BRAC UNIVERSITY
Department of Computer Science and Engineering

Examination: Mid **Duration: 1 Hour 10 min**
Semester: Fall 2023 **Full Marks: 25**

CSE 470: Software Engineering
SET A

Name: ID: Section:

Q1. [CO1] Consider a situation where Google has taken a project to develop an AI-based chat Application. The user should be able to send messages to other users. In addition to that, the users can also send voice clips instead of texts if they want. They should also be able to send images and file attachments along with text messages. For this reason, the chat application should efficiently manage large volumes of data and facilitate real-time collaboration. Furthermore, it must emphasize high responsiveness, while also giving priority to ensuring data security and user privacy. Now, Sundar Pichai has chosen you as the team lead of the project. He allows you to choose your teammates as per your preference. Now, you are not sure about the project requirements and it is an understandably complicated project. However, Sundar Pichai is desperate to have a quality product as soon as possible. He also informed you that he might bring changes in the middle of the development. Understanding the importance of the project, as a team leader you have divided the project into 50 modules and assigned 10 software engineers to work on that project. In addition, the project development phase needs to focus on prioritizing the user's feedback, bringing quick changes as per requirement, and most importantly providing a functional chat Application for end users at the earliest possible time.

A. **What** would be the ideal development method to work according to the above scenario? Justify your reasoning. [3 marks]

B. As a team lead, **what** would be the process to check the project progress according to your chosen framework methodology? [3 marks]

C. Sundar Pichai later informs you that for the longevity of the product, the codebase should be properly documented and for this, you will be forgiven the previously imposed tight timeline. **What** software development approach will you follow now? [3 marks]

D. **What** are the functional and non-functional requirements in the above scenario? [4 marks]

Q2. [CO2] You are tasked with designing a class diagram for a Space Exploration Mission Control System. This system is used to manage and monitor a complex space mission to explore a distant exoplanet. Here are the key components and functionalities of the system:

- **Spacecraft**: The spacecraft is the primary entity responsible for the mission. It has attributes such as a unique identifier, name, current status, and a list of scientific instruments on board.
- **Mission Crew**: The mission involves a team of astronauts and scientists who are part of the mission crew. Each crew member has a profile with details like name, role, and specialty.

- **Scientific Instruments**: The spacecraft is equipped with various scientific instruments to collect data. Each instrument has attributes like a name, purpose, and data collection capabilities.
- **Mission Phases**: The mission is divided into different phases, such as launch, cruise, orbit, and data collection. Each phase has specific tasks and objectives.
- **Communication System**: The spacecraft relies on a complex communication system to send and receive data. The system includes antennas, data transmission protocols, and signal processing components.
- **Mission Control Center**: The mission control center is responsible for monitoring and controlling the spacecraft. It has attributes like a location, mission status, and a team of mission controllers.
- **Data Analysis and Storage**: The system must store and analyze the vast amount of data collected during the mission. This includes data from scientific instruments and spacecraft telemetry.
- **Emergency Protocols**: The system should have mechanisms to handle emergencies and contingency plans for critical situations.
- **Mission Logs**: Maintain logs of all activities, commands, and data received during the mission for auditing and analysis.
- **Navigation and Trajectory Control**: The system needs to calculate and control the trajectory of the spacecraft to reach the exoplanet.

As you design the class diagram for this scenario, consider the relationships between these classes, the encapsulation of data and methods, and the system's overall architecture.
[8 marks]

Q3. [CO3] You are tasked with designing a particular software pattern for an online multiplayer game. The game is expected to have thousands of players simultaneously connected and interacting in a virtual world. The game features real-time gameplay, chat functionality, and the ability to interact with in-game objects. The server needs to manage the game world, synchronize player actions, handle player requests, and maintain the integrity of the game state while making sure players do not face high ping in different regions of the world.

A. **What** kind of software pattern you will use to solve the above scenario? Explain one advantage and one disadvantage of your software pattern in this scenario. [1+2 marks]

B. **What** is one disadvantage of using a Monolithic software architecture in this scenario? [1 marks]

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