DVA332 – Software Engineering 1: Basic Course

Date: 2018-11-07, 8:10–13:30

Responsible teacher: Jan Carlson 021-151722

Help allowed: Calculator, ruler and language dictionary

Max points: 40
Approved: Minimum 20 points

Grade 5: 34 – 40 p	**Grade A:** 36 – 40 p
Grade 4: 27 – 33.5 p	**Grade B:** 32 – 35.5 p
Grade 3: 20 – 26.5 p	**Grade C:** 27 – 31.5 p
	Grade D: 23 – 26.5 p
	Grade E: 20 – 22.5 p

Write on one side of the sheet only! Answer in English or Swedish.

Assumptions must be made when there is not enough information provided to solve an assignment, and all assumptions must be specified and explained in order to achieve full points.

Good luck!

Assignment 1: Project planning (8 p)

Your task is to plan two relatively independent projects, for which the following activities and effort estimations have been identified:

Note that the typical "project planning" questions found in many old exams are not covered at the same level of detail in the current course instance.

Project	Activity		Effort (person days)
1	R1	Requirements	60
	A1	Architectural design	40
	D1	Detailed design	50
	I1	Implementation & test	80
2	R2	Requirements	50
	D2	Design	40
	I2	Implementation & test	100
1+2	DR	Design review	8

The whole development team consists of ten persons, and it has been decided that no more than seven persons should work on any activity, to avoid the communication overhead of large groups. Moreover, each activity should have the same persons involved from start to finish.

Before implementation can start, there must be a design review, involving two persons from each project (and some external consultants not included in the planning), where the designs of both projects are discussed and adjusted if needed.

List all dependencies between the activities. Describe how team members are allocated to activities, and motivate why. State the resulting duration of each activity. Make a Gantt chart showing when the activities will happen in time (including both projects in the same chart). Durations and dependencies should also be clearly visible in the Gantt chart.

Hint: It is ok to round off durations to integers (effort values are only estimates).

Assignment 2: Scrum (8 p)

a) Describe the three Scrum *roles*, including their main responsibilities. (6 p)

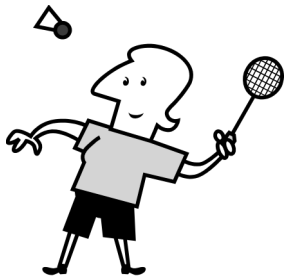
b) Describe the Scrum activity *sprint review*. (2 p)

Assignment 3: UML (8 p)

You have been asked to develop a system for managing badminton tournaments, to be used by both participants and organizers.

a) Make a *UML use case diagram* that captures the following functionality: All users should be able to browse the list of matches and view the details of an individual match. The organizers should also be able to add matches, and referees should use the system to enter match results. (4 p)

b) Draw a *conceptual UML class diagram* that captures the following concepts and relations: A tournament consists of a number of matches. Single matches have two players and double matches have four players. Each match has one referee. All participants (players and referees) must belong to a badminton club. (4 p)



Assignment 4: Software engineering research (8 p)

a) For each of the following research questions, select the most appropriate method to investigate it (controlled experiments, case studies, surveys or artefact analysis), and motivate your choice. (4 p)

1. *How common is the use of code generation from UML models when developing mobile applications?*

2. *How much is code understandability reduced by bad variable naming?*

b) Consider the research described below. State two important validity threats, and suggest how the research could be adjusted in order to reduce them. (4 p)

> *In order to validate that our new testing tool produces tests that are better than manually defined tests, we carried out an experiment involving 100 computer science students. Given a set of design specifications and their implementations, half of the subjects used the tool to generate tests, and the other half constructed tests manually. The tests were then analysed with respect to code coverage to compare the two categories.*

Assignment 5: Software architecture, design and implementation (8 p)

Do you agree with the following statements? Motivate why, or why not.

1. Architectural decisions often have a big impact on extra-functional quality aspects.

2. One benefit of the pipes-and-filters architectural style is that it results in a simple and explicit control flow.

3. In a layered architecture, each layer only uses the functionality of the layers directly above and directly below.

4. In most agile development projects, the architecture is decided early on and doesn't change much during the project.

5. High coupling is an indication of good design.

6. In test-driven development, each team member does either testing or implementation but never both.

7. Renaming classes and methods is an example of refactoring.

8. With the optimistic version control strategy, two developers can modify the same file at the same time.