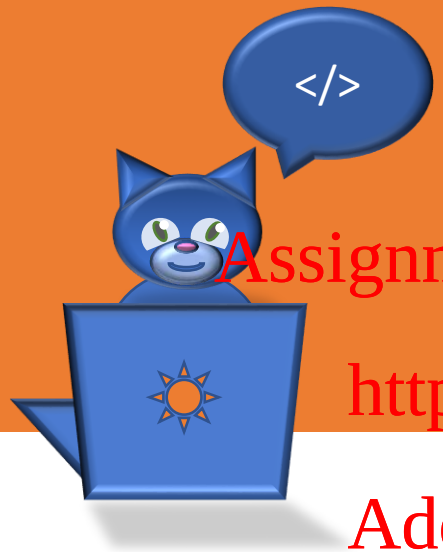
Please note that the slides published AFTER the lectures and workshops are the official slides and are the ones that should be used for revision.



COMP2013
Software Maintenance

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Workshop 2 (with answers)

CW1 Release; IDEs + Java 9/10/11 additions; Maintaining the ZooApp

Peer-Olaf Siebers

University of Nottingham
UK | CHINA | MALAYSIA

Week 2 Organisation

- Lecture 2:
  - Going through more advanced Java topics
    - Java Collections framework
    - Implementation of object oriented principles
- Lab 2:
  - Working further on the ZooApp example
  - Looking at packages
- Workshop 2:
  - CW1 Release
  - IDEs + Java 9/10/11 additions
  - Maintaining the ZooApp (basic maintenance)

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eclipse and intellij

Useful Website to Learn More about the IDEs

- TutorialsPoint: Eclipse (+ Java)
  - https://www.tutorialspoint.com/eclipse/index.htm

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- TutorialsPoint: IntelliJ
  - https://www.tutorialspoint.com/intellij_idea/index.htm
- JetBrains: IntelliJ Video Tutorials
  - https://www.jetbrains.com/idea/documentation/

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what's new in Java 9/10/11

What's new in Java 9/10/11

- Java 9
  - Modules
  - jShell (read-evaluate-print loop tool)
- Java 10
  - Local-Variable Type Inference
  - Enhancements for garbage collection and compilation
- Java 11
  - Removal of JavaFX, which is now available as a standalone technology

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Notes from Demonstration

REPL Commands - Notepad

File Edit Format View Help

```
To run jShell you need to be in the Java directory
Use -v for verbose feedback

Replace $x with the correct link (e.g. $1 in the first place)

1+1
$x*2

ArrayList<String> x=new ArrayList<>();
x.add("B")
x.add("A")
Collections.sort(x)
x

new ArrayList<>();
$7.add("A")
$7

void HelloREPL(){
System.out.println("Hello");
}
HelloREPL()

var x=new ArrayList()
x.add("D")
x.add("C")
Collections.sort(x)
x

var x=new ArrayList<String>()
x.add("E")
x.add("F")
Collections.sort(x)
x

var x=List.of(1,2,3)
x

Set.of(4,5,6)
$16

var z=Map.of(1,"A",2,"B")
```

Modules - Notepad

File Edit Format View Help

```
Warning: Modules don't work with '-defaultpackage'

File > Inport > General > Existing Projects into Workspace > Select archive file > TestModule.zip
Note: This only works if TestApp and TestTools do not already exist in the workspace!

Right click TestApp > Build Path > Configure Build Path > Projects > Modulepath > Add > TesTools

Right click TestApp > Configure > Create module-info.java > use testApp as module name
Delete "exports com.siebers.App;" as we want to keep this package private
Edit "requires testTools;" (module name is testTools)

Right click TestTools > Configure > Create module-info.java > use testTools as module name
Delete "exports com.siebers.DB;" as we want to keep this package private

Rule: "export" packages; "require" modules;
```

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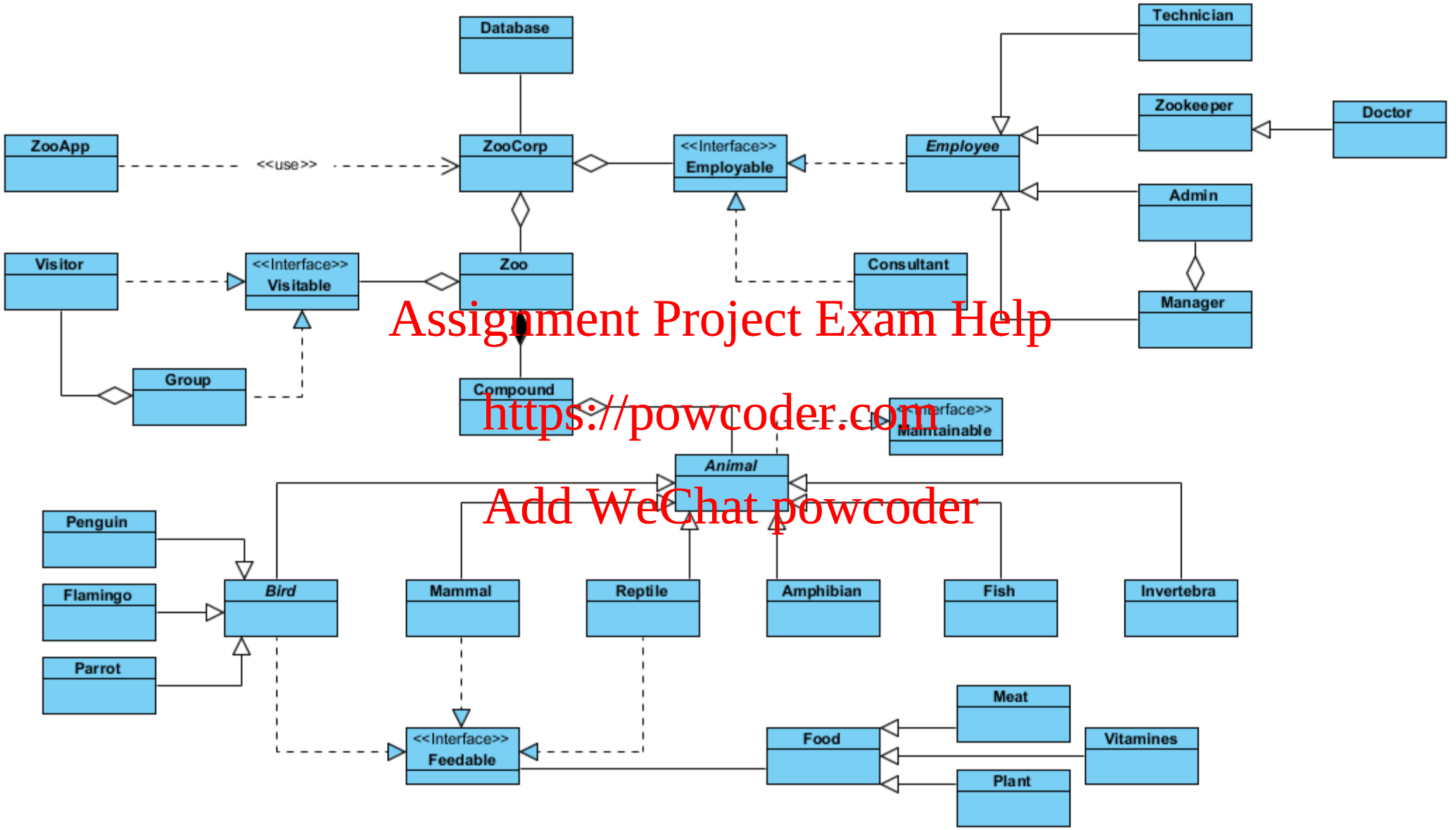
maintaining the zoo management software

Basic Maintenance



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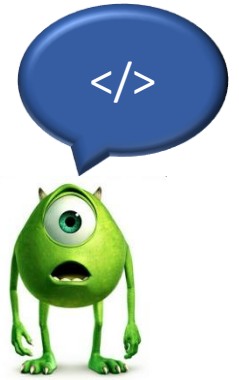
Basic Maintenance



- What would you propose how we should get started?

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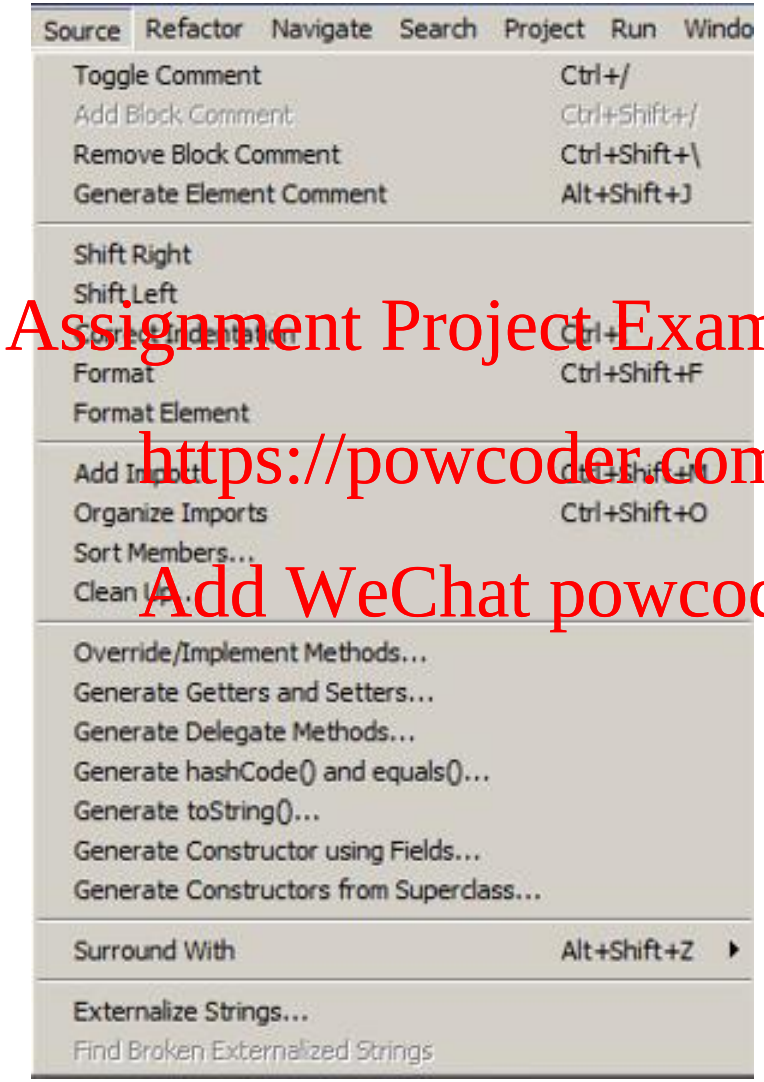
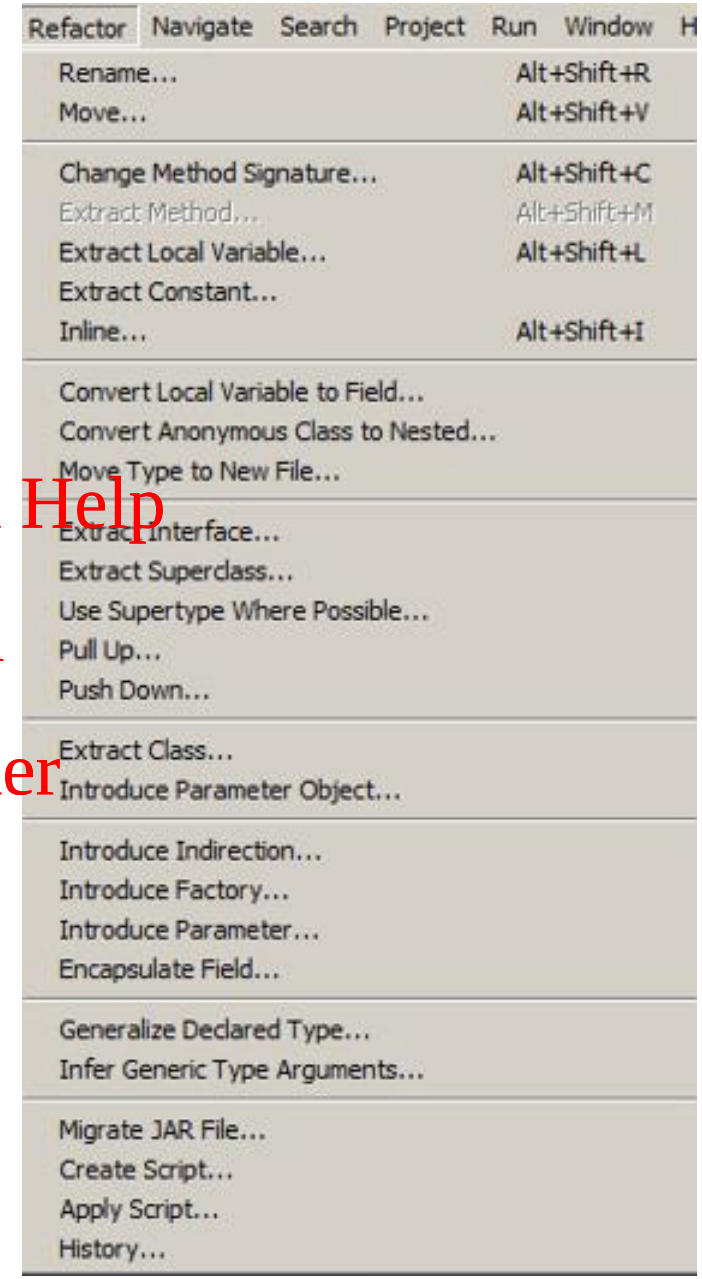
Basic Maintenance

- Use Eclipse





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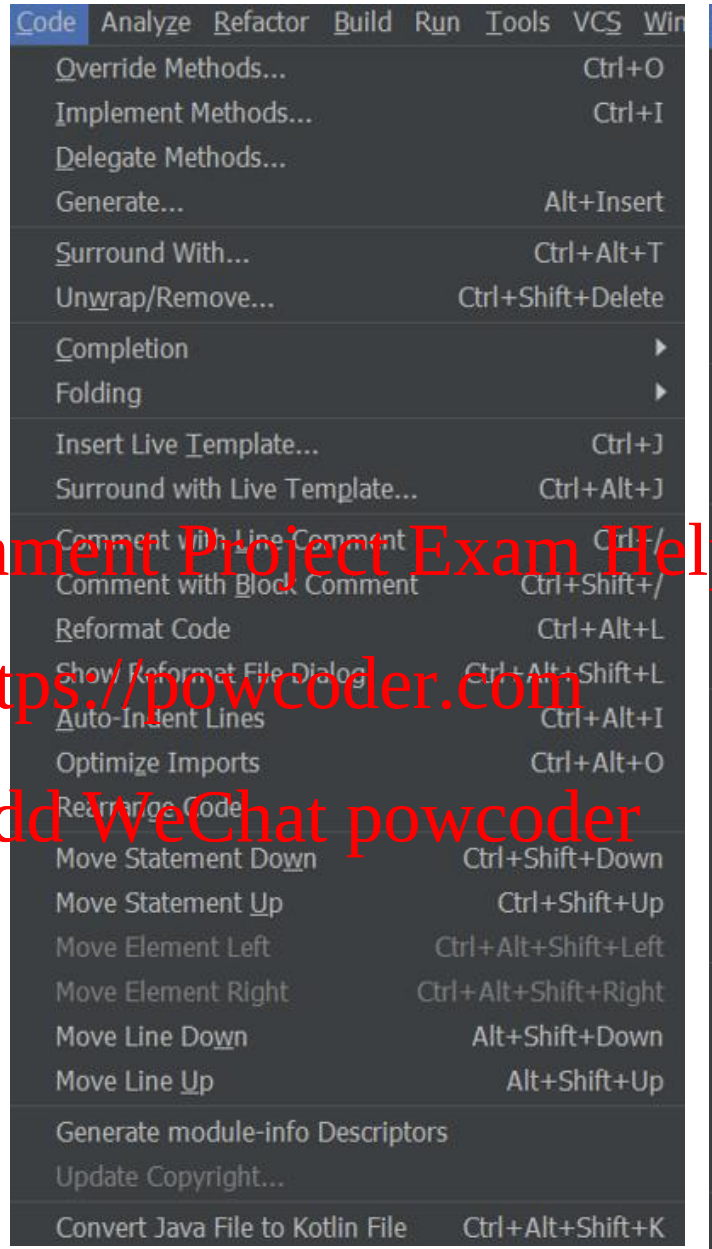
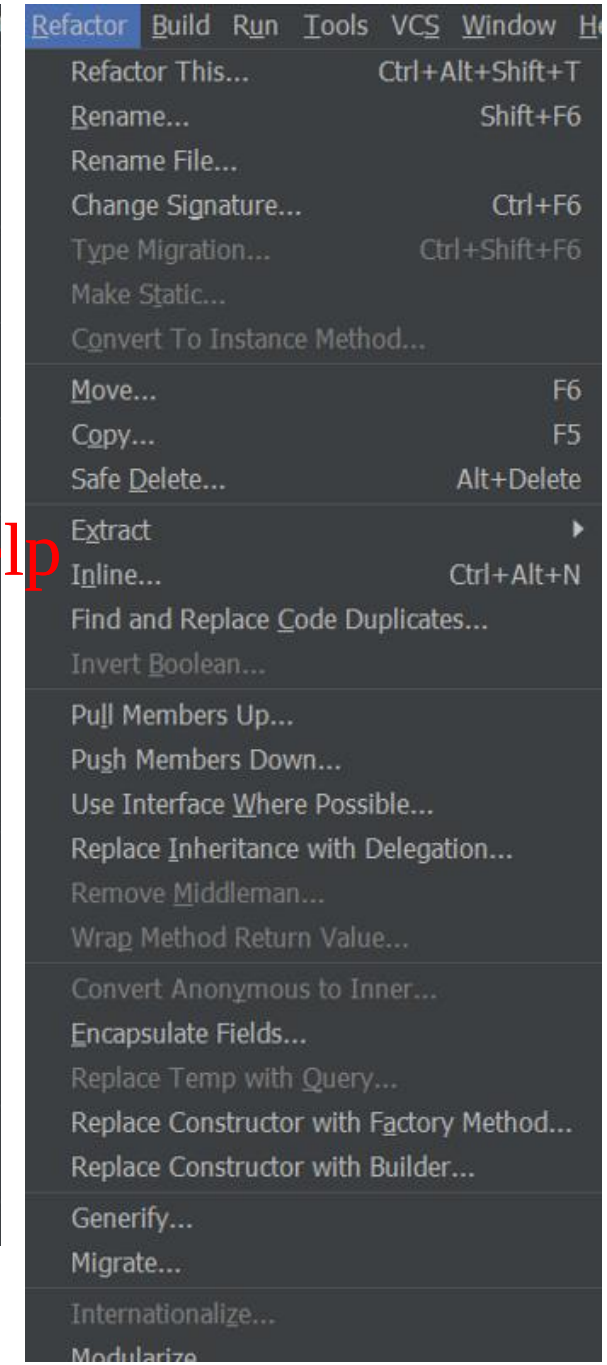
Basic Maintenance

- Use IntelliJ





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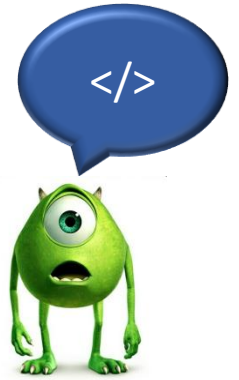
Basic Maintenance



- Dividing all classes into packages
  - Why is this useful?
- Making all animal subclasses abstract
  - They should not be instantiated as they are still high level
- Removing redundant code
  - "buildNewEnclosure()" is not required any more
  - Remove some setters (to gain control)
- Commenting code and producing Javadocs

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Basic Maintenance

- Packages are used in Java in order to prevent naming conflicts, to control access, to make searching/locating and usage of classes, interfaces, enumerations and annotations easier, etc.

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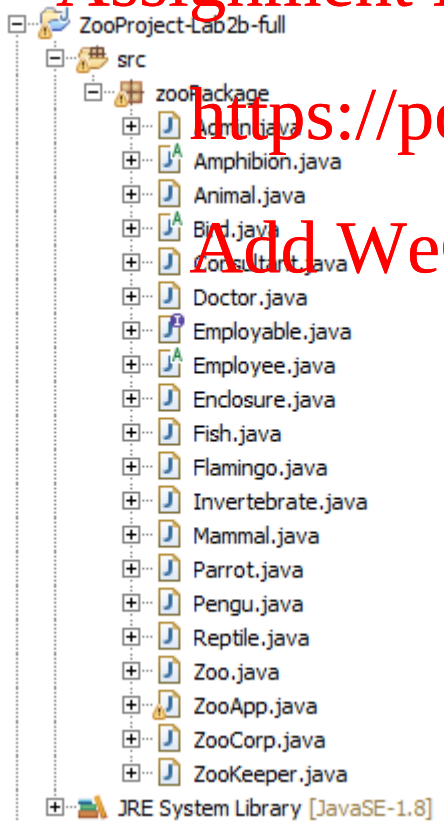

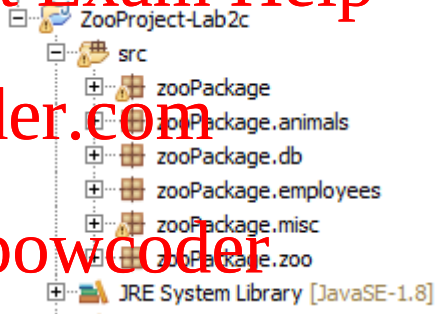

Remark: This and the following screenshots are based on an earlier version of ZooApp

Basic Maintenance

- Javadocs

```
/**
* xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx.
* <p>
* xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx.
* @param  variable          Description.
* @return                   Description.
*/
```

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@author John Smith	Class, Interface, Enum
@version version	Class, Interface, Enum
@since since-text	Class, Interface, Enum, Field, Method
@see reference	Class, Interface, Enum, Field, Method
@param name description	Method
@return description	Method
@deprecated description	Class, Interface, Enum, Field, Method

Basic Maintenance

```java
package zooPackage.zoo;
import java.util.ArrayList;
import zooPackage.animals.Animal;

/**
* Objects of this class represents zoo enclosures.
*
* @author      Peer-Olaf Siebers
* @version     2.3
* @since       1.0
*/

public class Enclosure {
    private ArrayList<Animal> animals;

    public Enclosure() {
        animals=new ArrayList<Animal>();
    }
    /**
    * This method adds animals to the "animals" list.
    *
    * @param  animal An animal that lives in any of the Zoos.
    */
    public void addAnimal(Animal animal){
        animals.add(animal);
    }
}
```

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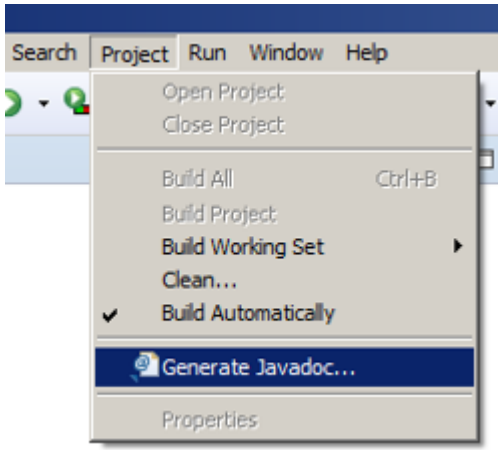
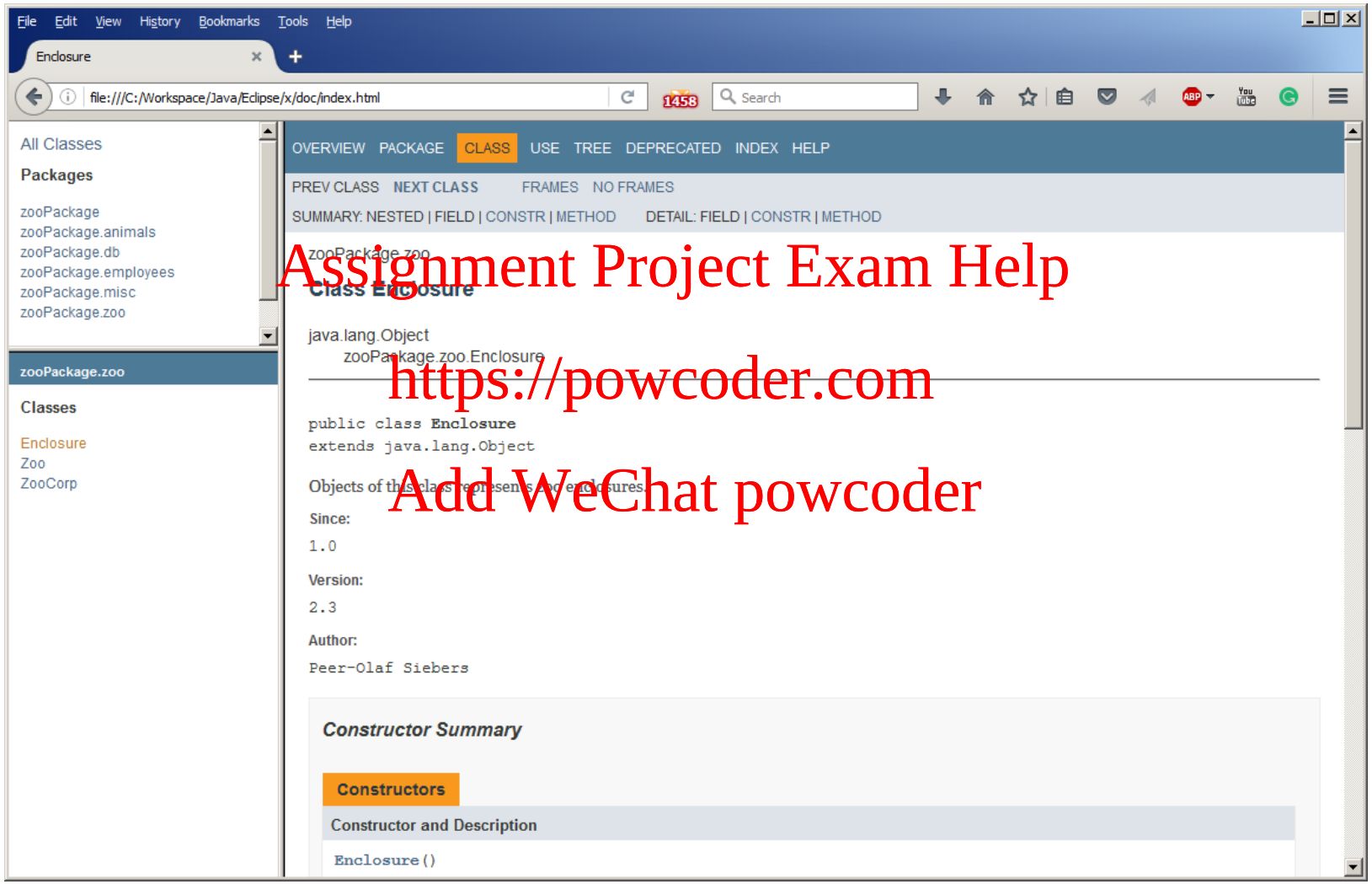


Basic Maintenance



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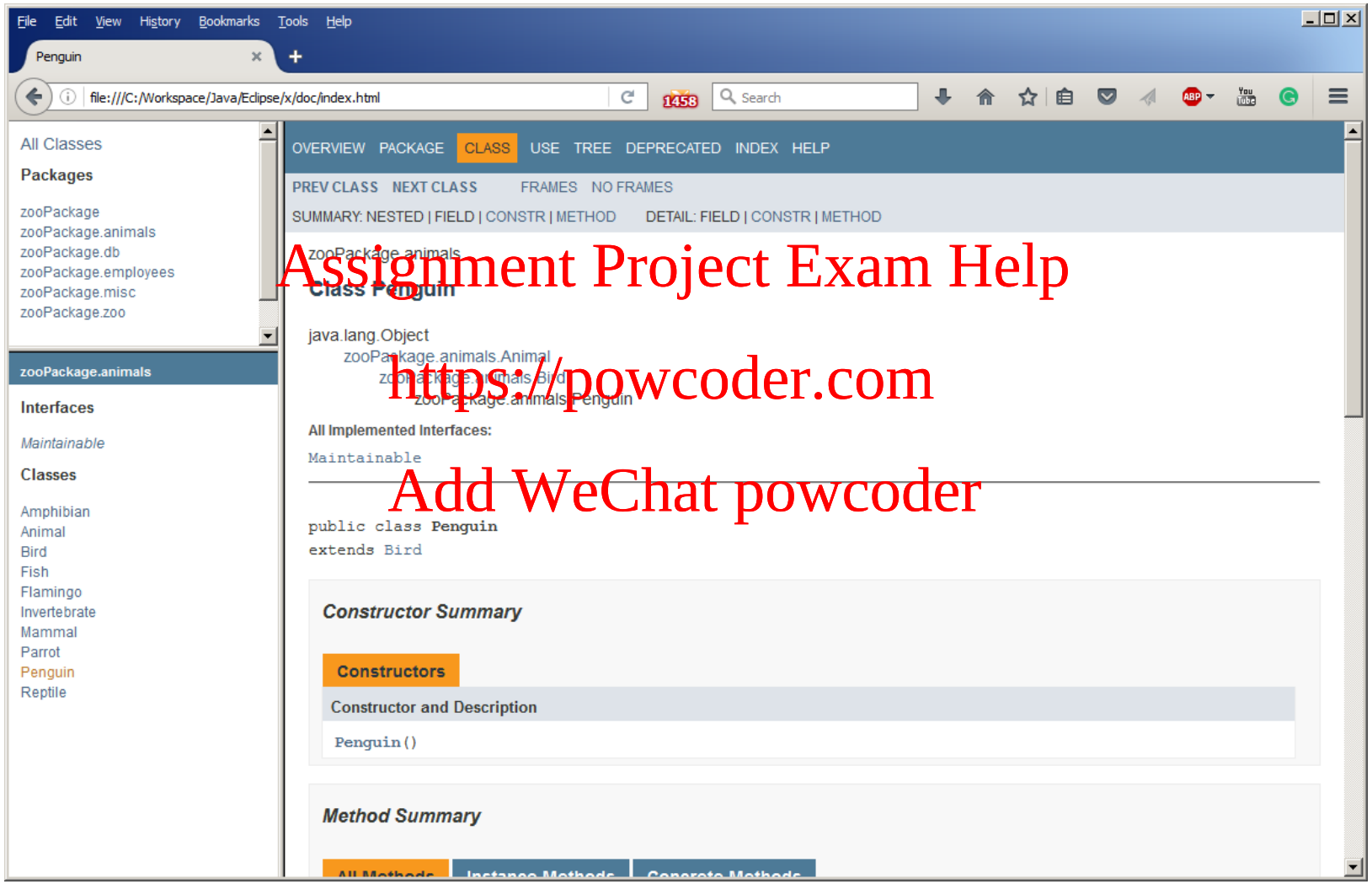

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And finally ...

- Two things we have not dealt with which are vital for SWM
  - Version control (e.g. GIT Repository)
  - Unit testing

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