Parallel Programming

Recitation Session 1

Thomas Weibel <weibelt@ethz.ch>

Laboratory for Software Technology,
Swiss Federal Institute of Technology Zürich

March 4, 2010

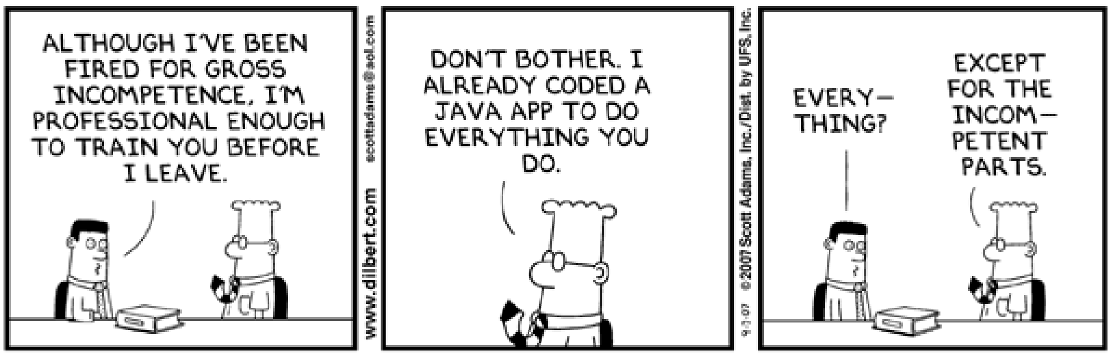
Administration

- Contact me if you feel lost: `weibelt@ethz.ch`
- Get the slides:
  `http://n.ethz.ch/~weibelt/download/parprog/`
- Homework is optional, everybody gets a "testat"
- Past experience: students who do the homework have a good chance to pass the exam

Source: `http://www.asiamex.com`

Executive Summary

- Solution to the last assignment
- Exceptions in Java
  - Quick overview
  - Quiz
- Hints for the next assignment


ALTHOUGH I'VE BEEN FIRED FOR GROSS INCOMPETENCE, I'M PROFESSIONAL ENOUGH TO TRAIN YOU BEFORE I LEAVE.
DON'T BOTHER. I ALREADY CODED A JAVA APP TO DO EVERYTHING YOU DO.
EVERY-THING?
EXCEPT FOR THE INCOM-PETENT PARTS.
www.dilbert.com
scottadams@aol.com
©2007 Scott Adams, Inc./Dist. by UFS, Inc.

© Scott Adams, Inc./Dist. by UFS, Inc.

Outline

Solution

```
class Solution {
  public static void main(String[] args) {
    int i;
    int tmp;

    /* iterate through the argument vector */
    for (i = 0; i < args.length; i++) {
      /* convert to int and increase */
      tmp = Integer.parseInt(args[i]) + 1;

      /* print out the result */
      System.out.println(tmp);
    }
  }
}
```

Alternative Solution

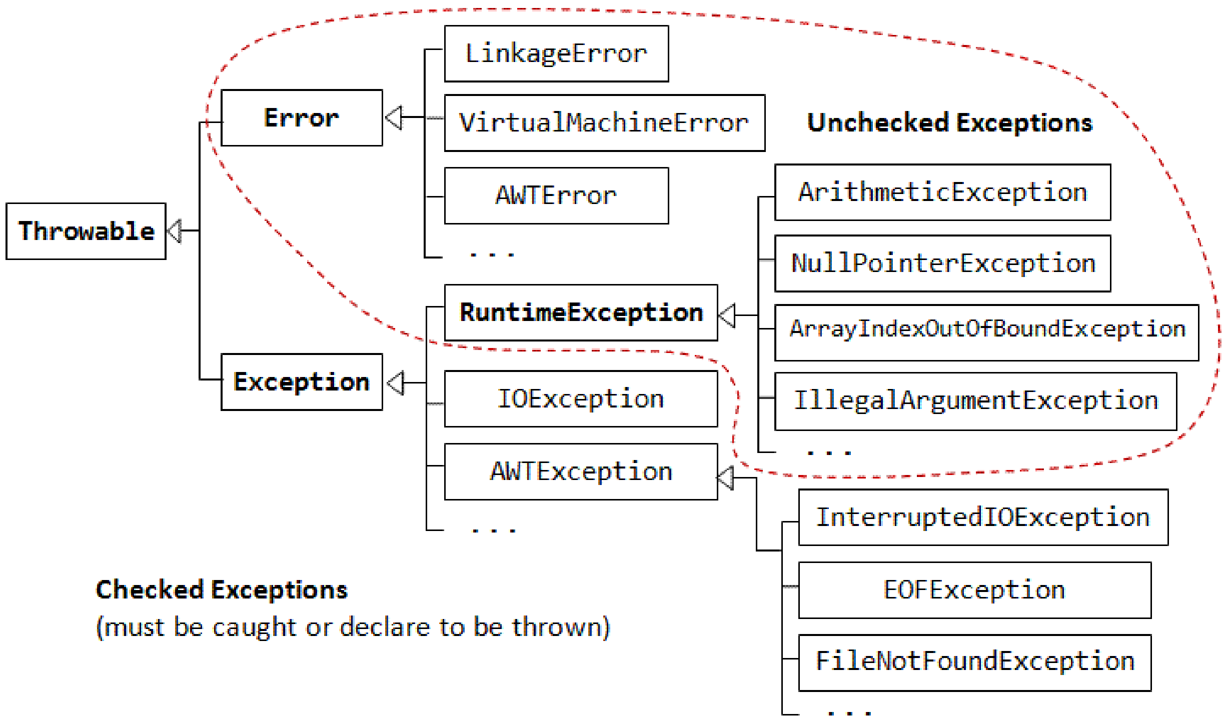
```
class AlternativeSolution {
  public static void main(String[] args) {
    /* iterate through the argument vector */
    for (String arg : args) {
      System.out.println(
      Integer.parseInt(arg) + 1
      );
    }
  }
}
```

Outline

Exceptions

- Exceptional event
- If a method encounters an exception, it creates an "exception object" and hands it off to the runtime system for handling
- Java knows 3 types of exceptions
  - Checked exceptions: Exceptions a program wants to recover from, eg. open a non-existing file (user input error)
  - Errors: Exceptions beyond the program's control, eg. hard disk error (block cannot be read)
  - Runtime exceptions: Violation of logic of a program, eg. null pointer access

Exception Types



Throwing an Exception

- Handing off the exception object is called throwing an exception
- Java contains the throw clause

```
Exception e = new Exception();
throw (e);
```

Try-Catch-Finally

Code that can throw exceptions must be enclosed in a `try` statement:

```
try {
  // statements
}
catch (ExceptionType1 name) {
  // handler for exceptions of type1
}
catch (ExceptionType2 name) {
  // handler for exceptions of type2
}
finally {
  // statements to always execute
}
```

Alternative: Announce a throw in the enclosing method (see later)

Catching an Exception

- To handle an exception it must be "caught"
- Java has a `catch` clause that will catch exceptions of a certain type (class):

  ```
  catch (<ExceptionType> <name>)
  ```

- If you catch type `X` you also catch all subtypes of `X`.

Finally

- After the catch block has finished you may want to “clean” up the state:

```
try {
  ...
}
finally {
  if (db != null && db.isConnected())
    db.close();
  else
    System.out.println("Not connected");
}
```

- The finally block will always be executed before the try statement completes

Announcing Throws

```
class Foo {
  ...
  void bar() throws FooBarException {
    ...
    throw(new FooBarException());
  }
}
```

- If a method can throw an exception, you must indicate that there could be throws
- Compiler needs to prepare for possible throw

Example

```
class Example {
  public static void main(String[] args) {
    for (String arg : args) {
      try {
        int tmp = Integer.parseInt(arg);
        if (tmp < 0)
          throw(new MyException("< 0"));
        System.out.println(tmp);
      }
      catch (MyException e) {
        System.out.println(e.getMessage());
      }
    }
  }
}
```

Example: Define New Exception Type

New exception types can be defined by extending `Exception`:

```
class MyException extends Exception {
  MyException(String text) {
    super(text);
  }
}
```

Outline

Quiz: Array Index

```
public static void main(String[] args) {
  int[] array = new int[4];
  for (int i = 0; i < 5; i++) {
    try {
      array[i] = i;
      System.out.println(array[i]);
    }
    catch (ArrayIndexOutOfBoundsException e) {
      System.out.println("Invalid index "
                           + i + "\n");
    }
  }
}
```

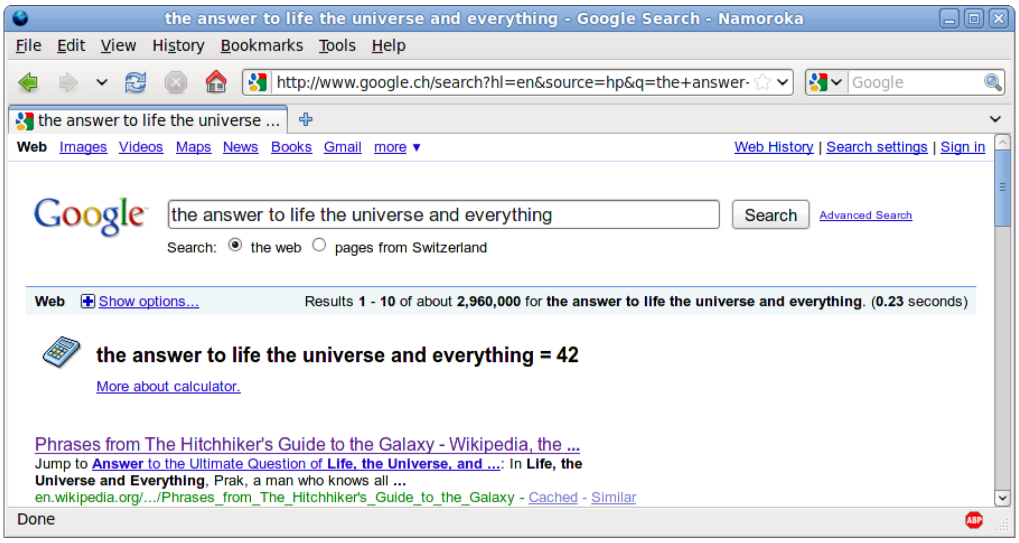
Quiz: Catch Order

```
public static void main(String[] args) {
  try {
    throw new
      InputMismatchException("Foobar!");
  } catch (Exception e) {
    System.out.println(e.getMessage());
  } catch (InputMismatchException e) {
    System.out.println(e.getMessage());
  }
}
```

Quiz: Finally

```
public static void main(String[] args)
    throws Exception {
  try {
    throw new
      Exception("I can has exception!");
  }
  catch (Exception e) {
    System.out.println(e.getMessage());
    throw new Exception("Oh noes!");
  }
  finally {
    System.out.println("Finally!");
  }
}
```

Quiz: Division by Zero


the answer to life the universe and everything - Google Search - Namoroka

http://www.google.ch/search?hl=en&source=hp&q=the+answer-

the answer to life the universe and everything

Search: ● the web ○ pages from Switzerland

Results 1 - 10 of about 2,960,000 for the answer to life the universe and everything. (0.23 seconds)

the answer to life the universe and everything = 42

More about calculator.

Phrases from The Hitchhiker's Guide to the Galaxy - Wikipedia, the ...
Jump to Answer to the Ultimate Question of Life, the Universe, and ...: In Life, the Universe and Everything, Prak, a man who knows all ...
en.wikipedia.org/.../Phrases_from_The_Hitchhiker's_Guide_to_the_Galaxy - Cached - Similar

Done

```
public static void main(String[] args) {
    int theAnswer = 42;
    System.out.println(theAnswer / 0);
}
```

Outline

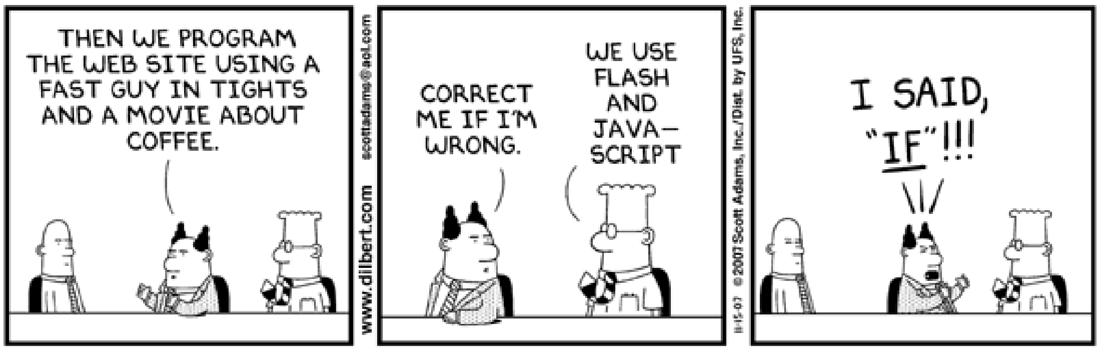
Hints for the New Assignment

- Separate `process` method to convert and increment
- Define a new exception class
- Throw exception in case of a negative number
- Catch exception and print the message

```
class NegValException extends Exception {
  public NegativeValueException() {
    super("Negative value -- bailing out.");
  }
}
```

Summary

- If a method encounters an exception, it creates an "exception object" and hands it off to the runtime system for handling
- Java knows 3 kind of exceptions: checked exceptions, errors, and runtime exceptions
- Use `throw` to throw exceptions
- `try`/`catch`/`finally` can be used to handle exceptions


THEN WE PROGRAM THE WEB SITE USING A FAST GUY IN TIGHTS AND A MOVIE ABOUT COFFEE.
scottadams@aol.com
www.dilbert.com
CORRECT ME IF I'M WRONG.
WE USE FLASH AND JAVA-SCRIPT
11-15-07 ©2007 Scott Adams, Inc./Dist. by UFS, Inc.
I SAID, "IF"!!!

© Scott Adams, Inc./Dist. by UFS, Inc.