Ira A. Fulton Schools of Engineering
Arizona State University

CSE 598: Advanced Software Analysis and Design

Directory Management System Project

Purpose

Learners will evaluate a system with object-oriented design and coupling violations. Learners will gain hands-on experience with improving the software system's quality and modifiability by refactoring the system to remove object-oriented design and coupling issues without changing the system's intended functionality. An excellent opportunity to gain further exposure to the topics discussed in the course (including object-oriented application design, modularity, coupling, and cohesion), Learners completing this project will also get to develop UML class diagrams that represent the design and implement the object-oriented design in Java.

Objectives

Learners will be able to:

- Evaluate an object-oriented design in the form of a class diagram.
- Identify object-oriented design violations.
- Use proper UML design tools to develop class diagrams.
- Refactor a given code to eliminate object-oriented design violations, including coupling, cohesion, and object design principles.
- Implement Java code based on a UML class diagram.

Technology Requirements

- Astah UML
- Java 21
- Java Development IDE: Eclipse or VSCode

Project Overview

Phase I: Evaluate the given design's object-oriented design and coupling violations.

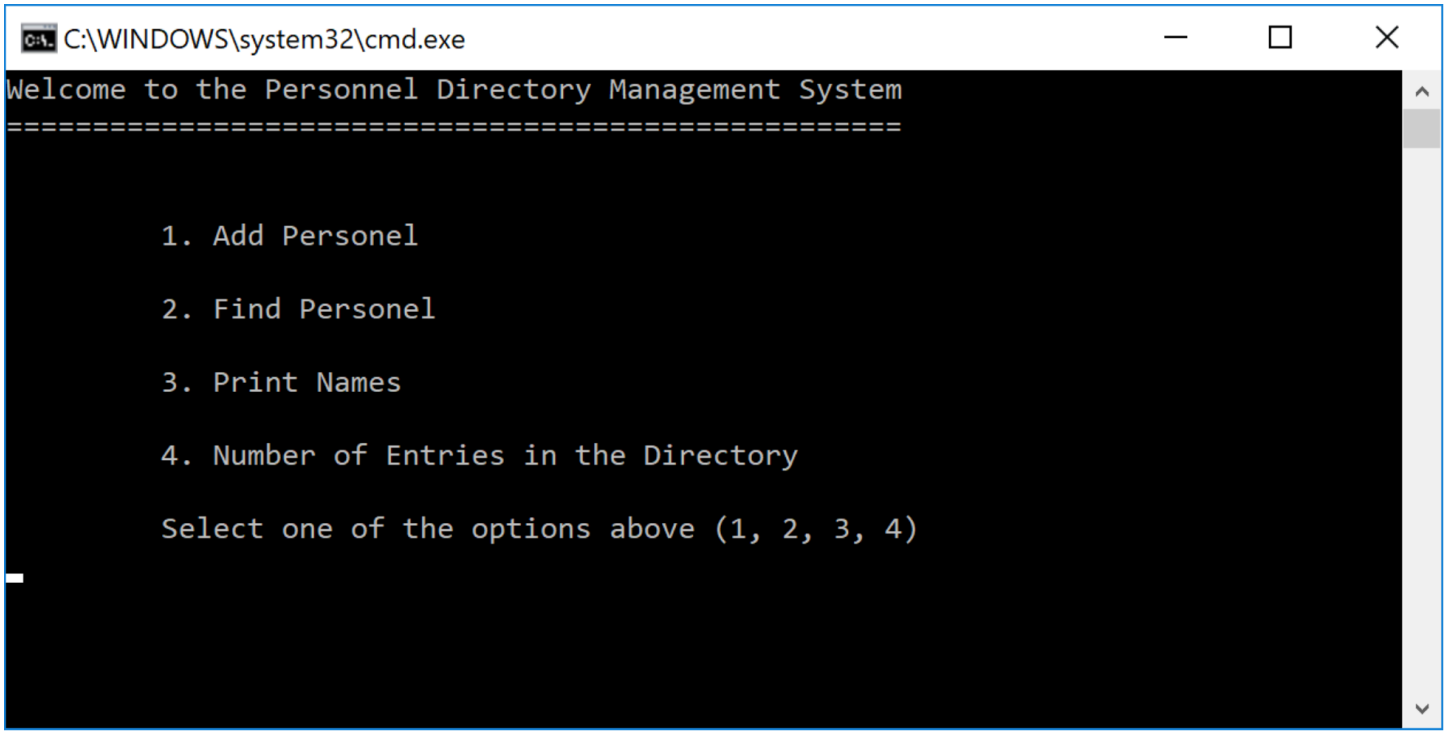
Phase II: Apply a design pattern and refactor the design and implementation using Java

Project Description

Review the Personnel Directory Management System implementation provided to you as downloadable resources for this project. There are five (5) Java files in all:

- *PersonnelDirectory.java*
- *Personnel.java*
- *Person.java*
- *Employee.java*
- *totalObjects.java*

This implementation has several object-oriented concept violations and coupling issues.



Directions

Technology Set Up

You have **two (2) options** to complete the project code: A) You can use a **local setup**, or B) you can use **Apporto**. Your choice will likely depend on what technology you have access to. Please review the set up directions for each option in the *Welcome and Start Here* module of your course, "Technology Set Up: Sports Concussion Assessment Project & Directory Management Project", and select the one most appropriate for you and your system.

Project Directions

Download a copy of the *Template_Your Name_CSE 598 ASAD_Directory Management System Project* document. You will use this document to submit your responses for Phase I Parts 1-2 and Phase II Part 2. Please add the current session and year (e.g., Spring A 2020, Fall B 2021) and your name where indicated in the header of your copy of this template.

Phase I

Refer to the *Template_Your Name_CSE 598 ASAD_Sport Concussion Assessment System Project* document to complete Phase I Parts 1-2.

Part 1

Use the Astah tool to draw a class diagram for the current implementation of the management system. Use proper UML notations while drawing your class diagram.

Take a clear screenshot of your completed diagram and include this in your copy of the learner submission template in the space provided for Phase I Part 1.

Part 2

Identify the places in the code where there are object-oriented concept violations, content coupling, common coupling, control coupling, and stamp coupling situations.

Include (copy/paste or take screenshots) the code segments that correspond to each situation on your copy of the learner submission template in the space provided for Phase I Part 2. You may add pages if necessary.

Explain how you would fix the object-oriented concept violations, common coupling, control coupling, and content coupling issues. Provide your answers together with the relevant code segments that you identified.

Part 3

Refactor the code to remove the object-oriented concept violations, common coupling, control coupling, and content coupling issues **without** removing any intended system functionalities.

You will submit your refactored code as a ZIP file.

Phase II

Refer to the *Template_Your Name_CSE 598 ASAD_Sport Concussion Assessment System Project* document to complete Phase II Part 2.

Part 1

In the current implementation of the directory, two (2) types of Personnel objects have been developed: Person and Employee.

Suppose that the directory will be extended with a few other types, including Executives, Security, and Volunteers. In order to accommodate future extensions to multiple personnel categories,

incorporate the factory pattern so that after calling the createPersonnel method of the PersonnelFactory, the Personnel Directory calls the PersonnelFactory to return the appropriate personnel type.

Design the PersonnelFactory class to satisfy these requirements.

Part 2

After you have incorporated the PersonnelFactory, draw the UML class diagram of the Personnel Directory using Astah. Use proper UML notation.

Take a clear screenshot of your completed diagram and include this in your copy of the learner submission template in the space provided for Phase II Part 2.

Part 3

Use Java to implement the new PersonnelDirectory system that complies with your class diagram.

You will save and submit your files as a ZIP file.

Submission Directions for Project Deliverables

You are given a limited number of attempts to submit your best work. The number of attempts is given to anticipate any submission errors you may have in regards to properly submitting your best work within the deadline (e.g., accidentally submitting the wrong paper). It is **not** meant for you to receive multiple rounds of feedback and then one (1) final submission. Only your most recent submission will be assessed.

You must submit your Directory Management System Project deliverables in the designated submission space in the course. Learners may not email or use other means to submit any project for review, including feedback, and grading.

The Directory Management System Project includes three (3) deliverables:

1. **Project Answers PDF:** Phase I Parts 1-2 and Phase II Part 2 of your project must be a **single PDF** with the correct naming convention: *Your Name_CSE 598 ASAD_Directory Management System Project*. You are **required** to use the provided template document, *Template_Your Name_CSE 598 ASAD_Directory Management System Project*.
2. **Phase I Part 3 ZIP file:** Phase I Part 3 of your project must be a **single ZIP** file with the correct naming convention: *Your Name_CSE 598 ASAD_Directory Management System Project_Phase I Part 3*.
3. **Phase II Part 3 ZIP file:** Phase II Part 3 of your project must be a **single ZIP** file with the correct naming convention: *Your Name_CSE 598 ASAD_Directory Management System Project_Phase II Part 3*.

Making File Submissions in Canvas

Before submitting, confirm that your deliverables follow the requirements for the project, and then submit your work in the designated submission space in the course. File submissions are manually graded by the course team.

1. In your course, go to **Submission: Directory Management System Project**.
2. Click **Start Assignment**.
3. Click **Choose File**.
4. Locate and select **one (1)** deliverable file from your device.
5. If needed, click **+Add Another File** and repeat Steps 3 and 4 until all deliverables are added.
6. Select the **agreement** and then click **Submit Assignment**.
7. (If needed and allowed) To resubmit files:
    a. Return to the Canvas submission space, click **New Attempt**, and repeat the process from Step 3.

Evaluation

Please review the rubric for how your Directory Management System Project will be graded. Projects will be evaluated based on each criterion and will receive a total score. Projects missing any part of the project will be graded based on what was submitted against the rubric criteria. Missing parts submitted after the deadline will not be graded.

Review the course syllabus for details regarding late penalties.

Rubric

Rubrics communicate specific criteria for evaluation. Prior to starting any graded coursework, learners are expected to read through the rubric, so they know how they will be assessed. You are encouraged to self-assess your responses and make informed revisions before submitting your final report. Engaging in this learning practice will support you in developing your best work. Points may be deducted at the discretion of the faculty for disorganized submissions that convolute the grading process.

Component	No Attempt	Undeveloped	Developing	Approaching	Meets
Phase I Part 1: UML diagram with correct notations.	Provided no response.	Submission provides a UML diagram, but the diagram is incorrect.	Submission provides a UML diagram, but the diagram has several incorrect UML notations or does not use the right modeling tool (Astah).	Submission provides a UML diagram, which correctly identifies most of the major objects but contains a few incorrect UML notations.	Submission provides a UML diagram, which uses proper UML notations and is drawn using the right modeling tool (Astah).

Component	No Attempt	Undeveloped	Developing	Approaching	Meets
Phase I Part 2: Identification and solution explanations of object-oriented design concept violations.	Provided no response.	Submission does not correctly identify the violations or explanations for how to solve them.	Submission identifies some violations, but several major violations or explanations for how to solve them are missing.	Submission correctly identifies most major violations and includes explanations for how to solve each violation.	Submission correctly identifies all major violations and includes explanations for how to solve each violation.
Phase I Part 3: Refactored implementation to eliminate the violations.	Provided no response.	The code does not correctly remove violations.	The modified implementation correctly removes only a few of the violations identified in Phase I Part 2.	The modified implementation correctly removes a majority of the violations identified in Phase I Part 2.	The modified implementation correctly removes all of the violations identified in Phase I Part 2.
Phase II Parts 1 & 2: Design of the Personnel-Factory and the UML class diagram of the directory management system that includes Personnel-Factory.	Provided no response.	Submission does not include the PersonnelFactory with the Modified Directory Management System. Submission provides a UML diagram, but the diagram may be incorrect.	Submission includes the PersonnelFactory with the Modified Directory Management System, but it has major flaws. The diagram may have several incorrect UML notations or may not use the right modeling tool (Astah).	Submission includes the PersonnelFactory with the Modified Directory Management System, but it has minor flaws. The diagram may contain a few incorrect UML notations.	Submission includes the correct PersonnelFactory with the Modified Directory Management System. The diagram uses proper UML notations and is drawn using the right modeling tool (Astah).
Phase II Part 3: Directory Management System implemen-tation that incorporates Personnel-Factory design.	Provided no response.	The code does not include the PersonnelFactory.	The code includes the PersonnelFactory, but it has major flaws.	The code includes the PersonnelFactory, but it has minor flaws.	The code includes the PersonnelFactory, and it is correctly implemented.