

## INM370 – Advanced Databases

### Tutorial 5 – Relational Database Management Issues

1)

Explain the purpose of the checkpoint mechanism. How often should checkpoints be performed? How does the frequency of checkpoints affect:

- System performance when no failure occurs?
- The time it takes to recover from a system crash?
- The time it takes to recover from a media (disk) failure?

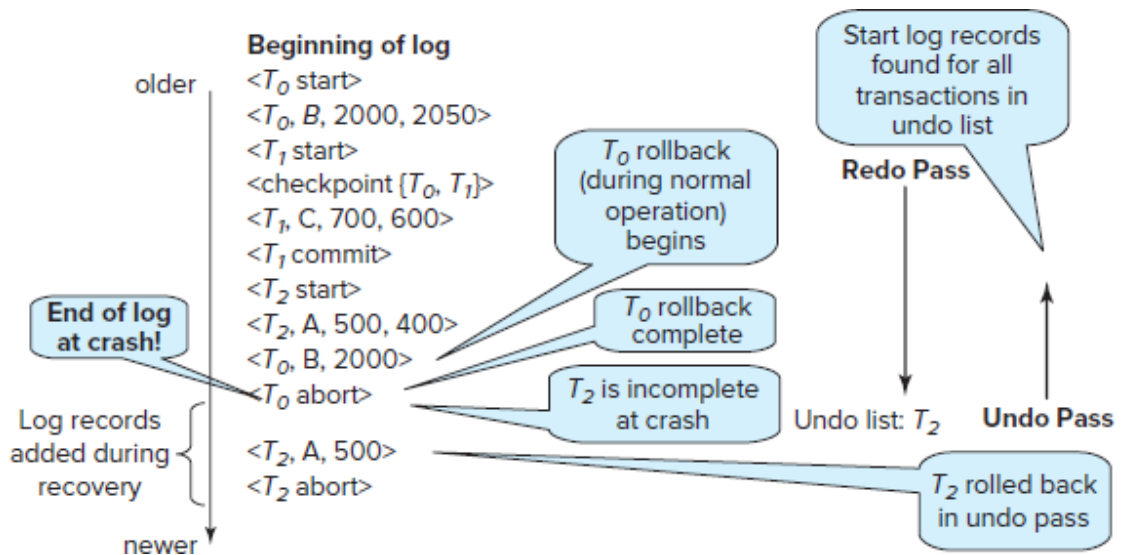
2)

Suppose there is a transaction that has been running for a very long time, but has performed very few updates.

- What effect would the transaction have on recovery time with the recovery algorithm covered in the lecture?
- What effect would the transaction have on deletion of old log records?

3)

Consider the log in the Figure below. Suppose there is a crash just before the log record  $\langle T_0 \text{ abort} \rangle$  is written out. Explain what would happen during recovery.



4)

Consider the timing diagram for transactions  $T_1, \dots, T_5$  below, in which  $t_0$  is the starting time of transactions,  $t_{\text{checkpoint}}$  is the time of a checkpoint, and  $t_{\text{failure}}$  is the time when the system fails. All transactions that had finished before  $t_{\text{failure}}$  were successful – they all *committed*, i.e. their respective commit records appear in the log. Based on the diagram, and assuming the basic recovery algorithm described in the lecture is used, answer **which of the transactions will be dealt with in the REDO** phase

of the algorithm, which will be dealt with in the UNDO phase, and which do not need to be dealt with in either of the phases?

There is no interdependency among the transactions.

Justify your answer.

