

Answers for Databases 2005 – Paper 6 Question 8 (tgg22)

(a) [Bookwork. Lectures 10 and 11 of syllabus.]

- (i) OLTP is the traditional task of database systems — used to support the day-to-day operational data needs of an enterprise. Performance requirements include the ability to support large numbers of concurrent update transactions.
- (ii) OLAP systems are usually built by extracting data from OLTP systems and using it for long-term analysis. Data is read-only, highly aggregated, denormalize, and multi-dimensional — including a hierarchy of temporal dimensions.
- (iii) The demand for large numbers of concurrent transactions in OLTP requires some type of schema normalization. This reduces both update anomalies and locking interference between transactions. On the other hand, OLAP schemas tend to be denormalized and are optimized for fast access to multidimensional data. A star schema is one typical example.
- (iv) **drill down** means to navigate to greater levels of detail, while **roll up** means the opposite — to navigate to lower levels of detail and higher levels of aggregation. To **slice** data means to execute queries that specify values for some dimensions.
- (v) A **star schema** is a relational schema that has been optimized for OLAP applications. In particular, it has a central **fact table** with referential pointers to a collection of *dimension tables*.

(b) [Lectures 4 and 6 of syllabus.] The query is

```
select distinct postcode
from Suppliers S, Parts P, SuppliedBy B
where S.sid = B.sid and P.pid = B.pid and P.weight < 1000
```

(c) [Lecture 5 of syllabus.] The ACID properties are

- Atomicity: Users can think of the execution of a transaction as atomic — either all or none of its actions are carried out.
- Consistency: Each transaction must preserve the consistency of the database.
- Isolation: The effect of a transaction can be understood independently from other concurrently executing transactions.
- Durability: Once a transaction completes, its changes persist.