Fakultät IV
Betriebssysteme und verteilte Systeme
Prof. Dr. rer. nat. Roland Wismüller

Excercise Sheet 11
Solution

Lecture Distributed Systems
Winter Term 2023/24

Exercise 1: Replication

a) The three most important points that speak in favor of generating replicas are reliability, data safety, and access speed.

b) Types of replicas:

- Permanent: permanently available replicas - initial set of replicas that make up a distributed data store (e.g. mirroring of web pages, replicated DNS servers).
- Server-initiated: initiated on demand by the server - copies of a data store that exist to enhance performance and which are generated by the initiative of the owner of the file storage (e.g. web hosting services, content delivery networks).
- Client-initiated or client caches: created by the client - local storage facility used by the client to temporarily store a copy of the previously requested data.

Exercise 2: Active Replication

No. For example, take read operations that take place on unmodified data, or commutative write operations. In principle, these situations allow different sequences to exist on different replicas. However, it can be difficult, if not impossible, to determine whether, for example, two write operations are commutative.

Exercise 3: Quorum Protocols (Mandatory exercise for 6 CP)

Exercise 4: Quorum-based Replication (Mandatory exercise for 6 CP)

Exercise 5: Programming: Consistency Protocols

a) You will find the solution to this problem in the archive `l11eFiles.zip`[1] on the lecture's web page.

b) The difficulty in implementing a *local-write* protocol lies in finding out which server is the current primary server, i.e. where the primary copy of x is currently located. For this further mechanisms like location services have to be implemented.

Exercise 6: Any Questions?

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[1] http://www.bs.informatik.uni-siegen.de/web/wismueller/vl/vs/l11eFiles.zip