

## Script generated by TTT

Title: Lehmann: Uebung\_Einf\_HF (21.06.2013)  
Date: Fri Jun 21 09:21:13 CEST 2013  
Duration: 82:25 min  
Pages: 63

## 2 Language Basics – Variables

### Arrays

- **Array:** "Indexed list" of elements
- Holds a **fixed number** of variables of a certain type (primitive or reference)
- Is itself a **reference type** (see next slide)

Indices: 0 1 2 3 4 5  
first index  
length of example array is 6  
element at index 4

array of primitive type elements

array of reference type elements (objects)

```
int[] someArray;
someArray = new int[6];
someArray[0] = 23;
someArray[1] = 12;
someArray[5] = 4 + someArray[2];

String[] someOtherArray;
someOtherArray = new String[30];
someOtherArray[17] = "bla bla";

AnyClass[] thirdArray;
thirdArray = new AnyClass[45];
thirdArray[44] = new AnyClass();
thirdArray[22 * 2].someMethod();
```

## 2 Language Basics – Variables

### Arrays

- Array is itself a **reference type**:

```
int[] someArray = new int[3];
int[] anotherArray = new int[3];

someArray[2] = 7;
anotherArray[1] = 8;
```

memory (simplified model)		
cell nr	cell name	cell content
...	...	...
1149	someArray	<1150>
1150		0
1151		0
1152		7
...	...	...
1327	anotherArray	<1328>
1328		0
1329		8
1330		0
...	...	...

```
someArray = anotherArray;

boolean b = (someArray[1] == 8);
// b == true
```

memory (simplified model)		
cell nr	cell name	cell content
...	...	...
1149	someArray	<1328>
1150		0
1151		0
1152		7
...	...	...
1327	anotherArray	<1328>
1328		0
1329		8
1330		0
...	...	...

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## 2 Language Basics – Variables

### Arrays

- Array is itself a **reference type**:

```
int[] someArray = new int[3];
int[] anotherArray = new int[3];

someArray[2] = 7;
anotherArray[1] = 8;

someArray = anotherArray;

boolean b = (someArray[1] == 8);
// b == true
```

- **Length** property:

```
int l = someArray.length;
// l == 3
```

memory (simplified model)		
cell nr	cell name	cell content
...	...	...
1149	someArray	<1328>
1150		0
1151		0
1152		7
...	...	...
1327	anotherArray	<1328>
1328		0
1329		8
1330		0
...	...	...

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## 2 Language Basics – Expressions, Statements, Blocks

### Expressions

- **Expression**: Legal combination of constants, variables and operators
- Can be (and typically are) nested
- Expressions evaluate to a **value** of a certain **type**

Given: `int a = 73; boolean someArray[] = new boolean[5];`

Example	Evaluates to	Type
48	48	int
2.0 / 3.0	0.6666666666666667	double
true	true	boolean
15 / 8	1	int
(17 + (3 * 9)) % 3	2	int
a + 1	74	int
a * 9.0 / someArray.length	131.4	double

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## 2 Language Basics – Expressions, Statements, Blocks

### Expressions

- Some expressions have so-called **side-effects**

Given: `int a = 73; int b;`

Example	Value	Side-effect
<code>a = 84</code>	84	Assign 84 to a
<code>b = (a = 48)</code>	48	Assign 48 to both a and b
<code>a++</code>	48	Assign 49 to a (!)
<code>++a</code>	50	Assign 50 to a (!)
<code>new Bicycle()</code>	Reference to the new instance of Bicycle, e.g. <1150>	Create and initialize new instance of class Bicycle in memory
<code>new double[10]</code>	Reference to the new array of double	Create and initialize new array in memory

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## 2 Language Basics – Expressions, Statements, Blocks

### Statements

- **Statement**: Complete unit of execution (ends with ";")

- **Expression statements**:
  - Assignment expressions `a = (17 + (3 * 9)) % 3;`
  - Use of `++` or `--` `a++;`
  - Method invocations `someObject.methodOne();`
  - Object creation expressions `new SomeClass();`
- **Declaration statements** `int a = 0;`
- **Blocks**
  - (next slide)
- **Control flow statements**
  - (later)

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## 2 Language Basics – Control Flow Statements

- **if** and **if else** have a straightforward meaning:

```
void applyBrakes() {  
    if (speed > 0) {  
        speed = speed - 1;  
    }  
}  
  
void applyBrakes() {  
    if (speed > 10) {  
        speed = speed - 2;      // break really hard  
    } else if (speed > 0) {  
        speed--;                // soft brakes  
    } else {  
        System.out.println(  
            "The bicycle has already stopped!");  
    }  
}
```

- **switch**: Equivalent to sequence of chained if else statements

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## 2 Language Basics – Control Flow Statements

- **while**: do something as long as some condition (boolean expression) is true

```
int count = 1;  
while (count < 8) {  
    System.out.print("#:" + count + " ");  
    count++;  
}
```

→ output will be: #:1 #:2 #:3 #:4 #:5 #:6 #:7

- **do while**: similar to "while", but check condition at the end of execution of something instead of at the beginning

```
int count = 1;  
do {  
    System.out.print("#:" + count + " ");  
    count++;  
} while (count < 8);
```

→ output will be: #:1 #:2 #:3 #:4 #:5 #:6 #:7

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## 2 Language Basics – Control Flow Statements

- **for**: usually means to do something for a fixed number of times:

```
for (int i=0; i<7; i++) { // loop will be executed 7 times  
    System.out.print("#:" + i + " ");  
}
```

→ output will be: #:0 #:1 #:2 #:3 #:4 #:5 #:6

- General form:

```
for (initialization; termination; update) {  
    statement*  
}
```

- **initialization** expression: Executed once at the beginning of first loop
- **termination** expression: If true then execute statement(s), else exit loop
- **update** expression: Executed after each iteration of the loop

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## 2 Language Basics – Control Flow Statements

- **for**: usually means to do something for a fixed number of times:

```
for (int i=0; i<7; i++) { // loop will be executed 7 times  
    System.out.print("#:" + i + " ");  
}
```

→ output will be: #:0 #:1 #:2 #:3 #:4 #:5 #:6

- **General form:**

```
for (initialization; termination; update) {  
    statement*  
}
```

- **initialization** expression: Executed once at the beginning of first loop
- **termination** expression: If true then execute statement(s), else exit loop
- **update** expression: Executed after each iteration of the loop

• **for** equivalent to **while** times

initialization;  
while (termination) {  
 statement\*  
 update;  
}



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## 3 Classes, Objects, Inheritance

Deepening readings:

- <http://java.sun.com/docs/books/tutorial/java/javaOO/classes.html>
- <http://java.sun.com/docs/books/tutorial/java/javaOO/objects.html>
- <http://java.sun.com/docs/books/tutorial/java/javaOO/more.html>
- <http://java.sun.com/docs/books/tutorial/java/landl/subclasses.html>
- <http://java.sun.com/docs/books/tutorial/essential/exceptions/index.html>

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## 2 Language Basics – Control Flow Statements

- **for:** usually means to do **something** for a **fixed number of times**:

```
for (int i=0; i<7; i++) { // loop will be executed 7 times
    System.out.print("#:" + i + " ");
}
```

→ output will be: # : 0 # : 1 # : 2 # : 3 # : 4 # : 5 # : 6
- General form:

```
for (initialization; termination; update) {
    statement*
}
```

- **initialization expression:** Executed once at the beginning of first loop
- **termination expression:** If **true** then execute statement(s), else exit loop
- **update expression:** Executed after each iteration of the loop

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## 2 Language Basics – Expressions, Statements, Blocks

### Blocks

- Variables declared inside a block are **only visible from within** that block:

```
int a = 7, b = 6;

if (a != b) {           // begin block
    int c;
    c = a * b;
    System.out.println(c);
}                         // end block

System.out.println(c);   // ERROR: c unavailable
```

Eclipse Java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

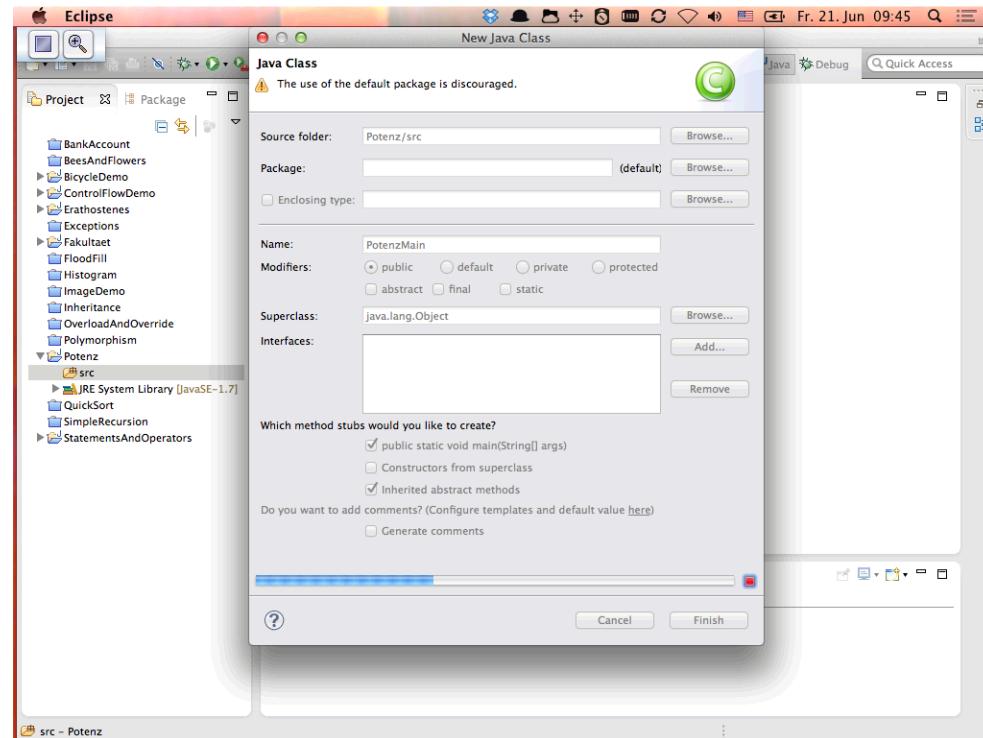
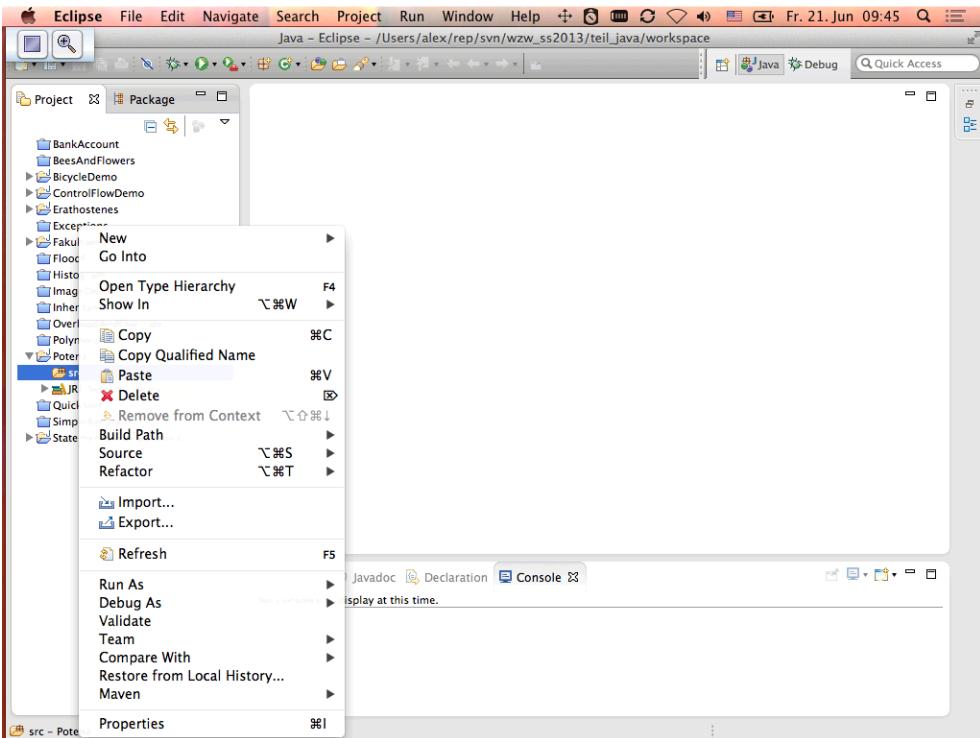
New Project

Select a wizard

Wizards:

- General
- CVS
- Java
  - Java Project
  - Java Project from Existing Ant Buildfile
- Maven
- Examples

No consoles to display at this time.



Eclipse - Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

\*PotenzMain.java

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3     }  
4 }  
5  
6  
7  
8  
9  
10
```

src - Potenz

File Edit Source Refactor Navigate Search Project Run Window Help

Java Debug Quick Access

Problems @ Javadoc Declaration Console

No consoles to display at this time.

Writable Smart Insert 5 : 9

Eclipse - Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

\*PotenzMain.java

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0, n = 8.0;  
4     }  
5 }  
6  
7  
8  
9  
10  
11  
12
```

src - Potenz

File Edit Source Refactor Navigate Search Project Run Window Help

Java Debug Quick Access

Problems @ Javadoc Declaration Console

No consoles to display at this time.

Writable Smart Insert 7 : 9

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:48 Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

The screenshot shows the Eclipse IDE interface with the title bar "Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace". The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help, and a date/time stamp. The toolbar has icons for New, Open, Save, Cut, Copy, Paste, Find, and others. The left sidebar shows a project tree with packages like BankAccount, BeesAndFlowers, BicycleDemo, ControlFlowDemo, Eratosthenes, Exceptions, Fakultaet, Floodfill, Histogram, ImageDemo, Inheritance, OverloadAndOverride, Polymorphism, and Potenz. Under Potenz, there is a src folder containing PotenzMain.java and other files. The central editor window displays the following Java code:

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0, n = 8.0;  
4         int i = 0;  
5     }  
6 }
```

The status bar at the bottom indicates "Writable" and "Smart Insert" with a timestamp of 8:9.

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:49 Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

The screenshot shows the Eclipse IDE interface with the title bar "Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace". The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help, and a date/time stamp. The toolbar has icons for New, Open, Save, Cut, Copy, Paste, Find, and others. The left sidebar shows a project tree with packages like BankAccount, BeesAndFlowers, BicycleDemo, ControlFlowDemo, Eratosthenes, Exceptions, Fakultaet, Floodfill, Histogram, ImageDemo, Inheritance, OverloadAndOverride, Polymorphism, and Potenz. Under Potenz, there is a src folder containing PotenzMain.java and other files. The central editor window displays the same Java code as the first screenshot, but with the cursor positioned at the start of the while loop in line 11.

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:50 Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

The screenshot shows the Eclipse IDE interface with the title bar "Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace". The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help, and a date/time stamp. The toolbar has icons for New, Open, Save, Cut, Copy, Paste, Find, and others. The left sidebar shows a project tree with packages like BankAccount, BeesAndFlowers, BicycleDemo, ControlFlowDemo, Eratosthenes, Exceptions, Fakultaet, Floodfill, Histogram, ImageDemo, Inheritance, OverloadAndOverride, Polymorphism, and Potenz. Under Potenz, there is a src folder containing PotenzMain.java and other files. The central editor window displays the Java code with the cursor at the start of the assignment statement "x = x \* x;" in line 11.

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:51 Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

The screenshot shows the Eclipse IDE interface with the title bar "Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace". The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help, and a date/time stamp. The toolbar has icons for New, Open, Save, Cut, Copy, Paste, Find, and others. The left sidebar shows a project tree with packages like BankAccount, BeesAndFlowers, BicycleDemo, ControlFlowDemo, Eratosthenes, Exceptions, Fakultaet, Floodfill, Histogram, ImageDemo, Inheritance, OverloadAndOverride, Polymorphism, and Potenz. Under Potenz, there is a src folder containing PotenzMain.java and other files. The central editor window displays the Java code with the cursor at the start of the increment statement "i = i + 1;" in line 12.

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:52

Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0;  
4         int n = 8;  
5         int i = 0;  
6         double result = 1.0;  
7         while (i < n) {  
8             result = result * x;  
9             i = i + 1;  
10        }  
11        System.out.println("Das Ergebnis lautet: " + result);  
12    }  
13}  
14
```

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:52

Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0;  
4         int n = 8;  
5         int i = 0;  
6         double result = 1.0;  
7         while (i < n) {  
8             result = result * x;  
9             i = i + 1;  
10        }  
11        System.out.println("Das Ergebnis lautet: " + result);  
12    }  
13}
```

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:53

Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0;  
4         int n = 8;  
5         // int i = 0;  
6         // double result = 1.0;  
7         // while (i < n) {  
8         //     result = result * x;  
9         //     i = i + 1;  
10        // }  
11        // for ()  
12        // System.out.println("Das Ergebnis lautet: " + result);  
13    }  
14}
```

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 09:55

Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0;  
4         int n = 8;  
5         // int i = 0;  
6         // double result = 1.0;  
7         // while (i < n) {  
8         //     result = result * x;  
9         //     i = i + 1;  
10        // }  
11        // double result = 1.0;  
12        // for (int i = 0; i < n; i++) {  
13        //     result = result * x;  
14        // }  
15        System.out.println("Das Ergebnis lautet: " + result);  
16    }  
17}
```

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:04 Java - Potenz/src/PotenzMain.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package PotenzMain.java

```
1 public class PotenzMain {  
2     public static void main(String[] args) {  
3         double x = 2.0;  
4         int n = 8;  
5  
6         int i;  
7         double result = 1.0;  
8         while (i < n) {  
9             result = result * x;  
10            i = i + 1;  
11        }  
12  
13        double result = 1.0;  
14        for (int i = 0; i < n; i++) {  
15            result = result * x;  
16        }  
17  
18        System.out.println("Das Ergebnis lautet: " + result);  
19    }  
20}
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz New Go Into Open Type Hierarchy Show In Copy Copy Qualified Name Paste Delete Remove from Context Build Path Source Refactor Import... Export... Refresh Run As Debug As Validate Team Compare With Restore from Local History... Maven Properties

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:04 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen;  
4     }  
5 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

```
<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0
```

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:05 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         Math.random();  
5     }  
6 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

```
<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0
```

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:05 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5     }  
6 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

```
<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0
```

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:05 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7     }  
8 }  
9  
10 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:06 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7     }  
8 }  
9  
10 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:08 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7     }  
8 }  
9  
10 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:08 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7     }  
8 }  
9  
10 }
```

BankAccount BeesAndFlowers BicycleDemo ControlFlowDemo Eratosthenes Exceptions Fakultaet Floodfill Histogram ImageDemo Inheritance OverloadAndOverride Polymorphism Potenz src (default package) BubbleSort.java PotenzMain.java JRE System Library [JavaSE-1.7] QuickSort SimpleRecursion StatementsAndOperators

Problems @ Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:09 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7     }  
8     }  
9     }  
10    }  
11    }  
12    }  
13 }
```

Problems Javadoc Declaration Console

<terminated> PotenzMain [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201)  
Das Ergebnis lautet: 256.0

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:10 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7         for (int i = 0; i < zahlen.length; i++) {  
8             System.out.println(zahlen[i]);  
9         }  
10    }  
11    }  
12    }  
13    }  
14    }  
15 }
```

Problems Javadoc Declaration Console

<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201)  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.18620177244411  
98.65382787122844  
58.00303482064463

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:12 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7         for (int i = 0; i < zahlen.length; i++) {  
8             System.out.println(zahlen[i]);  
9         }  
10        for () {  
11        }  
12    }  
13    }  
14    }  
15    }  
16    }  
17 }
```

Problems Javadoc Declaration Console

<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201)  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.18620177244411  
98.65382787122844  
58.00303482064463

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21. Jun 10:13 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7         for (int i = 0; i < zahlen.length; i++) {  
8             System.out.println(zahlen[i]);  
9         }  
10        for (int i = 0; i < zahlen.length; i++) {  
11            for (int j = i+1; j < zahlen.length; j++) {  
12            }  
13        }  
14    }  
15    }  
16    }  
17    }  
18    }  
19 }
```

Problems Javadoc Declaration Console

<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0\_21.jdk/Contents/Home/bin/java (21.06.201)  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.18620177244411  
98.65382787122844  
58.00303482064463

Syntax error on token ")", expected after this token

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:13

Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         for (int i = 0; i < zahlen.length; i++) {  
10            System.out.println(zahlen[i]);  
11        }  
12  
13         for (int i = 0; i < zahlen.length; i++) {  
14             for (int j = i+1; j < zahlen.length; j++) {  
15                 if (zahlen[i] > zahlen[j]) {  
16                     zahlen[i] = zahlen[j];  
17                     zahlen[j] = zahlen[i];  
18                 }  
19             }  
20         }  
21     }  
22 }
```

Problems Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.1862017244411  
98.65382787122844  
58.00303482064463
```

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:14

Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         for (int i = 0; i < zahlen.length; i++) {  
10            System.out.println(zahlen[i]);  
11        }  
12  
13         for (int i = 0; i < zahlen.length; i++) {  
14             for (int j = i+1; j < zahlen.length; j++) {  
15                 if (zahlen[i] > zahlen[j]) {  
16                     // tauschen  
17                 }  
18             }  
19         }  
20     }  
21 }
```

Problems Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.1862017244411  
98.65382787122844  
58.00303482064463
```

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:16

Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         for (int i = 0; i < zahlen.length; i++) {  
10            System.out.println(zahlen[i]);  
11        }  
12  
13         for (int i = 0; i < zahlen.length; i++) {  
14             for (int j = i+1; j < zahlen.length; j++) {  
15                 if (zahlen[i] > zahlen[j]) {  
16                     zahlen[i] = zahlen[j];  
17                 }  
18             }  
19         }  
20     }  
21 }
```

Problems Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.1862017244411  
98.65382787122844  
58.00303482064463
```

Eclipse File Edit Source Refactor Navigate Search Project Run Window Help Fr. 21.Jun 10:17

Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java \*BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         for (int i = 0; i < zahlen.length; i++) {  
10            System.out.println(zahlen[i]);  
11        }  
12  
13         for (int i = 0; i < zahlen.length; i++) {  
14             for (int j = i+1; j < zahlen.length; j++) {  
15                 if (zahlen[i] > zahlen[j]) {  
16                     double backup = zahlen[i];  
17                     zahlen[i] = zahlen[j];  
18                     zahlen[j] = backup;  
19                 }  
20             }  
21         }  
22     }  
23 }
```

Problems Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
45.75008391625802  
50.84768255156875  
9.817754228868814  
64.1862017244411  
98.65382787122844  
58.00303482064463
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21. Jun 10:18 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         for (int i = 0; i < zahlen.length; i++) {  
10            System.out.println(zahlen[i]);  
11        }  
12  
13         for (int i = 0; i < zahlen.length; i++) {  
14             for (int j = i+1; j < zahlen.length; j++) {  
15                 if (zahlen[i] > zahlen[j]) {  
16                     double backup = zahlen[i];  
17                     zahlen[i] = zahlen[j];  
18                     zahlen[j] = backup;  
19                 }  
20             }  
21         }  
22     }  
23 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321  
25.200013263483136  
26.895743870543022  
46.02322101126373  
49.1740536258274
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21. Jun 10:18 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         for (int i = 0; i < zahlen.length; i++) {  
10            System.out.println(zahlen[i]);  
11        }  
12  
13         for (int i = 0; i < zahlen.length; i++) {  
14             for (int j = i+1; j < zahlen.length; j++) {  
15                 if (zahlen[i] > zahlen[j]) {  
16                     double backup = zahlen[i];  
17                     zahlen[i] = zahlen[j];  
18                     zahlen[j] = backup;  
19                 }  
20             }  
21         }  
22     }  
23     System.out.println();  
24     for (int i = 0; i < zahlen.length; i++) {  
25         System.out.println(zahlen[i]);  
26     }  
27 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21. Jun 10:19 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         double heiner = 123.4;  
10  
11         for (int i = 0; i < zahlen.length; i++) {  
12             System.out.println(zahlen[i]);  
13         }  
14  
15         for (int i = 0; i < zahlen.length; i++) {  
16             for (int j = i+1; j < zahlen.length; j++) {  
17                 if (zahlen[i] > zahlen[j]) {  
18                     double backup = zahlen[i];  
19                     zahlen[i] = zahlen[j];  
20                     zahlen[j] = backup;  
21                 }  
22             }  
23         }  
24     }  
25     System.out.println();  
26 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21. Jun 10:19 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2  
3     public static void main(String[] args) {  
4         double[] zahlen = new double[10];  
5         for (int i = 0; i < zahlen.length; i++) {  
6             zahlen[i] = 100 * Math.random();  
7         }  
8  
9         int heiner = 123.4;  
10  
11         for (int i = 0; i < zahlen.length; i++) {  
12             System.out.println(zahlen[i]);  
13         }  
14  
15         for (int i = 0; i < zahlen.length; i++) {  
16             for (int j = i+1; j < zahlen.length; j++) {  
17                 if (zahlen[i] > zahlen[j]) {  
18                     double backup = zahlen[i];  
19                     zahlen[i] = zahlen[j];  
20                     zahlen[j] = backup;  
21                 }  
22             }  
23         }  
24     }  
25     System.out.println();  
26 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/Java/JavaVirtualMachines/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21.Jun 10:19 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7         int heiner = (int) 123.4;  
8         for (int i = 0; i < zahlen.length; i++) {  
9             System.out.println(zahlen[i]);  
10        }  
11        for (int i = 0; i < zahlen.length; i++) {  
12            for (int j = i+1; j < zahlen.length; j++) {  
13                if (zahlen[i] > zahlen[j]) {  
14                    double backup = zahlen[i];  
15                    zahlen[i] = zahlen[j];  
16                    zahlen[j] = backup;  
17                }  
18            }  
19        }  
20        System.out.println();  
21    }  
22    }  
23    }  
24    System.out.println();  
25 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/java/JDK/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21.Jun 10:20 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         double[] zahlen = new double[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = 100 * Math.random();  
6         }  
7         int heiner = (int) 123.4;  
8         for (int i = 0; i < zahlen.length; i++) {  
9             System.out.println(zahlen[i]);  
10        }  
11        for (int i = 0; i < zahlen.length; i++) {  
12            for (int j = i+1; j < zahlen.length; j++) {  
13                if (zahlen[i] > zahlen[j]) {  
14                    double backup = zahlen[i];  
15                    zahlen[i] = zahlen[j];  
16                    zahlen[j] = backup;  
17                }  
18            }  
19        }  
20        System.out.println();  
21    }  
22    }  
23    }  
24    System.out.println();  
25 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/java/JDK/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21.Jun 10:20 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         int[] zahlen = new int[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = (int) 100.0 * Math.random();  
6         }  
7         for (int i = 0; i < zahlen.length; i++) {  
8             System.out.println(zahlen[i]);  
9         }  
10        for (int i = 0; i < zahlen.length; i++) {  
11            for (int j = i+1; j < zahlen.length; j++) {  
12                if (zahlen[i] > zahlen[j]) {  
13                    double backup = zahlen[i];  
14                    zahlen[i] = zahlen[j];  
15                    zahlen[j] = backup;  
16                }  
17            }  
18        }  
19        System.out.println();  
20        for (int i = 0; i < zahlen.length; i++) {  
21            System.out.println(zahlen[i]);  
22        }  
23    }  
24    }  
25 }
```

Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/java/JDK/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

Eclipse File Edit Source Refactor Navigate Project Run Window Help Fr. 21.Jun 10:22 Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace

Project Package

PotenzMain.java BubbleSort.java

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         int[] zahlen = new int[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = (int) 100.0 * Math.random();  
6         }  
7         for (int i = 0; i < zahlen.length; i++) {  
8             System.out.println(zahlen[i]);  
9         }  
10        for (int i = 0; i < zahlen.length; i++) {  
11            for (int j = i+1; j < zahlen.length; j++) {  
12                if (zahlen[i] > zahlen[j]) {  
13                    double backup = zahlen[i];  
14                    zahlen[i] = zahlen[j];  
15                    zahlen[j] = backup;  
16                }  
17            }  
18        }  
19        System.out.println();  
20        for (int i = 0; i < zahlen.length; i++) {  
21            System.out.println(zahlen[i]);  
22        }  
23    }  
24    }  
25 }
```

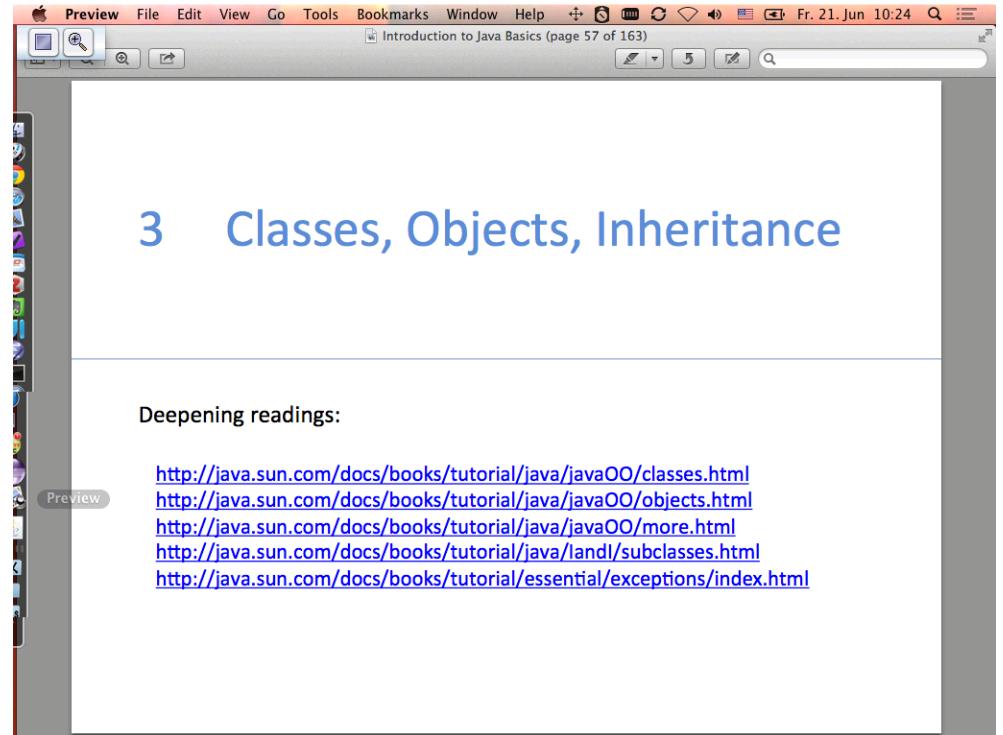
Problems @ Javadoc Declaration Console

```
<terminated> BubbleSort [Java Application] /Library/java/JDK/jdk1.7.0_21.jdk/Contents/Home/bin/java (21.06.201:  
46.02322101126373  
68.67539556325409  
50.471372781477356  
25.200013263483136  
62.44449461845307  
49.1740536258274  
52.44408558534167  
72.70417559921626  
13.124430157723321  
26.895743870543022  
13.124430157723321
```

The screenshot shows the Eclipse IDE interface with the following details:

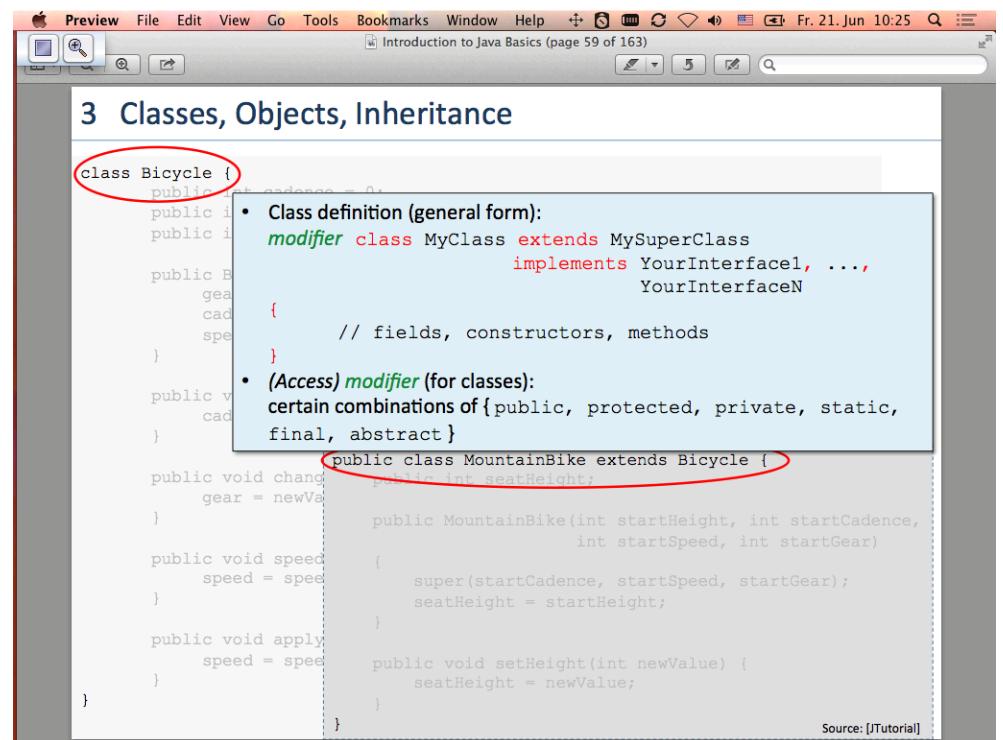
- Top Bar:** Eclipse, File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help.
- Title Bar:** Java - Potenz/src/BubbleSort.java - Eclipse /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace
- Left Sidebar (Project View):** Shows a tree view of the project structure:
  - Potenz
  - src
    - (default package)
    - BubbleSort.java
    - PotenzMain.java
  - JRE System Library [JavaSE-1.7]
  - QuickSort
  - SimpleRecursion
  - StatementsAndOperators
- Central Editor:** Displays the content of `PotenzMain.java`:

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         int[] zahlen = new int[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = (int) (100.0 * Math.random());  
6         }  
7  
8         for (int i = 0; i < zahlen.length; i++) {  
9             System.out.println(zahlen[i]);  
10        }  
11  
12        for (int i = 0; i < zahlen.length; i++) {  
13            for (int j = i+1; j < zahlen.length; j++) {  
14                if (zahlen[i] > zahlen[j]) {  
15                    int backup = zahlen[i];  
16                    zahlen[i] = zahlen[j];  
17                    zahlen[j] = backup;  
18                }  
19            }  
20        }  
21    }  
22  
23    System.out.println();  
24    for (int i = 0; i < zahlen.length; i++) {  
25        System.out.println(zahlen[i]);  
26    }  
27}
```
- Bottom Status Bar:** Writable, Smart Insert, 16 : 22.



The screenshot shows a Java application window with the title "Introduction to Java Basics (page 58 of 163)". The menu bar includes "Preview", "File", "Edit", "View", "Go", "Tools", "Bookmarks", "Window", "Help". The main content area displays two Java code snippets. The first snippet is a class definition for "Bicycle" with methods for changing cadence, gear, speed, and applying brakes. The second snippet is a class definition for "MountainBike" which extends "Bicycle" and adds a seat height attribute. Both snippets use color-coded syntax highlighting.

```
class Bicycle {  
    public int cadence = 0;  
    public int speed = 0;  
    public int gear = 1;  
  
    public Bicycle(int startCadence, int startSpeed, int startGear) {  
        gear = startGear;  
        cadence = startCadence;  
        speed = startSpeed;  
    }  
  
    public void changeCadence(int newValue) {  
        cadence = newValue;  
    }  
  
    public void changeGear(int newValue) {  
        gear = newValue;  
    }  
  
    public void applyBrakes(int reduction) {  
        speed -= reduction;  
    }  
}  
  
public class MountainBike extends Bicycle {  
    public int seatHeight;  
  
    public MountainBike(int startHeight, int startCadence,  
                        int startSpeed, int startGear)  
    {  
        super(startCadence, startSpeed, startGear);  
        seatHeight = startHeight;  
    }  
  
    public void setHeight(int newValue) {  
        seatHeight = newValue;  
    }  
}
```



Preview File Edit View Go Tools Bookmarks Window Help Fr. 21.Jun 10:28 Introduction to Java Basics (page 60 of 163)

### 3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;

    public void changeGear(int newValue) {
        gear = newValue;
    }

    public void speedUp(int startSpeed, int endSpeed) {
        speed = endSpeed;
    }

    public void applyBrakes(int startSpeed, int endSpeed) {
        speed = endSpeed;
    }

    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

- **Field declaration (general form):**  
`modifier type name;`
- **(Access) modifier (for fields):**  
certain combinations of {public, protected, private, static, final}
- **type:** Any primitive or reference type

Source: [JTutorial]

Preview File Edit View Go Tools Bookmarks Window Help Fr. 21.Jun 10:29 Introduction to Java Basics (page 61 of 163)

### 3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence;
    public int speed;
    public int gear;

    public Bicycle(int startCadence, int startSpeed, int startGear) {
        super(startCadence, startSpeed, startGear);
        seatHeight = startHeight;
    }

    public void changeGear(int newValue) {
        gear = newValue;
    }

    public void speedUp(int startSpeed, int endSpeed) {
        speed = endSpeed;
    }

    public void applyBrakes(int startSpeed, int endSpeed) {
        speed = endSpeed;
    }

    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

- **Method declaration (general form):**  
`modifier typeOfReturnValue name ( parameter* ) throwsClause { statement* }`
- **(Access) modifier (for methods):**  
certain combinations of {public, protected, private, static, final, abstract}
- **typeOfReturnValue:** Any primitive or reference type
- **parameter\*:** (later)
- **throwsClause\*:** (later)
- **statement\*:** statement(s) to execute

Source: [JTutorial]

Preview File Edit View Go Tools Bookmarks Window Help Fr. 21.Jun 10:32 Introduction to Java Basics (page 62 of 163)

### 3 Classes, Objects, Inheritance

```
class Bicycle {
    public int cadence = 0;
    public int speed = 0;
    public int gear = 1;

    public Bicycle(int startCadence, int startSpeed, int startGear) {
        gear = startGear;
        cadence = startCadence;
        speed = startSpeed;
    }

    public void changeCadence(int newValue) {
        cadence = newValue;
    }

    public void changeGear(int newValue) {
        gear = newValue;
    }

    public void speedUp(int startSpeed, int endSpeed) {
        speed = endSpeed;
    }

    public void applyBrakes(int startSpeed, int endSpeed) {
        speed = endSpeed;
    }

    public void setHeight(int newValue) {
        seatHeight = newValue;
    }
}
```

- **Constructor declaration (general form):**  
`modifier MyClass ( parameter* ) throwsClause { statement* }`
- **(Access) modifier:**  
certain combinations of {public, protected, private}
- **parameter\*:** (later)
- **throwsClause\*:** (later)
- **statement\*:** statement(s) to execute

Source: [JTutorial]

Preview File Edit View Go Tools Bookmarks Window Help Fr. 21.Jun 10:34 Introduction to Java Basics (page 63 of 163)

### 3 Classes, Objects, Inheritance

#### Why do we need constructors?

- Ensure **complete** and **consistent** initialization after object creation
- **Access (non-default) superclass constructors:**  
Construct object according to definition of superclass, then add specifics
- Provide **several** constructors for varying use-cases

```
class Bicycle {
    public int cadence;
    public int speed;
    public int gear;
}

public Bicycle(int c, int s, int g) {
    cadence = c;
    speed = s;
    gear = g;
}

public Bicycle(int g) {
    cadence = 0;
    speed = 0;
    gear = g;
}

class Tandem extends Bicycle {
    public int numberOfDrivers;

    public Tandem(int c, int s, int g, int n) {
        super(c, s, g);
        numberOfDrivers = n;
    }
}
```

The screenshot shows the Eclipse IDE interface with the following details:

- Top Bar:** Eclipse, File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help.
- Title Bar:** Java - Potenz/src/BubbleSort.java - Eclipse - /Users/alex/rep/svn/wzw\_ss2013/teil\_java/workspace
- Toolbar:** Includes icons for New, Open, Save, Cut, Copy, Paste, Find, and others.
- Project Explorer (Left):** Shows a tree view of Java projects and source files. Projects include BankAccount, BeesAndFlowers, Bicycledemo, ControlFlowDemo, Eratosthenes, Exceptions, Fakultaet, Floodfill, Histogram, ImageDemo, Inheritance, OverloadAndOverride, Polymorphism, Potenz, and src. Under src, there are BubbleSort.java and PotenzMain.java.
- Code Editor (Center):** Displays the Java code for BubbleSort.java. The code implements a bubble sort algorithm. A cursor is visible at line 16, column 16, where the assignment `int backup = zahlen[i];` is highlighted.

```
1 public class BubbleSort {  
2     public static void main(String[] args) {  
3         int[] zahlen = new int[10];  
4         for (int i = 0; i < zahlen.length; i++) {  
5             zahlen[i] = (int) (100.0 * Math.random());  
6         }  
7         for (int i = 0; i < zahlen.length; i++) {  
8             System.out.println(zahlen[i]);  
9         }  
10        for (int i = 0; i < zahlen.length; i++) {  
11            for (int j = i+1; j < zahlen.length; j++) {  
12                if (zahlen[i] > zahlen[j]) {  
13                    int backup = zahlen[i];  
14                    zahlen[i] = zahlen[j];  
15                    zahlen[j] = backup;  
16                }  
17            }  
18        }  
19        System.out.println();  
20    }  
21    for (int i = 0; i < zahlen.length; i++) {  
22        System.out.println(zahlen[i]);  
23    }  
24}
```

- Console (Bottom Left):** Shows the output of the application. The output is:  
3  
6  
7  
8  
23  
28  
50  
66  
80  
87
- Bottom Status Bar:** Writable, Smart Insert, 16 : 24.

## 3 Classes, Objects, Inheritance

### Why do we need constructors?

- Ensure **complete** and **consistent** initialization after object creation
- **Access (non-default) superclass constructors:**  
Construct object according to definition of superclass, then add specifics
- Provide **several** constructors for varying use-cases

```
class Bicycle {  
    public int cadence;  
    public int speed;  
    public int gear;  
  
    public Bicycle(int c, int s, int g) {  
        cadence = c;  
        speed = s;  
        gear = g;  
    }  
  
    public Bicycle(int g) {  
        cadence = 0;  
        speed = 0;  
        gear = g;  
    }  
}  
  
class Tandem extends Bicycle {  
    public int numberOfDrivers;  
  
    public Tandem(int c, int s, int g, int n) {  
        super(c, s, g);  
        numberOfDrivers = n;  
    }  
}
```

The screenshot shows a Java IDE interface with the following details:

- Menu Bar:** Preview, File, Edit, View, Go, Tools, Bookmarks, Window, Help.
- Toolbar:** Includes icons for New, Open, Save, Cut, Copy, Paste, Find, and Delete.
- Search Bar:** Introduction to Java Basics (page 64 of 163).
- Code Area:** Displays Java code for classes Person and Student, demonstrating inheritance and constructor initialization.

```
class Person {
    String firstName;
    String lastName;
    long taxIdent;

    Person(String fName, String lName) {
        firstName = fName;
        lastName = lName;
        taxIdent = createUniqueTaxIdentifier();           // side-effect!
    }
}

class Student extends Person {
    long matrikelNr;

    //Student(String fName, String lName, long matrikel) {
    //    super(firstName, lastName);
    //    matrikelNr = matrikel;
    //}
}

// Manual initialization, easy to make a mistake (e.g. what about `taxIdent`?)
Student student1 = new Student();
student1.firstName = "Max";
student1.lastName = "Mustermann";
student1.matrikelNr = 1234567890;

// Complete, consistent, convenient ☺
Student student2 = new Student("Max", "Mustermann", 1234567890);
```

Preview File Edit View Go Tools Bookmarks Window Help ⌘ ⓘ Fr. 21. Jun 10:42

Introduction to Java Basics (page 65 of 163)

## 3 Classes, Objects, Inheritance

**Example:**

```
class Person {  
    String firstName;  
    String lastName;  
    long taxIdent;  
  
    Person(String fName, String lName) {  
        firstName = fName;  
        lastName = lName;  
        taxIdent = createUniqueTaxIdentifier();           // side-effect!  
    }  
}  
  
class Student extends Person {  
    long matrikelNr;  
  
    Student(String fName, String lName, long matrikel) {  
        super(firstName, lastName);  
        matrikelNr = matrikel;  
    }  
}  
  
// Manual initialization, easy to make a mistake (e.g. what about 'taxIdent')?  
Student student1 = new Student();  
student1.firstName = "Max";  
student1.lastName = "Mustermann";  
student1.matrikelNr = 1234567890;  
  
// Complete, consistent, convenient ☺  
Student student2 = new Student("Max", "Mustermann", 1234567890);
```