

Basic Java Programming

Name: Erik Yu, Haoming Zhang, Pinrui Chen

Student Numbers: V00865663, V00853888, V00855446

Topics:

1. What Java is and why we use Java
2. Set up Java Environment for your computer
3. Basic syntax
4. Comments, variables, data types
5. If-else statement
6. For loop and while loop
7. Array
8. Basic Calculations & Scanner and Input
9. Write a simple java program called Lucky Number Calculator

Learning Outcomes:

- Identify Java syntax correctly
- Write a small Java program by using arrays, if-else statement, and loops.
- Explain and analyze simple java programs including fundamental structures (Variables, Data Types, assignment, expressions, basic I/O)

Rationale for technolog choice:

The main learning technologies provided for this tutorial are YouTube and e-textbooks. These two technologies are worthy of being chosen and can make a significant contribution to students' learning.

YouTube free for all which generates billions of views per day across tons of topics. Since there are various decent video tutorials about Java on Youtube, every student can learn Java programming for free Youtube videos. The videos we selected for this tutorial are succinct and to the point, which are mostly the same videos we watched when we in our first year university. This also helped us gaining knowledge of basic Java programming skills. Therefore, since it benefited us we had zero experience on programming, it will also be beneficial for our classmates, helping them gain a better understanding of our course content.

Some old versions of e-textbooks are released online, which are also decent learning technologies for students in our class. This is because digital textbooks are more accessible and portable, also contains more reliable sources. In terms of portability, it can make students backpack lighter. If students want to go to the library to learn our tutorials, they don't have to bring a printed textbooks to there in order to follow our tutorials. They can have access to the content of those books just by clicking the links we put beneath each topic. The digital version of a textbook in this way is more portable and accessible than printed textbook. Also, those academic e-textbooks are written by experts in the field of computer science, which are considered as reliable sources.

1. What Java is and why we use Java (Brief read)

Java is one of the most popular programming languages in the world. Because of its platform independence and multiplatform support, Java programs can be run on different types of computers and easy to be read and implemented (Hossain, 2019).

In this section, you will learn that what Java is, the history of Java and features of Java. The article is long, please choosing your interesting chapters to read.

1. Introduction to Java

1.1. A small history of Java

1.2. Hello world Java program

1.3. Java virtual machine

1.4. Java Runtime Environment vs. Java Development Kit

1.5. Development Process with Java

<https://www.vogella.com/tutorials/JavaIntroduction/article.html>

(Optional) Please check above link and brief read chapters 1.1-1.5 and write the “Hello World” program in Java.

2. Set up Java Environment for your computer

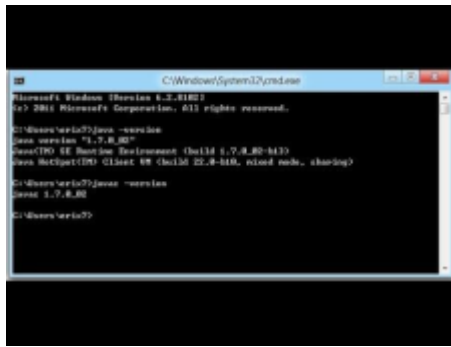
The Java Runtime Environment (JRE) is a set of software tools for development of Java applications. It combines the Java Virtual Machine (JVM), platform core classes and supporting libraries. JRE is part of the Java Development Kit (JDK), but can be downloaded separately. (Matthew, 2018)

In this section, you will learn how to install Java environment. (Note, only with Java Runtime Environment (JRE), you can run Java program. Therefore, this section is important.) Also, you will learn how to run Java program with command line.



(Double click to open “drawing” and play the video)

(This video talks about the steps of running Java program)



(Double click to open “drawing” and play the video)

(This video talks about the steps of installing Java environment)

(Method to run java program: 1, search “**cmd**” in your computer. 2, use the command “**cd**” to find your file address. 3, type “**javac “your file’s name.java”**” 4, type “**java “your file’s name”** (without .java)”)”)”)

Follow the steps in the video and install Java environment.

Copy your “Hello world” program and run it.

3. Basic syntax (Brief read)

In this section, you will learn the basic syntax of Java. The basic syntax contains 7 parts: Data type, Declaring variable, Arrays, Java keywords, Operators (Arithmetic, logical and comparison operator), Structures and Compiling and Executing.

With examples:

Data type	Primitive Types are the basic data types that store simple data
Declaring variable	int a/ double b
Arrays	Int [] arr= {1,2,3}
Java keywords	Public, static, class
Operators	+(Arithmetic)/&&(Logical)/<=(comparison)
Structures	See Article
compiling and executing	javac HelloWorld.java / java HelloWorld

This article discusses basic syntax of Java

<https://www.baeldung.com/java-syntax>

Please read the above article and give a different example for each type of syntax. Also, please recognize different types of your “Hello world” program.

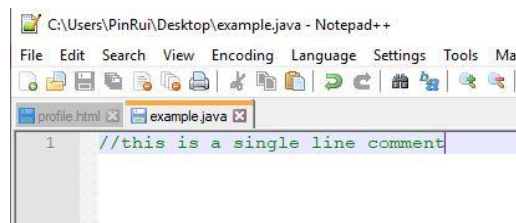
4. Comments, variables, data types

In this section, you are going to learn how to comment a single line code or multiple line code and learn the basics of variables and data types in Java.

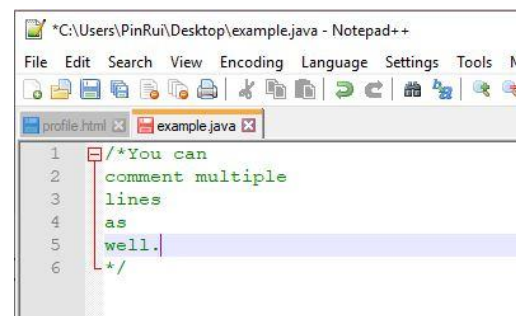
4.1 Comment

Comment is useful because it can provide an explanation of your thoughts. Often, you are working as a team with more than 10,000 lines of code written by different people. By commenting on your part of the code, it allows other people to understand the purpose of this piece of code and your algorithm.

You can comment your code in several ways. The first way is a single line comment and the syntax is by adding a double slash in front of your code. An example is provided in below figure.



You can also comment multiple lines and the syntax is by adding /* at the start of the code and */ at the end. An example is provided below too.



4.2 Variables and Data type

Please read chapter 2.1 and chapter 2.2 from the book, “*Building Java Programs A Back To Basics Approach third edition*”.

Exercise: create an integer data type called Integer which stores the value 15 and create a char data type called alphabet which stores “a”. After you have finished, comment your code with a multiline comment.

5. If-else statement

The If-else statement in Java is to test condition. If the condition is satisfied then continue to execute the code below. If the condition is not satisfied, then do not execute the code below.

Please watch the tutorial below to understand what is an If - else statement in Java and accomplish the exercise for this unit.

<https://www.youtube.com/watch?v=rn9h0TSftyw>

Exercise: Use the If-else statement to test the condition that if $1 + 2 = 3$ then print correct else print incorrect.

6. For loop and while loop

Loops in Java is very helpful when you are doing repeat jobs such as print number from 1 to 10. There are two ways to write a loop. The first one is a for loop and the second one is a while loop. Although they can do the same job, their syntax is different.

The first video explains how to write a for loop and the second video explains how to write a while loop.

<https://www.youtube.com/watch?v=0ll7vm1GQYE>

<https://www.youtube.com/watch?v=DGWDvG3eHmQ> (watch until 3:55)

Exercise:

First use a for loop to print the sum of integers from 1 to 5. Next, use the while loop to achieve the same result.

7. Array:

In this section, you are going to learn an important part of Java programming ---- array. After showing you some examples of array, there is a Youtube Video for you to get a brief idea of how array works and how array can be implemented in Java codings.

Arrays are for storing values in one single variable. By using array, you don't have to declare separate variables for each value. To declare an array, define the variable type with **square brackets**.

For example:

Int [] numbers;

String [] Teams;

To insert values to it, we can use an array literal - place the values in a comma-separated list, inside curly braces:

```
String[] Teams = {"Raptors", "Warriors", "Bucks", "Rockets"};
```

To create an array of integers, you could write:

```
int[] myNum = {10, 20, 30, 40};
```

This **Youtube tutorial** is a decent source for a simple Java array explanation:

<https://www.youtube.com/watch?v=L06uGnF4IpY>

8. Basic calculation & Scanner and Input in Java

In this section, you are going to learn easy basic calculation happens in Java which are essentially important for you to learn the materials in section 9. Also, you are going to learn how to implement Scanner in Java, allowing users to put in values for your Java programs to process.

Basic calculation

The calculation in Java is similar as mathematics.

For example:

```
Int a = 10;
```

```
Int b;
```

```
b = a + 1; (b = 11)
```

```
b = a - 1; (b = 9)
```

```
b = a / 10; (b = 1)
```

```
b = a * 10; (b = 100)
```

Exercise: try $a/3$ and $a/4$; also, change the type of a to double; Do you find the difference?

Try more calculation in Java;

Scanner and input

The Java Scanner class breaks the input into tokens using a delimiter that is whitespace by default. It provides many methods to read and parse various primitive values. Java Scanner class is widely used to parse text for string and primitive types using a regular expression. (Flores, 2014)

In this section, you will learn how to use Scanner to read input. First you need import Scanner class

```
import java.util.Scanner; // Import the Scanner class
```

Then, create a new Scanner object:

```
Scanner myObj = new Scanner(System.in); // Create a Scanner object
```

Next, read the user's input (We use “String” type here, think about how to read “int” type):

```
String userName = myObj.nextLine(); // Read user input
```

Last, we put the structure in the program that we have learnt in the previous section:

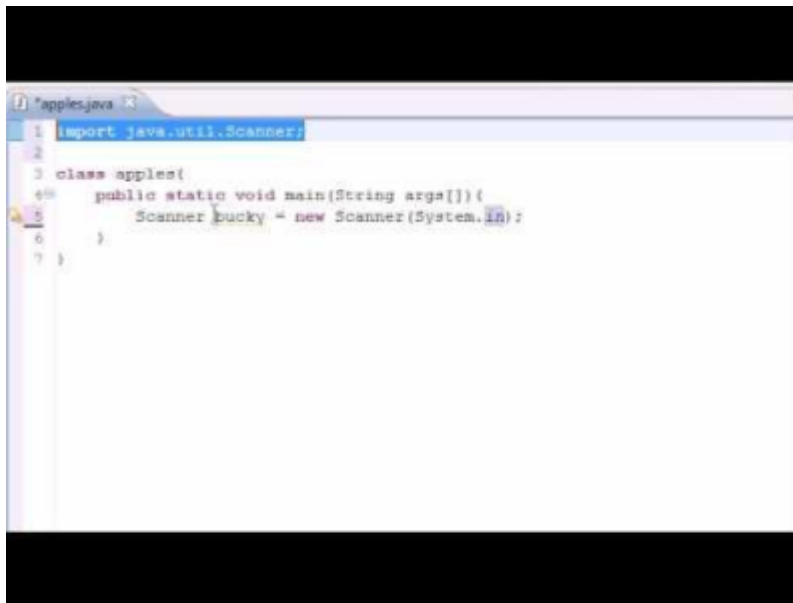
```
import java.util.Scanner; // Import the Scanner class

class MyClass {
    public static void main(String[] args) {
        Scanner myObj = new Scanner(System.in); // Create a Scanner object
        System.out.println("Enter username");

        String userName = myObj.nextLine(); // Read user input
        System.out.println("Username is: " + userName); // Output user input
    }
}
```

Table for different types:

Method	Description
<code>nextBoolean()</code>	Reads a <code>boolean</code> value from the user
<code>nextByte()</code>	Reads a <code>byte</code> value from the user
<code>nextDouble()</code>	Reads a <code>double</code> value from the user
<code>nextFloat()</code>	Reads a <code>float</code> value from the user
<code>nextInt()</code>	Reads a <code>int</code> value from the user
<code>nextLine()</code>	Reads a <code>String</code> value from the user
<code>nextLong()</code>	Reads a <code>long</code> value from the user
<code>nextShort()</code>	Reads a <code>short</code> value from the user



(Double click to open “drawing” and play the video)

Watch the video and write a program which allows user input their Name and age

9. Let’s do a simple java program: Simple Averaging Program

Now, the final part of this Java tutorial is asking you to try to write a small java program according to what you’ve learned. There is a YouTube video explaining the solution to the question if you cannot solve it.

Name: Simple Averaging Program

Question: Write a simple java program to average 10 integers user put in.

example:

User put in numbers:

1
2
3
4
5
6
7
8
9
10

Output:

Your average is 5

Please take 10 minutes to think or test out codes on your computer. If you cannot solve this, please watch the whole YouTube tutorial that guides you through all the codings:

<https://www.youtube.com/watch?v=KXuQQh6AynQ>

References:

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10. Armando Flores (2014) java.util.Scanner Example. Retrieved from: <https://examples.javacodegeeks.com/core-java/util/scanner/java-util-scanner-example/>