Moralizing stories

Requirements on transactions

THE PROBLEM OF THE LOST UPDATE

A conspiracy between your instructor and his spouse
Begins with a balance of $500

The instructor tells the ATM he will withdraw $100.
ATM gets current balance from bank computer
At the same time the spouse does the same
First ATM calculates new balance
And updates the central computer
And of course the other ATM does the same

How was the Update Lost?

- Each ATM read same balance
- Husband’s ATM update was ignored
- Moral: Wife’s ATM should not have been able to get the balance until husband’s transaction was done.
THE PROBLEM OF THE DIRTY READ

Another conspiracy between your instructor and his spouse

It all begins with a bank balance of $500

The instructor tells the ATM he will deposit $100. ATM gets current balance from bank computer, calculates new balance, updates main computer. Now spouse will withdraw $100, so ... ATM gets balance. Instructor CANCELS, ATM revises figures. Meanwhile, other ATM pays out and updates
What was Dirty?

- The spouse’s ATM dirty-read $600.
- But this was later cancelled.
- Problem: the ATM acted on invalid information.
- So cancellation was not effective
- Moral: transactions should not complete when based on bad data

THE PROBLEM OF THE INCORRECT SUMMARY

Illustrates that the state of the database may not be consistent during a transaction
Transferring $100 from Savings to Checking

• During transfer, the bank is totaling up funds of each customer.
• Transactions proceed interleaved.

Deduct $100 from savings
Add $100 to checking

Why is Bank $100 off?

• Money transfer transaction has two steps
• During the transfer, the account total is inconsistent
• Cannot allow other transactions access to inconsistent values
THE LOST TRANSACTION

Highlighting an important duty of the database

Again Transferring $100

- The transfer proceeds normally to completion
- $100 goes from savings to checking.
But the Server Dies

- So your instructor bounced a check
- charged $25 by the store
- and $25 by the bank

Moral of this story

- The bank’s computer should remember the transaction
- Head crash is not an excuse
The Incomplete Transaction

• In the midst of the transaction the server dies
• Only the deduction is recorded
• Leaving your instructor $100 short.

Moral of this Story

• Transaction should be wholly completed
• Or not performed at all
• No partial completion.