Tutorial Questions

1. Transaction and Concurrency Control

Q1. Consider the following schedules, check whether these schedules are recoverable, cascade-less and strict recoverable.

Schedule 1: r1(x), r2(z), r1(z), r3(x), r3(y), w1(x), w3(y), r2(y), w2(y), c1, c2, c3
Schedule 2: r1(x), r2(z), r3(x), r1(z), r2(y), r3(y), w1(x), c1, w2(z), w3(y), w2(y), c3, c2
Schedule 3: r3(x), r1(x), w3(x), r2(x), w1(y), r2(y), w2(x), c3, c3, c1

Where r and w represents read and write operation, and C represents commit operation. x, y, and z are the data items. 1, 2 and 3 are the transaction numbers.

Solution: Schedule 1: Irrecoverable
Schedule 2: Recoverable and cascade less but not strict
Schedule 3: Recoverable but not cascade less and not strict

Q2. Consider the following schedules.

Schedule 1: r2(z), r2(y), w2(y), r3(y), r3(z), r1(x), w1(x) w3(y), w3(z), r2(x), r1(y), w1(y), w2(x)
Schedule 2: r3(y), r3(z), r1(x), w1(x), w3(y), w3(z), r2(z), r1(y), w1(y), r2(y), w2(y), r2(x), w2(x)

(a) Find whether these schedules are conflict serializable or not.
(b) Are they conflict equivalent?

Hint: (a) Make a precedence graph for a schedule, and if the precedence graph contains any cycle then the schedule is not conflict serializable, else conflict serializable.
(b) If the precedence graphs of the schedules are equivalent then the schedules are also conflict equivalent.

Solution: (a) Schedule1: not conflict serializable
Schedule 2: conflict serializable
(b) Not conflict equivalent

- Questions related to View Serializable Schedules are given at http://www.edugrabs.com/questions-on-view-serializable/

- Questions related to Time Stamp Ordering Protocol are given at
  http://www.edugrabs.com/questions-on-timestamp-ordering/
  http://www.edugrabs.com/timestamp-ordering-protocols/

2. Indexing

Q1. A file contains 16384 records in an un-spanned organization. All records are ordered on a non-key attribute. Each record size is 32 bytes and the file block contains 1024 records. The file indexing is done with the key field of 6 byte and pointer field of 10 bytes. Compute the number of blocks at first level and second level.

Solution: Number of blocks at first level: 256
Number of blocks at second level: 4

Q2. Find the minimum number of nodes and keys in a B-tree with order 6 and level 4.

Solution: Nodes: 27, Keys: 53

Q3. Find the maximum number of nodes and keys in a B-tree with order 4 and level 4.

Solution: Nodes: 156, Keys: 624

Q4. What would be the degree for internal nodes in a B^+ tree with 512 bytes sized blocks? The index key and pointer field size are 8 and 4 bytes respectively.

Solution: Degree: 43

Q5. A database contains 500000 records with the record size of 200 bytes. The B^+ indexing of the given database is done with index node size is 1KB, search key size of 15 bytes, and tree (block) and data (record) pointers of size 5 bytes each. What would be the degree for the external nodes?

Solution: Degree: 51

Note: If you have any doubt in any question, then feel free to ask me.