Software Engineering Lecture Notes WS 24/25

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Preface

Lecture notes for the course “Software Engineering” at Heidelberg University WS24/25.

1 Introduction

1.1 Chapters

1. Introduction
2. Communication in a Project
3. Requirements Engineering (Communication with the Users)
4. Design (Communication with Developers)
5. Quality Management
6. Evolution
7. SWE-Process (Summary and Project Management)

2 Communication in a Project

Following topics relate to and determine communication within a project:

1. Number of participants and their roles in the project
2. Type of the contractual relationship
3. Team Organisation: The way developers communicate within the project
4. Collaborative Coding

3 Requirements Engineering

requirements engineering can be understood as corresponding to the communication with the users / clients. Deals with the following topics

1. Introduction to communication with users/clients.
    1. Clients and Requirements
    2. Description and specification of requirements
    3. Defining Requirements Engineering
    4. Outcome of Requirements Engineering
    5. Benefit of specification
    6. Complexities of RE
2. Usage modelling / description
    1. Introductory Example
    2. Introduction
    3. Tasks, Roles, Persona
    4. Domain Data
    5. Functions, UI-Structure
    6. GUI
3. Documentation Quality
    1. Introduction and Templates
    2. Characteristics and style guide
4. Usability
5. Quality assurance with the client
    1. acceptance test
    2. usability test
6. Quality requirements
    1. Motivation
    2. Quality attributes
    3. QR-description
    4. QR-test
7. Use-cases (not relevant to the exam)

    1. Description of Uses Cases
    2. Use for system testing

8. RE procedure

    1. Introduction
    2. Gathering requirements
    3. Specificying requirements

4 Design

Desing can be understood as communication with and wthin the developers. Deals with the following topics:

1. Introduction to Modelling
2. Class diagrams
3. Interaction diagrams (sequence diagrams)
4. State Diagrams
    1. UML State diagrams
    2. Dialog models
5. Class design with OOAD
    1. OOAD introduction
    2. OOAD: Analysis Class diagram
    3. OOAD: Design Class Diagram
6. Design Patterns
    1. Introduction
    2. Creational patterns
    3. Structural patterns
    4. Behavioral patterns
7. Rationales (Communication of decisions)
8. Summary of modelling techniques

5 Quality Assurance

Quality: Software satisfies the requirements

topics:

1. Introduction
2. Organizational quality assurance
3. Testing:
    1. Intro
    2. Test-case specification
    3. Black-box component testing
    4. White-box component testing
    5. System testing
    6. Integration testing / overall-component testing
4. Static testing
    1. Static Analysis
    2. Metrics
    3. Inspection
5. Analytical Quality assurance at large

6 Evolution

All activities that facilitate re-use and further development. (All activities that take place after the initial development phase)

topics:

1. Intro
2. Architecture
3. Re-use
4. Further development and change management
5. DevOps & IT-Governence
6. Re-engineering

7 SWE Process & Project Management

Making sure that the Software system is developed withing the time money constraints.

topics:

1. Project management
2. SWE-process models & methods