UNIVERSITÄT DES SAARLANDES

Fachrichtung 6.2 – Informatik

Lehrstuhl Prof. Weikum

Transaktionsorientierte Informationssysteme SS 2000

Übung 11

Aufgabe 1:

Reconsider the MediaRecoveryLSN for the method based on backups and archive logging. Give concrete examples, with histories referring to concrete page numbers etc., to show each of the following points:

a) It is insufficient to start the redo pass of the media recovery at the most recent begin-backup log entry if this most recent backup was not completed before the media failure occurred.

b) It is insufficient to start the redo pass of the media recovery at the begin-backup log entry of the most recent completed backup if the copying procedure for a backup bypasses the server's page cache.

c) It may be necessary (albeit extremely unlikely) to start the redo pass of the media recovery at the OldestUndoLSN as of the time when the most recent complete backup was initiated.

Aufgabe 2:

Investigate the mean time to data loss (MTTDL) for mirrored disks as well as for "triple mirroring" where each block is replicated on three different disks. To this end, design a stochastic state-transition model and derive from it an exact formula for the MTTDL, in close analogy to the derivation that we carried out in Section 16.2.

Aufgabe 3:

Extend the pseudocode for stateless queued transactions in a two-tier architecture, given in Section 17.2, to include the case of testable output devices such as automatic teller machines. The extended pseudocode should have the value-added property that, once a user input is successfully enqueued, the corresponding output message is delivered exactly once.

Aufgabe 4:

Consider a conversational client application such as the travel reservation scenario of Section 17.3. Compare the number and data volume of forced log

I/Os for running this application as a pseudo-conversational queued transaction chain versus using the general server reply logging method of Section 17.5, to provide application recovery. Assume that the queue manager resides on the data server, and forced logging is required only upon the commit of a transaction.

Aufgabe 5:

Construct a concrete example, with concrete transaction identifiers, page numbers, etc., that shows the necessity for the data server to log data read operations on behalf of client requests for the general client-server application recovery based on the server reply logging method of Section 17.5.
Hint: Consider, for example, a client request that invokes a stored procedure on the data server whose execution consists of a sequence of transactions.