

# MA122 - Computer Programming and Applications

Indian Institute of Space Science and Technology

February 03, 2017

# Lecture 9

MA122 -  
Computer  
Programming  
and  
Applications

for loop

increment and  
decrement

while loop

if statement

1 for loop

2 increment and decrement

3 while loop

4 if statement

```
statement1  
for (int_expr; test_expr; update_expr)  
    statement2  
statement3
```

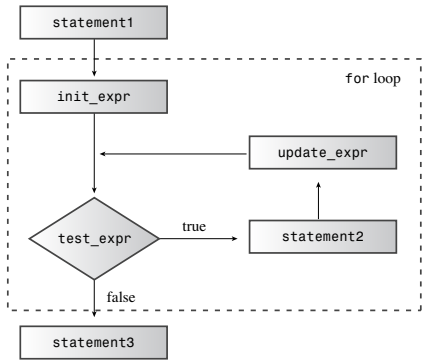


Figure 5.1 The design of for loops.

# for loop

```
1 // forloop.cpp -- introducing the for loop
2 #include <iostream>
3 int main()
4 {
5     using namespace std;
6
7     int i; // create a counter
8     // initialize; test ; update
9
10    for (i = 0; i < 5; i++)
11        cout << "C++ knows loops.\n";
12
13    cout << "C++ knows when to stop.\n";
14    return 0;
15 }
```

# for loop

```
1 // num_test.cpp -- use numeric test in for loop
2 #include <iostream>
3 int main()
4 {
5     using namespace std;
6
7     cout << "Enter the starting countdown value: ";
8     int limit;
9     cin >> limit;
10
11     short i;
12     for (i = limit; i; i--) // quits when i is 0
13         cout << "i = " << i << "\n";
14
15     cout << "Done now that i = " << i << "\n";
16     return 0;
17 }
```

# factorial program

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```
1 // -- more looping with for
2 #include <iostream>
3 const int ArSize = 16; // example of external
   declaration
4
5 int main()
6 {
7     short factorials[ArSize];
8     factorials[1] = factorials[0] = 1LL;
9
10    for (int i = 2; i < ArSize; i++)
11        factorials[i] = i * factorials[i-1];
12    for (int i = 0; i < ArSize; i++)
13        std::cout << i << "! = " << factorials[i] << std::
           endl;
14    return 0;
15 }
```

# changing the step size

```
1 // -- count as directed
2 #include <iostream>
3 int main()
4 {
5     using std::cout; // a using declaration
6     using std::cin;
7     using std::endl;
8
9     cout << "Enter an integer: ";
10    int by;
11    cin >> by;
12
13    cout << "Counting by " << by << "s:\n";
14
15    for (int i = 0; i < 100; i = i + by)
16        cout << i << endl;
17    return 0;
18 }
```

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# increment and decrement

```
1 // -- the increment operator
2 #include <iostream>
3 int main()
4 {
5
6     using std::cout;
7     int a = 20;
8     int b = 20;
9
10    cout << "a = " << a << ": b = " << b << "\n";
11
12    cout << "a++ = " << a++ << ": ++b = " << ++b << "\n"
13        ;
14    cout << "a = " << a << ": b = " << b << "\n";
15
16    return 0;
17 }
```

# increment and decrement

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```
1 // -- the increment operator
2 #include <iostream>
3 int main()
4 {
5
6     using std::cout;
7     int x = 5;
8     int y = ++x;
9
10    cout << "x = " << x << ": y = " << y << "\n";
11
12    int z=y++;
13
14    cout << "y = " << y << ": z = " << z << "\n";
15
16
17
18    return 0;
```

# scope

```
1 //scope.cpp
2 #include <iostream>
3 int main()
4 {
5     using std::cout;
6     using std::endl;
7     int x = 20;           // original x
8     {                   // block starts
9         cout << x << endl; // use original x
10        int x = 100;      // new x
11        cout << x << endl; // use new x
12    }                   // block ends
13    cout << x << endl;    // use original x
14    return 0;
15 }
```

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```
statement1  
while (test_expr)  
    statement2  
statement3
```

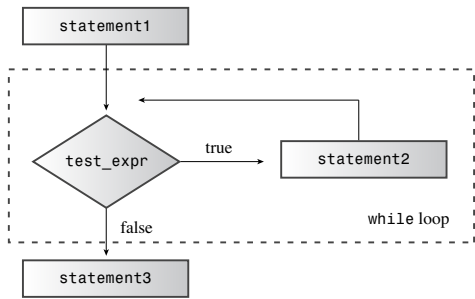


Figure 5.3 The structure of while loops.

# while

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if statement

```
1 // while.cpp -- introducing the while loop
2 #include <iostream>
3 const int ArSize = 20;
4 int main()
5 {
6     using namespace std;
7     char name[ArSize];
8     cout << "Your first name, please: ";
9     cin >> name;
10    cout << "Here is your name :\n";
11    int i = 0;
12    while(name[i] != '\0')
13    {
14        cout << name[i] << ": " << int(name[i]) << endl;
15        i++;
16    }
17    return 0;
18 }
```

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```
statement1  
if (test_expr)  
    statement2  
statement3
```

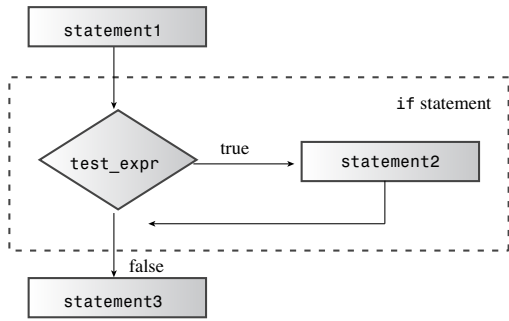


Figure 6.1 The structure of if statements.



# Relational Operators

Table 5.2 Relational Operators

Operator	Meaning
<	Is less than
<=	Is less than or equal to
==	Is equal to
>	Is greater than
>=	Is greater than or equal to
!=	Is not equal to

# if

```
1 // if.cpp -- using the if statement
2 #include <iostream>
3 int main()
4 {
5     using namespace std;
6     char ch;
7     int spaces = 0; int total = 0;
8     cin.get(ch);
9     while (ch != '.') // quit at end of sentence
10    {
11        if (ch == ' ') // check if ch is a space
12            ++spaces;
13        total++; // done every time
14        cin.get(ch);
15    }
16    cout << spaces << " spaces, " << total;
17    cout << " characters total in sentence\n";
18    return 0; }
```