Introduction to C++ Programming: Lecture 3

Presented by

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The conditional operator evaluates an expression, returning one value if that expression evaluates to true, and a different one if the expression evaluates as false. Its syntax is:

```
condition ? result1 : result2
```

If condition is true, the entire expression evaluates to result1, and otherwise to result2.

```cpp
// conditional operator
#include <iostream>
using namespace std;
int main ()
{
    int a,b,c;
    a=2;
    b=7;
    c = (a>b) ? a : b;
    cout << c << '\n';
}
```
The if keyword is used to execute a statement or block, if, and only if, a condition is fulfilled. Its syntax is:

\[
\text{if (condition) statement;}
\]

```cpp
if (x == 100) cout << "x is 100";
```

If \( x \) is not exactly 100, this statement is ignored, and nothing is printed.

```cpp
if (x == 100) { cout << "x is "; cout << x; }
```

```cpp
if (condition) statement1
else statement2;
```

```cpp
if (x == 100) cout << "x is 100";
else cout << "x is not 100";
```
if (x > 0)
    cout << "x is positive";
else if (x < 0)
    cout << "x is negative";
else
    cout << "x is 0";
```cpp
#include <iostream>
using namespace std;

int main () {
    // local variable declaration:
    int a = 100;

    // check the boolean condition
    if( a == 10 ) {
        // if condition is true then print the following
        cout << "Value of a is 10" << endl;
    } else if( a == 20 ) {
        // if else if condition is true
        cout << "Value of a is 20" << endl;
    } else if( a == 30 ) {
        // if else if condition is true
        cout << "Value of a is 30" << endl;
    } else {
        // if none of the conditions is true
        cout << "Value of a is not matching" << endl;
    }

    cout << "Exact value of a is : " << a << endl;

    return 0;
}
```
Loops repeat a statement a certain number of times, or while a condition is fulfilled. They are introduced by the keywords **while, do, and for.**

**The while loop**
The simplest kind of loop is the while-loop. Its syntax is:

while (expression) statement

The while-loop simply repeats statement while expression is true. If, after any execution of statement, expression is no longer true, the loop ends, and the program continues right after the loop. For example, let's have a look at a countdown using a while-loop:

```cpp
// custom countdown using while
#include <iostream>
using namespace std;

int main ()
{
    int n = 10;
    while (n>0) {
        cout << n << " ";
        --n;
    }
    cout << " liftoff! \n";
}
```

(prints the value of n and decreases n by 1)
The do-while loop is also called **exit control loop** because, in do-while loop, compiler will 1st execute the statements, then check the condition, whether it is true or false.

```cpp
// C++ program to add numbers until user enters 0
#include <iostream>
using namespace std;

int main()
{
    float number, sum = 0.0;

    do {
        cout << "Enter a number: ";
        cin >> number;
        sum += number;
    } while (number != 0.0);

    cout << "Total sum = " << sum;

    return 0;
}
```

Figure: Flowchart of do...while Loop
The for loop is designed to iterate a number of times. Its syntax is:

```
for (initialization; condition; increase) statement;
```

1. **initialization** is executed. Generally, this declares a counter variable, and sets it to some initial value. This is executed a single time, at the beginning of the loop.

2. **condition** is checked. If it is true, the loop continues; otherwise, the loop ends, and statement is skipped, going directly to step 3.

3. **statement** is executed. As usual, it can be either a single statement or a block enclosed in curly braces `{ }`.

4. **increase is executed**, and the loop gets back to step 2.

5. **the loop ends**: execution continues by the next statement after it.
Examples

```c++
// countdown using a for loop
#include <iostream>
using namespace std;

int main ()
{
    for (int n=10; n>0; n--)
    {
        cout << n << " , ";
    }
    cout << " liftoff!\n";
}
```

10, 9, 8, 7, 6, 5, 4, 3, 2, 1, liftoff!
```cpp
int main()
{
    int i=0,j;

    cout << i << endl;
    for (i = 1; i < 5; i++)
    {
        cout << "loop in :: " << i << endl;

        for (j = i; j < 3; j++)
        {
            cout << "\t inner for loop j :: " << j << endl;
        }
        cout << "loop end :: " << i << endl;
    }
    cout << i << endl;
    return 0;
}
```
Thanks!