0:

		switch(num<0) {
			case 1:
				cout<<"number is negative" <<endl;
				break;
			case 0:
				cout<<"number is zero"<<endl;
				break;
				default:
					cout<<"number invalid"<<endl;
		}
default:
	cout<<""<<endl;
}
}
```



TASK 4

```
#include <iostream>
using namespace std;
int main() {
   int age;


   cout << "Enter your age: ";
   cin >> age;

   if (age >= 18) {

      cout << "You are an adult." <<endl;
   } else {

      if (age >= 13) {

         cout << "You are a teenager." <<endl;
      } else {

        cout << "You are a child." <<endl;
      }
   }
```

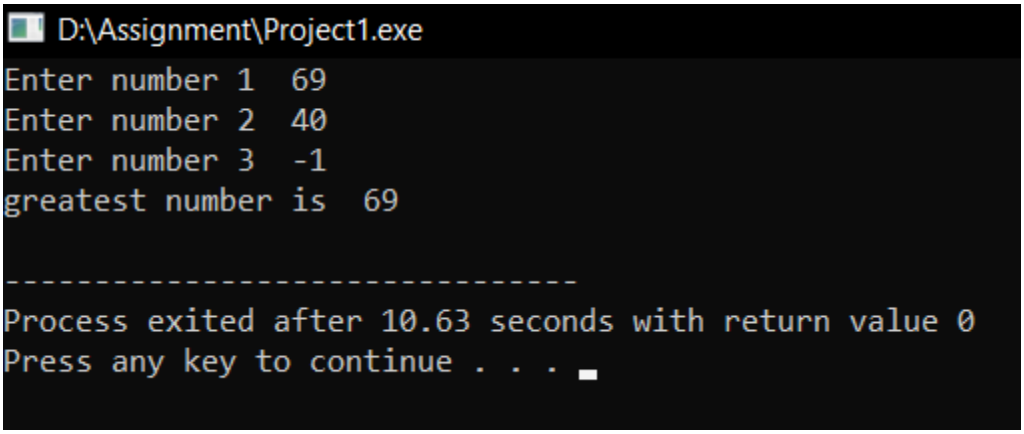
```
    return 0;
}
```


D:\Assignment\Project1.exe
Enter your age: 34
You are an adult.

Process exited after 1.527 seconds with return value 0
Press any key to continue . . .

TASK 5

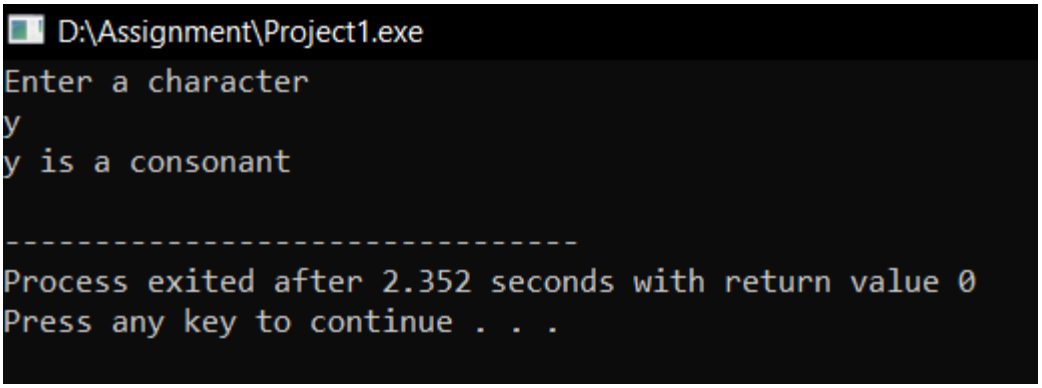
```
#include <iostream>
using namespace std;
int main() {
   double num1, num2, num3;


   cout <<  "Enter number 1 ";
   cin >> num1;

   cout <<  "Enter number 2 ";
   cin >> num2;

   cout <<  "Enter number 3 ";
   cin >> num3;

   if (num1 >= num2) {
      if (num1 >= num3) {
         cout << "greatest number is " << num1 << endl;
      } else {
         cout << "greatest number is " << num3 << endl;
      }
   } else {
      if (num2 >= num3) {
         cout << "greatest number is " << num2 << endl;
      } else {
         cout << "greatest number is " << num3 << endl;
      }
   }

   return 0;
}
```


D:\Assignment\Project1.exe
Enter number 1 69
Enter number 2 40
Enter number 3 -1
greatest number is 69

Process exited after 10.63 seconds with return value 0
Press any key to continue . . .

TASK 6

```
#include<iostream>
using namespace std;

int main()
 {
   char chara;
   cout << "Enter a character"<<endl;
   cin >> chara;


   if (chara >= 'a' and chara <= 'z')  {

      if (chara == 'a' or chara == 'e' or chara == 'i' or chara == 'o' or chara == 'u') {
         cout << chara << " is a vowel" << endl;
      } else {
         cout << chara << " is a consonant"  << endl;
      }
   } else {
      cout << "Invalid input. Please enter an alphabet." << endl;
   }

   return 0;
}
```



LAB WORK TASKS

TASK 1

```
int num1(0), num2(0);
double x,y,z,f;
char operation;
cout<<"enter num1"<<endl;
cin>>num1;
cout<<"enter num2"<<endl;
cin>>num2;
cout<<"press a for addition"<<endl;
cout<<"press s for subtraction" <<endl;
cout<<"press d for division"<<endl;
cout<<"press m for multiplication"<<endl;
cin>>operation;
x=num1+num2;
y=num2-num1;
z=num2*num1;
f=num2/num1;
 switch(operation) {
       case'a':
                  cout<<x<<endl;
                  break;
    case's':
       cout<<y<<endl;
       break;
    case'd':
       cout<<z<<endl;
        break;
    case'm':
       cout<<f<<endl;
       break;
    default:
       cout<<"no correct operation"<<endl;
       break;
 }
```

TASK 2

```
int mon;
   cout << "Enter the month (1-12)"<<endl;
   cin >> mon;

   switch (mon) {
      case 1:
      case 3:
      case 5:
      case 7:
      case 8:
      case 10:
      case 12:
         cout << "31 days" <<endl;
         break;
      case 4:
      case 6:
      case 9:
      case 11:
         cout << "30 days" <<endl;
         break;
      case 2:
         cout << "28 or 29 days (leap year)" <<endl;
         break;
      default:
         cout << "Invalid month. Please enter a number between 1 and 12." <<endl;
   }

   return 0;
```

TASK 3

```
int a,b;
cout << "Enter the first integer";
cin >> a;
cout << "Enter the second integer";
cin >>b;

   if (a == b) {
      cout << "The two values are equal." <<endl;
   } else {
      if (a > b) {
         cout << "The greater value is" << a <<endl;
      } else {
         cout << "The greater value is" << b << endl;
      }
   }

   return 0;
```

TASK 4

```
int m;
cout<<"enter integer  m "<<endl;
cin>>m;

if (m==0) {
cout<<"n is 0"<<endl; }
else {
      if(m>0){
               cout<<"n is 1"<<endl;
               }
      else{
               cout<<" n is -1"<<endl;
      }
      }
      return 0;
```