Java Basics

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Overview

What ’s Java?

- is a programming language.
- developed by James Gosling and his team at Sun Microsystems.
- cross-platform running is the obvious advantage compare to C++.
- first released in 1995 by Sun Microsystems.
- Java 1.8 is released in 2014。

Overview

What ’s Java?

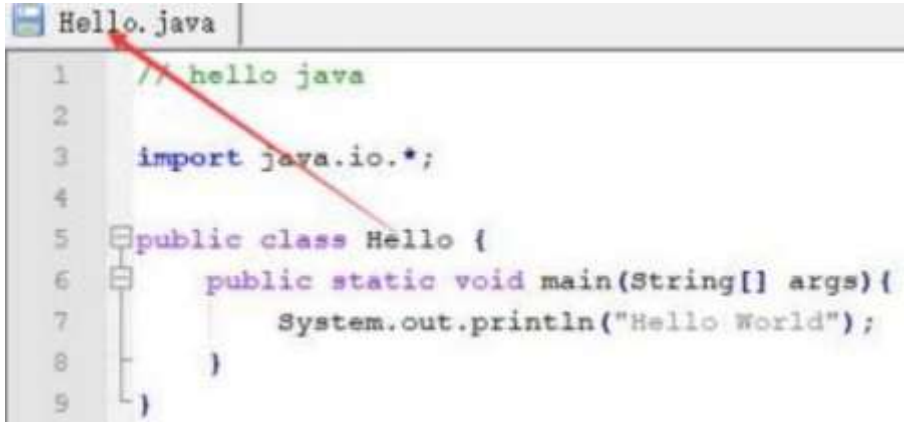
- Object oriented programming language.
- Platform independence.
- Robust and secure: garbage collection system, strong type-checking exception handling system, etc.
- Large ecosystem.

TIOBE Index

Sep 2021	Sep 2020	Change	Programming Language	Ratings	Change
1	1		C	11.83%	-4.12%
2	3	↑	Python	11.67%	+1.20%
3	2	↓	Java	11.12%	-2.37%
4	4		C++	7.13%	+0.01%
5	5		C#	5.78%	+1.20%
6	6		Visual Basic	4.62%	+0.50%
7	7		JavaScript	2.55%	+0.01%
8	14	⇈	Assembly language	2.42%	+1.12%
9	8	↓	PHP	1.85%	-0.64%
10	10		SQL	1.80%	+0.04%

First Program

- Hello World Example：
  - // represents a commented line.
  - import java.io.* means all the classes of io package can be imported.
  - class is used to declare a class in Java.
  - public means it is visible to all.
  - static means there is no need to create an object to invoke the method.
  - void means a method doesn't return any value.
  - main represents the starting point of the program.
  - String[] args is used for command line argument.
  - System.out.println() is used to print statement on an output device like the computer screen.



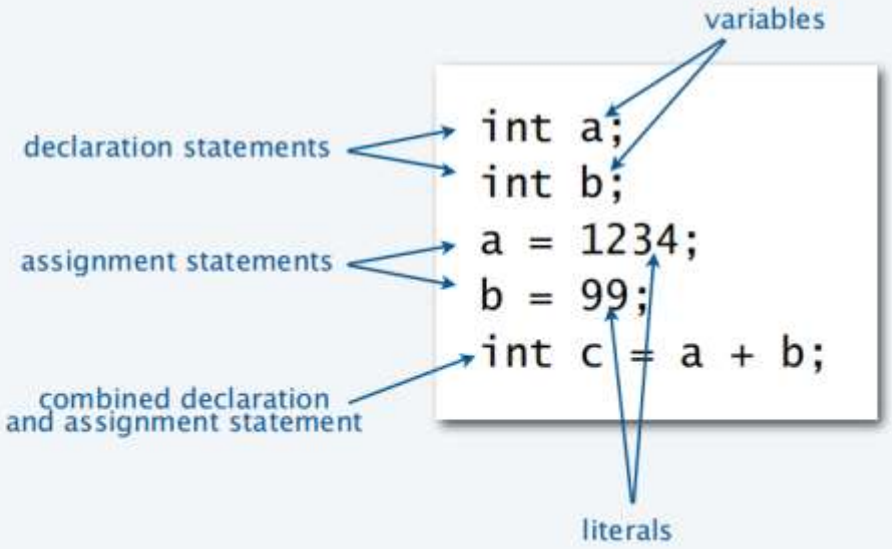
Basic Syntax

A variable is a name that refers to a value.

A literal is a programming-language representation of a value.

A declaration statement associates a variable with a type.

An assignment statement associates a value with a variable.



Basic Syntax: Type Conversion (tricky)

Automatic

- Convert number to string for "+".
- Make numeric types match if no loss of precision.

expression	*type*	*value*
`"x: " + 99`	`String`	`"x: 99"`
`11 * 0.25`	`double`	`2.75`

Explicitly defined for function call.

`Integer.parseInt("123")`	`int`	`123`
`Math.round(2.71828)`	`long`	`3`

Cast for values that belong to multiple types.

- Ex: small integers can be `short`, `int` or `long`.
- Ex: `double` values can be truncated to `int` values.

`(int) 2.71828`	`int`	`2`
`(int) Math.round(2.71828)`	`int`	`3`
`11 * (int) 0.25`	`int`	`0`

Pay attention to the type of your data.

← Type conversion can give counterintuitive results but gets easier to understand with practice

think:
(int) (11 * 0.25)

More examples:

```java
public class test {
    Run | Debug
    public static void main(String[] args) {
        int a = 7 / 5;
        double b = 7 / 5;
        double c = 7.0 / 5;
        System.out.println(a);
        System.out.println(b);
        System.out.println(c);
    }
}
```

```
[Running] cd "/Users
1
1.0
1.4
```

```java
public class test {
    Run | Debug
    public static void main(String[] args) {
        System.out.println("11" + 1);
        System.out.println(1 + 1 + "1");
    }
}
```

```
111
21
```

Basic Syntax: If Statement

```java
public class Conditional{
    Run | Debug
    public static void main(String[] args){
        int a = 5;
        int b = 3;
        int max;
        boolean booleanExpression = (a > b);
        if(booleanExpression){
            max = a;
        }else{
            max = b;
        }
        System.out.println(max);

        if (!booleanExpression){
            System.out.println("a <= b");
        }
    }
}
```

```
if (booleanExpression){
        codes;
}else{

codes;
}

if (booleanExpression){
        codes;
}
```

Basic Syntax: Loop Statement

```java
public class loop {
    public static void main(String[] args) {
        for (int i = 0; i < 10; i++) {
            System.out.println(i);
        }

        int initialization = 0;
        while(initialization < 10){
            System.out.println(initialization);
            initialization++;
        }
    }
}

```

```
for (initialization; boolExp; update){
        codes;
}


while(boolExp){
        codes;
        update;
}
```

Exercise I

Description

Fibonacci series is defined by: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
Represented by an array, it would be: a[0] = 1, a[1] = 1, a[2] = 2, ..., a[n] = a[n-1] + a[n-2].
Write a Java program named “TestFibonacci.java” which reads two non-negative numbers from the console by using System.in. Denote the two numbers by n and d, and the program is expected to output d elements of the series from n-th element (i.e. a[n-1]) in the reverse order to the console by using System.out. An example is given below. (You can assume that the output numbers are no larger than 100000).

OJ link: http://10.26.200.14/d/csc2003_2024_Spring/p/P10004

Exercise II

Description

Write a Java program to compute the greatest common divisor of two given positive integers A and B. You can assume the two positive integers are no larger than 1,000,000. For example, the highest common factor of 54 and 24 is 6.

OJ link: http://10.26.200.14/d/csc2003_2024_Spring/p/P10005

Exercise III

A Narcissistic Number (or a self-love number) is a number that is the sum of its own digits each raised to the power of the number of digits. For example, a 3-digit Narcissistic Number satisfies the equation abc = a^3 + b^3 + c^3. Write a Java program to print all the 3-digit Narcissistic Numbers.

Exercise IV (optional)

Given a number m (100 < m < 10^7), write a Java program to print all the Narcissistic Numbers that is less than m.

Exercise

Solutions attached in the zip file.

Q&A