

COMP2012H Honors Object-Oriented Programming and Data Structures

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 COMP2012H, you have to carefully study the lecture notes on our course website.

In Java

In C++

Hello World Program

```
/*
 * 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");
    }
}
```

```
/*
 * 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;
}
```

Executing a Java program

1. Compile the program:
javac HelloWorld.java
2. Execute the program:
java HelloWorld

Executing a C++ program

1. Compile the program:
g++ -o hello_world.out hello_world.cpp
2. Execute the program:
hello_world.out

Basic Output

To print the word "abc" with a newline character:

```
System.out.println("abc");
```

Or,

```
System.out.print("abc\n");
```

To print the word "abc" with a newline character:

```
cout << "abc" << endl;
```

where endl means "end of the line"

Or ,

```
cout << "abc\n";
```

Comments

- For one or more lines of comments:

```
/* ... */
```

- For one line of comment only:

```
// ...
```

The same.

Using Packages/Libraries

```
import java.io.*;
```

```
#include <iostream>
```

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;
```

- Basic Data Types:
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For examples:

```
int num1;  
num1 = 100;  
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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
	Modulus (Remainder)	%	9 % 4	1
Assignment Operators	Assignment	=	x = y	
	Addition Assignment	+=	x += y	
	Subtraction Assignment	-=	x -= y	
	Multiplication Assignment	*=	x *= y	
	Division Assignment	/=	x /= y	
Relational Operators	And	&&	true && false	false
	Or		true false	true
	Not	!	!false	true
Comparison Operators	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
	Not equal to	!=	20 != 10	true
Increment Operators	Post-increment	++	x = 1; y = 2; y = x++; cout << x << " " << y;	2 1
	Pre-increment	++	x = 1; y = 2; y = ++x; cout << x << " " << y;	2 2
Decrement Operators	Post-decrement	--	x = 1; y = 2; y = x--; cout << x << " " << y;	0 1
	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>