COMPSCI 732: Software Tools and Techniques
Assignment 3: Aspect-Oriented Software Development (AOSD)

Worth 16.6% of your final grade
This assignment is due on 24th May 2007
This assignment must be done individually

Aims

The aim of this assignment is to give you hands-on experience about development using aspect-oriented techniques. You will learn how to modularize designs and code using Aspect-Oriented Software Development (AOSD).

Part A (Contains Tasks 1 and 2)

Part A is concerned with refactoring the application. For the programming section you may use any IDE, but we give brief instructions assuming that you are using Eclipse.

Please download a folder containing the application called *Compsci732Ass3_aspects.zip* from the course page. Place it in the "work" folder if you are using Eclipse ("C:\work" or any other folder that you wish to use as the work-space).Then open the Eclipse IDE -> file -> new -> project -> double-click first icon (java project;-) -> *set project name to* Compsci732Ass3_aspects -> create new project in workspace -> Finish!

Then do the following tasks.

Task 1 [15 marks]

Add the security checking to do the authentication and authorization (login and password) into the LoginSystem.java by refactoring this class. Do not add any new classes nor refactor/change any other files. Please refer to (*and understand*) the Security.java. The "login&password.txt" file keeps the login (as "user") and password (as "password") in a txt file instead of a database.

The code snippet from the LoginSystem.java that needs to be refactored/extended is reproduced below:

```
           Function function = new Function();
//         to do security check first
           function.withdrawMillions();
//         to do security check first
           function.transferMillions();
//         to do security check first
           function.checkBalance();
//         to do security check first
           function.printBalance();
//         to do security check first
           function.quickWithdraw2000000NZD();
```

Do the checks at the commented portions of the code i.e. where it is mentioned "`//to do security check first`".

Note: For simplicity, it is a requirement that the customer either completes all the transactions in the sequence provided or aborts it at any place that he wishes. This is explained using the screen-dumps shown below from the Java Console:

a) Example of a full-run without aborting/exiting the application:-

```
Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
Withdrew NZD 10 000 000 or NZD 10 MILLION ------1

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue

Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
Tranferred NZD 20 000 000 or NZD 20 MILLION ------2

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue

Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
Checked Balance: 20000000 ------3

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue

Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
Checked Balance: 20000000 ------3
Printing Balance: NZD ------4 20000000

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue

Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
```

```
QuickWithdrew NZD 2 000 000 or NZD 2 MILLION ------5

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue
```

b) If exit, user enters yes when prompted:-

```
Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
Withdrew NZD 10 000 000 or NZD 10 MILLION ------1

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue
yes
```

c) If wrong login or password:-

```
Please enter login as "user":
user
Please enter password as "password":
xya
Please enter login as "user":
afo
Please enter password as "password":
asfof
Please enter login as "user":
sdaof
Please enter password as "password":
afag
Please enter login as "user":
```

d) Extra example:

```
Please enter login as "user":
ashdf
Please enter password as "password":
fha;
Please enter login as "user":
uset
Please enter password as "password":
password
Please enter login as "user":
user
Please enter password as "password":
password
Login sucessful
Tranferred NZD 20 000 000 or NZD 20 MILLION ------2

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue

Please enter login as "user":
user
Please enter password as "password":
```

```
password
Login sucessful
Checked Balance: 20000000 ------3

Would you like to Exit?
Enter "yes" to exit, or just press Enter to continue
```

Once completed, make a copy of the *LoginSystem.java file* and keep it in a safe place
separately.

Task 2 [50 marks]

We will next remove all these security cross-cutting concerns by aspectising the
application using AspectJ. Complete the "applicationContext.xml" file to aspectise the
security concerns. Use the "Security.java" file to inject the security aspects. Remember
the user must either goes through all the transactions in the order provided or aborts it at
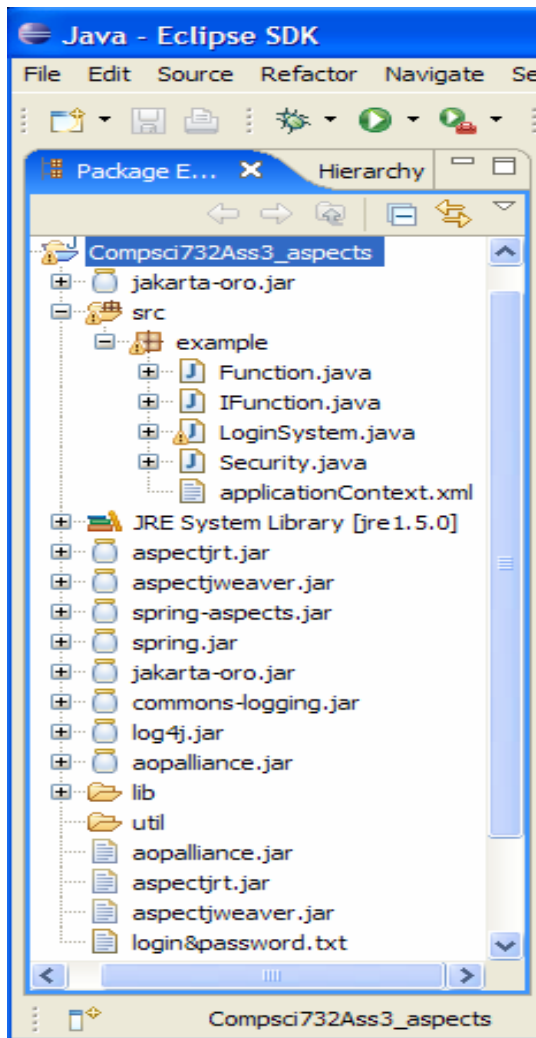any place that he wishes.

Figure 1: Directory Structure of Assignment 3, note the "applicationContext.xml" file

Part B (Contains Tasks 3 and 4)
You were given a sample application to refactor with aspects. Please answer the following questions in a word document called "Answers Part B.doc".

Task 3 [30 marks]
Draw the Requirements Engineering (RE), AO Analysis, AO Design and AO Sequence Diagrams for the application as per Task 2 above. Insert clear explanations.

Task 4 [5 marks]
What type of advice did you use for the aspects and why would you consider it appropriate?

Deliverables
You should provide the following deliverables for this project (You must use Java for your development):
1. A LoginSystem.java file for the first part.
2. A single zipped file containing all of your code this asignment for Task 2. The zipped file should be named *Compsci732Ass3_aspects.zip*.
3. A Word document called "Answers Part B.doc" for Part B which states how far you got in your implementation and all your answers to the questions in Part B (Task 3 and 4) of this assignment.

You should plan to spend no more than 25 hours on this assignment. This is an individual project, so make sure you develop your own solutions. Submit through the web drop-box. You can make as many submissions as you like, only your last submission will be marked. If you make multiple submissions ensure that you send all files for each submission.