UNIVERSITY COMPUTER SCIENCE • EXERCISE SHEET

8.5 Transactions and concurrency

Name: _____ Class: _____ Date: _____ **Total: 24 marks**

KEY WORDS transaction • serializability

Objective

Classify schedules as serializable or lost-update, and match isolation levels to anomalies.

1 Key knowledge and worked examples

■ The reference

T1 withdraws 10, T2 deposits 20 from a balance of 100 ✓. `R1 R2 W2 W1` ends 90 (the deposit lost); `R1 W1 R2 W2` ends 110 – equal to serial T1 then T2 ✓.

■ Worked example: the levels

Read-uncommitted allows the dirty read (T2 sees T1's uncommitted value that may roll back); read-committed removes it; repeatable-read stabilises re-reads; serializable removes phantoms ✓.

2 Practice

2.1 ACID: name the C and what it means. [3]

2.2 From 100, `R2 R1 W1 W2` (withdraw 10, deposit 20): final value? [3]

2.3 Name 2PL's price and its cure. [3]

exercises.lol exercises.com.cn

3 Exam-style questions

3.1 From balance 200: T1 withdraws 30, T2 deposits 50.

Compute the ending of `R1 R2 W2 W1` and say which update vanished. Compute the ending of `R1 W1 R2 W2`. State the serializability verdict of each, with the reason. State what 2PL changes about the first schedule's outcome. [8]

3.2 T1 updates rows matching a filter; T2 inserts a new matching row between T1's two reads.

Name the anomaly. State which isolation level prevents it and which lowest level already shows consistent re-reads. Give the mechanism serializable uses (range locks or equivalent) and why read-committed cannot stop the insert. [7]

exercises.lol exercises.com.cn