M. Roggenbach, CS-135 – Lab Class 6 – 17/03/2019

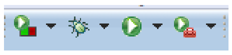
- **To be solved in groups of two.**
- **To be submitted to blackboard by Monday, 25.3., 11am.**
- **Submission: Every student individually, one pdf file.**
- **Please mark clearly with whom you are working together: there should be 2 student numbers on top of your submissions.**
- **No other formats than .pdf will be accepted!!!**

☐ Task 6.1

Getting Started with Emma

1. Install the tool (Eclipse Plugin) "Emma" from the `http://update.eclemma.org/`:
   (a) Start Eclipse.
   (b) Click `Help` → `Install New Software`
   (c) Select `Add`, give it a name such as `Emma`, type in the URL `http://update.eclemma.org/` and click OK.
   (d) Select `EclEmma`.
   (e) Click twice `Next`, accept the licence, and click `Finish`.
   (f) Restart Eclipse (if needed).
2. Make a new Java Project in Eclipse.
3. Download the files `Clipper.java` and `ClipperTests.java` from

   `http://www.cs.swan.ac.uk/~csmarkus/Tools/`
4. Import these files into your Eclipse Project.
5. Run the JUnit test suite `ClipperTests`.
6. Run `CodeCover` by clicking the the leftmost "play" button of

   Note: You must run the normal JUnit before this step.
7. Check in the `coverage` sub-window (should it not show automatically, you can get it via `Window -> Show View -> Other -> Java -> Coverage`) that the **method** `clip` has 100% coverage.

   Note: Remember the system under test is the method `clip`. Emma shows coverage for all Java code. You need to expand the package tree and navigate down to the `clip` method in order to isolate it.
8. Open the `Clipper.java` source file. Check that all statements of the `clip` method are underlined in green. This indicates that they have all been executed during the testing.

9. Remove the test cases `clip2, clip3, clip4` from `ClipperTests`. Run the tools again (JUnit and Emma). Check the coverage of `clip`: it is down to 83.3%, and the code of `Clipper.java` shows one line in red – indicating that the test suite did not cover it – and two lines in yellow – indicating that only one of two possible branches was tested.

☐ Challenge Task 6.2

Why is the coverage of the class `Clipper.java` not shown as 100%?

Submission:

- Screenshot of eclipse showing the 100% coverage in the first scenario.
- Screenshot of eclipse showing the 83.3% coverage in the second scenario.
- Attempt of a brief response (2 lines of text) for Task 5.2.

☐ Task 6.3

Developing a Whitebox Test Suite with Emma

Consider the extended Mortgage-Problem, where it is computed how much a person can borrow. Inputs are *age*, *salary*, and *gender*. Output is the amount that one can borrow.

Mortgage:

Input: integer *age* in the range 18 .. 55
integer *salary* in the range 1 .. 100,000
gender ∈ {male, female}

Output: integer *salary* * *factor*, where
factor is given by the following table

Category	*factor*
Young (18–35 years)	7.5 male, 7 female
Middle (36 – 45 years)	5.5 male, 5 female
Old (46 – 55 years)	3.5 male, 3 female

1. Make a new Java Project in Eclipse.
2. Download the files `Mortgage.java` and `Main.java` from

   `http://www.cs.swan.ac.uk/~csmarkus/Tools/`

3. Import these files into your Eclipse Project and run the `main` method.
4. Develop a White Box Test suite with 100% coverage for the method `calculateMortgage`.

   Note: You might want to draw the program graph of `calculateMortgage.java` in order to systematically develop the test cases for C_p coverage.

Submission:

- Your JUnit code.
- Screenshot of eclipse showing that you have reached full coverage.

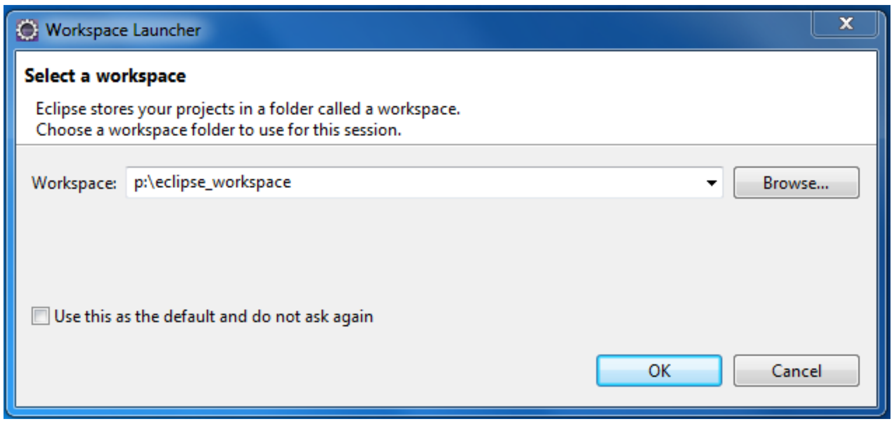
Computer Instructions

1 Making a screen-shot

Click on 'Start', type 'Snipping Tool' in the search field, press 'enter'. Use the tool.

2 Eclipse

Under the "Specialist Apps", open the folder "College of Science". Within this folder, open the folder "Computer Science". There, you find the program "Eclipse". When you start Eclipse you might be asked for the workspace path. This path should be set as follows:



Workspace Launcher

Select a workspace

Eclipse stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.

Workspace: p:\eclipse_workspace

☐ Use this as the default and do not ask again

2.1 Making a new project

1. Click `File` → `New` → `Java Project`.
2. Typing a good project name i.e. `Sphinx`.
3. Click `Finish`.

2.2 Importing a file into a project

1. Expand your project, say `Sphinx` in the left hand panel (Package Explorer),
2. Right click the `src` folder, click import.
3. Select `File System` under `General`, click `Next`.
4. Locate the directory containing the `Sphinx.java` file, click `OK`.
5. Check the file, e.g. `Sphinx.java`, in the right hand list, Click `Finish`.

2.3 Running a program

You run a program, e.g., `Sphinx.java`, by clicking the play icon. This may bring up a wizard where you need to select to run a `Java Application`. You may need to show the `Console` view by clicking `Window` → `Show View` → `Console`.

2.4 Activating JUnit4 for a project

1. Right-click on your project and select `Properties`.
2. Click on `Java Build Path`.
3. Select `Libraries`
4. Select `Add Library`.
5. Select `Junit`.
6. Click on next, select the Junit Version `JUnit 4`.
7. Click `Finish.`
8. Click `OK.`