DBTech VET / DBTechNet
SQL Transactions*
Pilot Course Offering
Athens & Thessaloniki, Greece May 20 - June 13, 2013

Lecture No. 3

D.A. Dervos, C. Skourlas, M. Laiho, J.F. Aldana-Montes
www.dbtechnet.org

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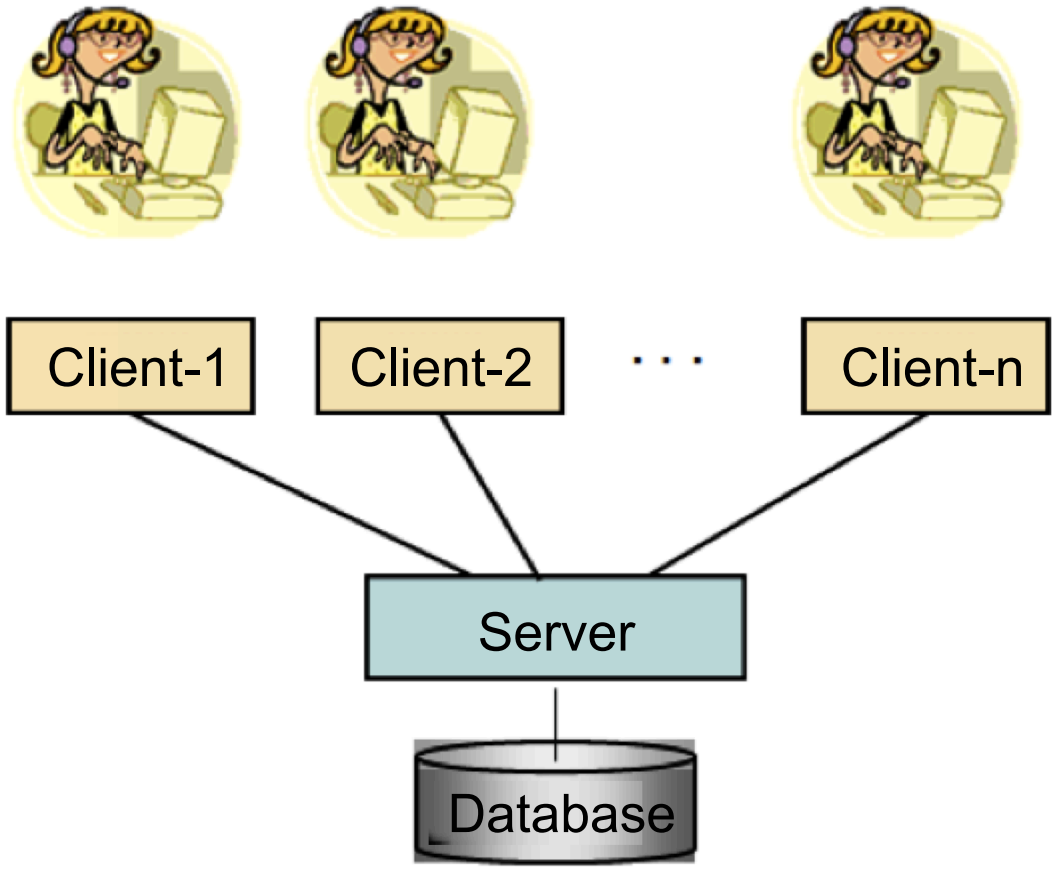
Concurrently executing transactions



Martti Laiho

IF

- The DBMS is lacking the support of basic concurrency control (CC) services, or
- The programmer is lacking the knowledge of how to make proper use of the DBMS supported CC services

IF ... THEN

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THEN

Data update operations may end up corrupting the DB data content

Concurrency problems (anomalies)

- Lost update
- Dirty read
- Non-repeatable read
- Phantom read

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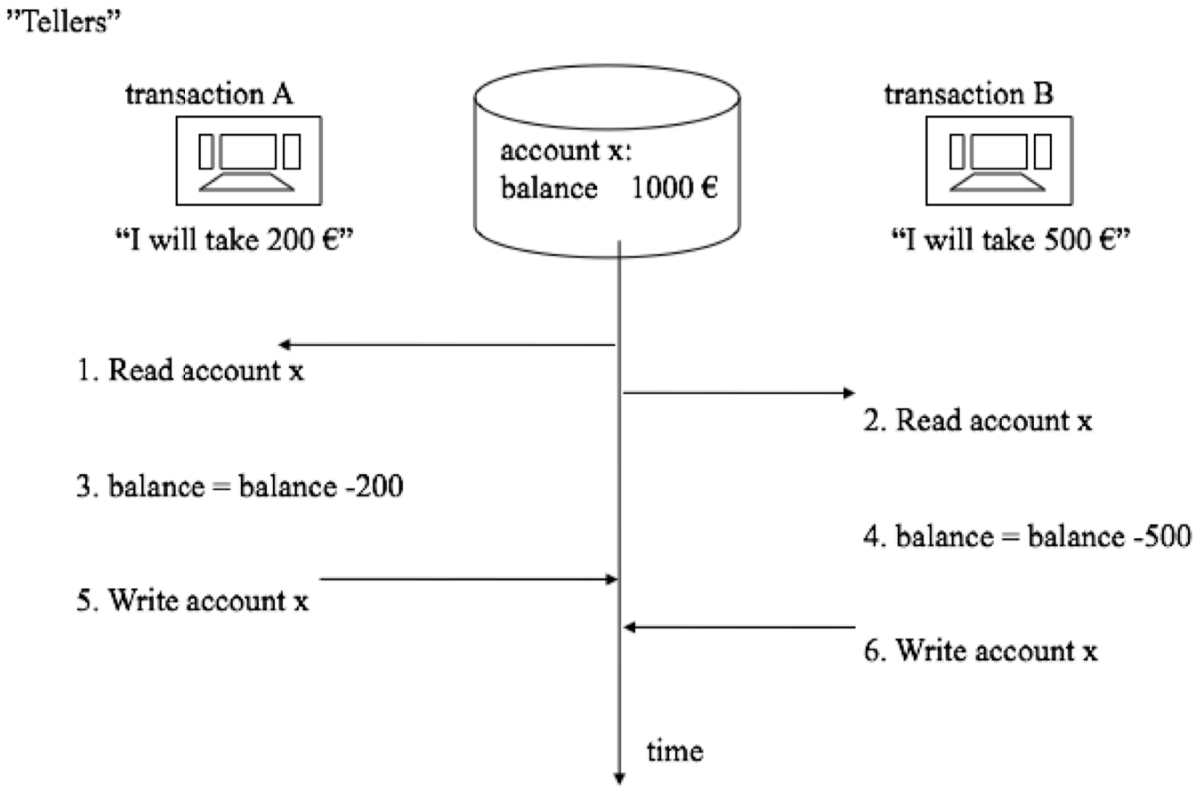
The lost update problem



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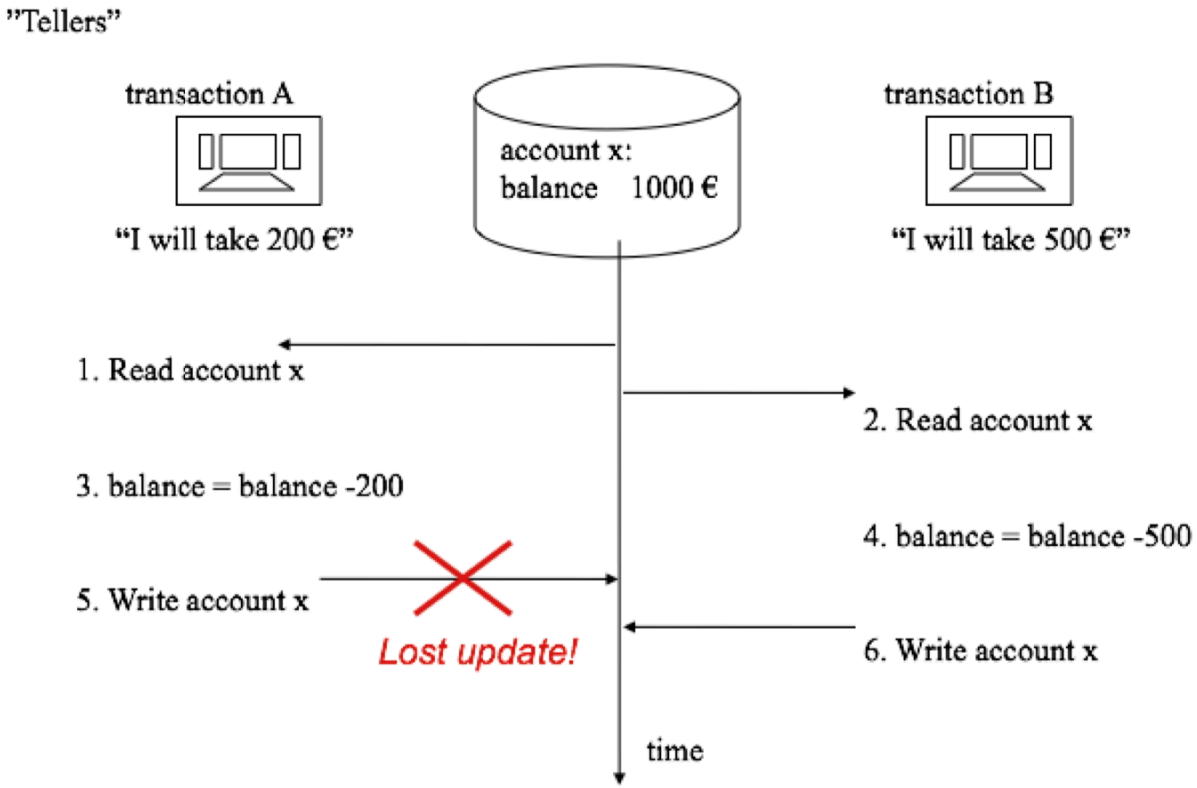

Concurrency problems (anomalies)

Lifelong Learning Programme

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- Non-repeatable read
- Phantom read

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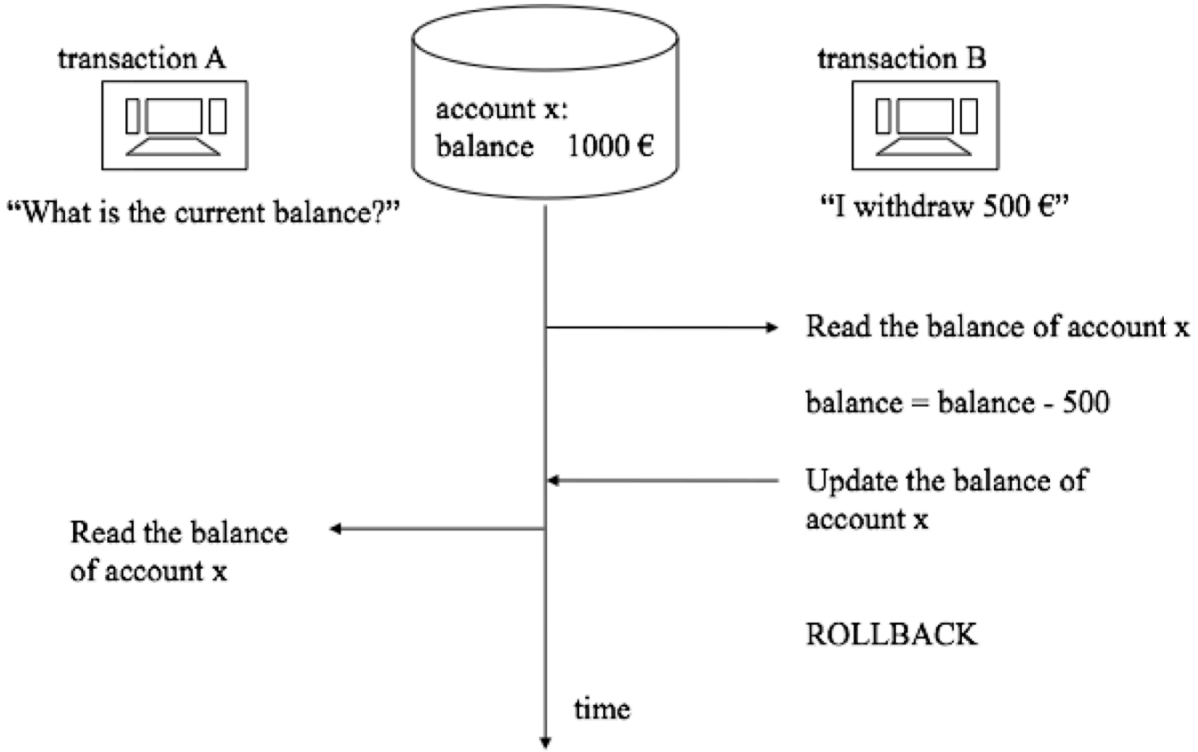

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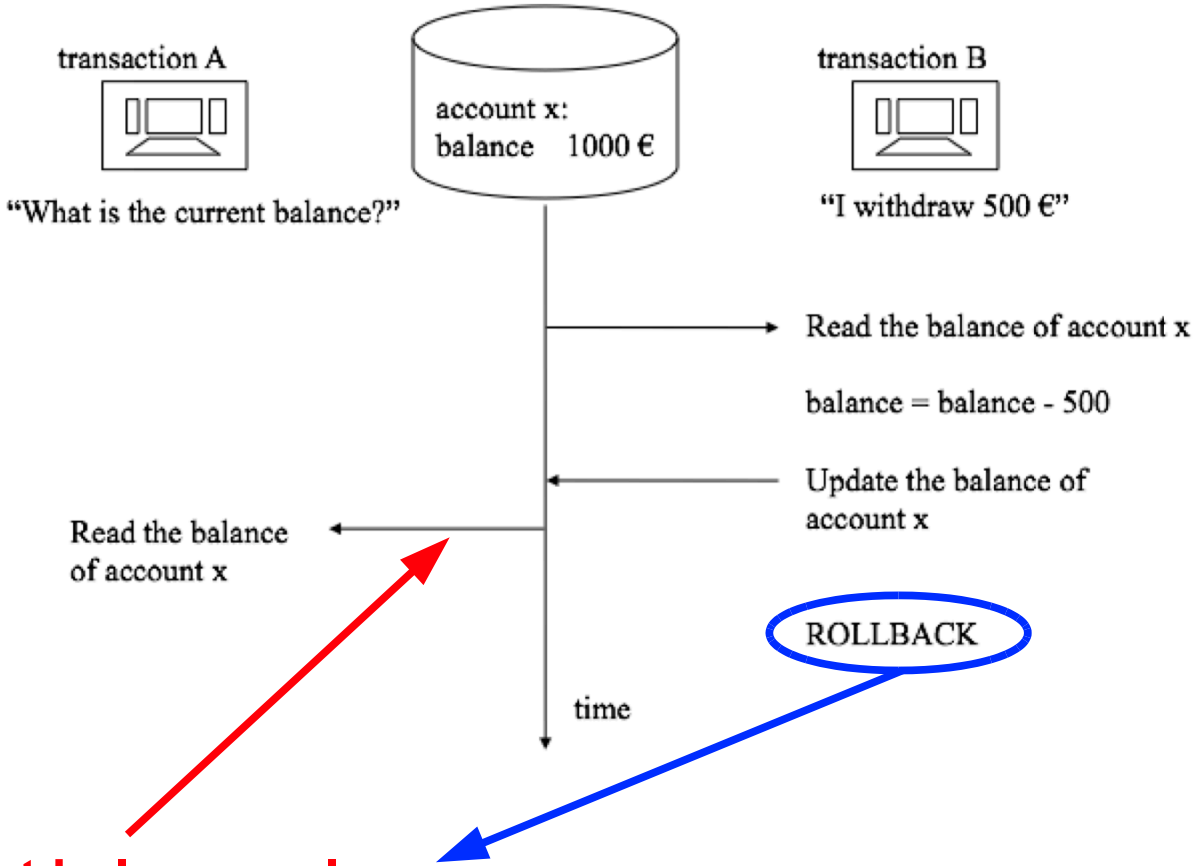

account balance value that never existed!

Lock-based concurrency control

Compatibility of S and X locks:

Lock of transaction A to object o

Lock request of transaction B to object o	Shared	eXclusive
Shared	**Grant**	**Wait !**
eXclusive	**Wait !**	**Wait !**

- S-lock grants read access to object
- X-lock grants write access to object
- X-lock request after getting S-lock is called as lock promotion

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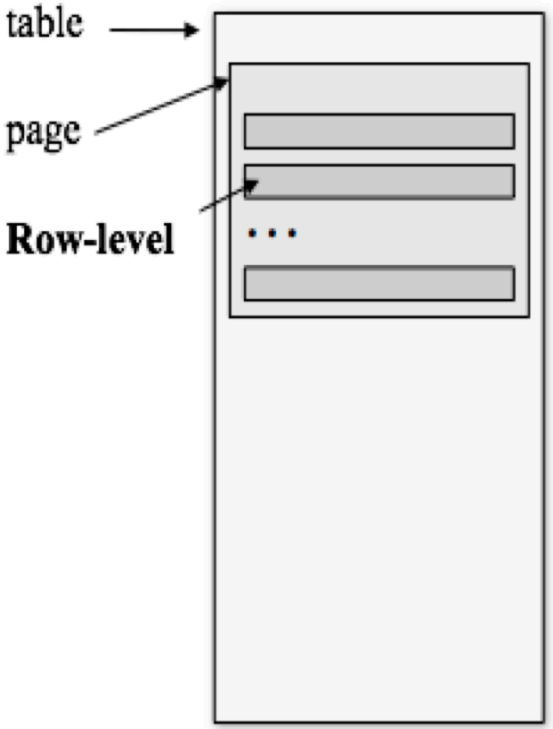
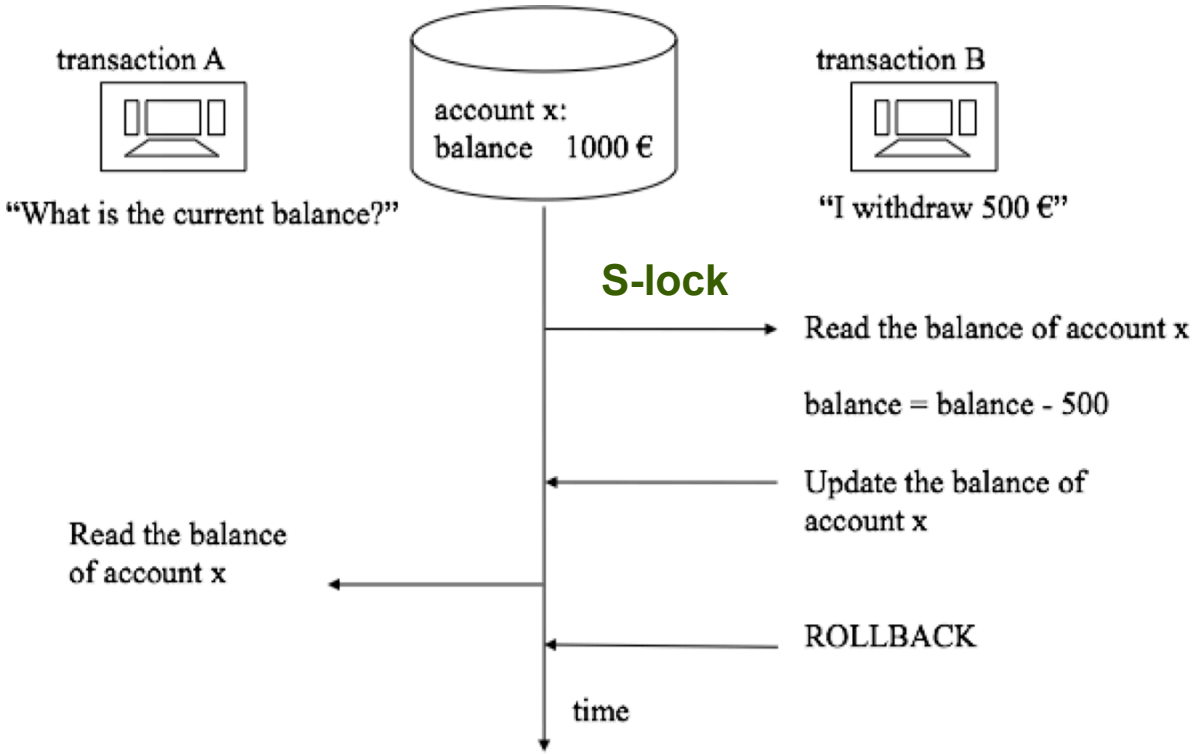
Locking granularity:



Dirty read with locks...



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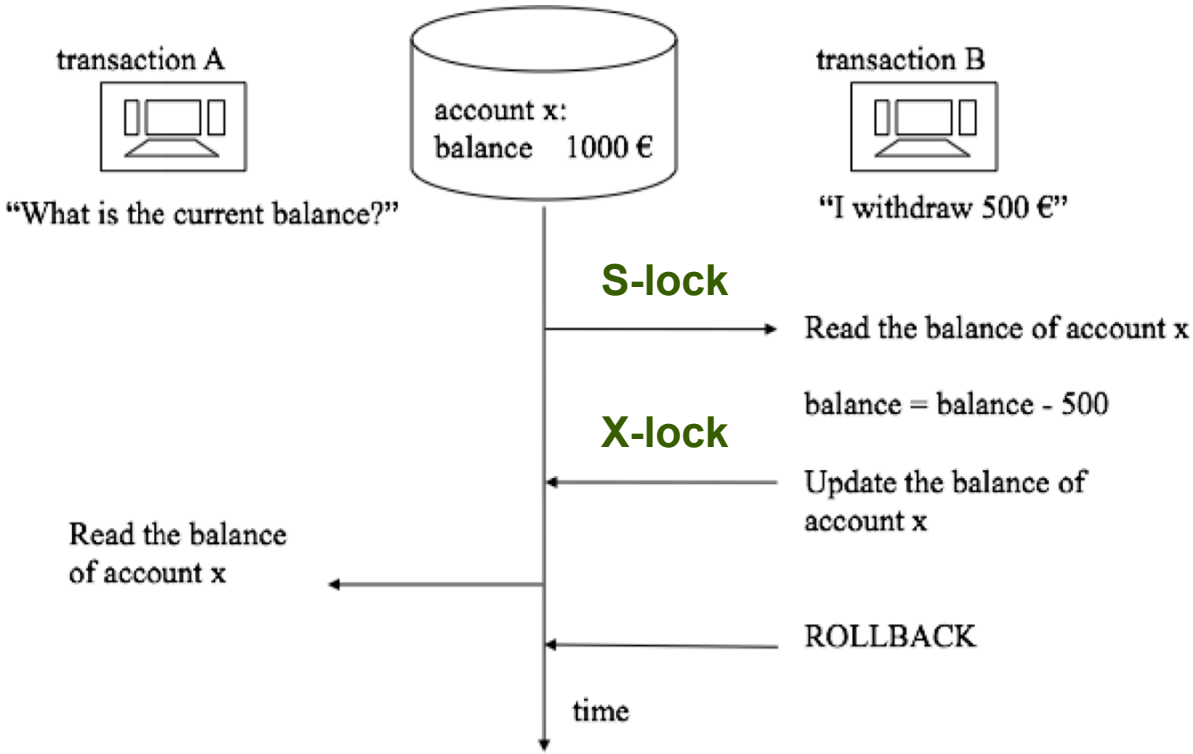

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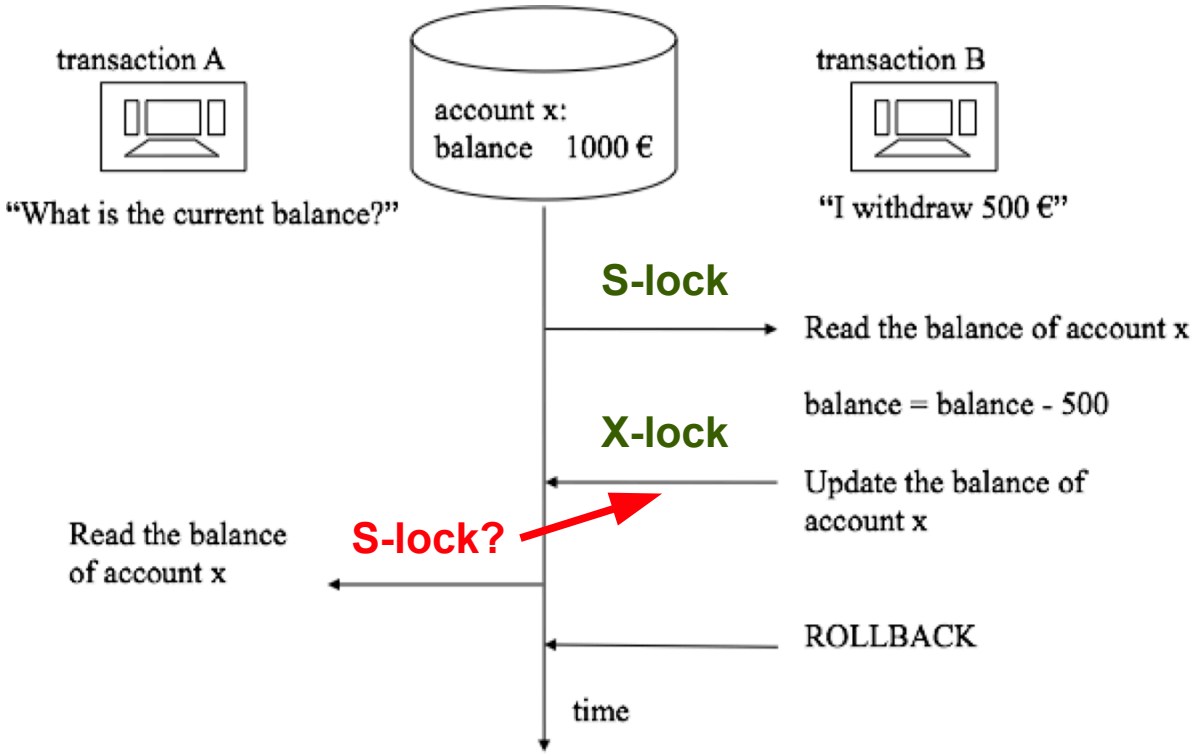

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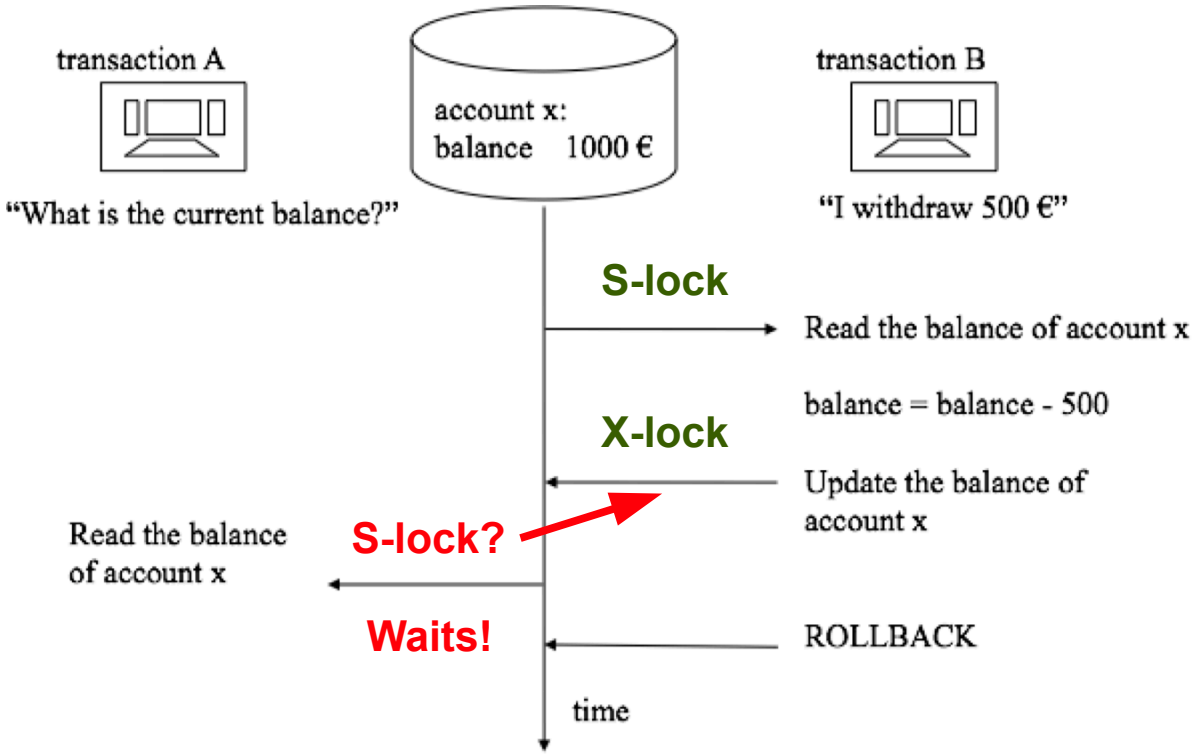

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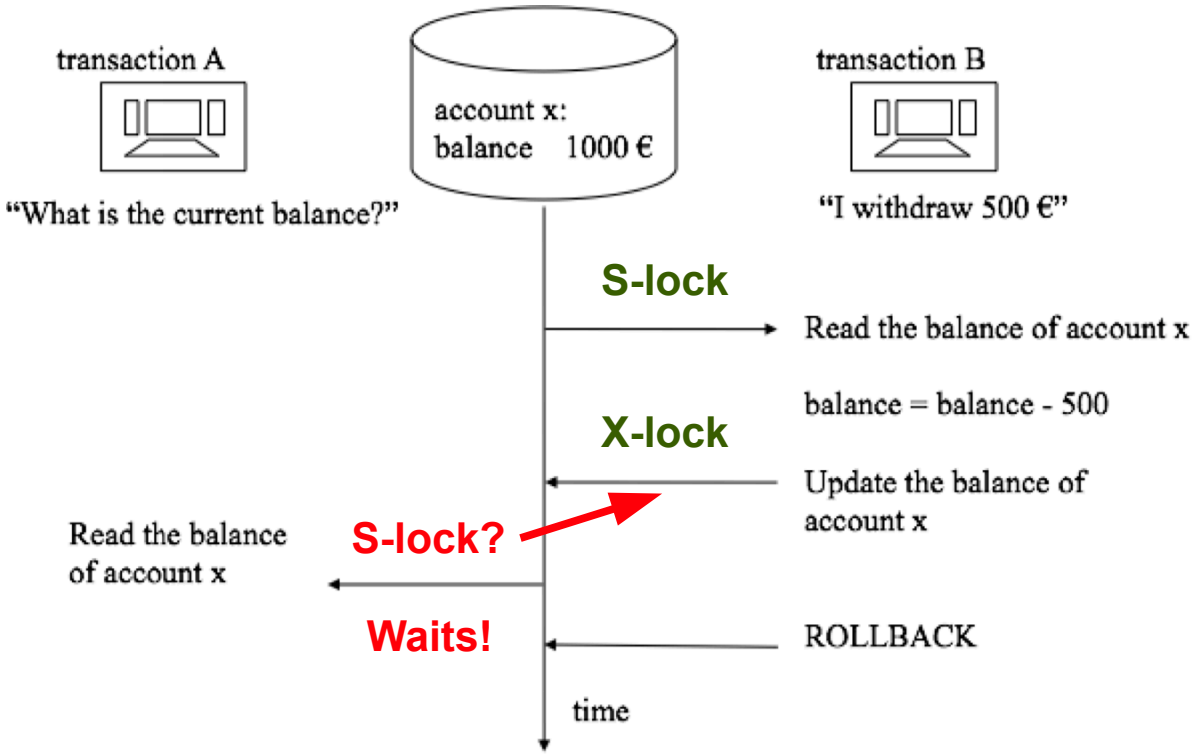
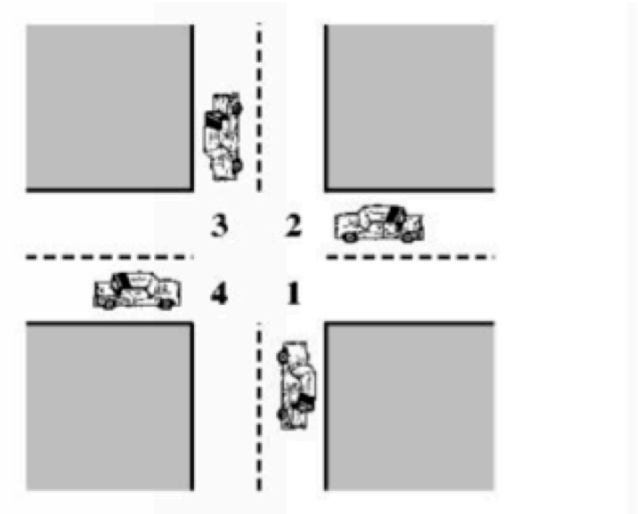


... problem resolved!

Deadlocks in general*



* From: http://cse.csusb.edu/tong/courses/cs460/notes/deadlck.php

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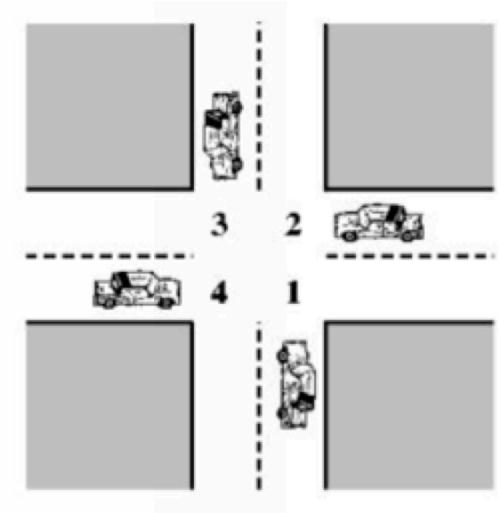

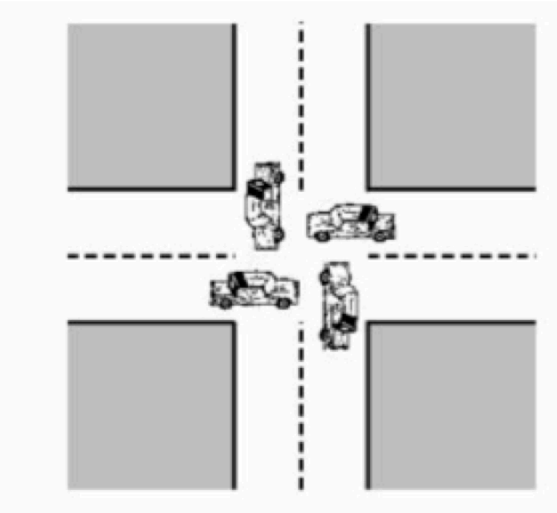

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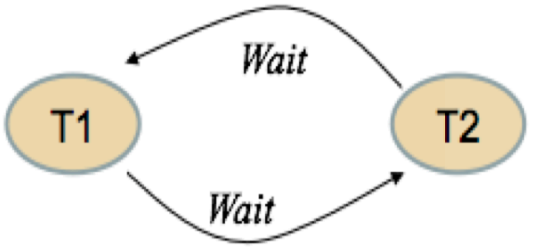
DBMS deadlock



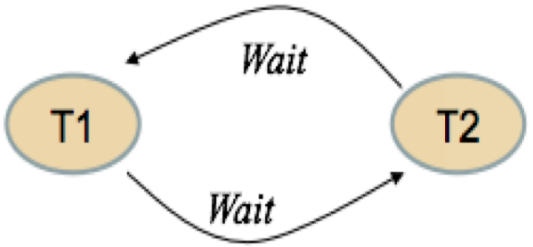
A Cycle of Lock Waits

Modern DBMS systems will detect the deadlock in some seconds (deadlock detection) and solve the waiting cycle

- *selecting the victim*
- *making automatic Rollback (not Oracle)*
- *send error message to the application*

=> *Application must react on the deadlock !*

DBMS deadlock



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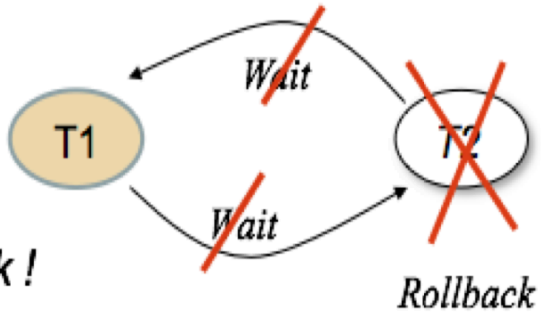
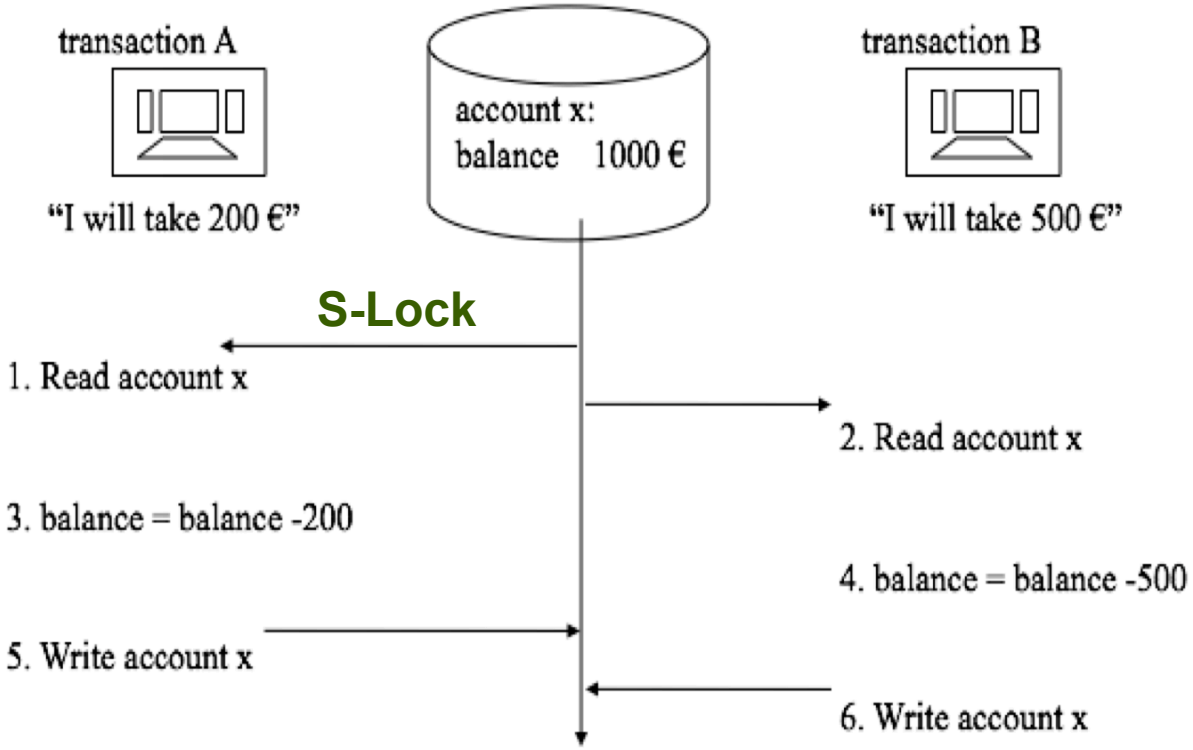


Lost update with locks



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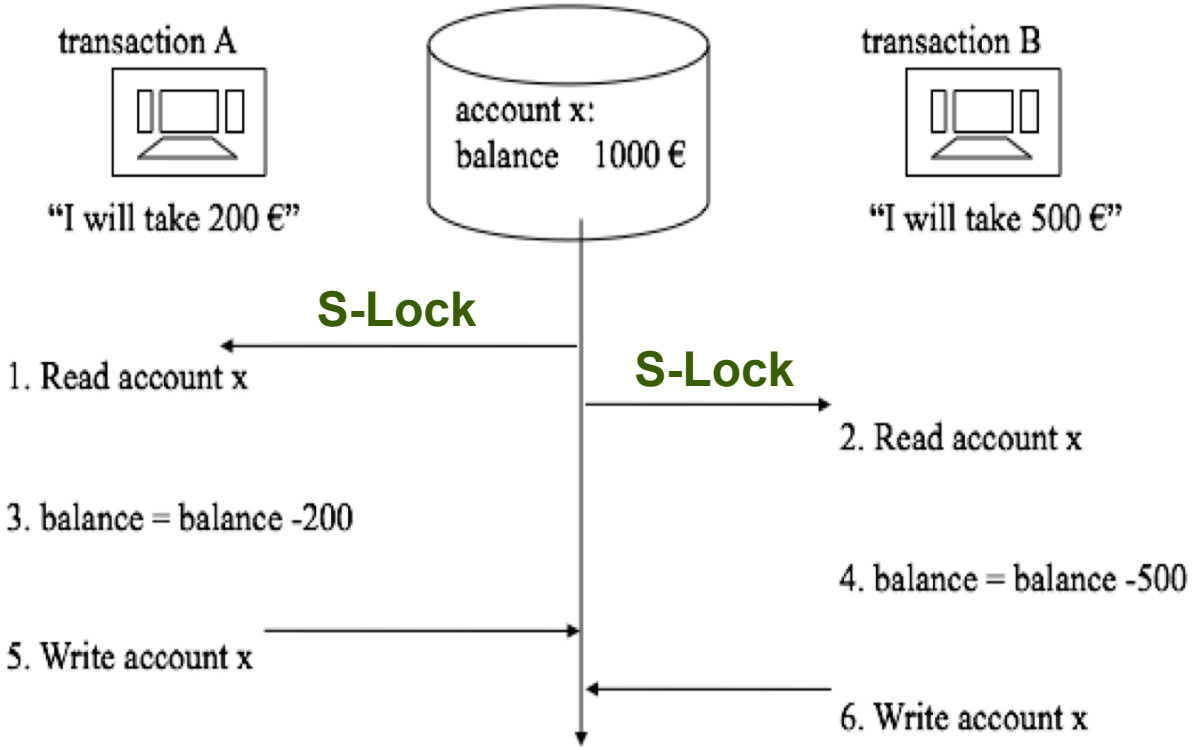

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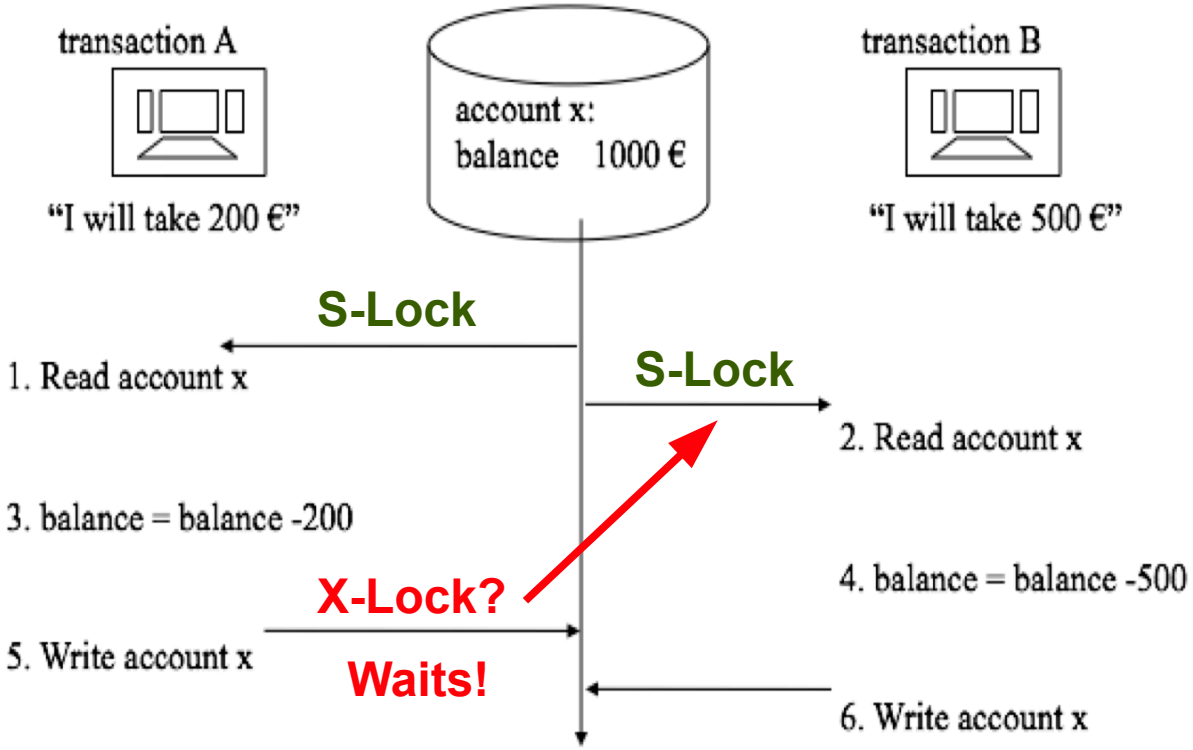

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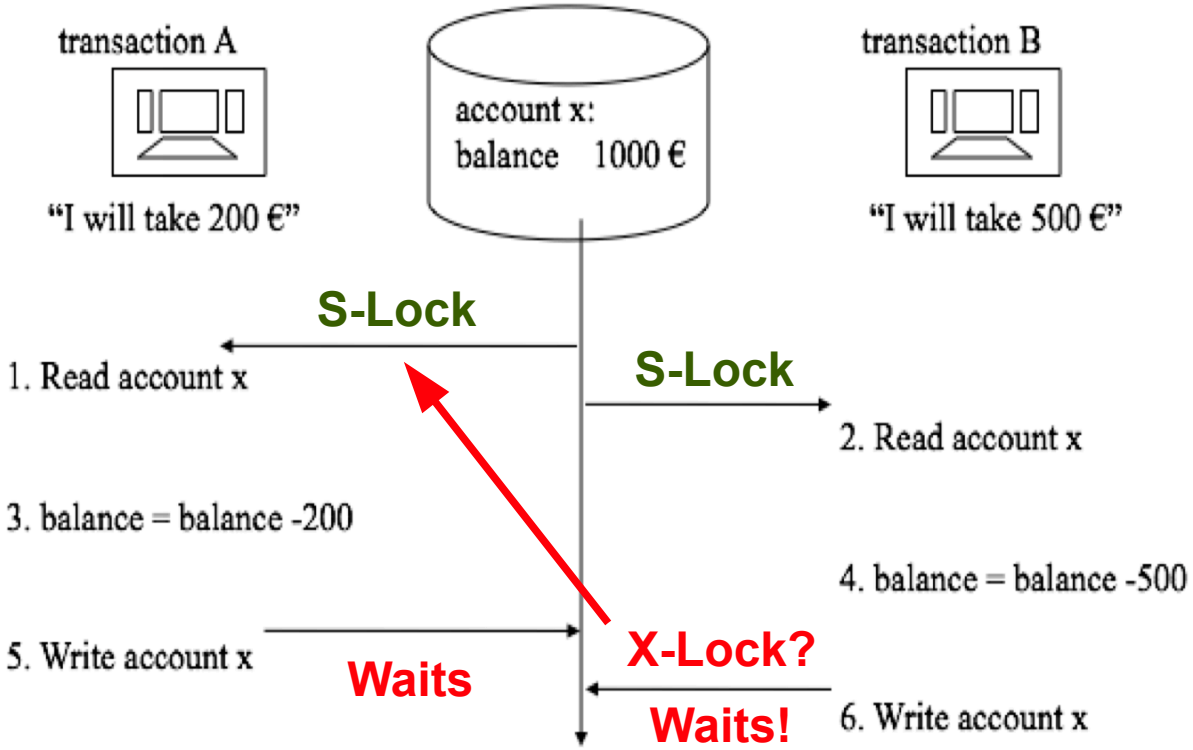

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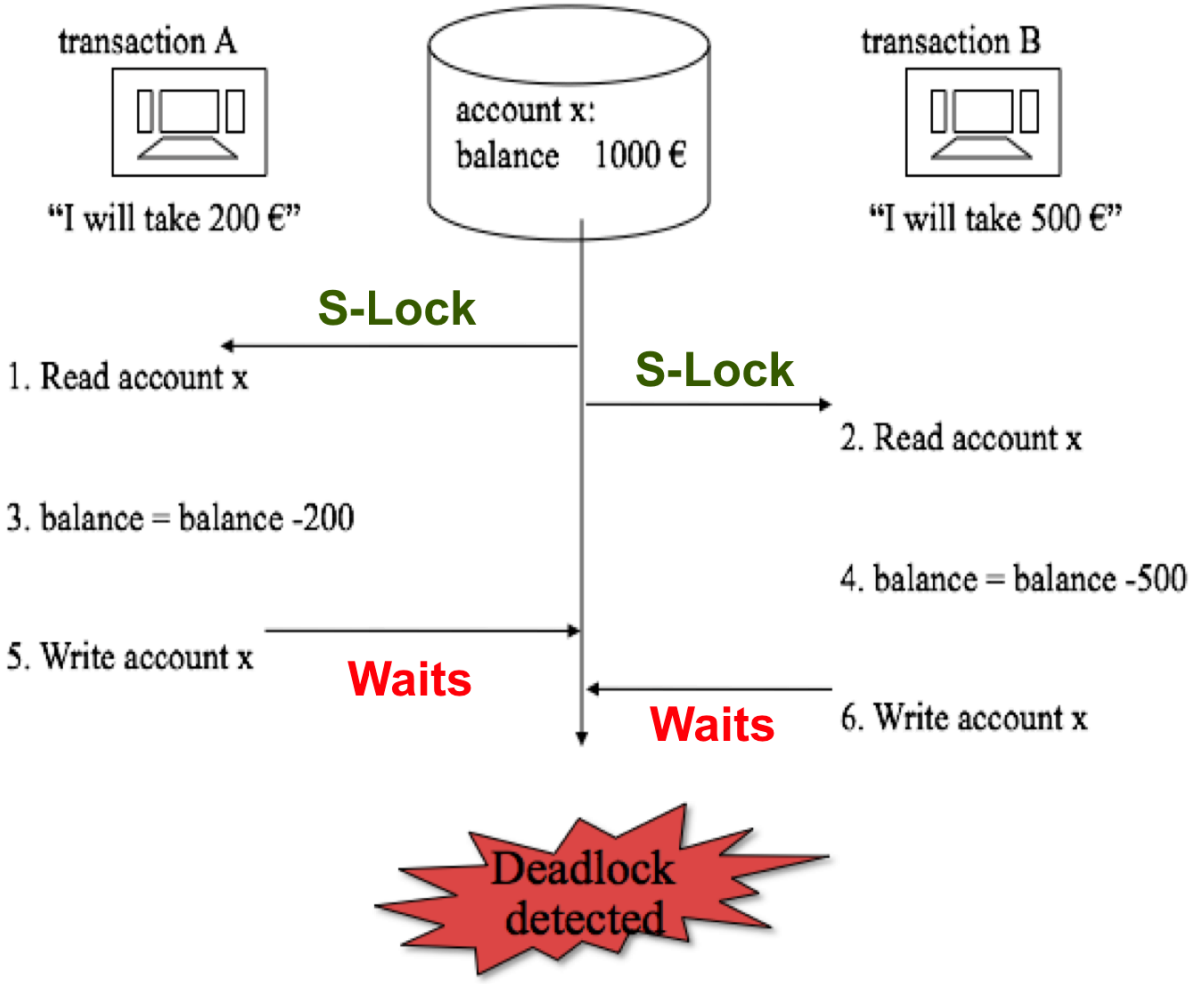

... one of (A,B) need be rolled back

Lost update with locks: sensitive updates

Using ANSI/ISO SQL, the “lost update” scenario is implemented with transactions A and B making use of (single) SQL UPDATE statements, instead of (separate) READ and WRITE operations, e.g.:

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UPDATE Accounts SET balance = balance – 200
WHERE acctID = 100;
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This is the case with most of today's OLTP DBMS products...

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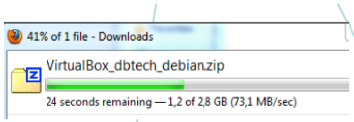
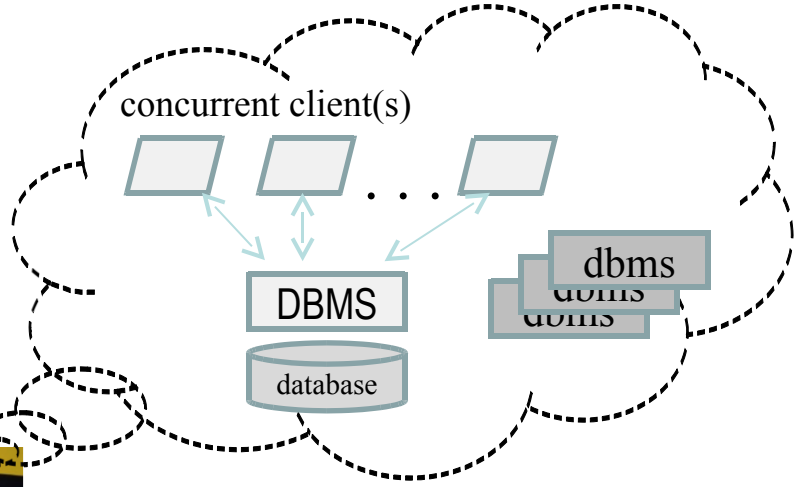
...is it, really?

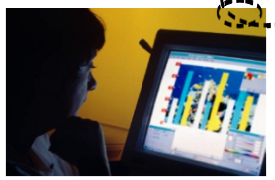
http://www.dbtechnet.org/download/DebianDBVM05.zip



.. just download, unzip, import into Oracle's VirtualBox, and run



for the classroom ...



... and/or for self-practicing

Martti Laiho

Hands-On Demo

Five short videos

Before we conclude

Lifelong Learning Programme

Any Questions?

Our next meeting: Lecture No. 4

Thursday 30 May, 7.00 – 8.00 p.m. EEST