Question Bank
Software Engineering
IV1300

2016

Sista frågan i det här dokumentet kommer att ställas bara på första ordinarietentan.

Basics of Software Engineering

Question: **Definition of software** (1 point) (based on Mira's material, Chapter 1.3)

What is software? (1 point)

Question: Definition of software engineering (2,5 points)

What is the definition of software engineering (0,5 points) and what two key phrases does this definition include? (2 points)

Question: Relationship to other disciplines (1 point)

How is software engineering related to computer science and system engineering?

Question: Diversity of software application (3 points)

One of the most significant factor in determining software engineering methods is the type of application that is being developed. Sommerville lists eight such types. List (1,5 points) and explain (1,5 points) six of them.

Question: Relationship to other disciplines (3 points)

There is no universal software engineering method or technique that is applicable for all different types of software. However, there are three general issues that affect different types of software. These are *heterogeneity*, *business and social change* and *security and trust*. Explain in what way these issues provide challenge to software developers?

Question: Types of software products (2 points)

There are two types of software products.
What are they? (0,5)
Provide an example of each type. (0,5)
Who is in the control of the specification of each product type? Motivate? (1 point)

Question: Professional and ethical responsibilities (4 points)

Like other engineers, software engineers must accept that their job involves wider responsibilities than simply the application of technical skills, the professional and ethical responsibilities. Some of the professional and ethical responsibilities are:

- Confidentiality
- Competence
- Intellectual property rights
- Computer misuse.

Describe briefly in what way the software engineers may misuse their responsibilities.

Organizational Levels

Question: **Organizational levels and strategies** (6 points) based on Mira's material in Chapter 5

Give an account of organizational levels and the strategies that apply on each level.

Software Processes

Question: Process versus process model (1 point)

What is a process and process model? (1 point)

Question: Reasons for modelling processes (4 points)

Lari Lawrence Pfleeger (see Mira's slides) lists reasons for modelling processes. List and explain them.

Question: Process Model (4 points)

Give an account of the waterfall model.

Question: Process Model (4 points)

Give an account of the incremental model.

Question: Process Model (4 points)

Give an account of the reuse-oriented model.

Question: Process Phases (4 points)

There are many different process models, but all must include four fundamental software engineering activities. These are:

1. Software specification
2. Software design and implementation
3. Software validation
4. Software evolution.

Give an account of software specification phase and its inclusive requirements engineering process.

Question: Process Phases (4 points)

Give an account of Boehm's spiral model – the risk-driven software process framework.

Requirements

Question: Requirement levels (3 points)

Sommerville describes two levels of requirements. What are they? (1 point) Why do you need to write requirements on different levels of detail? (1 point) How are these requirements structured into hierarchies? (1 point)

Question: Requirement types (4 points)

Software requirements are often grouped into functional, non-functional requirements. Describe briefly each requirements type and exemplify it.

Question: Non-functional requirements (2 points)

Describe three main different types of non-functional requirement which may be placed on a system. Give at least one example of each of the types.

Question: Defining requirements in natural language (2 points)

Discuss the problem of using natural language for defining user and system requirements and show, using small examples, how structuring natural language into forms can help avoid some of these difficulties.

Question: Requirements engineering process phase (4 points)

After initial feasibility studies, the next stage of the requirements engineering process is requirements elicitation and analysis.

Describe the process and each of its phases. (2 points)
Give four reasons for why the elicitation and analysis phase is difficult. (2 points)

Question: Requirements engineering discovery process phase (4 points)

When discovering requirements, you may use different techniques such as

1. Use cases
2. Interviewing
3. Scenarios
4. Ethnography

Describe (2 points) and compare two of them (2 points).

Question: Requirements engineering discovery process phase (2 points)

Describe(1 point) and motivate (1 point) the role of ethnography within requirements engineering process?

Question: Requirements engineering discovery process phase (3 points)

During the requirements validation phase, different types of checks should be carried out on the requirements in the requirements document. Sommerville suggests five types of checks. List and describe three of them.

Question: Requirements engineering discovery process phase (3 points)

There are a number of requirements validation techniques which can be used. These are requirements reviews, prototyping, and test-case generation. Describe each of them.

Question: Requirements change management (3 points)

The requirements for software systems are always changing. Hence, one must define a process of understanding and controlling changes to system requirements. Describe the requirements management process.

Testing

Question: Verification and validation (2 points)

Verification and validation are not the same thing. What is the difference? Explain why validation is a particularly difficult process.

Question: Confidence level in verification and validation (3 points)

The ultimate goal of verification and validation is to establish confidence that the software system is "fit for purpose". However, the level of confidence depends on (1) software purpose, (2) user expectations, and (3) marketing environment. Motivate how the level of confidence varies with respect to the three above-listed reasons.

Question: Program inspections (3 points)

Sommerville provides three advantages of program inspections. What are they?

Question: Equivalence partitioning (2 points)

Give an account of equivalence partitioning within testing.

Question: Component testing (4 points)

There are different types of interface between program components. These are (1) parameter interfaces, (2) shared memory interfaces, (3) procedural interfaces, and (4) message passing interfaces. Explain them.

Question: Component testing (4 points)

There are different classes of interface errors. Sommerville lists (1) interface misuse, (2) interface misunderstanding, and (3) timing errors. Explain them.

Question: Interface testing (2 points)

Why is interface testing difficult?

Question: Test-driven development (4 points)

Given an account of test-driven development. What are its fundamental steps? (2 points). Mention at least its two benefits. (2 points)

Question: User testing (1,5 points)

Sommerville distinguishes three types of user testing. What are they and what do they imply?

Question: Acceptance testing (6 points)

Sommerville identifies six stages in the acceptance testing process. These are (1) define acceptance criteria, (2) plan acceptance testing, (3) derive acceptance tests, (4) run acceptance tests, (5) negotiate test results, and (6) reject/accept system. Give an account of these phases.

Project Management

Question: Differences with other engineering projects (3 points)

Most projects have important goals such as

1. Deliver the software to the customer at the agreed time.
2. Keep overall costs within budget.
3. Deliver software that meets the customer's expectations.
4. Maintain happy and well-functioning development team.

These goals are not unique to other engineering projects. However, software engineering differs in a number of ways from other engineering projects. List and explain three such differences.

Question: Risk management (4 points)

Give an account of a risk management process and its phases.

Question: Risk types (4 points)

Sommerville categorizes risks into three groups:

1. Project risks
2. Product risks
3. Business risks.

Explain provide an example of each risk category and (3 points). Why do the risk types overlap sometimes? (1 point)

Question: Risk types (4 points)

Sommerville categorizes risks into three groups:

1. Project risks
2. Product risks
3. Business risks.

Explain each risk category and provide an example (3 points). Why do the risk types overlap sometimes? (1 point)

Question: Risk strategies (3 points)

The risk planning process considers each of the key risks that have been identified and develops strategies for managing these risks. Sommerville identifies three strategies. What are they? Provide an example for each strategy.

Question: Planning stages (3 points)

Project planning takes place at three stages in a project lifecycle. Describe these stages.

Question: Project scheduling (5 points)

Give an account of a project scheduling process.

Question: Agile planning (5 points)

Most of the agile approaches such as Scrum and extreme programming have a two-stage approach to planning. What are the two stages (2 points) and how do they correspond to traditional planning (2 points)?

People Management

Question: Managing people (5 points)

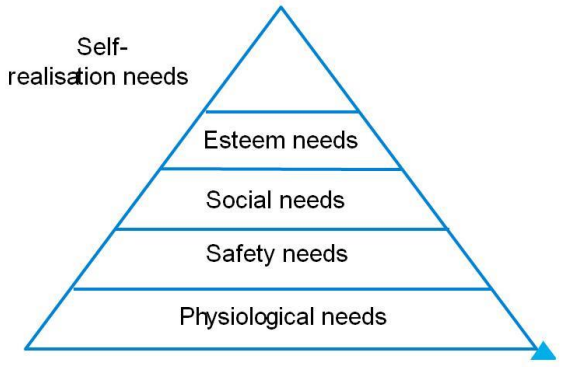
The people working are the greatest assets in a software organization. Therefore, to ensure that the organization gets the best possible return on investment, it is important to manage people with respect.

Explain and motivate why it may not always be optimal to assign software engineers to the roles of project managers? (2 points)

There are four critical factors that must be considered while managing people. These are *consistency*, *respect*, *inclusion* and *honesty*. (3 points). Explain and motivate three of them.

Question: Motivating people (5 points)

Project managers need to motivate their people. Using Maslow's hierarchy of human needs, explain what employee needs project managers should focus on and how they may be satisfied.



Question: Personality types (5 points)

Question: Personality types (4 points)

There are three different personality types that must be considered when choosing team members.

- What are they? (1 point)
- Explain how each personality type is motivated while doing the work? (1 point)
- What personality types would you choose when creating a team? (1 point). Motivate why? (1 point).
- In case it is impossible to choose people with the right personality types, how should you manage people so that the organizational and group objectives are met? (1 point)

Question: Cohesive groups (5 points)

It is important to create a team that has the right balance of personalities, experience and skills. This however does may not always lead to successful and cohesive groups. What does it mean that the group is cohesive? (2 points). What are the benefits of a cohesive group? (3 points)

Question: Group communications (5 points)

It is essential that group members communicate effectively and efficiently with each other and other project stakeholders. However, the effectiveness and efficiency is influenced by (1) group size, (2) group structure, (3) group composition, (4) the physical work environment, and (5) the available communication channels. Motivate why these issues impact group communication?

Quality Management

Question: Quality in manufacturing (3 points)

What are the fundamentals of quality management in manufacturing industry (1 point) and why are they not directly comparable with software quality (2 points)?

Question: Process-based quality (3 points)

Give an account of process-based quality and its phases in the manufacturing context (2 points). Is there any clear link between process and product quality in manufacturing? Motivate! (1 point).

Question: Software standards (3 points)

There are three reasons why software standards are important. What are they? (3 points)

Question: Quality management & software development (2 points)

Should or should not quality management and software development be separated? Motivate your answer! (1 point) When is it practically impossible to separate them in smaller companies? Motivate your answer! (1 point)

Question: Reviews (5 points)

Reviews are quality assurance activities that check the quality of project deliverables. Give an account of a software review process and its phases in a traditional software development context (3 points). What does the review process look like in agile development (1 point)? In what context (traditional or agile) is it more appropriate to use reviews? Motivate your answer (1 point)

Question: Inspections (2 points)

Despite of the well-known cost effectiveness, many software development companies are reluctant to use inspections or peer reviews. Motivate why inspections are effective (1 points) and explain why companies are unwilling to have inspections (1 point).

Configuration and Version Management

Question CM defintion (2 points)

What is configuration management and why is it important?

Question CM activities (6 points)

There are four principal configuration management activities:

- Change management
- Version management
- System building
- Release management

Choose and describe two of these activities.

Question Change management process (5 points)

Describe the change management process.

Question Change impact (3 points)

Sommerville lists five factors that should be taken into account in deciding whether or not a change should be approved. List and describe three of them.

Question (1 point)

What is Change Control Board and what is its function?

Question (2 points)

Is it ethical for a company to quote a low price for a software contract knowing that the requirements are ambiguous and that they can charge a high price for subsequent changes requested by the customers? Motivate your answer.

Question : (8 points) Den här frågan kommer att ställas bara på första ordinarietentan.

During the course project, you have been assigned a specific role, such as for instance, tester, developer, business manager, etc. Your task was to follow the responsibilities assigned to your role. Among many tasks, you were responsible for one or several process models.

From the perspective of your role and from the perspective of **only one** process, do the following:

- Present what role and responsibilities you have had (0 points).
- Describe the process model for which you have been responsible (1 points).
- List and describe the good sides of your process model (1 point).
    - at least 2 good sides
- Motivate why these good sides have been achieved (1 point).
- List and describe the bad sides of your process model (1 point).
    - at least 2 bad sides
- Motivate why these bad sides have been encountered (1 point)!
- Describe and evaluate the solutions that you have used for remedying the bad sides (1 point).
- Evaluate the book from the perspective of the process model you have been responsible for (2 points).
    - Does the book cover the necessary details of the process? Motivate your answer!
    - Does any other literature cover the necessary details of the process? Motivate your answer!
    - Does the book correctly describe the process? Motivate your answer!
    - Does any other literature describe the process? Motivate your answer!
    - What suggestions would you provide to Ian Sommerville to improve his process descriptions? Motivate your suggestions!
    - Finally, does the book properly describe the relationship between your process and other processes? Motivate your answer!

If you happen to be CEO, then you are welcome to choose any role.

Under kursprojektet, har du tilldelats en specifik roll, till exempel testare, utvecklare, affärschef osv. Din uppgift var att följa de ansvarsområden som givits till din roll. Bland många uppgifter, var du ansvarig för en eller flera processmodeller.

Ur din rolls och utifrån endast en process perspektiv, gör följande:

- Presentera vilken roll och ansvarsområden du har haft (0 poäng).
- Beskriv den processmodell för vilken du har varit ansvarig (1 poäng).
- Lista och beskriv de goda sidorna av din processmodell (1 poäng).
    - minst 2 goda sidor
- Motivera varför dessa goda sidor har uppnåtts (1 poäng).
- Lista och beskriv de dåliga sidorna av din processmodell (1 poäng).
    - minst 2 dåliga sidor
- Motivera varför dessa dåliga sidor har uppstått (1 poäng)!
- Beskriv och utvärdera de lösningar som du har använt för att åtgärda de dåliga sidorna (1 poäng).
- Utvärdera kursboken utifrån den process du har varit ansvarig för (2 poäng).
- Har boken täckt de nödvändiga detaljerna i processen? Motivera ditt svar!
- Har annan literatur täckt de nödvändiga detaljerna i processen? Motivera ditt svar!
- Har boken korrekt beskrivit processen? Motivera ditt svar!
- Har en annan literatur korrekt beskrivit processen? Motivera ditt svar!

- Vilka förslag skulle du ge till Ian Sommerville för att förbättra sina process-beskrivningar? Motivera dina förslag!
- Slutligen, har boken beskrivit relationen mellan din process och andra processer ordentligt? Motivera ditt svar!

Om du råkar vara VD, så är du välkommen att välja vilken roll som helst.