OMSCS 6310 – Software Architecture & Design
Assignment #5 [100 points]: Design Patterns Study Paper (Compare & Contrast)
Summer Term 2017 – Prof. Mark Moss
Due Date: Monday, July 10, 2017, 11:59 pm (AOE)

Purpose: The purpose of this assignment is for you to increase your familiarity with design patterns by comparing and contrasting their appropriateness to support different situations. To do this, you are responsible for writing a short report on two patterns that you have selected, and your pattern choices are listed below. Your paper should be a maximum of 7 pages without diagrams (and 10 pages including diagrams).

Submission: This project must be completed as an individual, not as part of a group. Please submit your answers via T-Square. You must notify us via a private post on Piazza BEFORE the Due Date if you are encountering difficulty submitting your project. You will not be penalized for situations where T-Square is not operating correctly, or having significant technical problems. However, you must alert us in a timely manner in these situations; and, you are responsible for submitting your answers on time in all other cases.

- You need to submit your final solution to T-Square as one PDF file named ***design_patterns.pdf*** along with your design artifacts and associated diagrams.
- Please consider that uploading files to T-Square can occasionally take a long time, even in the case of seemingly "relatively small" submissions. Plan accordingly, as submissions outside of the T-Square Due Date cannot be accepted. You are permitted to do unlimited submissions to T-Square, thus we recommend you save, upload and submit often. You should use the same naming standards for your optional "interim submissions" that you would for the final submission.

Writing Style Guidelines: The style guidelines can be found on the course Udacity site, and at: https://s3.amazonaws.com/content.udacity-data.com/courses/gt-cs6310/assignments/writing.html

Deliverables: Your report must address the following topics:

1. [10 pts] Select two design patterns (#1 & #2) per the rules listed in the Candidate Patterns section below. Present a very brief description (1/2 page each, maximum) for each of the patterns.

2. [20 pts] Describe a practical situation (problem exemplar) for which your selected design pattern #1 would be a very good solution. Ensure that the exemplar you choose is significantly different from any in your source material. Explain why design pattern #1 is a very good solution, and you may use class, structural and/or behavioral diagrams to help make your case.

3. [25 pts] Now using the same situation from Part 2, you should explain how well, or how poorly, design pattern #2 supports the exemplar. Once again, you may use class, structural and/or behavioral diagrams to help make your case. Explaining why the pattern is a poor fit is not just about stating "it's doesn't work well": you should use well-constructed counter-arguments, etc. to demonstrate any problems or difficulties.

[Now "reverse the circumstances" in Parts 4 & 5]

4. [20 pts] Describe a practical situation (problem exemplar) for which your selected design pattern #2 would be a very good solution. Ensure that the exemplar you choose is significantly different from any in your source material, *and significantly different from your exemplar in Part 2*. Explain why design pattern #2 is a very good solution, and you may use class, structural and/or behavioral diagrams to help make your case.

5. [25 pts] Now using the same situation from Part 4, you should explain how well, or how poorly, design pattern #1 supports the exemplar. Once again, you may use class, structural and/or behavioral diagrams to help make your case. Explaining why the pattern is a poor fit is not just about stating "it's doesn't work well": you should use well-constructed counter-arguments, etc. to demonstrate any problems or difficulties.

Limit the textual portion of your submission to 7 pages, not including diagrams and tables.

Candidate Patterns: You may select from certain patterns from the Gamma et al. book: https://s3.amazonaws.com/content.udacity-data.com/courses/gt-cs6310/readings/gt-sad-gamma-fixed.pdf

These patterns from the Gang of Four book ARE permitted for this assignment:

- Abstract Factory
- Prototype
- Bridge
- Façade
- Flyweight
- Chain of Responsibility
- Command
- Interpreter
- Memento
- State
- Template Method

These patterns from the Gang of Four book are NOT permitted for this assignment:

- ~~Builder~~
- ~~Factory Method~~
- ~~Singleton~~
- ~~Adapter~~
- ~~Composite~~
- ~~Decorator~~
- ~~Proxy~~
- ~~Iterator~~
- ~~Mediator~~
- ~~Observer~~
- ~~Strategy~~
- ~~Visitor~~.

Other Directions and/or Suggestions:

- Read the material by Gamma et al. before beginning this assignment.
- Some patterns have evolved since the original publication of the Gamma, et al. book. Be sure to look into more modern variations and extensions and include them in your report.
- The class resources page contains links to several on-line pattern repositories that you are welcome to use as source material; however, you may search for alternatives. You are encouraged to mention any interesting and relevant discoveries on the class forum.
- Although your specific exemplars, etc. may be couched in terms of a particular programming language, your overall explanations and concepts should be language independent. More specifically, they should be reasonably applicable in other similar programming languages and/or environments, albeit with certain implementation modifications.
- Although you are encouraged to find answers to the questions listed above using outside sources, the reports are to be written by you and not copied directly from a webpage or other source.
- All diagrams must be produced using a software drawing tool – no hand-drawn diagrams.