Lecture 6

summary of Java SE

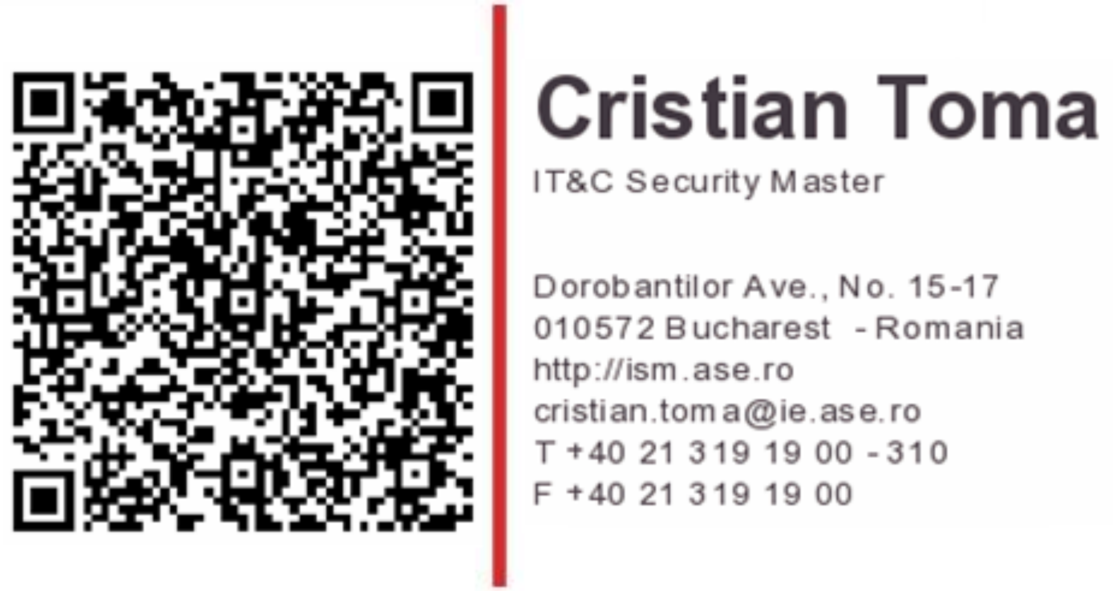
presentation

Java Programming – Software App Development

Cristian Toma

D.I.C.E/D.E.I.C – Department of Economic Informatics & Cybernetics
www.dice.ase.ro

Cristian Toma – Business Card



Cristian Toma

IT&C Security Master

Dorobantilor Ave., No. 15-17
010572 Bucharest - Romania
http://ism.ase.ro
cristian.toma@ie.ase.ro
T +40 21 319 19 00 - 310
F +40 21 319 19 00

Agenda for Lecture 6 – Summary of JSE

1. Java Exceptions
2. Source Code Design Patterns
3. Exchange Ideas

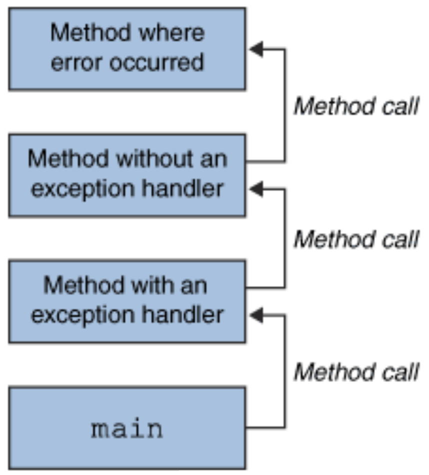
1

Exception mechanisms and features

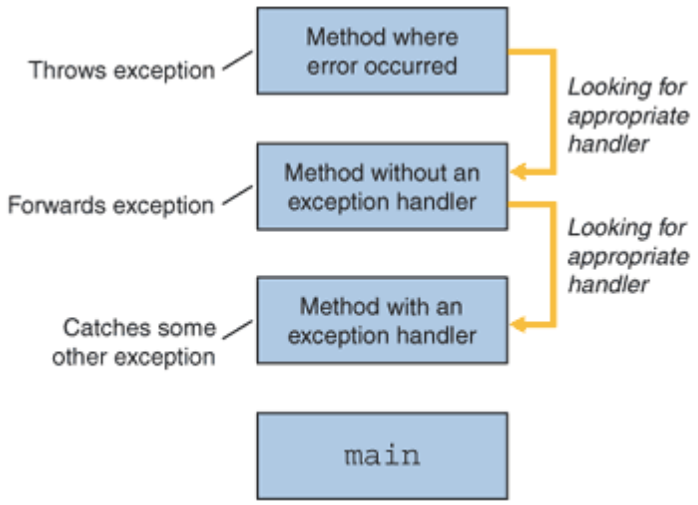
Java Exceptions

1.1 Java Exceptions Summary

Propagation Mode:


Method where error occurred
Method call
Method without an exception handler
Method call
Method with an exception handler
Method call
main

The call stack.


Throws exception
Method where error occurred
Looking for appropriate handler
Forwards exception
Method without an exception handler
Looking for appropriate handler
Catches some other exception
Method with an exception handler
main

Searching the call stack for the exception handler.

1.1 Java Exceptions Summary

Exceptions Types:

1. checked exception
They are not passing by the compilation phase. May exist a “recovery” mechanism but it is a MUST to have “try-catch” source code statements.

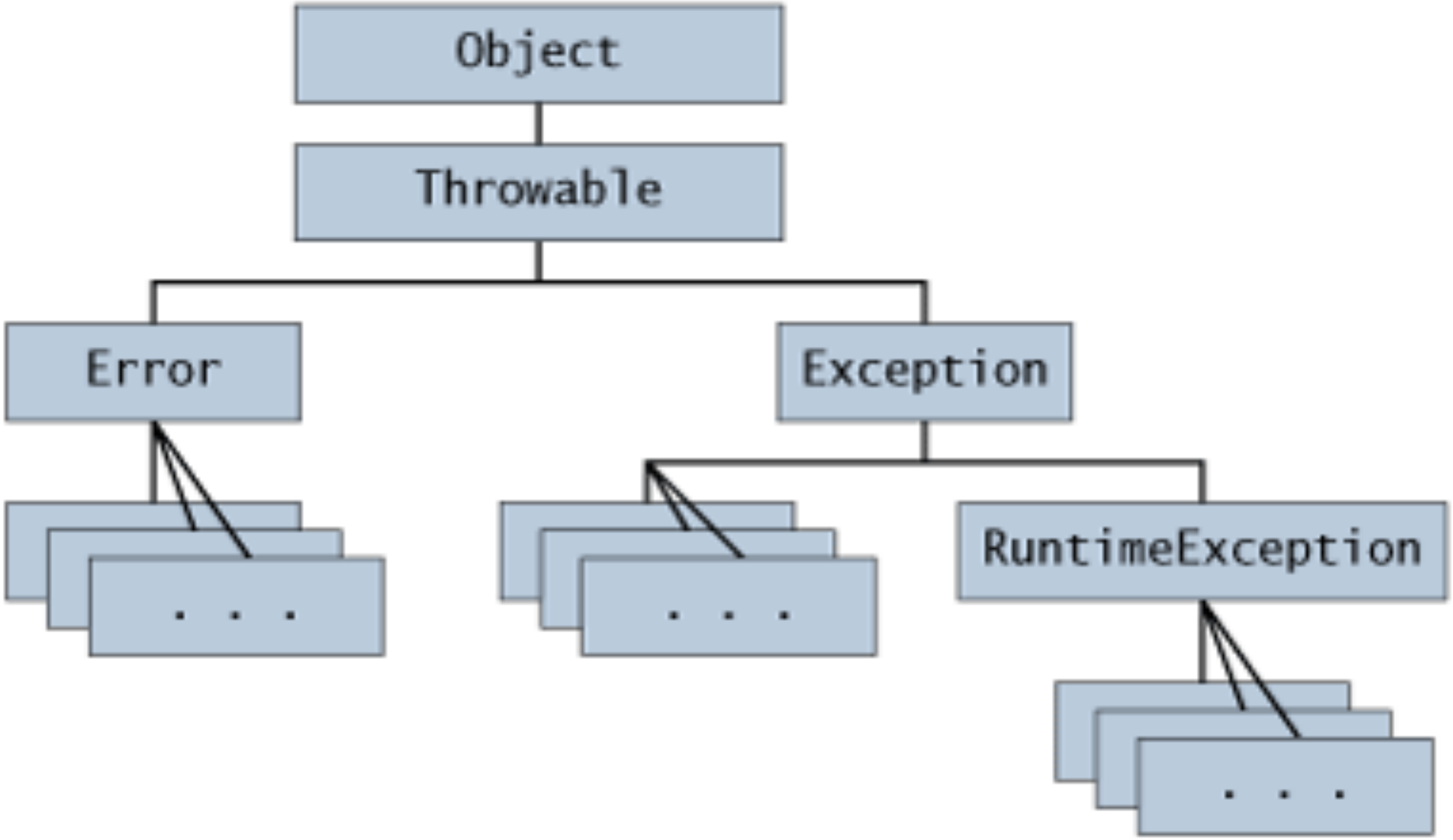
2. errors
They are passing by the compilation phase, BUT it is impossible to forecast malfunctions of HW or OS – e.g. HDD has bad sectors and for opening a file there is a ‘java.io.IOError’ throw. In practice, there is not a try-catch statement for them.

3. runtime exception
They are passing by the compilation phase, BUT the development logics is not implemented correct – e.g. after computations there is a «divison by zero». It is possible to use try-catch mechanism but it is better to investigate and to correct the «logic bug».

- **2+3 = unchecked exception**

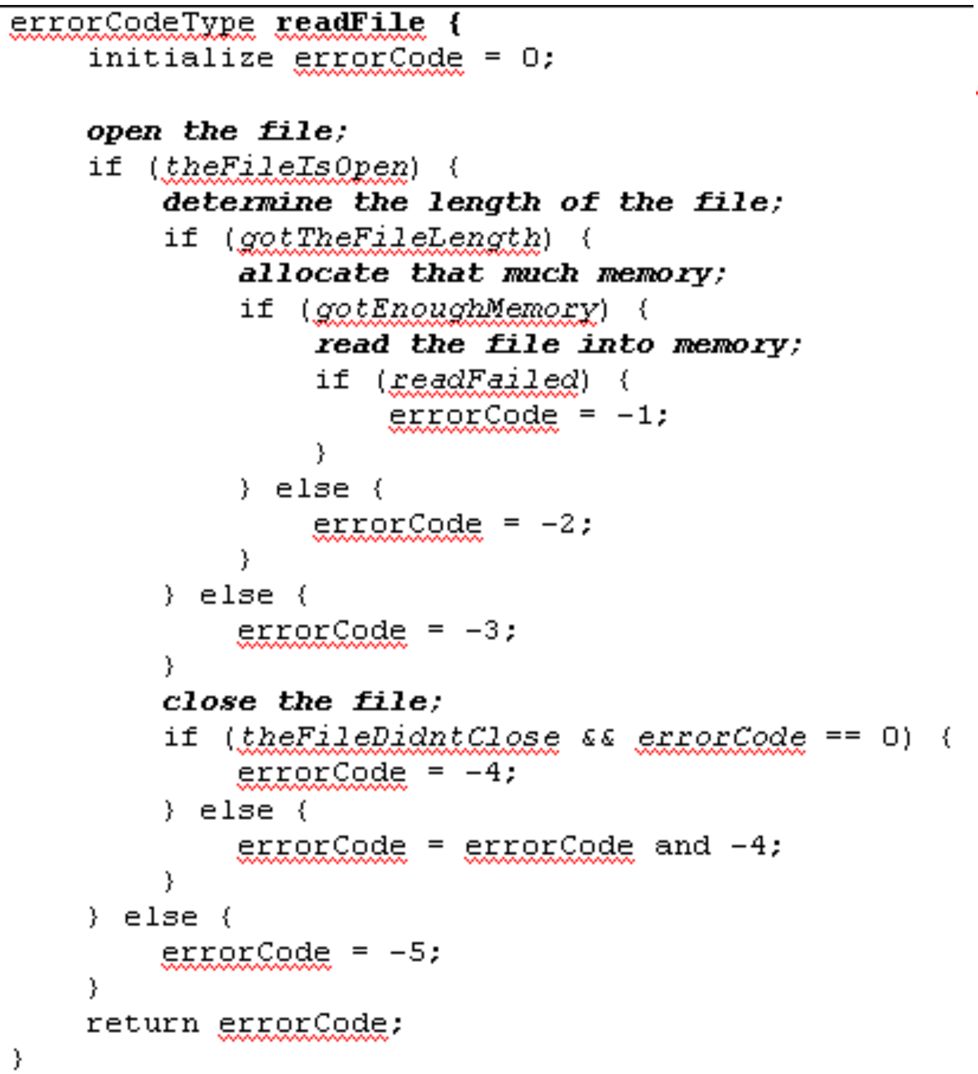
1.1 **Java** Exceptions Summary

Exceptions Class Hierarchy in Java:



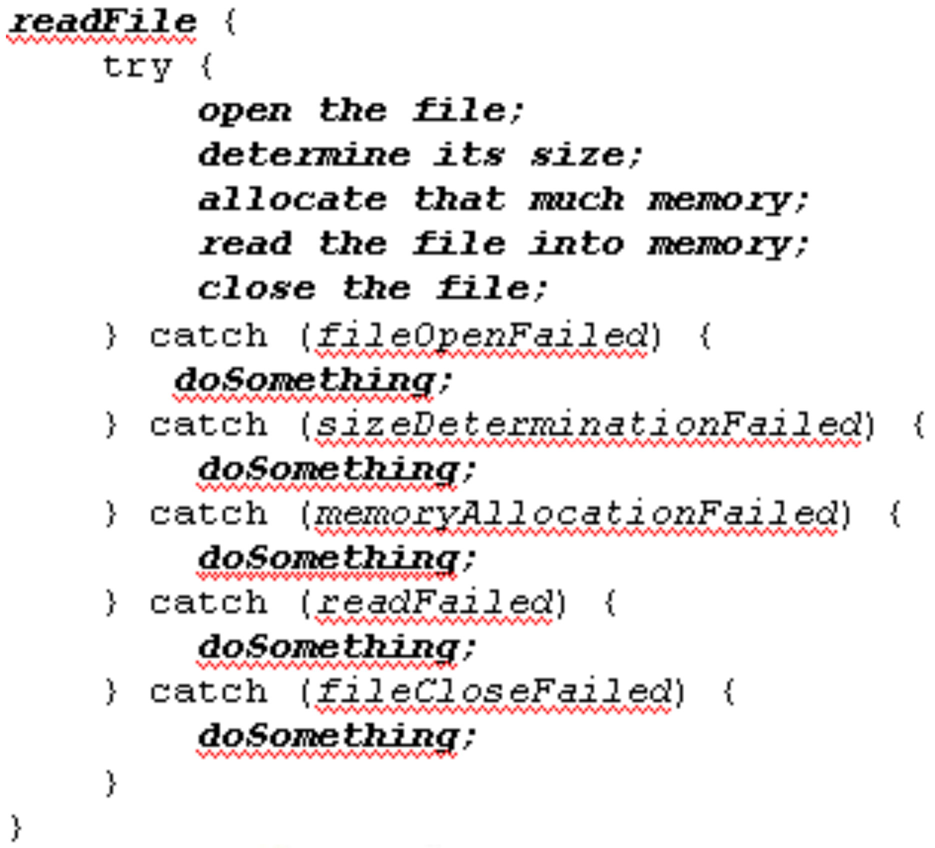
1.1 Java Exceptions Summary

Exceptions C vs. Java/C++ approach:



```
errorCodeType readFile {
    initialize errorCode = 0;

    open the file;
    if (theFileIsOpen) {
        determine the length of the file;
        if (gotTheFileLength) {
            allocate that much memory;
            if (gotEnoughMemory) {
                read the file into memory;
                if (readFailed) {
                    errorCode = -1;
                }
            } else {
                errorCode = -2;
            }
        } else {
            errorCode = -3;
        }
        close the file;
        if (theFileDidntClose && errorCode == 0) {
            errorCode = -4;
        } else {
            errorCode = errorCode and -4;
        }
    } else {
        errorCode = -5;
    }
    return errorCode;
}
```



```
readFile {
    try {
        open the file;
        determine its size;
        allocate that much memory;
        read the file into memory;
        close the file;
    } catch (fileOpenFailed) {
       doSomething;
    } catch (sizeDeterminationFailed) {
        doSomething;
    } catch (memoryAllocationFailed) {
        doSomething;
    } catch (readFailed) {
        doSomething;
    } catch (fileCloseFailed) {
        doSomething;
    }
}
```

Section Conclusion

Fact: **Java Exceptions**

In few **samples** it is simple to remember: Exceptions mechanisms and types in Java.

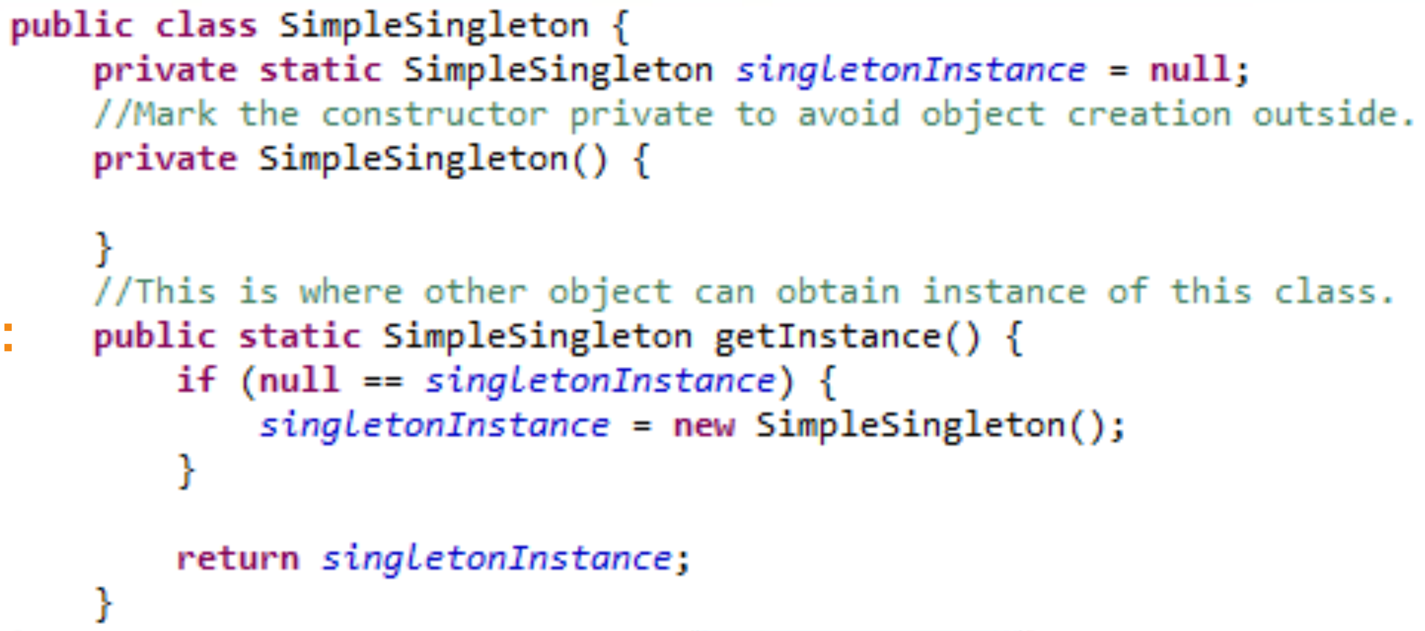
2

Source Code Design Patterns – factory methods, singletons

Source Code Design Patterns

1.2 Java Source Code Design Patterns Summary

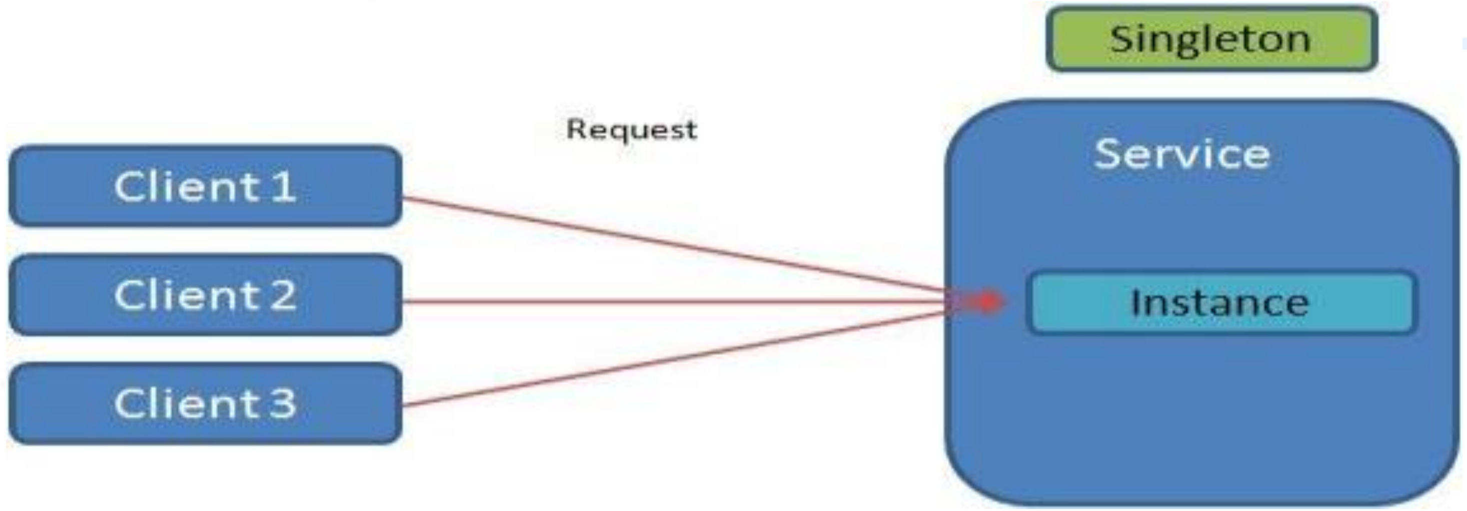
Java Singleton:



```
public class SimpleSingleton {
    private static SimpleSingleton singletonInstance = null;
    //Mark the constructor private to avoid object creation outside.
    private SimpleSingleton() {

    }
    //This is where other object can obtain instance of this class.
    public static SimpleSingleton getInstance() {
        if (null == singletonInstance) {
            singletonInstance = new SimpleSingleton();
        }

        return singletonInstance;
    }
```



http://searchdaily.net/category/java/designpattern/creational-pattern/

1.2 Java Source Code Design Patterns Summary

Bruce Eckel, "Thinking in Patterns with Java",
http://www.tutok.sk/fastgl/download/books/Thinking%20in%20Patterns%20with%20Java.pdf
One of the best book for source code design patterns.

Java Singleton:

- ***"Singleton is used to control the amount of created objects."***
- **In same category beside Singleton, there is Objects Pool.**

Java Factory Method:

Where to use & benefits

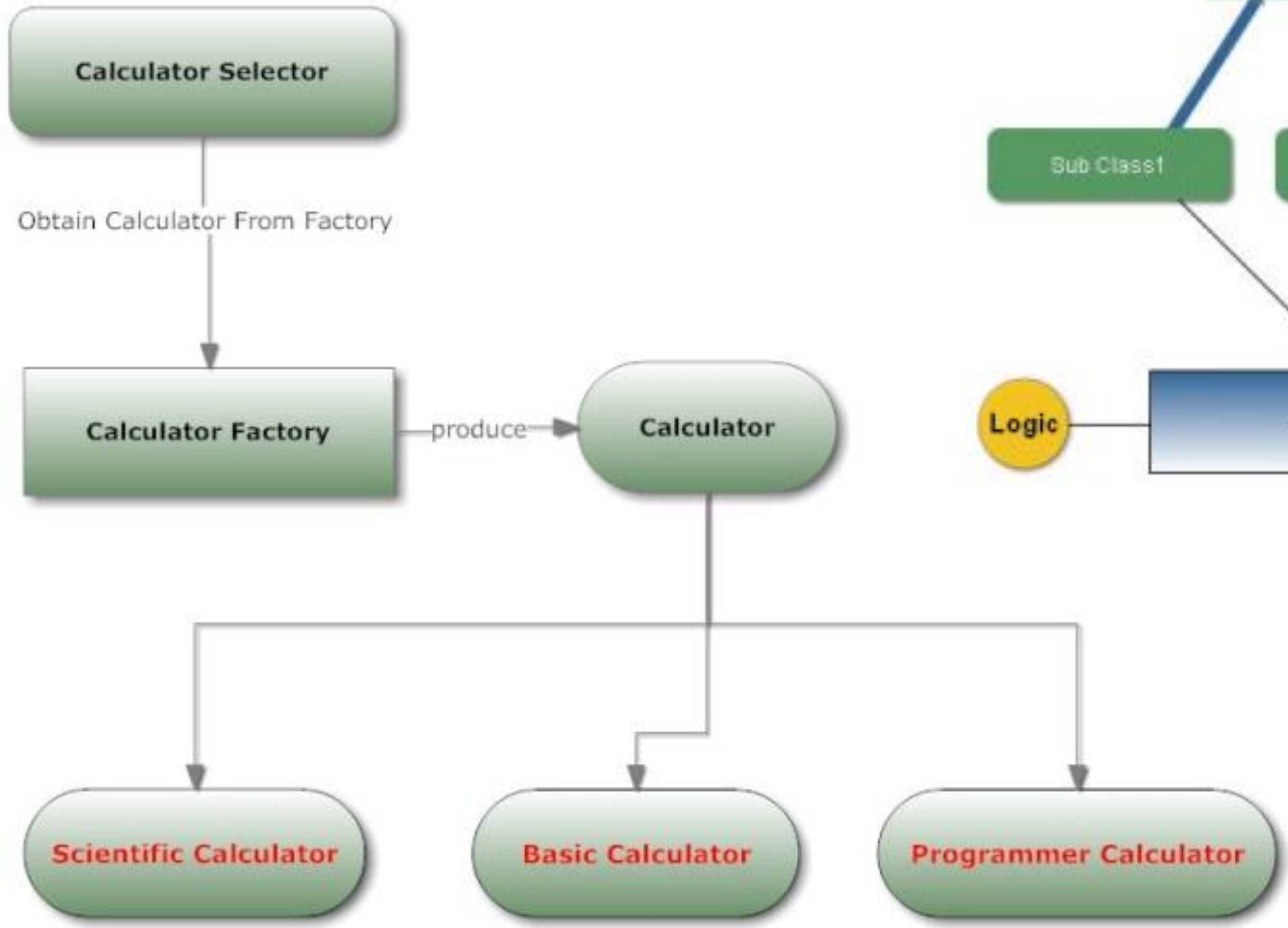
- Connect parallel class hierarchies.
- A class wants its subclasses to specify the object.
- A class cannot anticipate its subclasses, which must be created.
- A family of objects needs to be separated by using shared interface.
- The code needs to deal with interface, not implemented classes.
- Hide concrete classes from the client.
- Factory methods can be parameterized.
- The returned object may be either abstract or concrete object.
- Providing hooks for subclasses is more flexible than creating objects directly.
- Follow naming conventions to help other developers to recognize the code structure.

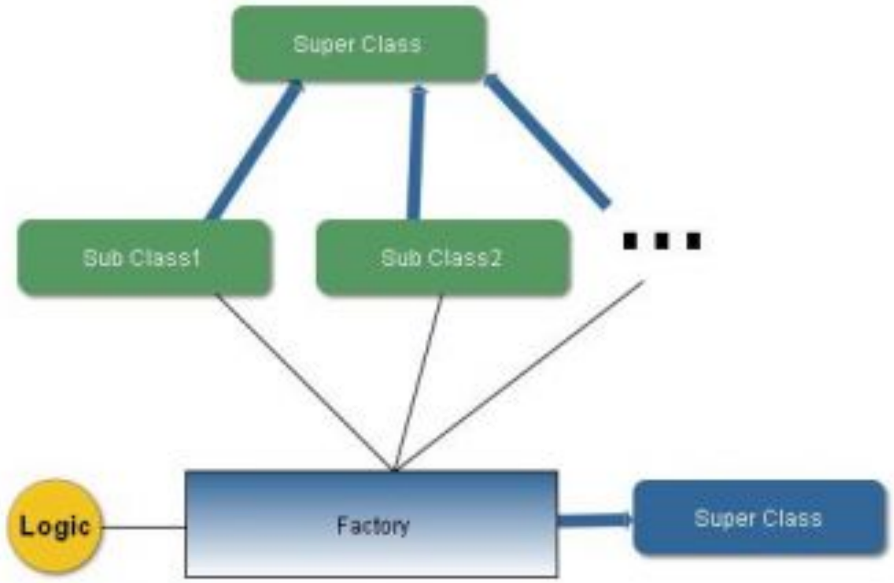
http://javamagic.wordpress.com/2010/08/27/factory-method-pattern/

1.2 Java Source Code Design Patterns Summary

http://javamagic.wordpress.com/2010/08/27/factory-method-pattern/

Java Factory Method:





http://searchdaily.net/factory-method-pattern-tutorial/

1.2 Java Source Code Design Patterns Summary

Java Factory Method:

```
public class Calculator {
    public Calculator() {

    }

    protected String name;

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    protected String type;

    public String getType() {
        return type;
    }

    public void setType(String type) {
        this.type = type;
    }
}
```

```
public class ScientificCalculator extends Calculator {
    public ScientificCalculator(String name) {
        System.out.println("Hello I'm " + name);
    }
}
```

```
public class BasicCalculator extends Calculator {
    public BasicCalculator(String name) {
        System.out.println("Hello I'm " + name);
    }
}
```

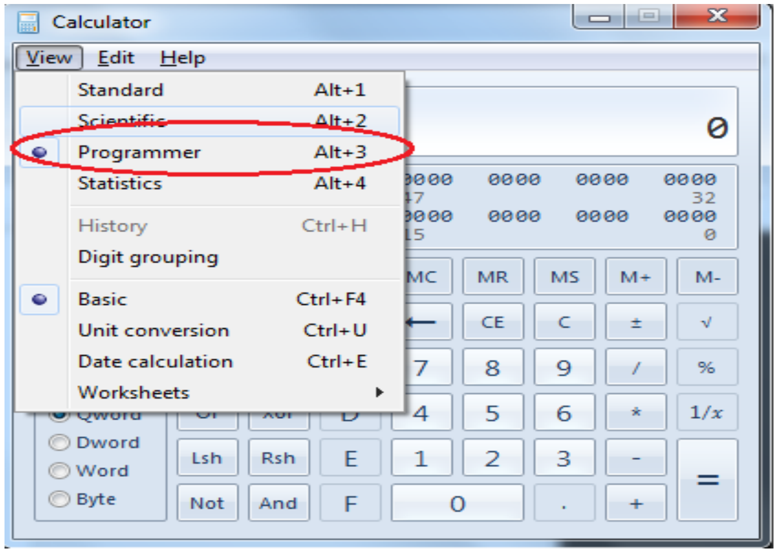
```
public class ProgrammerCalculator extends Calculator {
    public ProgrammerCalculator(String name) {
        System.out.println("Hello I'm " + name);
    }
}
```

http://searchdaily.net/factory-method-pattern-tutorial/

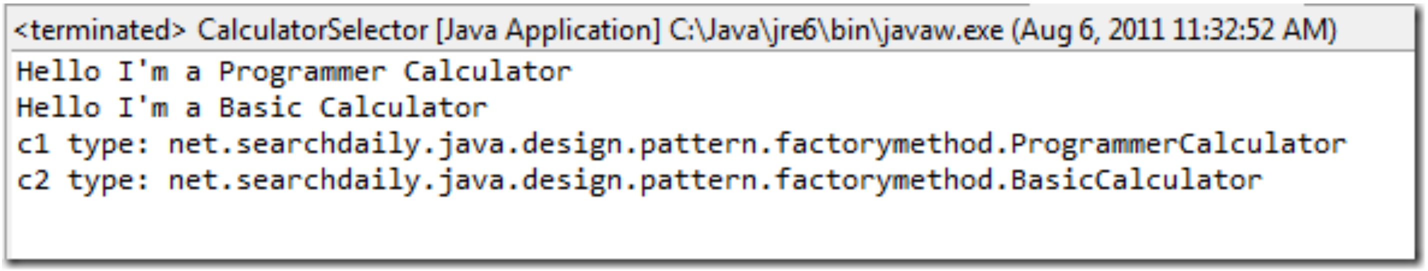
1.2 Java Source Code Design Patterns Summary

Java Factory Method: http://searchdaily.net/factory-method-pattern-tutorial/

```java
public class CalculatorFactory {
    public Calculator getCalculator(final String type, final String name) {
        if ("B".equals(type)) {
            return new BasicCalculator(name);
        } else if ("S".equals(type)) {
            return new ScientificCalculator(name);
        } else if ("P".equals(type)) {
            return new ProgrammerCalculator(name);
        } else {
            return new Calculator();
        }
    }
}
```



```java
public class CalculatorSelector {
    public static void main(String[] args) {
        CalculatorFactory factory = new CalculatorFactory();
        Calculator calculator1 = factory.getCalculator("P", "a Programmer Calculator");
        Calculator c2 = factory.getCalculator("B", "a Basic Calculator");
        System.out.println("c1 type: " + calculator1.getClass().getName());
        System.out.println("c2 type: " + c2.getClass().getName());
    }
}
```



```
<terminated> CalculatorSelector [Java Application] C:\Java\jre6\bin\javaw.exe (Aug 6, 2011 11:32:52 AM)
Hello I'm a Programmer Calculator
Hello I'm a Basic Calculator
c1 type: net.searchdaily.java.design.pattern.factorymethod.ProgrammerCalculator
c2 type: net.searchdaily.java.design.pattern.factorymethod.BasicCalculator
```

Source code design patterns
for easy sharing

Section Conclusions

Source code design patterns such as: Singleton, Objects Pool, Factory Methods…patterns used in any kind of software solution.

3

Share knowledge, Empowering Minds

Communicate & Exchange Ideas

Recapitulation with samples…

From previous lectures!

Questions & Answers!

But wait…

There’s More!

Thanks!

Java SE Programming
End of Lecture 5 – summary of Java SE