

# CRASH RECOVERY

Q1

1) Discuss the different types of failure classification.

→ Typically, the ~~three~~ three major types of failure that result from a major hardware or software malfunction are,

1) Transaction Failure is occur when the transaction is not process and the processing steps are the roll back to a specific time in the processing cycle.

The transaction Failure can occur when same but not physical data bases are updated at the same time.

2) System Failure can occur be caused by bugs in the database, operating system or hardware. In each case the transaction processing is terminated without control of the application.

3) Media Failure:-

Disc crashes or controllers Failure can occur because of disk right bugs in the operating system hardware error in the channel or controller head crashes or media degradation.

2) What is mean by lock? Define lock.

→ To be able to recover from the failure that affects the transaction.

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The system maintain a lock to keep a track of all operation that affects the value of database items.

3) state the purpose of commit statement.

→ A transaction  $T$  reaches its committing point when all its operations that access the database have been executed successfully and effects of all transaction operation on database is records in the lock.

4) Consider the following log image, that is obtained during recovery after a crash

$\langle T_1, \text{start} \rangle$

$\langle T_1, X, 10, 10 \rangle$

$\langle T_1, Y, 20, 5 \rangle$

$\langle T_2, \text{start} \rangle$

$\langle T_2, X, 20, 200 \rangle$

$\langle T_1, \text{commit} \rangle$

$\langle T_3, \text{start} \rangle$

$\langle T_3, Z, 10, 20 \rangle$

$\langle \text{check point} \rangle$

$\langle T_3, X, 20, 200 \rangle$

$\langle T_2, \text{commit} \rangle$

$\langle T_4, \text{start} \rangle$

$\langle T_4, X, 200, 100 \rangle$  } system crash.

→ list contained in the

→  $L = \{ T_2, T_3, T_4 \}$

list the content in  
 undolist =  $\{T_1\}$   
 redolist =  $\{T_2\}$

5) Consider the lock given below corresponding the schedule S specify the transaction are rolled back. which operation in the block redone and which are undone.

→ { start - Transaction  $T_1$  }  
 { read - item  $T_1, A$  }  
 { read - item  $T_1, D$  }  
 { write - item  $T_1, D, 20$  }  
 { commit,  $T_1$  }  
 { check point }  
 { start transaction  $T_2$  }  
 { read - item  $T_2, B$  }  
 { write - item  $T_2, B, 12$  }  
 { start transaction  $T_4$  }  
 { read - item  $T_4, B$  }  
 { write item  $T_4, B, 15$  }  
 { start transaction  $T_3$  }  
 { write - item  $T_3, B, 30$  }  
 { read - item  $T_4, A$  }  
 { write - item  $T_4, A, 20$  }  
 { commit  $T_4$  }  
 { read - item  $T_2, D$  }  
 { write - item  $T_2, D, 25$  } system crash.

→ we now describe the immediate update protocols since there is a check point after  $\{ \text{commit } T_1 \}$ ,

all redo and undo operations are done for the entries after this check point. In case of immediate update method the following transactions are redo that is  $\{ T_4 \}$  and undo transaction  $\{ T_2, T_3 \}$

In case of deferred update method  $T_4$  transactions are written and there is no transactions are undone. Since in deferred update method the actual updation of the database takes place only when the transaction issues commit.

6)  $\langle T_1, \text{start} \rangle$

$\langle T_1, X, 40 \rangle$

$\langle \text{check point} \rangle$

$\langle T_2, \text{start} \rangle$

$\langle T_2, U, 80 \rangle$

$\langle T_2, \text{start} \rangle$

$\langle T_3, 2, 40 \rangle$

$\langle T_2, \text{commit} \rangle$  system crash.

→ If immediate object technique is used, what be the recovery procedure

→ using immediate update protocol or problem here is a check point after  $\langle T_1, X, 40 \rangle$  all redo-undo operation are done for the entries after check point

In this case immediate update method to following transaction are redone

Reader operation is  $T_2$  &

Under operation is  $T_3$ .

7)  $\langle T_0, \text{start} \rangle$

$\langle T_0, A, 1000, 950 \rangle$

$\langle T_0, B, 2000, 2050 \rangle$

$\langle T_0, \text{commit} \rangle$

$\langle T_1, \text{start} \rangle$

$\langle T_1, C, 700, 600 \rangle$

$\langle T_1, \text{commit} \rangle$

→ after execution of transaction the value of

$A = 950$  &  $B = 2050$  &  $C = 600$