CSCI E-97
Assignment 5
Due: Friday, 12/20/2013

Introduction

In this assignment you will design a modular system for managing a system of robotic spacecraft for the exploration and mining of asteroids.

You will have 2 documents as input to your design:

- Asteroid Exploration Requirements Document describing the functional requirements.
- Software design template (from assignment 2) as a base for your design.

Requirements

Please refer to the Asteroid Exploration System Requirements document for detailed requirements. Any questions or requests for clarification of requirements should be shared on the course web site discussion forum.

Assignment Details

This section describes details and expectations of the assignment.

Focus on Design

This assignment is design only. While your design should support implementation, NO implementation of your design is required.

Use the design template used for the other assignments.

Modular Architecture and Design

The Requirements specify 5 subsystems. Each of these subsystems should be defined as independent modules, approximating level 5 of the Modularity Maturity Model: Service Oriented architecture (SOA).

Each module should define a service Interface that can be called from the other modules where appropriate. The Command and Control User Interface provides a graphical user interface rather than an API.

You will reuse the Authentication Service that you developed in Assignment 4. You can refer to the design for the Authentication Service. Do not include it in the design for the Exploration System.

Because you are combing multiple modules, you should include an architecture level component diagram showing the services with dependencies. Remember to include text describing the diagram and how the components fit together, similar to the System Architecture for the Mobile Application Store. Include the module overview in your design document.

User Interface

This is our first design problem with a user interface. In place of an API definition, you should provide simple wireframes of what each of the user interfaces should look like. These can be hand drawn or you can use a drawing utility to create the user interfaces. Each user interface should identify the Service interfaces that will be used to populate the UI and save the updates made through the UI. You may find that you need to extend the Service interfaces to support the UI.

Persistence

This system will require that the data will be persisted to a data base. Provide some details on how the objects will be mapped to the database. This assignment supports creation and updates to objects, so consider how these changes will be persisted to the database. Specify the attribute that will be used to identify instances of a class.

Development Process

For this assignment, the peer design review is required. You can continue to work together with your partner from assignment 4. If you have any questions regarding the peer design reviews, please contact the TAs at ta.cscie97@gmail.com. Please work with your partner to complete the design reviews by Thursday, December 12th. This should provide enough time to incorporate the comments from the design review and complete the design before the due date, Friday, December 20th.

Assignment Notes:

Reuse the design template from assignment 2. Your design document should include the following:

- UML Component Diagram
    - showing the high level modules and their interdependencies
- Use Case Diagram
    - for each module

- UML Class Diagram
    - for each module
- Class Dictionary
    - for each module
    - you can omit non interesting classes from your class dictionary (e.g. Exception classes). However anything core to the design or that requires additional detail to implement should be included in the class dictionary (e.g. Asteroid, SpaceCraft, Mission, Resource, Message, …). The class dictionary is intended to be a guide to help with the implementation of the classes.
- UML Sequence Diagram(s)
    - show the message flow for receiving status message from a spacecraft where spacecraft has discovered water on target asteroid
    - show the message flow for receiving a status message where the spacecraft has completed its mission
    - show the message flow for provisioning a new mission
- Activity Diagram
    - documenting the provisioning of a new mission.

Every diagram should have some adjoining text that provides context. What is the diagram? Why is it here? What does it show?

Design Patterns

There are no required design patterns for this assignment. However you should think about applying patterns where appropriate and highlight their use in your design. For example, consider applying the Observer, Mediator, Factory, and Facade patterns.

Requirements

Provide a summary of the requirements in the requirements section of your design. Also, when addressing a requirement in your design, refer to the requirement so it is clear to the reader how the design meets the requirements.

What To Turn In

You'll turn in a zip file containing:

- Your design document (in pdf format)
- Include a document (in pdf format) describing your results:
    - Comments from peer design review
    - What design patterns did you apply in this design?
    - Did the modular approach to the design help?
    - Did you find that you needed to go back and update modules to support modules

designed later?

- Did the design review help improve your design?
- Did the reuse of the Authentication Service help or hinder your design?
- Do you think you could implement this design?