Software Engineering Concepts

SE - Lab 01

Start date: 24 October, 2025.
Due date: 29 October, 2025.

Lab Overview

This lab is designed to introduce you to the fundamental concepts of Software Engineering, focusing on the Software Development Life Cycle (SDLC).

Practical Example: Attendance System Using Java

Let's apply each SDLC phase to develop an attendance system using Java:

1. Requirement Analysis

- **Functional Requirements**:
  - Record student attendance (present/absent)
  - Generate attendance reports
  - Manage student database
  - Calculate attendance percentage
- **Non-functional Requirements**:
  - System should handle 500+ students
  - Response time < 2 seconds
  - Data security and backup

2. Design

- **Architecture**: MVC (Model-View-Controller) pattern
- **Database Design**:
  - Students table (id, name, email, course)
  - Attendance table (student_id, date, status)
- **UI Design**: Swing-based desktop application
- **Class Design**: Student, Attendance, AttendanceManager classes

3. Implementation (Coding)

```
public class Student {
        private int studentId;
        private String name;
        private String course;
        // constructors, getters, setters
}
```

```
public class AttendanceManager {
        public void markAttendance(int studentId, boolean isPresent) {
                // Implementation logic
        }

        public double calculateAttendancePercentage(int studentId) {
                // Calculate and return percentage
        }
}
```

4. Testing

- **Unit Testing**: Test individual methods using JUnit
- **Integration Testing**: Test database connectivity
- **System Testing**: Test complete workflow
- **User Acceptance Testing**: Teachers validate the system

5. Deployment

- Package application as JAR file
- Install on school computers
- Configure database connections
- Train users on system usage

6. Maintenance

- Monitor system performance
- Fix bugs reported by users
- Add new features (SMS notifications, mobile app)
- Regular database backups and updates

Your Tasks to Complete

Answer the following questions based on the SDLC phases and the practical example provided above.

Questions

1. What is the purpose of the Requirement Analysis phase in the SDLC?
2. How does the Design phase contribute to the overall success of a software project?
3. Why is Testing considered a critical phase in the SDLC?
4. What are the key activities involved in the Deployment phase?
5. How does Maintenance ensure the long-term success of a software application?

Analysis Questions

There are many ways to take the attendance of the students, such as:

- Manual attendance sheet
- Biometric systems (fingerprint/iris scan)
- RFID attendance systems

- Mobile apps for self-check-in
- QR code-based attendance

Choose any two methods and compare them based on the following criteria:

1. Accuracy
2. Ease of Use
3. Implementation Cost
4. Time Efficiency
5. Student Privacy

Provide a brief analysis of the advantages and disadvantages of each method you choose.

Submission Guidelines

- Submit your answers in a well-formatted document (PDF or Word).
- Include code snippets where applicable.
- Ensure clarity and conciseness in your explanations.