2005 Paper 6 Question 4

Concurrent Systems and Applications

(*a*) *Transactions* provide a means of grouping together a collection of separate operations to form a single logical operation. Explain the difference between implementations that enforce *strict isolation* and *non-strict isolation*. What are *dirty reads* and *cascading aborts*? [8 marks]

(*b*) Optimistic Concurrency Control (OCC) is a mechanism used to enforce isolation of transactions.

(*i*) Explain the OCC algorithm. [4 marks]

(*ii*) Is deadlock possible? Are cascading aborts possible? [2 marks]

(*iii*) Under what circumstances might this mechanism yield poor performance? [1 mark]

(*c*) Explain how to use a *write-ahead log* to provide persistence by detailing what information must be written to the log and how it can be used to recover from a fail-stop catastrophe. What are *checkpoints* and why are they useful? [5 marks]