EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

Mathematisch–Naturwissenschaftliche Fakultät
Fachbereich Informatik (WSI)
Praktische Informatik
Prof. Dr. Klaus Ostermann

Jonathan Brachthäuser

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Homework Assignment 2

Software Design & Programming Techniques (WS2014)

The deadline for this assignment is Nov 5, 23:59. Hand in the assignments via email to jonathan.brachthaeuser@uni-tuebingen.de. Please include all names of the group members in your email.

1 Single Responsibility Principle

Answer the following questions.

1. What is the Single Responsibility Principle (SRP)?
2. What is an axis of change?
3. What is cohesion?
4. What is the connection between cohesion and the SRP?
5. Which design goals (reusability, extensibility, ...) are addressed by the SRP? Please explain the connection between the design goals and the SRP in 1-2 sentences.
6. Does the SRP lead to more and smaller, or fewer and bigger classes? Consider both extreme cases.

2 Open Closed Principle

Answer the following questions.

1. What is the Open Closed Principle (OCP)?
2. Why is abstraction the key to the OCP? Which kinds of abstractions exist in object oriented (OO) languages, which ones exist in functional programming (FP) languages?
3. What are the major means of extensibility in OO languages? What are the major means of extensibility in FP languages?
4. Perform a short research about the concept of "information hiding". How does information hiding connect with the OCP?

You may want to read `http://www.objectmentor.com/resources/articles/ocp.pdf`.

3 Applying the Principles

The above picture shows a desktop dash in Ubuntu. The dash allows uniform access to different kinds of information by entering textual queries. Assume we are given the following requirement specification of a desktop dash search given by our client

> The dash should contain functionality to enter text to search for. The text can either be filenames or websearch queries. There should be a browseable search history of all previous queries.

A first very unspecific draft of our system looks like:

```
class DashSystem {
  ... parseStringInput(...) // These are method names ...
  ... executeQuery(...)
  ... listPreviousQueries(...)
  ... searchInternet(...)
  ... searchFiles(...)
}
```

The goal of this exercise is to step-wise refine this initial design to adhere to SRP and OCP.

Single Responsibility Principle

1. Explain why the draft might violate the SRP. What are possible dimensions of change?
2. Improve the design to adhere to the SRP. You do not need to implement the methods. Feel free to specify more precise type signatures, though.
3. Explain why your improved design does adhere to the SRP. Which parts of your design are affected by the changes expected in (1)?

Open Closed Principle

1. Explain why your improved design might still violate the OCP. What extensions can be expected in the future?
2. Improve the result of the first iteration to also adhere to the OCP.
3. Explain why your improved design does adhere to the OCP. Give examples of extensions that are now supported by your second design.