

EINDHOVEN UNIVERSITY OF TECHNOLOGY
Faculty of Mathematics and Computer Science

Partial examination Software Architecture (2II45)
on Monday, September 29, 10.30h-12.00h

Work clearly. Read the entire exam before you start. Motivate each answer concisely and to the point. Maximal grades are given between parentheses. The total score sums up to 20 points.

1. (1) Give motivations (at least three) for having a software architecture.
Answer (see ADS-Introduction slides 4 & 6 & 17): (complex systems:) understanding, analysis, communication (distribution of work, documentation) and construction;
2. (2) What is an architectural style and by what is it described?
Answer (see ADS-Architectures slides 14 & 15):
 - coherent set of design decisions concerning the architecture (*generic* solution for a *class* of problems);
 - vocabulary, *generic* structure and behavior, rules and guidelines for application
3. (1) Give motivation for the Peer-to-Peer architectural style.
Answer (see ADS-Architectures slide 21): sharing resources and content, cooperation in communities, symmetry in roles (of peers)
4. (1) Give three types of transparencies in distributed systems with their description, i.e. *what* is hidden.
Answer: see ADS-Architectures slide 6 or book p. 5.
5. In a given distributed system, a shared file store is used for background storage. For the architecture of the file store we may choose between a centralized Client-Server or a distributed Peer-to-Peer solution (in which each client stores part of the file system). Which of these two styles is more appropriate considering
 - (1) performance
Answer: P2P, as it allows parallel processing of both individual as well as multiple simultaneous requests;
 - (1) maintainability
Answer: centralized CS, single source.
Note: maintainability \neq availability.
 - (1) information protection (access control)
Answer: centralized CS, single access point.
6. (2) What is meant by scalability, and scalable systems?

Answer (see ADS-Architectures slides 8 & 9): essential elements: metric, usage parameters, architectural parameters, required change to architectural parameters to accommodate change in usage parameters given a metric.

7. (2) Give two examples of concurrent server organizations.

Answer: Definition *concurrent* (versus *iterative*) *server*: see ADS-Process slide 15 or book p. 89 (each request handled by a concurrent task created a) initially or b) upon demand). Note: a *concurrent server* is **not** the same as a *server cluster*. Examples: see ADS-Process slides 15 and beyond.

8. (1) Which communication types are most appropriate for streaming?

Answer (see ADS-Communication slide 12): types: intermediate storage (**transient**/persistent), awaiting responses (**synchronous**/asynchronous), units of information (discrete/**continuous**). Hence: transient, synchronous, continuous.

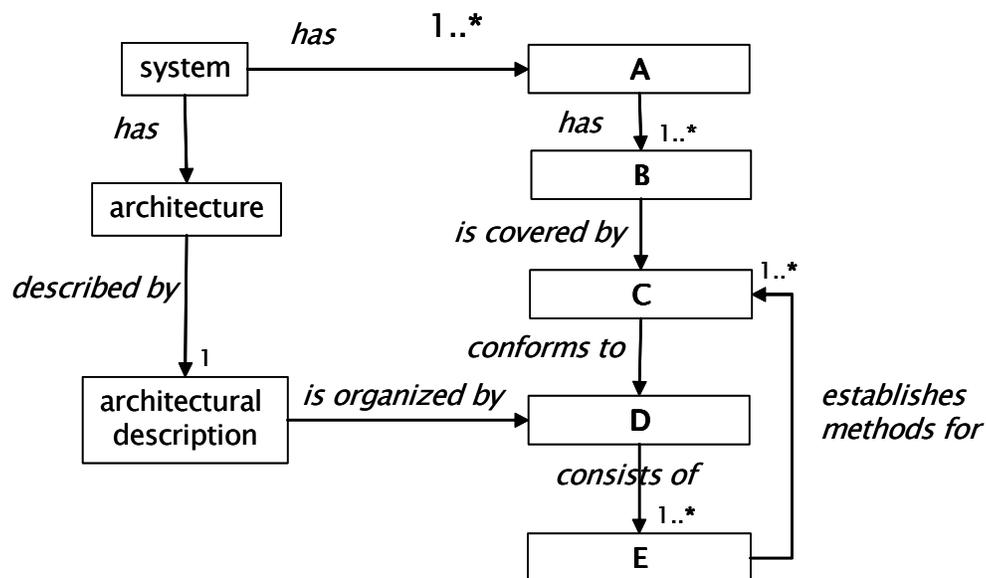
9. (2) Give at least three disadvantages of synchronous RPCs.

Answer: see ADS-Communication slide 20.

10. (3) What are the architectural views proposed by Kruchten? Describe each view in one sentence.

Answer: see ADS-Introduction slides 21 & 22.

11. (2) The diagram below is a fragment of the conceptual model that is proposed in the IEEE1471 Standard for Software Architecture. It contains a number of rectangles in which concepts need to be filled in.



Assign values for the 'unknowns' A-E choosing from the following set: model, quality, metric, concern, style, view, object, viewpoint, stakeholder.

Answer: see ADS-Introduction slide 24.