CST8002 Programming Language Research Project

# Hybrid 03 – N-Layered Architecture, MVC Pattern, UML Diagrams, Unit Test

**See Brightspace for Due Date**

**Refer to the Weekly Schedule document posted in Brightspace under Course Information for additional requirements common to all assessments.**

# Overview

Practical Project 2 will require you to refactor your project to use either an N-Layered Architecture or implement a Model View Controller (or variant) Design Pattern. Additionally, you will need to document your project structure using UML diagrams as well as write at least one unit test. This Hybrid provides some learning resources on these topics and is assessed via a Brightspace quiz.

Optionally you can review the “Sample Java Project – Example 2” located in the Learning Resources content area in Brightspace for an example of Layered Architecture.

# Tasks

* Review the learning materials in each section below.
  + What is N-Layered Architecture?
  + What is Model View Controller (MVC) Design Pattern?
  + What is an UML Package Diagram?
  + What is an UML Class Diagram?
  + What is an UML Sequence Diagram?
  + What are the best practices for Unit Testing?

## What is N-Layered Architecture?

* N-Layered Architecture involves separating a program structure into separate logical layers encompassing different roles in the application, typically Presentation, Business, Persistence, and Data store.
* Review [1] using Safari by Oreilly in the School Library for a detailed overview of Layered Architecture.
* Review the Sample Java Project – Example 2 in Brightspace as well.

## What is Model View Controller (MVC) Design Pattern?

* Model View Controller is a design pattern that separates program structure into three parts, Model, View, and Controller (MVC).
* Review [2] using Safari by Oreilly in the School Library for a detailed overview of MVC.

## What is an UML Package Diagram?

* A UML Package Diagram provides an overview of the package organization of an application, each package acting as a container for related classes.
* Review [3] for more information on UML Package Diagrams, and an example of a multi-layered model diagram [4].

## What is an UML Class Diagram?

* A UML Class Diagram documents the features of, and relationships between the classes and interfaces of an application.
* Review [5] for more information on UML Class Diagrams.

## What is an UML Sequence Diagram?

* UML Sequence Diagrams are used to document information exchanges between lifelines, typically method calls between objects.
* Review [6] for more information on UML Sequence Diagram.

## What are the best practices for Unit Testing?

* Unit testing frameworks permit developers to automate tests that focus on small parts of a software system.
* Typically, you will create one or more test methods, which use the unit testing framework with some sort of assert statement.
* Each test method should only test one focused aspect of the software. If you place multiple tests (asserts) inside of a single test method, the first assert that is triggered will throw an exception. Once the exception is thrown, none of the other tests in the method are performed and your unit testing results will be incomplete.
* Review [7] for more information on best practices for unit testing.

# Grading (10 Points Total)

* There is a short Hybrid Quiz in Brightspace to test your knowledge based on this handout.
* Hybrid Quiz 03 – 10 questions, 1 point per question.

# Sources Cited / Learning Resources

Access the books for [1] and [2] via the school library’s Safari by O’Reilly:   
<https://algonquincollege.libguides.com/az/databases?a=s>

[1] Raju Gandhi, Mark Richards, Neal Ford. Head First Software Architecture. Sebastopol. O’Reilly Media, Inc. 2024.

- Search Safari by O’Reilly for “Head First Software Architecture”, then read Chapter 6 on Layered Architecture.

[2] Eric Freeman, Elisabeth Robson. Head First Design Patterns, 2nd Edition. Sebastopol. O’Reilly Media, Inc. 2020.

- Search Safari by O’Reilly for “Head First Design Patterns, 2nd Edition”, then read Chapter 12 on Patterns of Patterns: Compound Patterns starting with the section heading: The King of Compound Patterns to the end.

[3] Kirill Fakhroutdinov. (2009-2024). UML Package Diagrams Overview. uml-diagrams.org. [online] Available at: <https://www.uml-diagrams.org/package-diagrams-overview.html> [Accessed on Nov 24, 2024]

[4] Kirill Fakhroutdinov. (2009-2024). Multi-Layered Application: UML Model Diagram Example. uml-diagrams.org. [online] Available at: <https://www.uml-diagrams.org/multi-layered-application-uml-model-diagram-example.html> [Accessed on Nov 15, 2024]

[5] Kirill Fakhroutdinov. (2009-2024). UML Class and Object Diagrams Overview. uml-diagrams.org. [online] Available at: <https://www.uml-diagrams.org/class-diagrams-overview.html> [Accessed on Nov 15, 2024]

- Use the links at the top to review multiple class diagram types.

[6] Kirill Fakhroutdinov. (2009-2024). UML Sequence Diagrams. uml-diagrams.org. [online] Available at: <https://www.uml-diagrams.org/sequence-diagrams.html> [Accessed on Nov 15, 2024]

[7] erik@daedtech.com. (May 2, 2023). You Still Don’t Know How to Do Unit Testing (and Your Secret is Safe with Me). stackify.com. [online]. Available at: <https://stackify.com/unit-testing-basics-best-practices/> [Accessed on Nov 24, 2024]