

Software Construction HS 2021

Instructor: Prof. Dr. Alberto Bacchelli

Assignment 3

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Week 08

To correctly complete this assignment you **must**:

- Carry out the assignment with your team only (unless otherwise stated). You are allowed to discuss solutions with other teams, but each team should come up its own personal solution. A strict plagiarism policy is going to be applied to all the artifacts submitted for evaluation.
 - Provide solutions to the exercises. Each solution will consist of source code and its changes and/or explanations (e.g., of decisions taken):
 - The explanations must be written in a PDF file with the name:
*Group[id on OLAT]-a[AssignmentNumber].pdf*¹
 - Source code and its changes, as well as explanations must be pushed to the master branch of your GitHub repository by **Nov 30, 2021 @ 16:00**² and the tutor who follows your group has to be tagged in the commit they need to consider.
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¹e.g., a correct name would be: *Group1-a2.pdf*.

²Solutions sent within the first 24 hours after the deadline will be given 50% of the points they would normally get. Solutions sent after 24 hours from the deadline will not be graded.

Exercise 1 - A Checkers Game – Two Design Patterns IN! (30 pts)

Choose two design patterns among those that we cover in class until the lecture on Nov 23 (included), excluding the pattern you already implemented in Assignment 2 (e.g., Singleton). For *each* chosen design pattern, you must have a corresponding implementation in your code. If not, refactor your code to include it. Then, complete the following points:

1. Write a natural language description of *why* and how the pattern is implemented in your code (**5 pts**).
2. Make a sequence diagram of how the pattern works dynamically in your code (**5 pts**).
3. Make a class diagram of how the pattern is structured statically in your code (**5 pts**).

Exercise 2 - A Checkers Game – Unit Tests: IN! (30 pts)

Consider ten important classes in your checkers game.

1. Describe why these classes are important in your system's design and what their current responsibilities are (you must use UML diagrams to support your description) (**8 pts**).
2. Since these are important classes, you want to make sure that they are well tested! Write unit tests to reach at least 80% line coverage in each of them. If this goal is not achievable (or not important), you can explain why (**18 pts**).
3. Create a testing report for your system with: (1) line coverage overall and (2) a histogram with the distribution of the line coverage (**4 pts**).

Exercise 3 - A Checkers Game – 20%-Time (30 pts)

1. Google (used to?) ask their employees to spend 20% of their time at Google on a project that their job description does not cover. As a result of the 20% Project, Google now has services such as Gmail and AdSense.

This is your occasion to have similar freedom. You can decide what to do next to your game:³ It can be an extension/improvement from any perspective, such as improved code quality or novel features. Define your own requirements and get them approved by your tutor (especially in terms of load). Afterwards you must implement the requirements. (**22 pts**).

2. During the analysis and design phases of this extension use responsibility driven design and UML (push to the repository the *single* PDF file including all the produced documents) (**8 pts**).

³Consider that this exercise is worth one-third of the points of this assignment, so plan its load accordingly.