

Part I General Software Engineering

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General instructions

- This part of the exam has 5 assignments and 4 pages, including this one.
Read all assignments carefully and completely before you begin.
- Please use a new sheet of paper for each assignment.
When you are done, please sort all your pages by assignment numbers, and number them consecutively.
Make sure to keep your pages of Part I and Part II separate, they will be corrected separately.
- Motivate clearly all statements and reasoning. Explain calculations and solution procedures.
- Be precise in your statements. Imprecise formulations may lead to a reduction of points.
- Write clearly. Unreadable text will be ignored.
- You may answer in either English or Swedish.
- The assignments are not ordered according to difficulty.
- This part of the exam is designed for 25 points and 2 hours. You may thus plan about 5 minutes per point.

As a rule of thumb: For questions valued 0.5p, expected good and concise answers take usually one line of text, 1p a few lines, 3p a page.

1. (5p) **Requirements Engineering**

- (a) What is the goal of Requirements Elicitation? (0.5p)
- (b) Consider the following requirements of an interactive project-planning tool:
 - R1:** The user shall be able to add a new task to the project.
 - R2:** The critical path of the Gantt chart shall be displayed in red.
 - R3:** The colorizing according to R2 shall be done maximally 2.0 seconds counted from the last keystroke creating or modifying the critical path.

Task: For each of the requirements, determine if the requirement is a functional or a non-functional requirement. Provide a short motivation (1.5p)
- (c) *Scenario:* Your hairdresser salon has started a web-site for frequent customers. If you have signed up for the free membership you can login and book treatments. You can search for different employees, date, or time. The hairdressers use the system for planning, for instance, entering working hours and serving drop-in customers. The customer can erase bookings if more than 24 hours remain before the start of the treatment. The hairdressers can edit anything, and can also edit advertisements from their vendors.

Task: Now, create a use-case diagram of the web-site consisting of two different actors and two different use-cases. Don't forget the use case texts. Only logging in and logging out are basic functions, not to be considered as use-cases. (3p)

2 (5p) **Project planning and processes**

- (a) Describe two advantages of working with a Waterfall life-cycle model and two advantages of working with Iterative development methods. (2p)
- (b) Describe with an example the four strategies used in risk management. (3p)

3. (5p) **Design and Architecture**

- (a) Draw an architecture of a web-shop with a line-and-box diagram. Point out the following elements of the diagram: module, relationship, and interface. (1p)

Hint: Don't spend too much time in making the architecture perfect, 5-10 elements will do

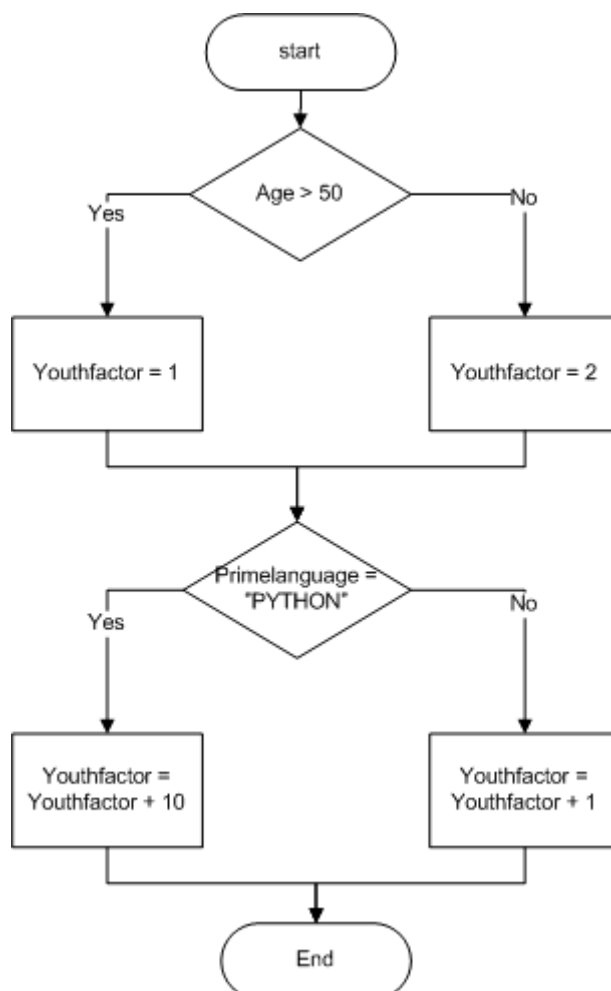
- (b) Draw a UML class diagram of the following (partial) rules for assigning teachers to thesis students. Use at least 2 generalization associations:

- A thesis student must be assigned to an examiner for the work
 - An examiner shall be employed as a teacher
 - Teachers can be employed as lecturers or professors
 - A master thesis student must also be assigned to a tutor
 - Any employee, including assistants, can take the role as tutor
 - A bachelor thesis student can have a tutor, but it is not required (2p)
- (c) Define the concept of cohesion in the context of software architecture. Shall we strive for high or low cohesion in software design? Don't forget to motivate your answer.(2p)

4. (5p) Testing and configuration management

- (a) Describe the concept of test-driven development (TDD.) (1p)
- (b) Describe the concept of continuous integration. (1p)
- (c) Consider the control graph for calculating a humoristic Youthfactor.

Make two tables of test cases: one that guarantees branch coverage testing, and one that guarantees full path coverage testing. For both tables, use the minimal number of test cases.(3p)



5. (5p) **Software Quality**

Describe five methods, tools, or techniques that can be used to achieve high maintainability in Software Engineering. For each of your selected answers, describe how it might be possible to measure the maintainability. Don't forget to motivate your answer.(5p)