

# Lecture (04)

## Branching and decision making I

By:

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- If , else if, else statements
- Break , continue

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## If , else if, else statements

- The if, if...else and nested if...else statement
- are used to make one-time decisions in C/C++ Programming, that is, to execute some code/s and ignore some code/s depending upon the test expression.

```
if (test expression)
{
    statement/s to be executed if test expression is true;
}
```

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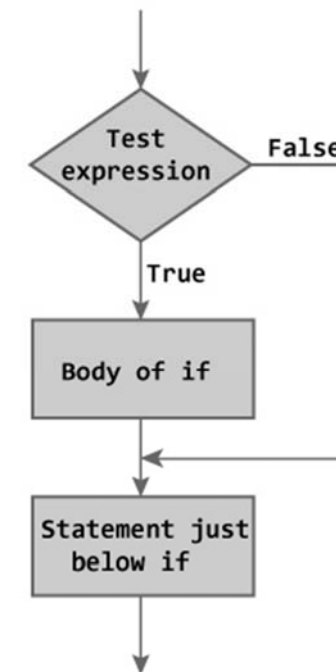
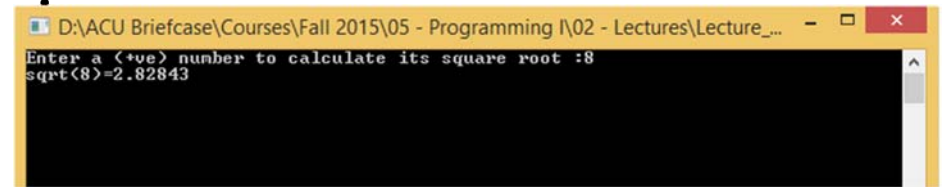


Figure: Flowchart of if Statement

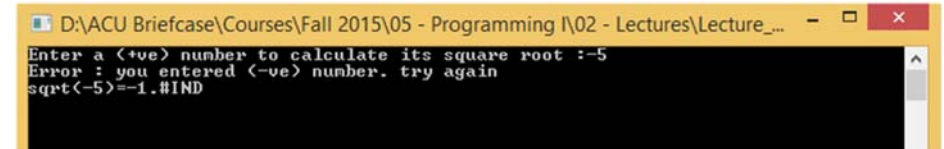
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# Example 01

- Write a program that calculates the square root of entered number.
- Program should check user input, if the input is negative number program display error message and exit.



```
D:\ACU Briefcase\Courses\Fall 2015\05 - Programming I\02 - Lectures\Lecture_... - [X]
Enter a (+ve) number to calculate its square root :8
sqrt(8)=2.82843
```



```
D:\ACU Briefcase\Courses\Fall 2015\05 - Programming I\02 - Lectures\Lecture_... - [X]
Enter a (+ve) number to calculate its square root :-5
Error : you entered (-ve) number. try again
sqrt(-5)=-1.#IND
```

## C if...else statement

- The if...else statement is used if the programmer wants to execute some statement/s when the test expression is true and execute some other statement/s if the test expression is false.

*if (test expression)*

{

*statements to be executed if test expression is true;*

}

*else*

{

*statements to be executed if test expression is false;*

}

```
#include "stdafx.h"
#include <iostream>
#include <cmath>
using namespace std;
int _tmain(int argc, _TCHAR* argv[])
{
    int num;
    double result;
    cout<<"Enter a (+ve) number to calculate its square root :";
    cin>>num;
    if(num<0)
    {
        cout<<"Error : you entered (-ve) number. try again"<<endl;
    }
    result=sqrt((double)num);
    cout<<"sqrt("&<<num<<" )="<<result<<endl;
    fflush(stdin);
    cin.get();
    return 0;
}
```

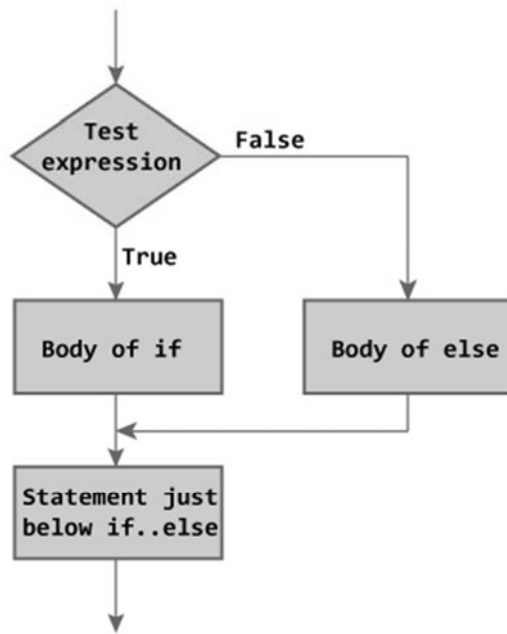


Figure: Flowchart of if...else Statement

## Example 02

- Write a program that calculates the square root of entered number.
- Program should check user input, if the input is negative number program display error message and exit.
- If the number is +ve calculates and display square root

```

D:\ACU Briefcase\Courses\Fall 2015\05 - Programming I\02 - Lectures\Lecture_...
Enter a (+ve) number to calculate its square root :9
sqrt(9)=3

D:\ACU Briefcase\Courses\Fall 2015\05 - Programming I\02 - Lectures\Lecture_...
Enter a (+ve) number to calculate its square root :-5
Error : you entered (-ve) number. try again
  
```

```

#include "stdafx.h"
#include <iostream>
#include <cmath>
using namespace std;
int _tmain(int argc, _TCHAR* argv[])
{
    int num;
    double result;
    cout<<"Enter a (+ve) number to calculate its square root :";
    cin>>num;
    if(num<0)
    {
        cout<<"Error : you entered (-ve) number. try again"<<endl;
    }
    else
    {
        result=sqrt((double)num);
        cout<<"sqrt("<<num<<")="<<result<<endl;
    }
    fflush(stdin);
    cin.get();
    return 0;
}
  
```

# Nested if...else statement (if...elseif...else Statement)

- The nested if...else statement is used when program requires more than one test expression.

```
if (test expression1)
{
    statement/s to be executed if test expression1 is true;
}
else if(test expression2)
{
    statement/s to be executed if test expression1 is false and 2 is true;
}
else if (test expression 3)
{
    statement/s to be executed if text expression1 and 2 are false and 3 is true;
}
else
{
    statements to be executed if all test expressions are false;
}
```

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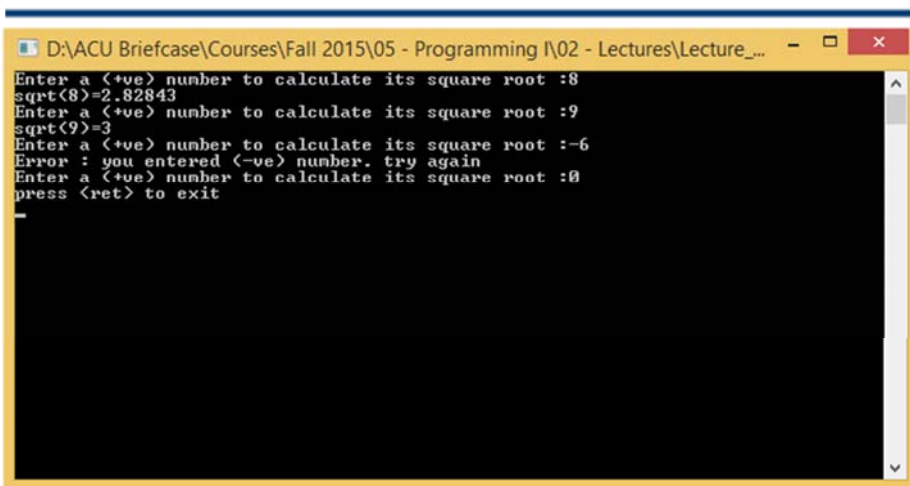
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## Example 03

- Write a program that calculates the square root of as long as you entered number.
- Program should check user input, if the input is negative number program display error message and exit.
- If the number is +ve calculates and display square root
- If you entered 0 program exit

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```
Enter a (+ve) number to calculate its square root :8
sqrt(8)=2.82843
Enter a (+ve) number to calculate its square root :9
sqrt(9)=3
Enter a (+ve) number to calculate its square root :-6
Error : you entered (-ve) number. try again
Enter a (+ve) number to calculate its square root :0
press <ret> to exit
```

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```
#include <iostream>
#include <cmath>
using namespace std;
int _tmain(int argc, _TCHAR* argv[])
{
    int num;
    double result;
    while(1)
    {
        cout<<"Enter a (+ve) number to calculate its square root :";
        cin>>num;
        if(num<0)
        {
            cout<<"Error : you entered (-ve) number. try again"<<endl;
        }
        else if(num==0)
        {
            break;
        }
        else
        {
            result=sqrt((double)num);
            cout<<"sqrt("<<num<<")="<<result<<endl;
        }
    }
    fflush(stdin);
    cout<<"press <ret> to exit"<<endl;
    cin.get();
    return 0;
}
```

# Break and continue

- break is used in terminating the loop immediately after it is encountered. The break statement is used with conditional if statement.

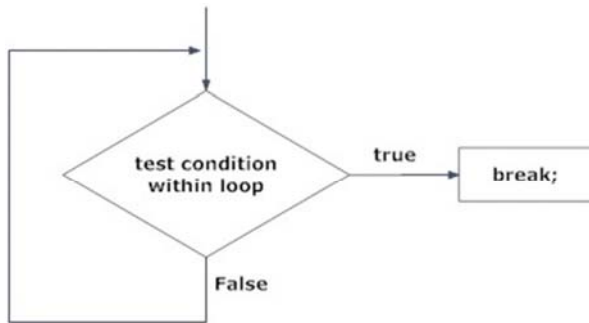


Figure: Flowchart of break statement

```

while (test expression) {
    statement/s
    if (test expression) {
        break;
    }
    statement/s
}
  
```

```

do {
    statement/s
    if (test expression) {
        break;
    }
    statement/s
} while (test expression);
  
```

```

for (initial expression; test expression; update expression) {
    statement/s
    if (test expression) {
        break;
    }
    statements/
}
  
```

NOTE: The break statement may also be used inside body of else statement.

- It is sometimes desirable to skip some statements inside the loop. In such cases, continue statements are used.

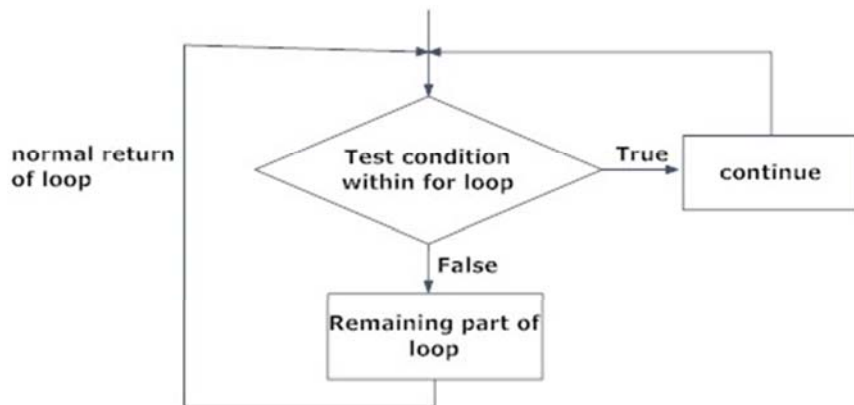


Fig: Flowchart of continue statement

```

while (test expression) {
    statement/s
    if (test expression) {
        continue;
    }
    statement/s
}
  
```

```

do {
    statement/s
    if (test expression) {
        continue;
    }
    statement/s
} while (test expression);
  
```

```

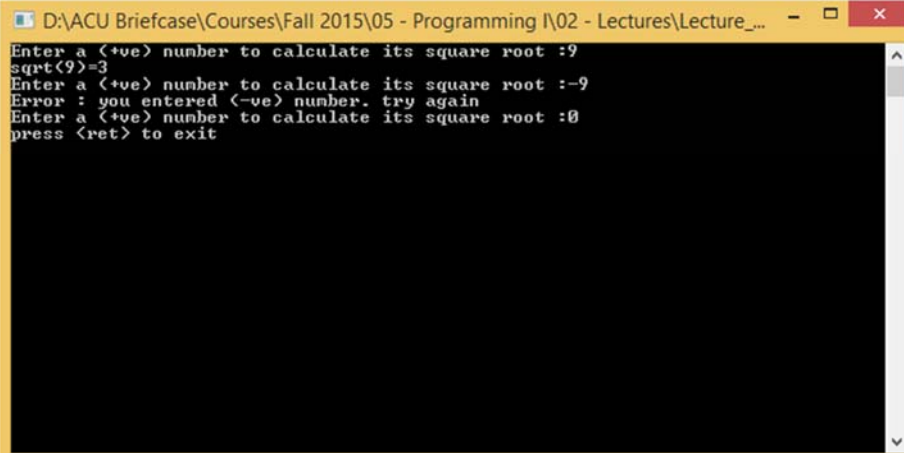
for (initial expression; test expression; update expression) {
    statement/s
    if (test expression) {
        continue;
    }
    statements/
}
  
```

NOTE: The continue statement may also be used inside body of else statement.



# Example 04

- Rewrite example 03 using continue, break statements



```
D:\ACU Briefcase\Courses\Fall 2015\05 - Programming I\02 - Lectures\Lecture_...
Enter a (+ve) number to calculate its square root :9
sqrt(9)=3
Enter a (+ve) number to calculate its square root :-9
Error : you entered (-ve) number. try again
Enter a (+ve) number to calculate its square root :0
press <ret> to exit
```

```
int _tmain(int argc, _TCHAR* argv[])
{
    int num;
    double result;
    while(1)
    {
        cout<<"Enter a (+ve) number to calculate its square root :";
        cin>>num;
        if(num<0)
        {
            cout<<"Error : you entered (-ve) number. try again"<<endl;
            continue;
        }
        else if(num==0)
        {
            break;
        }
        result=sqrt((double)num);
        cout<<"sqrt("<<num<<")="<<result<<endl;
    }
    fflush(stdin);
    cout<<"press <ret> to exit"<<endl;
    cin.get();
    return 0;
}
```

