Database Management System – cs422 DE

Assignment 8 – Week 12

This assignment is based on lecture 10 (chapter 22 – Database Recovery).

○ Submit your *own work* on time. No credit will be given if the assignment is submitted after the due date.
○ Note that the completed assignment should be submitted in .doc, .docx, .rtf or .pdf format only.
○ In MCQs, if you think that your answer needs more explanation to get credit then please write it down.
○ You are encouraged to discuss these questions in the Sakai forum.

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(1) What is meant by granularity? Give examples.

Granularity defines the level of details, the lower the granularity the finer is the level of d etails. Ex.: entire database, a record, a field. Let's consider a field gender, it can accept on ly two values, M or F, the granularity of this field is really low.

(2) Discuss the types of failure that may occur in a database environment. Explain why it is important for a multi-user DBMS to provide a recovery mechanism.

- **System crashes**.-The OS hosting the database might crash for example

- Media failures (read/write fail).- A disk might be broken

- Software error.- A software accessing the database introduce incoherent data.

- Natural disasters.- A storm destroy facilities

- unintentional destruction of data or facilities.- Someone execute a wrong sql command that delete huge amount of data mistakenly.

- sabotage.- Destroy data or facilities intentionally.

Database needs strong recovery mechanism because quite often one of the failures discuss earlier will happen, so to fit enterprise requirements a DBMS should provides strong recovery mechanism as one of the mean to keep data coherent and safe.

(3) Discuss how the log file (or journal) is a fundamental feature in any recovery mechanism. Explain what is meant by forward and backward recovery and describe how the log file is used in forward and backward recovery.

A "Log File" is a database that contains information about all transactions and checkpoints, this database can be used by a Recovery Manager to restore a database in a consistent state.

Forward recovery: if transactions were committed but not yet written in secondary storage, the recovey manager will use the Log File to redo these transactions.

Backward recovery: For transactions that were not yet committed when the crash happened, the r ecovery manager will use the Log File to undo the changes made by these transactions.

(4) What is the significance of the write-ahead log protocol? How do checkpoints affect the recovery protocol?

write-ahead log protocol is needed when "Immediate Update" approach is in use, that simply means before writing changes to database log records should be written first, if failure happens, the log records will be used to undo changes.

At every checkpoint transactions are recorded to secondary storage, when a failure happens, the recovery manager will undo or redo after the last checkpoint. If a database become corrupted the recovery manager will recover from secondary storage and will redo transactions committed after the last checkpoint.

(5) Compare and contrast the deferred update and immediate update recovery protocols.

Deferred update: updates are not written to the database until after a transaction has been committed, if transaction fail before commit, no undo is needed.
Immediate update: the changes are written as they occur after being logged, if transaction failed, changed need to be undone.