National University of Sciences and Technology (NUST)
School of Electrical Engineering and Computer Science

SE 314 – Software Construction

Semester Project

CLO3. Design and develop solutions based on Software Construction principles.

CLO4. Use modern tools for software construction

Project Title: Give a suitable name to your project.

Project Overview: In this semester project, students will design and implement a project of their choice. The project promotes the application of several key concepts studied in the course, including static checking, validation, version control, and concurrency. The main task is to develop a project which is **Easy to Understand**, **Safe from Bugs** and **Ready for Change**.

Project Phases:

Phase 1: System Design Students will create a high-level design for the selected project. They should decide on the system's architecture, core features, and user roles.

- Consider the design of the user interface and the functionality required for the selected problem.
- Task: Produce a detailed system design document.

Phase 2: Implementation and Specification

- Students will start implementing the project. Keep in mind that you have to write the specifications before implementing the class and its methods.
- They will choose specific programming languages and compilers or interpreters.
- Task: Implement the core features of the project in the selected programming language.

Phase 3: Version Control and Collaboration

- Students will integrate version control features (e.g., Git) to allow users to track code changes, collaborate, and resolve conflicts.
- Task: Ensure that multiple users can edit and compile code collaboratively, while keeping track of changes and resolving conflicts.

Phase 4: Testing and Validation

- Students will create a testing plan that covers unit testing, integration testing, and user testing.
- They will thoroughly test the platform, ensuring that code compilation and real-time collaboration work as expected.
- Task: Develop and execute test cases, document results, and make necessary improvements.

Project Deliverables: (Expected during Last two weeks)

- **Report**

- Project description and design document.
- Version control and collaboration features.
- Testing plan, test cases, and results.

- **Final project presentation and demonstration**
  - Working Project
  - Presentation

Grading: Evaluation will be based on the completeness and functionality of the implemented platform, the quality of the system design, the effectiveness of collaboration features, and the thoroughness of testing and validation.

This open-ended project allows students to apply various software construction concepts while encouraging creativity and innovation. They will gain experience in building a practical software development tool, which can be a valuable addition to their portfolios.

Examples for Project:

Here are some examples of software project ideas that address different problems and challenges, providing students with a range of opportunities to apply their skills and knowledge:

1. **E-Learning Platform for Special Education:**
   - Problem: Accessible and interactive e-learning resources for special education students are limited.
   - Solution: Create a platform with adaptive content, tailored to different learning needs, such as dyslexia-friendly fonts, interactive lessons, and customized assessments.
2. **Community Health Tracker:**
   - Problem: Lack of a centralized system to track and report local health data, especially in response to pandemics.
   - Solution: Develop a web or mobile app that allows users to report and visualize health data, symptom trends, and vaccination rates in their community.
3. **Sustainable Transportation Planner:**
   - Problem: Reducing carbon emissions and promoting sustainable transportation is a challenge.
   - Solution: Build an app that helps users plan their commutes using eco-friendly transport options, such as public transit, bike-sharing, and carpooling.
4. **Mental Health Chatbot:**
   - Problem: Access to mental health services is limited, and there's a stigma around seeking help.

- Solution: Create a chatbot that offers emotional support and guidance for individuals facing mental health challenges.

5. **Environmental Monitoring System:**
    - Problem: Environmental conservation efforts require real-time data on air and water quality, and wildlife tracking.
    - Solution: Design a network of IoT sensors and a centralized platform for collecting and analyzing environmental data.
6. **Food Allergy Tracker:**
    - Problem: People with food allergies need a reliable way to track their dietary intake.
    - Solution: Develop a mobile app that allows users to scan food labels, log their meals, and receive real-time allergy alerts.
7. **Automated Job Matching Platform:**
    - Problem: Job seekers often struggle to find the right job openings, while employers face difficulties in identifying suitable candidates.
    - Solution: Build a platform that uses AI algorithms to match job seekers with appropriate job listings based on their skills, qualifications, and preferences.
8. **Elderly Care Management System:**
    - Problem: Providing care and support to the elderly can be challenging for both caregivers and families.
    - Solution: Develop a system that allows caregivers to schedule, monitor, and coordinate care for elderly individuals, including medication reminders and health status tracking.
9. **Local Farmers' Market App:**
    - Problem: Local farmers and artisans need a way to reach a broader customer base.
    - Solution: Create a mobile app that connects consumers with local farmers' markets, allowing users to browse, order, and arrange pickups.
10. **Sustainability Reporting Tool for Businesses:**
    - Problem: Many businesses struggle to track and report their sustainability efforts.
    - Solution: Build a web-based tool that simplifies data collection, reporting, and visualization of a company's sustainability initiatives, including carbon footprint reduction and waste management.
11. **Smart Home Energy Management System:**
    - Problem: High energy consumption in homes and a need for efficient energy use.

- Solution: Create a system that monitors and optimizes energy usage in a smart home by controlling appliances, lighting, and heating/cooling systems.

12. **Language Learning Platform for Immigrants:**
    - Problem: Immigrants often struggle to learn the local language.
    - Solution: Develop a language learning platform that offers culturally relevant content and personalized lessons to support immigrants in language acquisition.
13. **Community Donation and Volunteer Management:**
    - Problem: Coordinating community donations and volunteers can be challenging.
    - Solution: Build a platform that connects volunteers with local charities and allows for the efficient management of donations, events, and volunteers.
14. **AI-Enhanced Personal Assistant:**
    - Problem: People need more efficient ways to manage their daily tasks.
    - Solution: Create a personal assistant app that uses AI to provide scheduling, reminders, and suggestions tailored to the user's preferences.
15. **Renewable Energy Forecasting Tool:**
    - Problem: Renewable energy sources need accurate forecasting for grid integration.
    - Solution: Design a tool that uses weather data and machine learning to predict the output of solar and wind energy installations.
16. **Crisis Management and Response System:**
    - Problem: Efficient response to natural disasters and emergencies is critical.
    - Solution: Develop a system for emergency services, volunteers, and affected individuals to coordinate responses, share real-time information, and request assistance.
17. **Elderly Social Interaction App:**
    - Problem: Isolation and loneliness among the elderly.
    - Solution: Create a social app that connects seniors with peers and encourages social interaction, including virtual games, video calls, and discussion groups.
18. **Personal Finance and Budgeting Tool:**
    - Problem: Many people struggle with managing their finances and sticking to budgets.
    - Solution: Build a user-friendly application for tracking expenses, setting budgets, and receiving financial advice.
19. **Sustainable Fashion Marketplace:**
    - Problem: Promoting sustainable and ethical fashion options.

- Solution: Create an e-commerce platform that connects consumers with sustainable clothing brands and provides information on materials and ethical practices.

20. **Museum Virtual Tour App:**
    - Problem: Limited access to museums and cultural institutions, especially for remote or disabled individuals.
    - Solution: Develop a mobile app that offers virtual tours of museums, allowing users to explore exhibits and learn about art and history from home.

These project ideas cover a range of issues and challenges, from education and healthcare to environmental conservation and community support. They provide students with opportunities to apply their software construction skills in meaningful and impactful ways.