

## 1 Q9

### 1.0.1 9.1

### 1.0.2 9.2

Selinger optimization improves upon DP approach by keeping for each not only the plan of least cost, but also plans that have higher cost but produce a result that is sorted in an order that may be useful for parent queries.

### 1.0.3 9.3

View serializable: If a given schedule is found to be view equivalent to some serial schedule. Alternatively, there are no cycles in the dependency graph.  
Conflict serializable: If there are no cycles in the conflict graph.

### 1.0.4 9.4

We can use strict 2-phase locking for recoverability. This requires that in addition to the lock being 2-Phase, all Exclusive(X) Locks held by the transaction be released until after the Transaction Commits.

### 1.0.5 9.5

Database operations are in fact relational algebra operations. These operations are pure mathematical expressions, and are generally reads or writes into disjoint pieces of data. This makes them naturally parallelizable.

### 1.0.6 9.6

File system does not generally have multiple readers and writers to a single file. It also does not need to manage structured data. Hence, many of the ACID like concerns simply do not occur in the case of a file system.

### 1.0.7 9.7

### 1.0.8 9.8

### 1.0.9 9.9

### 1.0.10 9.10

all trees of  $n$  vertices is  $n^{n-2}$ . Number of left-deep trees is  $n!$ .  $n^{n-2}$  is much larger than  $n!$ .