Telecooperation Lab
Prof. Dr. Max Mühlhäuser

Telekooperation 1: Exercise WS15/16

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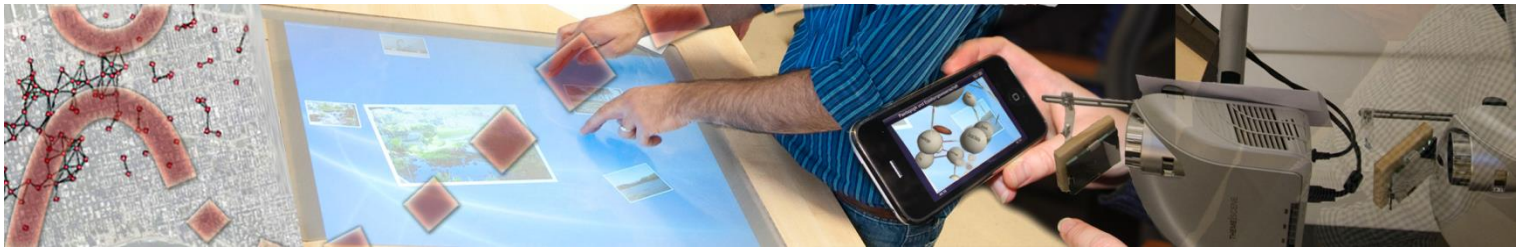

TK1 – EXERCISE 19.11.2015

- **Solution 2nd Theory Exercise**
- 3rd Theory Exercise
- 2nd Programming Exercise

Task 1.1: RPC Failure Semantics (3 P.)

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You want to implement RPC with at-most-once failure semantics. What do you have to implement on the client and the server side (e.g., buffer, algorithms, additional information in messages)?

Task 1.1: RPC Failure Semantics (3 P.)

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Type of Error Sem.	for absence of errors	in case of omissions	in case of server.crash
maybe	1 proc-exec. 1 result returned	0|1 proc-exec. 0 results returned	0|1 proc-exec. 0 results returned
at-least-once	1 proc-exec. 1 result returned	≥1 proc-exec. ≥1 result returned	≥0 proc-exec. ≥0 result returned
at-most-once	1 proc-exec. 1 result returned	1 proc-exec. 1 result returned	0|1 proc-exec. 0 results returned
exactly-once	1 proc-exec. 1 result returned	1 proc-exec. 1 result returned	1 proc-exec. 1 result returned

Task 1.1: RPC Failure Semantics (3 P.)

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- at-most-once:
  - Repeated requests & replies, duplicates recognized → exec only once
  - Server crash → no result (no reply), server may have executed or not

- Problem sources
  - Request omission, reply omission, server crash

- Request omission:
  - Requests have to be cached on the client
  - Request packages get a unique ID
  - Lost requests have to be retransmitted
  - Multiple requests with an ID are only processed once

- Reply omission:
  - Results have to be cached
  - Lost results have to be retransmitted
  - The call cannot be repeated to get the results (would be possible with at-least-once)

Task 1.2: Marshalling (4 P.)

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a) Define the term ”Marshalling“.

Marshalling: Structured data and primitive data types are transformed into an external representation (serialized form), e.g., for transmission.

Task 1.2: Marshalling (4 P.)

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b) In the lecture CORBA CDR has been presented. In CORBA CDR there is no explicit typing. Explain why this is the case and describe advantages as well as disadvantages.

With CDR the type is exposed to the recipient via IDL. In this case, typing is not necessary.

Advantages:
- Lower memory consumption as no types have to be transferred
- Time efficient as no additional information have to be read to identify types

Disadvantages:
- The definition must be known by everyone

Task 1.3: Request-Reply Protokolle. (3 P.)

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a) Describe advantages and disadvantages of Request-Reply-Acknowledge (RRA) in comparison to Request-Reply (RR).

Advantages RRA

- Replies can be deleted by the server after ACK (reduced memory consumption)
- If a reply omission occurs no further request has to be sent to the server. (which would result in a repeated calculation of the result)

Disadvantages RRA

- It is not clear what to do with ACK omission
  - In this case, reply is never deleted, thus, additional strategies are needed such as timeouts, resends, etc.
- Message overhead is created

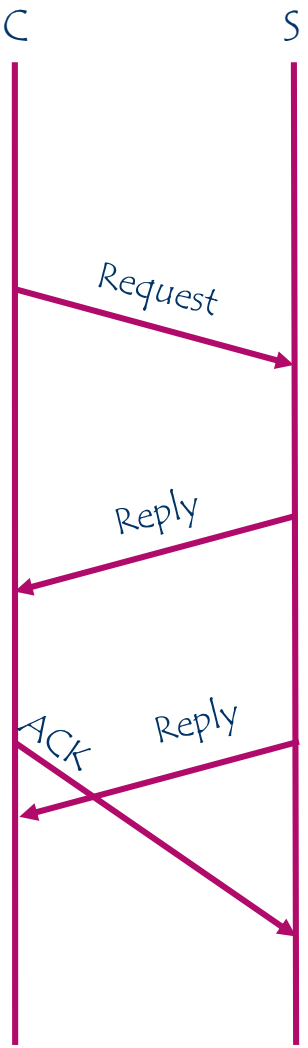
Task 1.3: Request-Reply Protokolle. (3 P.)

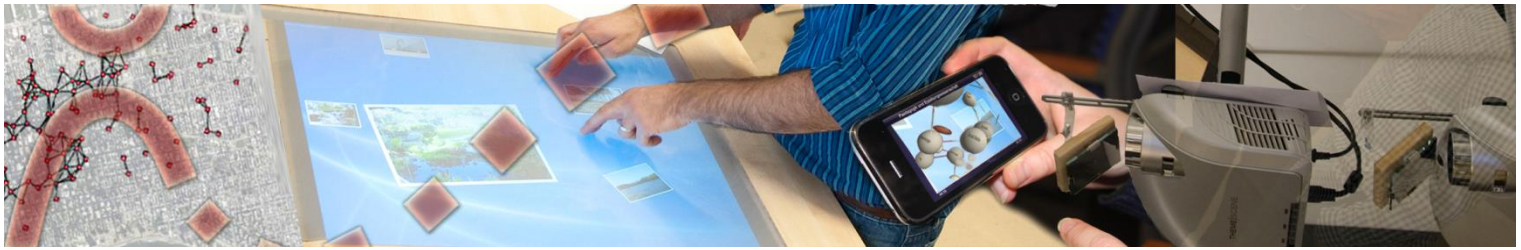
b) Should a server with RRA send a reply multiple times to get an ACK?

Assumption: server is sending a reply multiple times.
Scenario: ACK has been send, but is too late. Server resends reply.

Additional requirements that have to be taken into account:
(1) The client has to identify the message as a repeated message, which he already got and resend an ACK
(2) The server has to process late ACKs, even if replies have already been send

Answer: No.





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Thank you for your attention!