Lecture 1:
Introduction to Java Programming

Basic lab instructions

- Talk to your classmates for help. You can even work on the lab with a partner if you like.
- You may want to bring your textbook or look up the internet for syntax and examples.
- Stuck? Confused? Have a question? Ask a Lab Assistance (LA) for help, or look at the book or past lecture slides.
- Complete as many problems as you can within the allotted time. You don't need to keep working on these exercises after you leave the lab.
- Feel free to complete problems in any way.

Goals

- Practice **writing**, **compiling**, and **running** Java programs
- Start using **Eclipse** editor software
- Gain familiarity with **syntax errors** and debugging

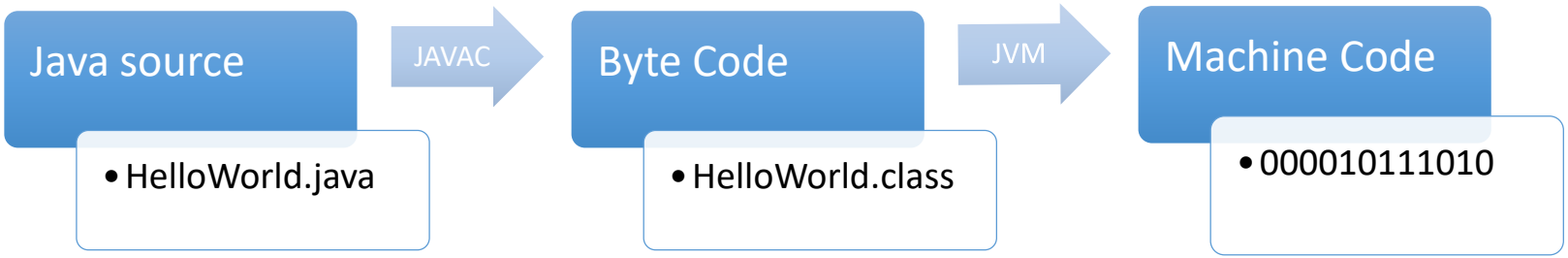
I. KEYNOTES

Java

- Simple
  - No pointer
  - Automatic garbage collection
  - Not support multiple inheritances
  - Rich class library
- Object oriented:
  - All code is encapsulated in class.
  - All functions are associated with class.
  - Almost data types are objected

Java (cont)

- Interpreted:
  - Compiled into byte code for the JVM (Java Virtual Machine).
  - Byte code is dependent on the Java platform, but is typically independent of operating system specific features.

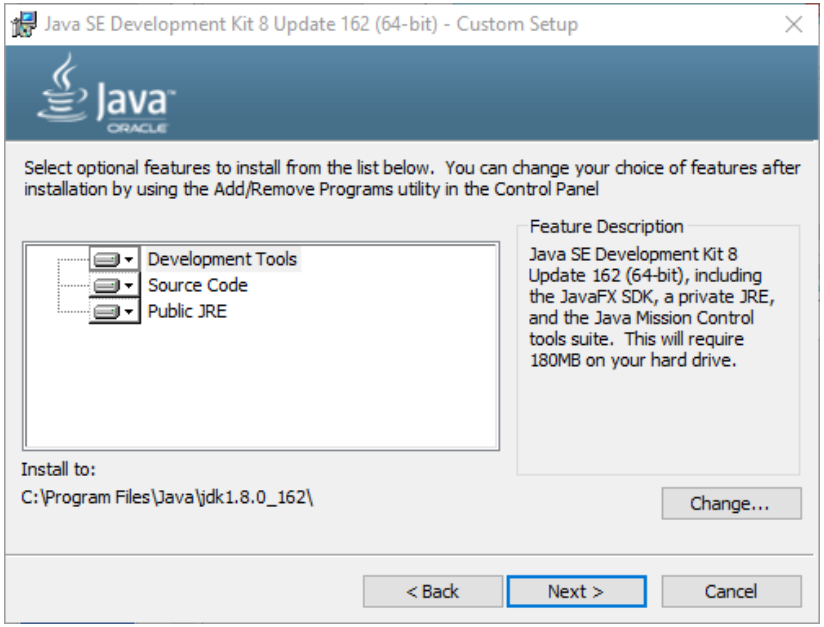


II. TUTORIAL

- ✓ Start project
- ✓ Your first program
- ✓ Running code
- ✓ Debug code
- ✓ Export to executable program

1. Software requirement

- Java SE Software Development Kit 8 (JDK 7)
  Link:
  http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html
  - Run the execute file and follow the install steps.

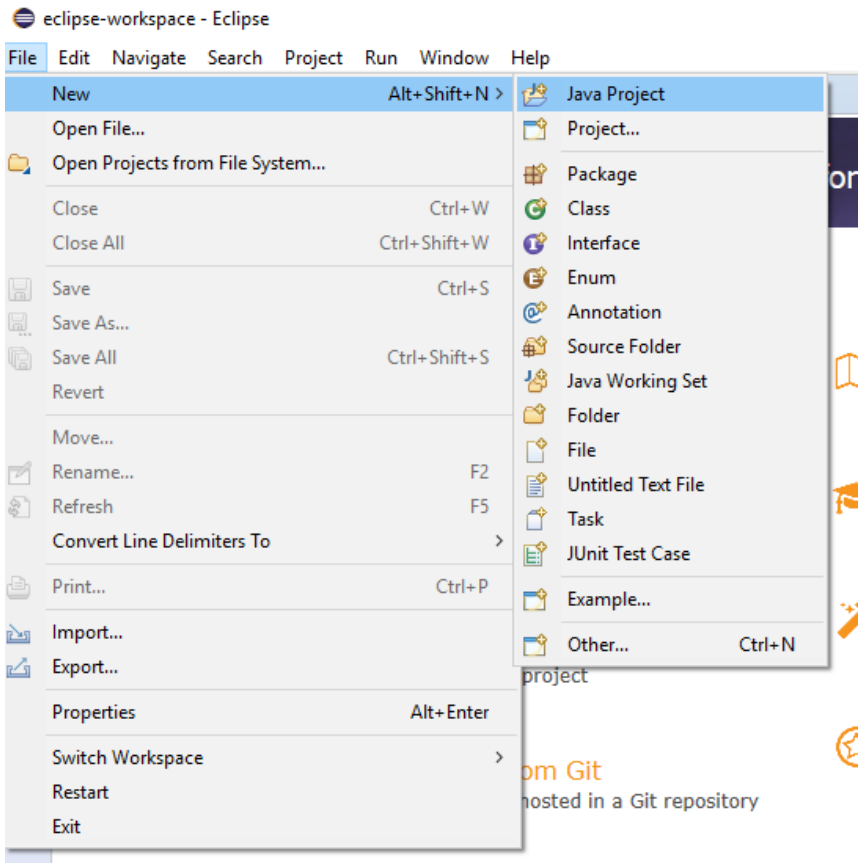


1. Software requirement

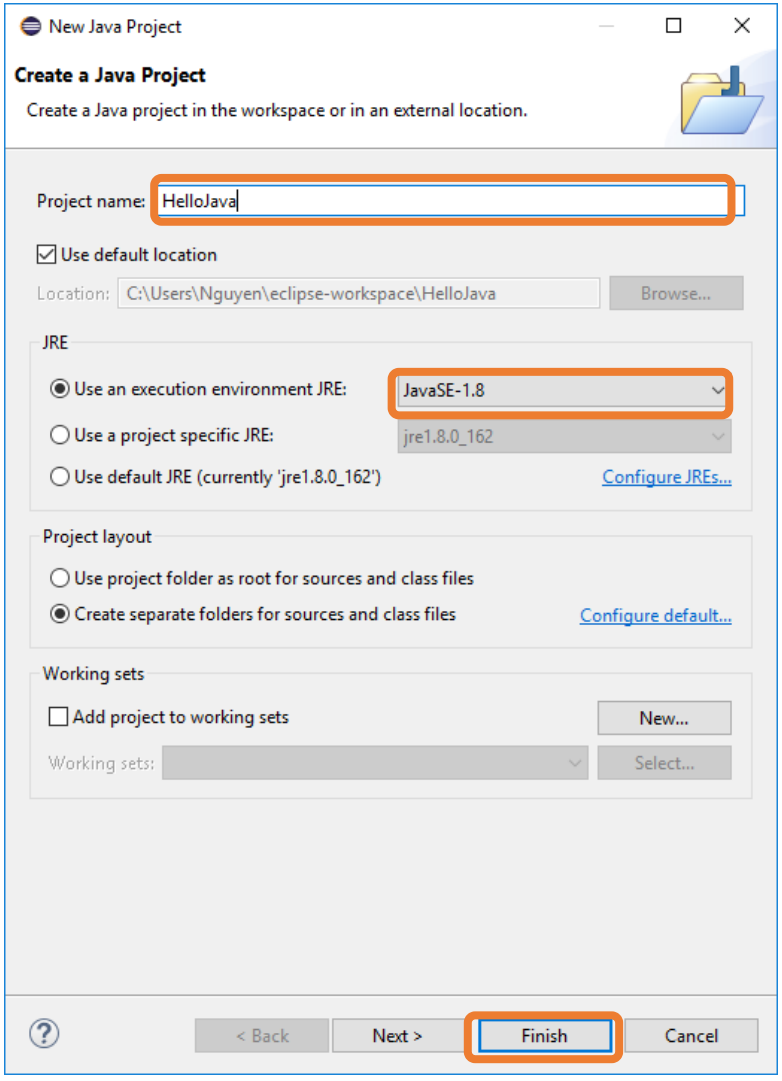
- Eclipse Oxygen (4.7) for Java Developer
  Link:
  http://www.eclipse.org/downloads/packages/eclipse-ide-java-developers/oxygen2
  - Simply unwrap the zip file to some directory where you want to store the executables .

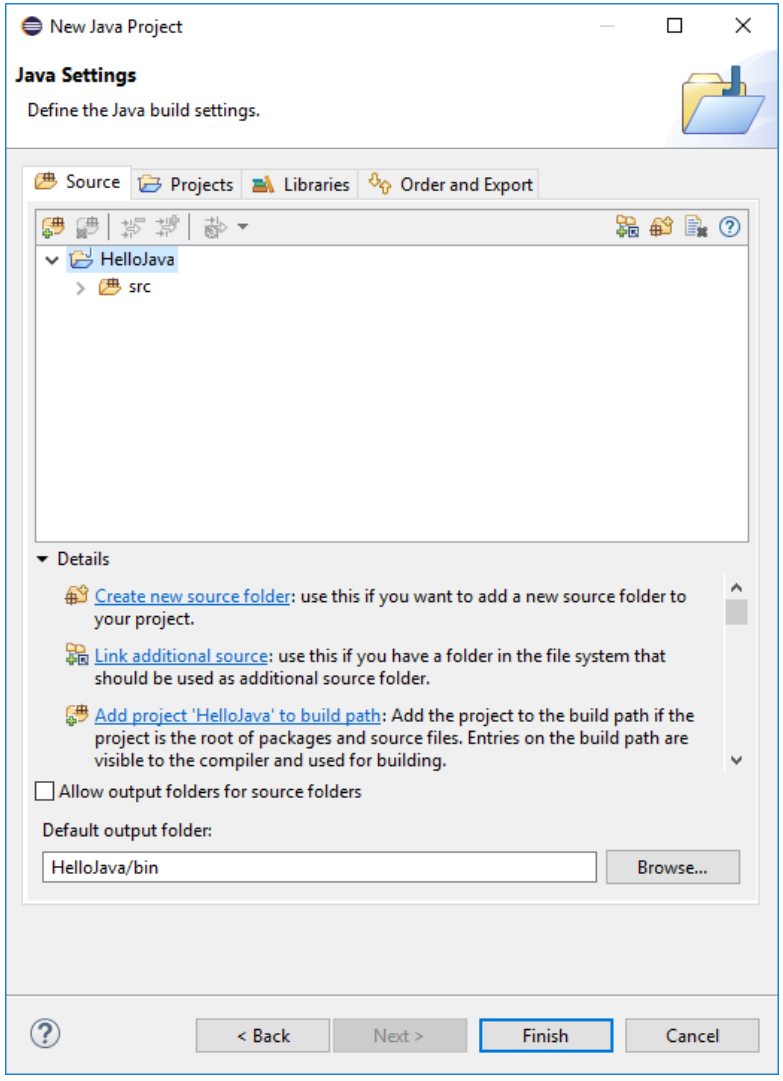
2. Working with Eclipse
Creating new project

- Open Eclipse, and create new project

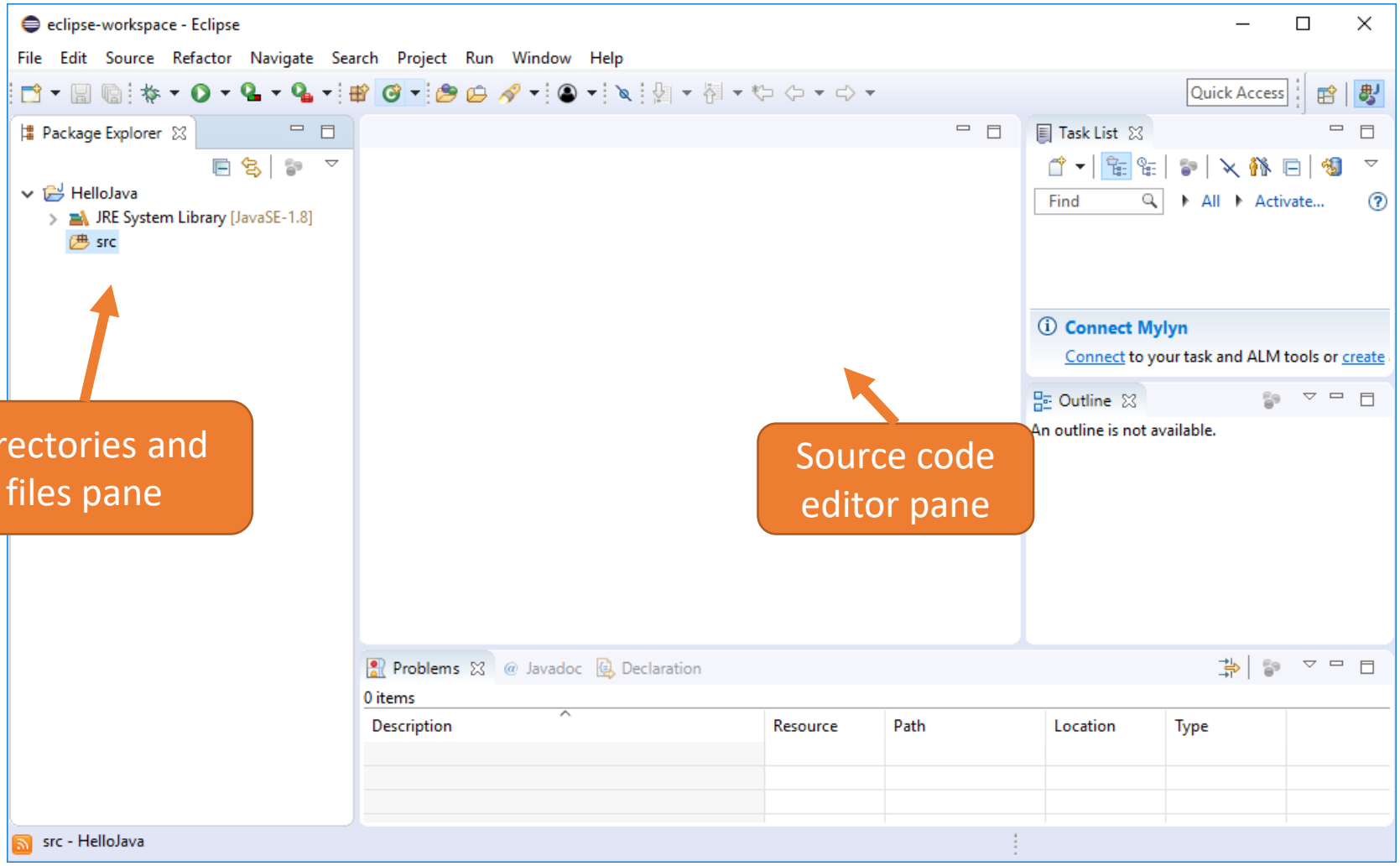


2. Working with Eclipse
Creating new project

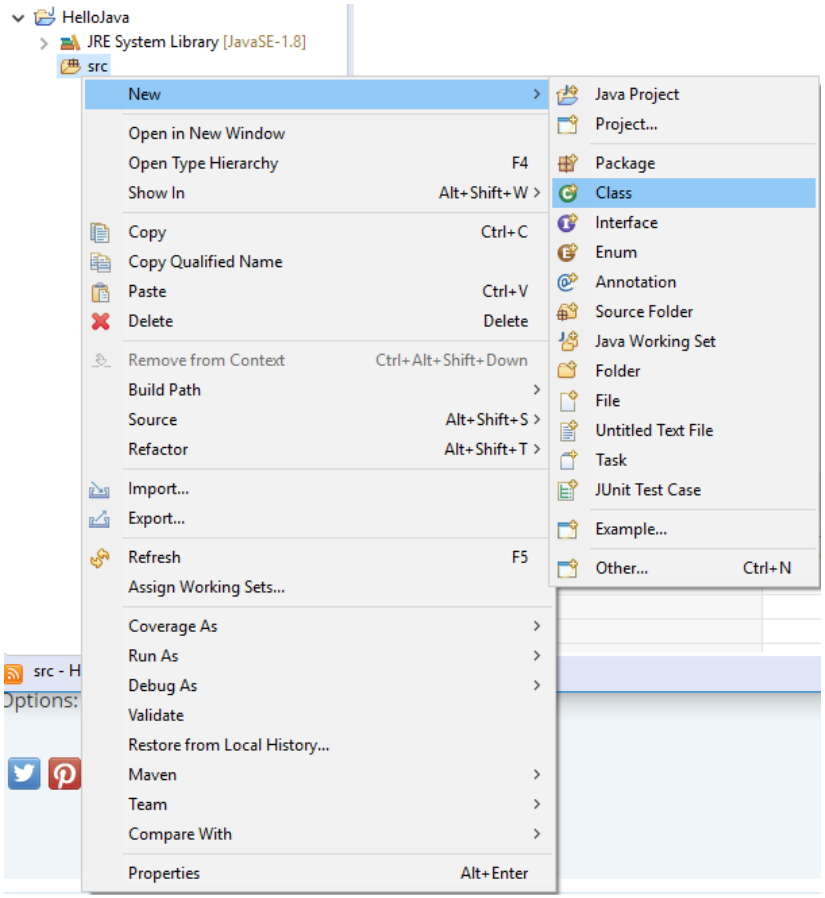


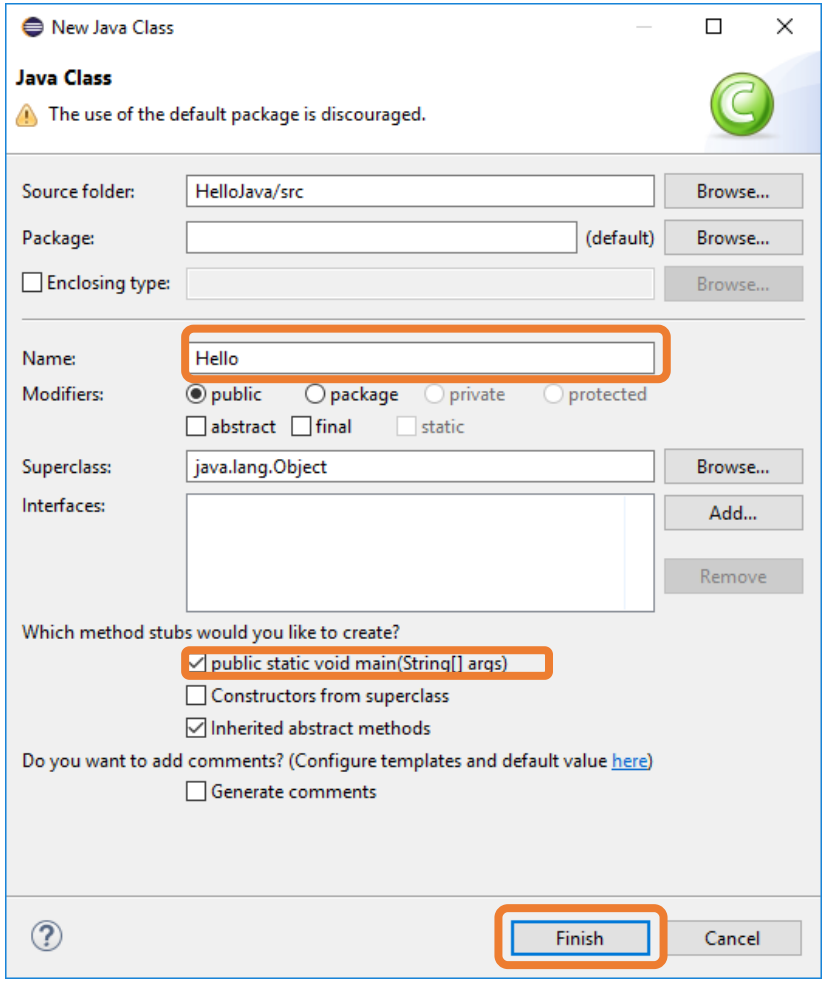


2. Working with Eclipse
Main GUI

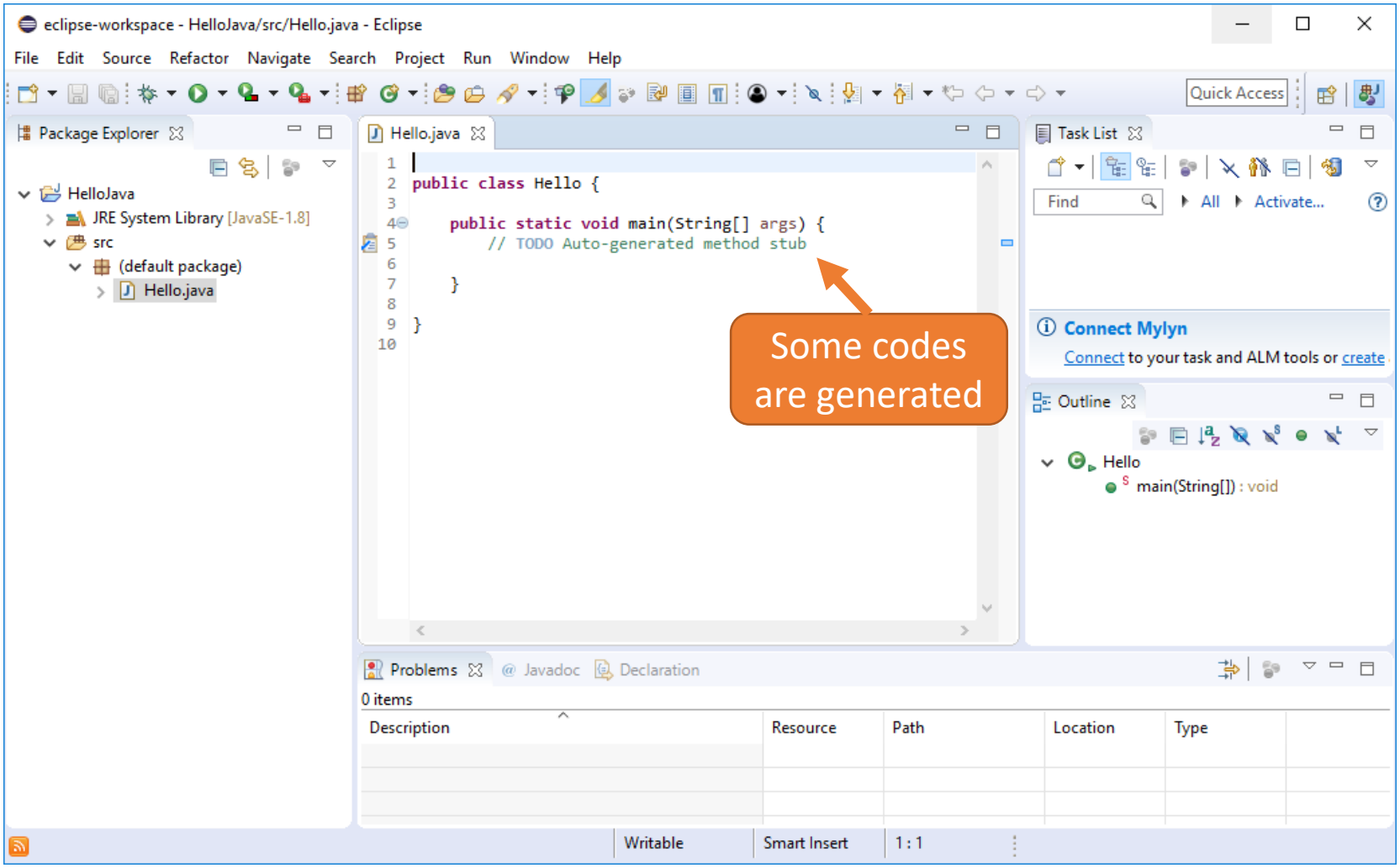


3. First Application
Creating a class





2. Working with Eclipse
Creating a class



3. First Application
Printing output

- Using to print function in java console application
- Standard
  - System.*out*.*print()*
  - System.*out*.*println()*
- With format
  - System.*out*.*printf()*
  - System.*out*.*format()*

```
int a = 10;
int b = 20;
// Tedious string concatenation.
System.out.println("a: " + a + " b: " + b);
// Output using string formatting.
System.out.printf("a: %d b: %d\n", a, b);
```

3. First Application
Printing output with format

- Format String:
  - % [**flags**] [**width**] [.**precision**] conversion-character (square brackets denote optional parameters)

```
System.out.println(String.format("%-10d%-10d", 12345, 67890));
12345     67890
```

- Flags:
  - **-** : left-justify (default is to right-justify)
  - **+** : output a plus (+) or minus (-) sign for a numerical value
  - **0** : forces numerical values to be zero-padded (default is blank padding)
  - **,** : comma grouping separator (for numbers > 1000)
  - : space will display a minus sign if the number is negative or a space if it is positive

```
System.out.println(String.format("%+10d%+10d", 100, -200));
+100      -200
```

- Conversion-Characters:
  - **d** : decimal integer [byte, short, int, long]
  - **f** : floating-point number [float, double]
  - **c** : character Capital C will uppercase the letter
  - **s** : String Capital S will uppercase all the letters in the string
  - **h** : hashcode A hashcode is like an address. This is useful for printing a reference
  - **n** : newline Platform specific newline character- use %n instead of \n for greater compatibility

3. First Application
Printing output with format example


```
long n = 461012;
System.out.format("%d%n", n);        //  -->  "461012"
System.out.format("%08d%n", n);      //  -->  "00461012"
System.out.format("%,8d%n", n);      // -->  " 461,012"
System.out.format("%+,8d%n", n);     //  -->  "+461,012"

double pi = Math.PI;
System.out.format("%f%n", pi);       // -->  "3.141593"
System.out.format("%.3f%n", pi);     // -->  "3.142"
System.out.format("%10.3f%n", pi);   // -->  "     3.142"
System.out.format("%-10.3f%n", pi);  // -->  "3.142"
```

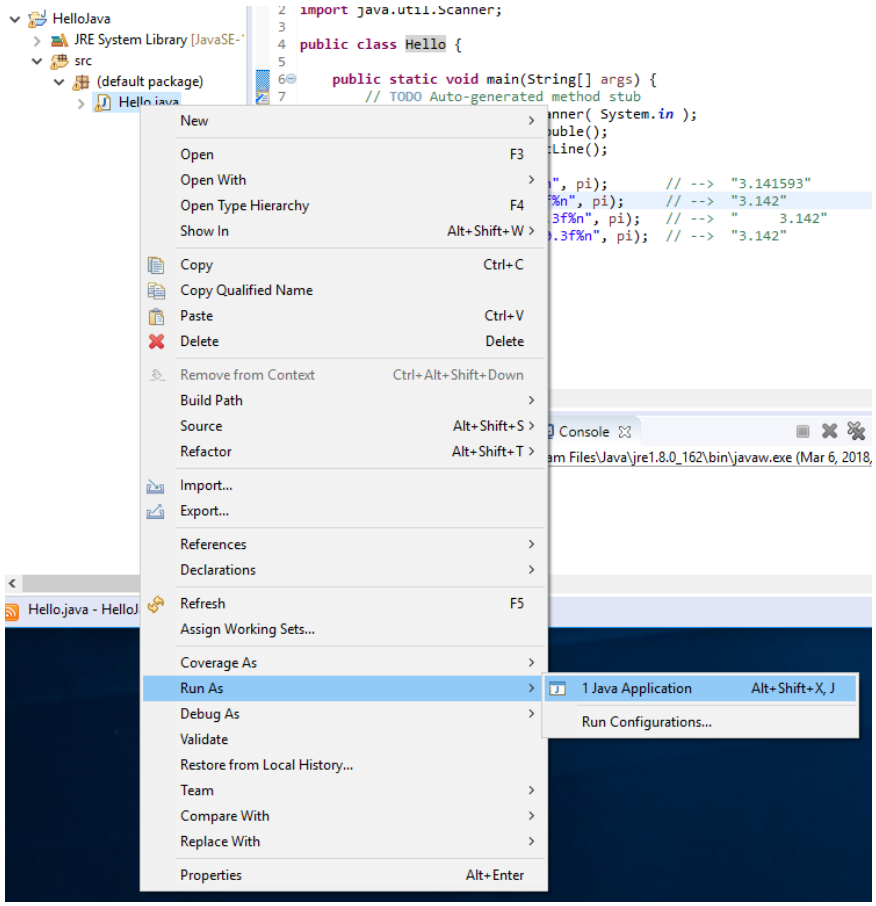
3. First Application
Get the input

- Use Scanner object to read the input:
  - `Scanner input = new Scanner( System.in );`
- For different input type
  - input.nextDouble() to read in double
  - input.nextInt() to read in integer
  - input.nextLine() to read in a String

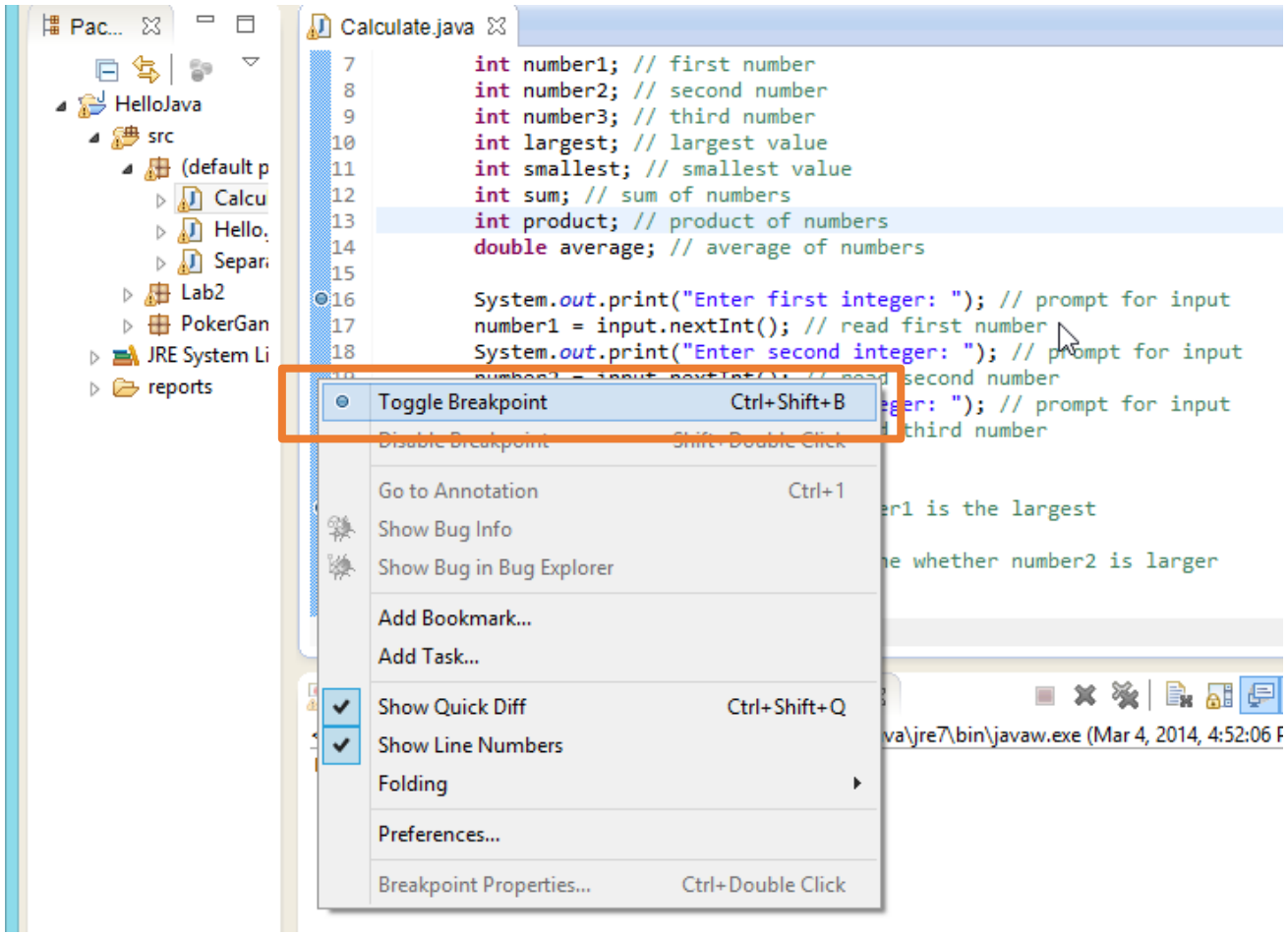
```
import java.util.Scanner;
…
// create Scanner to obtain input from command line
Scanner input = new Scanner( System.in );
int i= input.nextInt();
String str = input.nextLine();
```

4. Running Your App

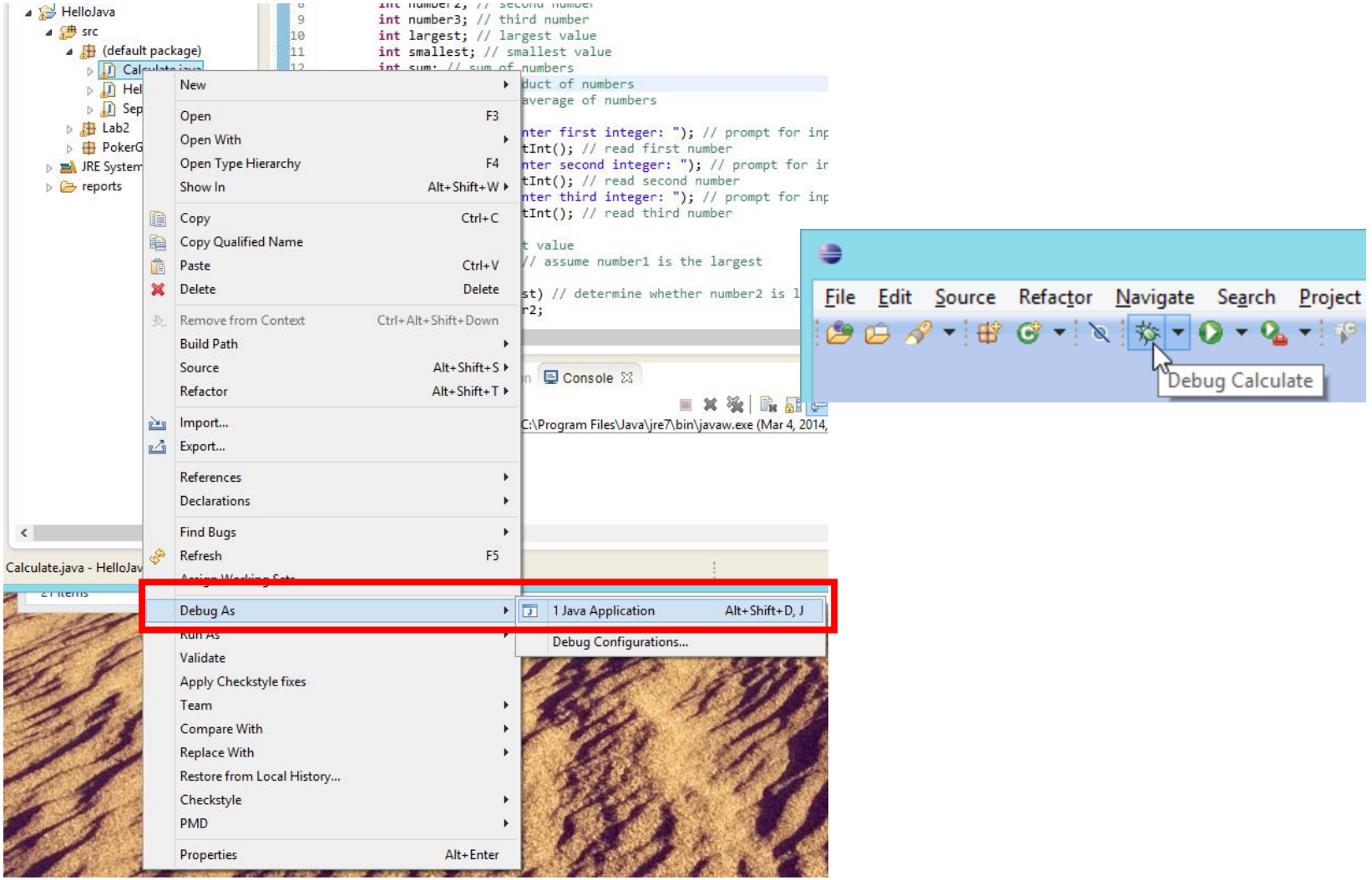
- Right click on the class Select Run As -> Java Application
- Menu Run –> Run
- Note:
  - Show console log: Menu Window-> Show view -> Console



5. Debugging
Setting breakpoints

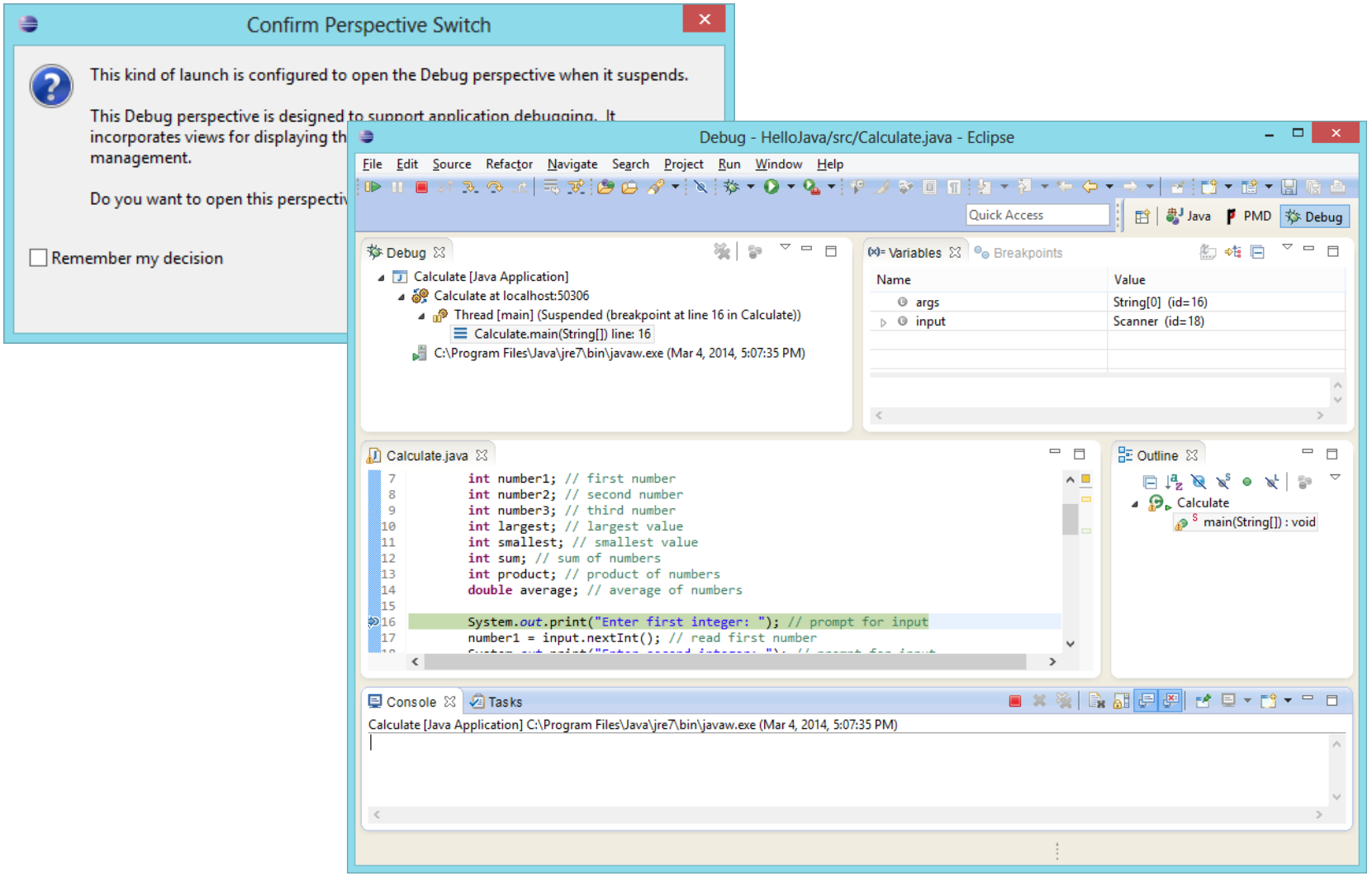


5. Debugging
Starting debugging



- 2.

5. Debugging
Debug perspective



III. PRACTICE

Exercise 1: Name

- Objective:
  - Using *System.out.printf* to output text and characters
  - Using Scanner class to get input text
  - Compiling and executing Java applications.
  - Debug your program, add breakpoint and watch your variable.
- Problem:
  - Write an application that input your name, and displays the welcome *"Hello <your name>."*
- Sample output:

```
Input your name: Java
Hello Java.
```

Exercise 2: Numbers

- Objective:
  - Using the *Scanner* class to obtain input from the user.
  - Using *System.out.printf* to output information to the user.
  - Using arithmetic operators to perform calculations and operators to compare variable values.
  - Using *if* statements to make decisions based on the truth or falsity of a condition.
- Problem:
  - Write an application that inputs three integers from the user and displays the sum, average, product, smallest and largest of the numbers.
  - *Note: The calculation of the average will result in an float with precision is 3 number. i.e. 3.333*
- Sample output:

```
Enter first integer: 10
Enter second integer: 20
Enter third integer: 30
For the numbers 10, 20 and 30
Largest is 30
Smallest is 10
Sum is 60
Product is 6000
Average is 20.000
```