

COMP2011 Programming with C++

Syntax Comparison between Java and C++: Basics and Program Flow Control

The purpose of this set of notes is to help you quickly transfer your basic knowledge of Java to that of C++. Please note that it is not a complete summary of our lecture notes. For all the C++ features discussed in COMP2011, you have to carefully study the lecture notes on our course website.

| In Java | In C++ |
|--|---|
| Hello World Program | |
| <pre>/* * File: HelloWorld.java * A common program used to demo a new language */ public class HelloWorld { public static void main(String[] args) { System.out.println("Hello World!"); } }</pre> | <pre>/* * File: hello_world.cpp * A common program used to demo a new language */ #include <iostream> using namespace std; int main() { cout << "Hello World!" << endl; return 0; }</pre> |
| Executing a Java program <ol style="list-style-type: none">1. Compile the program: javac HelloWorld.java2. Execute the program: java HelloWorld | Executing a C++ program <ol style="list-style-type: none">1. Compile the program: g++ -o hello_world.out hello_world.cpp2. Execute the program: hello_world.out |

| Basic Output | |
|--|--|
| To print the word “abc” with a newline character: <code>System.out.println("abc");</code> Or, <code>System.out.print("abc\n");</code> | To print the word “abc” with a newline character: <code>cout << "abc" << endl;</code> where <code>endl</code> means “end of the line” Or , <code>cout << "abc\n";</code> |

| Comments | |
|---|-----------|
| <ul style="list-style-type: none">• For one or more lines of comments: <code>/* ... */</code>• For one line of comment only: <code>// ...</code> | The same. |

| Using Packages/Libraries | |
|---------------------------------|--|
| <code>import java.io.*;</code> | <code>#include <iostream></code> |

Statements

- Each statement ends in a semicolon “;”
- Extra blanks, tabs, lines are ignored.
- More than one statement can be on one line.
- A statement may be spread over several lines.

For example:

```
System.out.print("Hello" +  
" world"); System.out.println("!");
```

The same.

For example:

```
cout << "Hello" <<  
" world"; cout << "!" << endl;
```

Variables

- Primitive Data Types:
 - Integer: `short`, `int`, `long`
Examples of values: 0, 1, 100, -101, ...
 - Floating point: `float`, `double`, `long double`, etc.
Examples of values: 0.5, -123.908232
 - Character: `char`
Examples of values: 'A', 'a', 'B', 'b', ...
 - Boolean: `boolean`
Examples of values: `true`, `false`

- Variables have to be declared and defined.
For examples:

```
int num1;  
num1 = 100;  
double num2 = 0.05;
```

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if Statement

The syntax of the if statements are the same in Java and C++:

```
if (<bool-expr>) <stmt>  
if (<bool-expr>) { <stmt(s)> }  
if (<bool-expr>) <stmt> else <stmt>  
if (<bool-expr>) { <stmt(s)> } else { <stmt(s)> }  
if (<bool-expr>) { <stmt(s)> } else if (<bool-expr>) { <stmt(s)> } else { <stmt(s)> }
```

For example, in Java:

```
int x = -5;  
if (x > 0)  
{  
    System.out.print("x is positive");  
    if (x % 2 == 1)  
        System.out.println(" and odd.");  
    else  
        System.out.println(" and even.");  
} else if ((x < 0) && (x % 2 == 1))  
    System.out.println("x is negative and odd.");  
else if ((x < 0) && !(x % 2 == 1))  
    System.out.println("x is negative and even.");  
else  
    System.out.println("x is zero.");
```

For example, in C++:

```
int x = -5;  
if (x > 0)  
{  
    cout << "x is positive";  
    if (x % 2)  
        cout << " and odd." << endl;  
    else  
        cout << " and even." << endl;  
} else if ((x < 0) && (x % 2))  
    cout << "x is negative and odd." << endl;  
else if ((x < 0) && !(x % 2))  
    cout << "x is negative and even." << endl;  
else  
    cout << "x is zero." << endl;
```

if-else Operator

The syntax of the if-else expressions are the same in Java and C++:

```
<condition> ? <result1> : <result2>
```

It means that if <condition> is true, the expression's value will be <result1>, otherwise it will be <result2>.

For example:

```
int x = 2, y = 3;
cout << ((x > y) ? x : y) << endl; // the output will be 3
```

while Loop

The syntax of the while statements are the same in Java and C++:

```
while (<bool-expr>) { <stmt(s)> }
do { <stmt(s)> } while (<bool-expr>);
```

for Loop

The syntax of the following for statements are the same in Java and C++:

```
for (<for-initialization>; <bool-expr>; <post-processing>) { <stmt(s)> }
```

break and continue

The syntax are the same in Java and C++:

In a **for** loop, **break** means to stop the whole loop; while **continue** means to skip the current execution.

Methods and Functions

The class methods in Java are equivalent to the class member functions in C++.

But C++ also has global functions which are similar to static class methods in Java.

For example,

```
/* File: Example.java
A Java program of the class Example
with two methods:
PrintNum() and AddOne()
*/
public class Example {
    public static void main(String args[])
    {
        PrintNum(10);
        PrintNum(AddOne(10));
    }

    public static void PrintNum(int num)
    {
        System.out.println("The number is " + num);
    }

    public static int AddOne(int num)
    {
        return (num + 1);
    }
}
```

For example,

```
/* File: function_example.cpp
A C++ program with two functions:
PrintNum() and AddOne()
*/
#include <iostream>
using namespace std;

void PrintNum(int num)
{
    cout << "The number is " << num << endl;
}

int AddOne(int num)
{
    return (num + 1);
}

int main()
{
    PrintNum(10);
    PrintNum(AddOne(10));
    return 0;
}
```

Operators

The following operators are the same in Java and C++:

| | | Symbol | Example | Output |
|----------------------|---------------------------|--------|---|--------|
| Arithmetic Operators | Addition | + | 1 + 2 | 3 |
| | Subtraction | - | 1 - 2 | -1 |
| | Multiplication | * | 1 * 2 | 2 |
| | Division | / | 1.0 / 2 | 0.5 |
| | | | 1 / 2 | 0 |
| Assignment Operators | Modulus (Remainder) | % | 9 % 4 | 1 |
| | Assignment | = | x = y | |
| | Addition Assignment | += | x += y | |
| | Subtraction Assignment | -= | x -= y | |
| | Multiplication Assignment | *= | x *= y | |
| Relational Operators | Division Assignment | /= | x /= y | |
| | And | && | true && false | false |
| | Or | | true false | true |
| Comparison Operators | Not | ! | !false | true |
| | Larger than | > | 20 > 10 | true |
| | Larger than or equal to | >= | 20 >= 10 | true |
| | Smaller than | < | 20 < 10 | false |
| | Smaller than or equal to | <= | 20 <= 10 | false |
| | Equal to | == | 20 == 10 | false |
| Increment Operators | Not equal to | != | 20 != 10 | true |
| | Post-increment | ++ | x = 1; y = 2; y = x++; cout << x << " " << y; | 2 1 |
| Decrement Operators | Pre-increment | ++ | x = 1; y = 2; y = ++x; cout << x << " " << y; | 2 2 |
| | Post-decrement | -- | x = 1; y = 2; y = x--; cout << x << " " << y; | 0 1 |
| Decrement Operators | Pre-decrement | -- | x = 1; y = 2; y = --x; cout << x << " " << y; | 0 0 |

References:

1. Cay Horstmann. (2012). C++ For Everyone. Second Edition. Wiley.
2. The Java Tutorial. Aug 2016. <https://docs.oracle.com/javase/tutorial/index.html>