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 a definition of architecture as used in the course.
   **Answer** (see ADS-Introduction slide 17).

2. (1) Give (at least) three techniques and mechanisms for scalability.
   **Answer** (see ADS-Architectures slide 10).

3. (1) Give motivation for the Client-Server architectural style.
   **Answer** (see ADS-Architectures slide 17).

4. (2) Server discovery and contact can be realized by means of (i) a repository for access points (e.g. DCE) or (ii) a so-called ‘superserver’. Explain the differences between both realizations.
   **Hint**: draw diagrams for both types of realizations.
   **Answer**: See ADS-Process slide 13.

5. **Persistent** and **synchronous** communication is a popular alternative in message-oriented communication.
   - (1) Give a motivation for this alternative.
   - (1) Give an example application using this alternative.
   - (2) Draw an example interaction scheme between a client and a server that clearly illustrates this alternative.
   **Answer**: See book Section 4.1.2 and ADS-Communication slide 15.

6. (2) Explain the meaning of marshalling and its motivation.
   **Answer** See book p. 131 and ADS-Communication slide 26.

7. (1) Which forms of transparency are supported by naming?
   **Answer**: see ADS-Naming slide 3.

8. For locating mobile entities, one could use **forwarding pointers or home-based approaches**.
   - (1) Give at least two drawbacks of forwarding pointers.
     **Answer**: See book p. 184.
   - (1) Describe the principle of a home-based approach.
     **Answer**: See Figure 5-3 in book or ADS-Naming slide 16.
• (1) Give at least one drawback of home-based approaches.

9. (3) Describe the two conditions for *interactive consistency* and show that
   in case of forgeable messages interactive consistency can not be accomplished
   with 3 parties.
   Answer: see ADS-FaultTolerance slides 12-14.

10. (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.

```
    system
      +------has------+
      |               |
      v               v
architecture
      +-----described by-----+
      |                        |
      v                        v
architectural description
```

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.