COIT20258 Assessment item 2— Assignment 2

Due date: Week 8, Thursday, 2 May 2024, 11:59 PM AEST

ASSESSMENT

Weighting: 35%

Length: NA

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1. Objectives

The purpose of this assessment item is to assess your skills attributable to the following learning outcomes and achieving the expected graduate attributes of *advanced level* knowledge, communication, cognitive, technical, and creative skills, and self-management.

- Design system architecture and components using design patterns and object-oriented design
- Develop three-tiered software applications using agile and plan-driven methods
- Plan and conduct test-driven development, validation and verification testing

2. Assessment Task

Your task in this Assignment Two is to review and enhance the requirements specification developed as part of your Assignment One, correct any errors, reflect on the feedback provided by your marker or tutor, and build the software prototype, AIS-R-Initial details of which are in this document. You are to improve the visual designs in line with the enhanced requirements specification, create UML class diagrams, core classes and methods, models, and controller classes for event handling as required following the enhanced requirements specification. You are to develop a test plan to test the software prototype, AIS-R-Initial following the functional and non-functional requirements. The software prototype, AIS-R-Initial that will build following the enhanced requirements specification and design will be a software application which is a Java desktop application with a front-end GUI, middle layer implementing the business logic and backend to store data in files. Test your application using the test plan developed. You will document the detailed design, test plan and evidence of testing.

2.1 Problem (Case Study from Assignment One)

AI-SPACE, an Australia based intelligent aerospace company, explores the possibilities of designing and manufacturing renewable energy driven drones and robotic space vehicles. The AI-SPACE is seeking to hire new engineering recruits to carry out the research and development in its R&D facilities in Melbourne, Sydney, Brisbane, and Adelaide branches. AI-SPACE has commenced the recruitment process by advertising for applicants to fill positions for the software, aerospace, mechanical and electronics engineering departments of the AI-SPACE. The recruitment division will have *administration staff* to register incoming *recruit details.* These *recruit details* are then accessed by the *management staff* who will

assign the applicants to one of the four engineering departments. In order to facilitate this recruitment drive and record keeping, AI-SPACE has approached you to develop privacy preserving secure and maintainable software to keep track of the registration of each recruit's application and how staff manages these records. You need to develop a software prototype called AIS-R, where AIS stands for Australian Intelligent Space, and R stands for Recruit. AIS-R is a representation of AIS-R-Initial and AIS-R-Enhanced detailed in following sections. This software prototype is to provide a proof-of-concept to allow stakeholders to determine if they should invest a larger sum of money for more complete software.

You will be developing the software prototype AIS-R in three stages.
You have already completed the *first stage (Assessment One individual)* in which you have completed requirements engineering identifying functional and non-functional requirements through capturing use cases, drawing use case diagrams, and conceptualizing system architecture as part of Assignment One. Based on your tutor's (marker's) feedback on your Assessment One, you need to work on all aspects to be reviewed and corrected to build a correct software prototype version as part of your Assessment Two.

You are now in the *second stage (Assessment Two individual) of AIS-R*, and you will work individually and build an initial software prototype called AIS-R-Initial which will be an MVC driven JavaFX Scene builder based GUI desktop application. As part of building the AIS-R-Initial, you are required to revise your requirements engineering specification incorporating necessary corrections. You will follow the revised requirements engineering specification and develop the required designs and test plans, and implement and test the software prototype, AIS-R-Initial. Read this entire document, i.e., the Assessment Two Specifications thoroughly to get a thorough in-depth view of the AIS-R-Initial. The AIS-R-Initial should have GUIs that are to enable staff registration and recruit registration. Security and privacy need to be maintained for the registration details data. The collected data will be saved in csv (comma separated value) files.
While you will be working with the Assessment Two for AIS-R-Initial, you are required to *include and implement and test two creative features or functionalities* that were not explicitly mentioned in the Assessment Two specifications.

In this Assessment Two (individual), i.e., the second stage of the AIS-R, you will use JavaFX and Scene Builder and build the software prototype, AIS-R-Initial in continuation with the software requirement specifications and design of the AIS-R-Initial you have completed in Assessment One, and/or the updated software requirement specifications and design of the AIS-R-Initial in line with your tutor's (or marker's) feedback on your Assessment One. You're required to record and articulate the updates you made in your software requirement specifications and design of the AIS-R-Initial. Your creative presentation of the existing and/or updated software requirement specifications and design of the AIS-R-Initial is to pave the way for the coherence of the software prototype, AIS-R-Initial.

The AIS-R-Initial is comprised of the following sub-systems. In addition to the functionalities inherent in the AIS-R-Initial with respect to the following details, you need to *include and implement two more creative functionalities* as mentioned above by realizing the domain specific aspects of the AIS-R-initial as inherent in the following details.

Staff registration includes administration staff and management staff. AIS-R-Initial is to enable the registration of an administrative staff with all details so that s/h can later login and use the system, i.e., the software prototype, AIS-R-Initial.

An administration staff having a full name, an address, a phone number (should contain 10 digits), email address, username, password, staff Id, and position type such as full-time, part-time, or volunteer will be responsible for collecting and recording each recruit's personal details of. The personal details of each recruit include recruit's full name, address, phone, email address, date of interview, and highest qualification level.

A management staff will be responsible for verifying the recruits' details before assigning each recruit to an appropriate engineering department. AIS-R-Initial should enable a management staff's registration so that s/he can login and use the system, i.e., AIS-R-Initial.

A management staff has the same details as an administration staff except a position type. A management staff details also include a management level and a branch. A management level may be classified as senior manager, mid-level manager, and supervisor. Branch management staff can be located on Melbourne, Sydney, Brisbane, and Adelaide. A management staff will be responsible for verifying the recruits' details before assigning each recruit to an appropriate engineering department which is one of the departments such as software, aerospace, mechanical and electronics engineering.

Recruit registration is carried out by administration staff members. Recruits do not have access or interact directly with AIS-R-Initial. Only administration staff members will collect the details of each applicant and register the recruit's information on their behalf. A recruit has a full name, an address, a phone number (should contain 10 digits), email address, username, password, interview date (which can be suggested and confirmed), and the highest qualification level which should be Bachelors, Masters, or PhD. Only one applies.

The management staff will determine the suitability of each recruit and assign each recruit to one of the engineering departments such as software, aerospace, mechanical, or electronics. Only one applies. A location of the engineering department assigned can be Melbourne, Sydney, Brisbane, and Adelaide.

Entering and saving data is to facilitate capturing and saving staff and recruit registration data appropriate to the scenarios detailed above and below.

Staff registration process is to allow a staff to click an appropriate 'Enter Data Buttons', for example Enter Admin Staff Details and Enter Management Staff Details. The software prototype, AIS-R-Initial is to add the entered data to an ArrayList. Include 'Save Data Buttons', for example Save Admin Staff Details and Save Management Staff Details to write the entered data to a file. All the Admin Staff and Management Staff data should be saved in a file named 'staff.csv' which is a text file that stores the attribute values separated by commas. You use an overloaded toString() method to format the attribute values separated by commas. Correct heading of each data is significant.

Recruit registration process conducted by an admin staff include entering a recruit's data and saving the recruit's data in a file named 'recruits.csv'. More precisely, all recruits' data entered by respective admins should be saved in 'recruits.csv'. When recruits' registration details are retrieved for reporting purposes, respective admin staff associated in entering and saving the recruits' details should also be known along with the date and time when the registration details were entered and saved, and the branch where the admin staff worked during entering and saving the recruits' details, which altogether are to provide a measure for non-repudiation. Use an ArrayList to hold the recruit's data entered by an admin staff before a click on the save button to save the data to the file, 'recruits.csv'. There should be options for the Management staff to see recruits' data, the associated admin staff that entered the data, and metadata such as when and where the data was saved.

During the first run of the program, the save method should create the files ('staff.csv' and 'recruits.csv') as the files may not exist. But this should be done after checking that the files do not exist. During the subsequent runs the entered data should be appended to the files so that data already written to the files do not get overwritten and lost.

The tasks to be completed in articulation with the details in this Assignment Two:

1. Develop additional use case diagrams expanding the initial use case diagrams.
2. Identify the classes. You can use your use case diagrams, use cases, and functional requirements to correctly identify the classes.
3. Elaborate your understanding of the collaboration between/among classes.
4. Develop the correct UML class diagrams with attributes, methods, relationships, and cardinalities.
5. Correlate the context diagram, use case diagrams, and the attributes of classes to identify the user input and the data to be saved.
6. Create Test classes for the classes in UML diagrams towards Test driven development using JUnit testing.
7. Build the software prototype, AIS-Initial by
    a. designing and revising the enhanced GUI using Scene Builder
    b. following Model View Controller pattern
    c. implementing the core classes including model class and methods as required
    d. implementing the controller classes and methods for events handling as required.

8. The non-functional requirements from your first assignment need to get mapped to quality aspects of your software prototype, AIS-Initial. Choose two of the quality aspects as a focus of your design and implementation, for example maintainability.
9. Conduct automated testing using Test classes and test data, and gathers evidence in the form of screenshots and brief justifications.

2.2   Graphical User Interface

The GUI should have necessary controls, components, and reports befitting the scenarios inherent in the above details. Design and implementation of the GUI should ensure usability and user experience.

2.3   Data Structures

The Data Structures should be compatible with the scenarios inherent in the above details. Data Structure chosen should ensure high performance while storing, retrieving, and modifying the data as required in the AIS-R-Initial.

2.4   Privacy and Security of the Data

All data to be entered and recorded will be arbitrary, but measures to ensure privacy and security of the data should include access rights to view and modify data, time stamping, encryption, decryption, and non-repudiation within the scope of the AIS-R-Initial.

3.   Coding

Include necessary accessors, mutators methods, constructors, and toString() method for each class. Also, follow good coding practices, using meaningful names, camel case notation for naming, constants as necessary, and include meaningful comments. You can use NetBeans or another IDE to develop your application. Follow the coding standards given in the Unit website. Once you have created your UML class diagrams with correct attributes, you can use your IDE to generate most of the methods such as constructors, getters, and setters. The auto-generated toString() method will not give correct display format. Write your own toString() method.

4.   Report

You should submit a report containing the following details and also in articulation with the tabulated marking criteria.

1. UML class diagrams for the classes
   Note: UML class diagrams generated using a software tool after completing the coding will not be accepted.
2. Test plan showing input data, expected results, and actual results. Show testing of erroneous entries also.
3. Evidence (through screenshots) of automated testing using Test classes and test data.
4. Your reflection of the overall requirements specification, user interface design, and implementation.

5.   10-minute Video Commentary Presentation

Your 10-minute video commentary presentation is to capture the key features and implementation aspects of your completed software prototype, AIS-R-Initial.

6.   Assignment Submission

You should submit the following by using the Moodle online submission system available via the Assignment Two submission link provided on the Unit website:
- your report in word document (.doc or .docx),
- a zip file of your 10-minute video commentary presentation screen capturing key features and implementation aspects of your completed software prototype, AIS-R-Initial, and
- a zip file of the NetBeans project with your completed Assignment Two, i.e., completed software prototype, AIS-R-Initial.

Make sure you submit the correct versions of your report, your 10-minute video commentary presentation of your completed software prototype, AIS-R-Initial, and your completed Assignment Two NetBeans project i.e., completed software prototype, AIS-R-Initial.

7.   Assessment Item 2 Marking Criteria

Refer to the detailed marking criteria tabulated in the next page.

Assessment Item 2 Marking Criteria

S. No	Total Marks 35	Marks Allocated	Marks Awarded
1	Graphical User Interface Presentation: Intuitive and easy to use with informative messages	2	
2	Design and use of appropriate data structures	1	
3	Use case diagrams of main functional requirements	2	
4	Detailed UML class diagrams with attributes, methods, data types, and associations	2	
5	Data correctly added to ArrayList and saved into .csv files with proper heading	2	
6	Creation of Test classes for two of the model classes	2	
	Functional requirements		
7	Implementation of admin and management staff registration, and recruit Registration	3	
8	Correct implementation of management staff reviewing a recruit's details and assigning the recruit to one of the four appropriate departments	2	
9	Correct implementation of search and retrieval of required data	2	
10	Correct implementation of any three reporting features that best demonstrate features of the AIS-R-Initial prototype	3	
11	Correct implementation of potential measures for data privacy and security	3	
12	Two additional Creative features/functionalities	2	
	Report		
13	Test plan and test data to test all functional requirements implemented	1.5	
14	Evidence of automated testing using the Test classes	1.5	
15	Evidence of testing using the test data	1.5	
16	Your reflection of the overall requirements specification, user interface design, and implementation. Choosing two of the quality aspects in your AIS-R-Initial as a focus of your design and implementation, for example maintainability.	1.5	
17	Well-presented report with student details, good document structure with sections, paragraphs, tables/figures, and correct spelling, grammar.	1	
	Video Presentation		
18	With clear voice commentary, create a 10-min video presentation by screen recording the critical building blocks and features of your finished software prototype, AIS-R-Initial	2	
	Penalties		
19	Late Penalty (-1.75 marks: 5% of total allocated marks per calendar day) [Enter -ve marks in the red region if late penalty is applicable)		
20	Plagiarism (penalty as per the plagiarism policy)		
	Total	**35**	