What would the DBMS implementations do?

THERE IS ALSO AN REVIEW OVER THIS PART, BECAUSE IT WAS SO LONG

Overview over this video

In this video, we will look at how the different implementations implement ACID!

We will also see a review over this part, since it is fairly big

Transaction Support in DBMS

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- Fully ACID compliant: PostgreSQL, Oracle DB, IBM DB2, …
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Most, however does MVCC (incl. MySQL/InnoDB on lower isolation levels)

- Database requires more storage, but relative little delay

Deadlocks

MySQL (with InnoDB)

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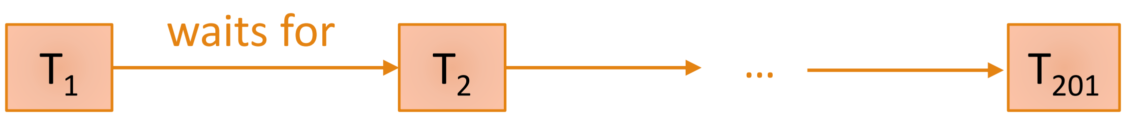

If cycle: rollback the smallest transaction

Deadlock detection can be switched off, in which case time-out is used (on locks)

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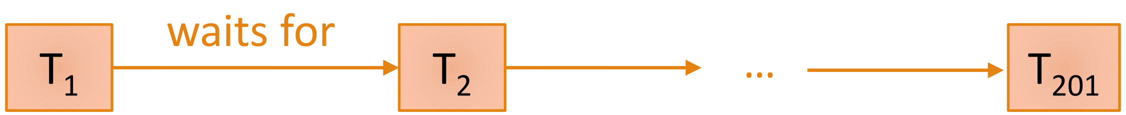

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Uses update-locks

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Similar issues whenever systems share resources

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Some example scenarios:

- Processes in an operating system that access the same files, network resources, etc.
- Users editing the same document online
- Document versioning systems like subversion, git, etc.

Try it out...

```
CREATE TABLE Student (id INT NOT NULL, name …);

INSERT INTO Student VALUES (1, ‘Anna’, …);
SELECT * FROM Student;

START TRANSACTION;
INSERT INTO Student VALUES (2, ‘Ben’, …);
INSERT INTO Student VALUES (3, ‘Chloe’, …);
ROLLBACK;
SELECT * FROM Student;
```

Try out reads, writes, different isolation levels, dirty reads, look up the documentation, …

Experiment with more complex scenarios…

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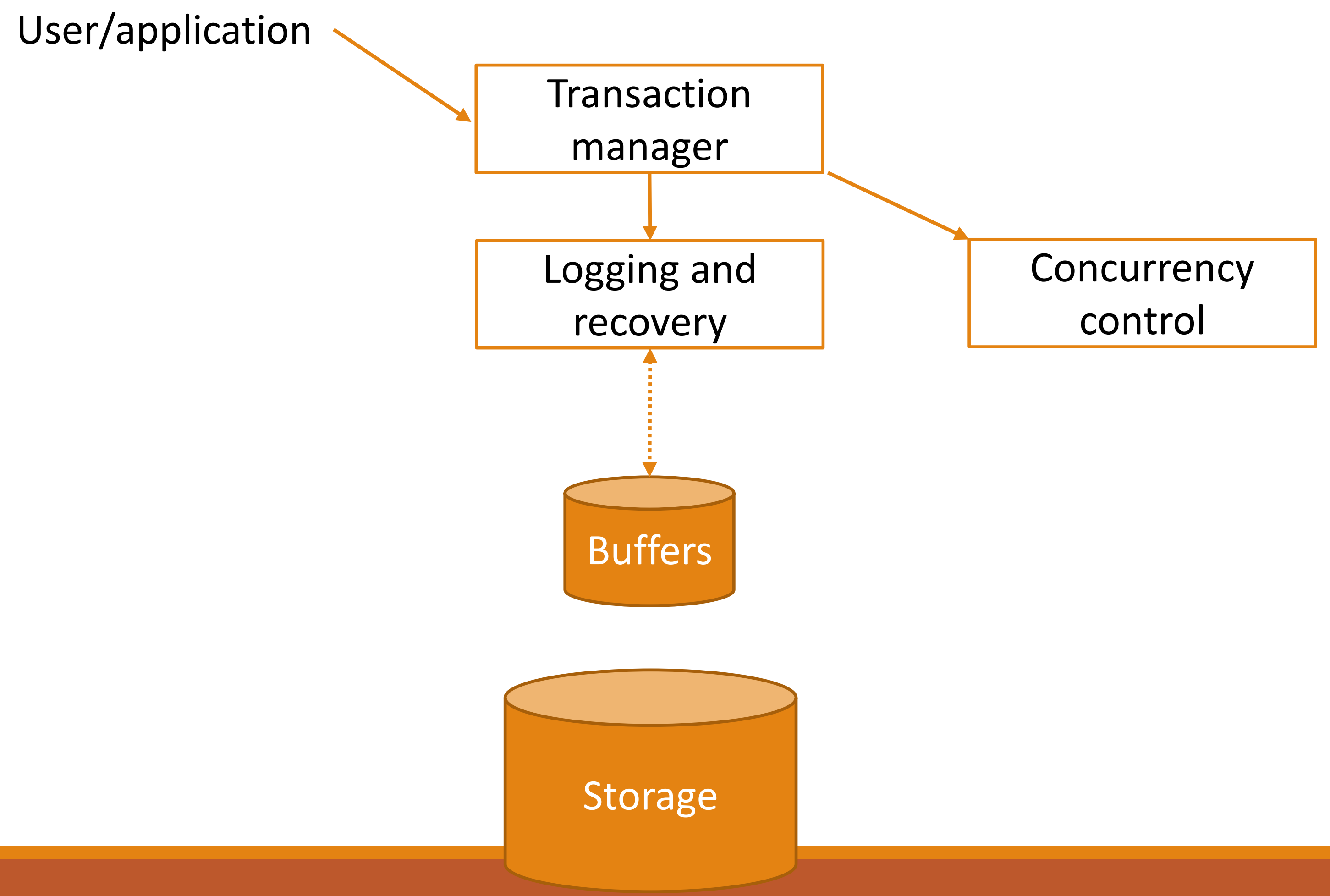
Experiment with more complex scenarios…

I would suggest to use some programming language for interacting with it, if you want to try with multiple transactions at a time…

Review

Relational DBMS Components
(Simplified from Content video)



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- Begin/end transactions, isolation levels, auto commit, …
- Need to understand the consequences of these commands to make effective use of DBMS
  - When to combine different SQL statements into a transaction?
  - When do we need (conflict) serialisability? When is a weaker isolation level fine?

Transaction Management Review

Dealing with **transactions** is a core task of DBMS

- Many things can go wrong when processing transactions, even when executing single SQL statements.
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- Schedules should be **strict**

Methods for enforcing conflict-serialisability & strictness:

- **Strict two-phase locking** & **deadlock prevention** methods
- **Timestamping**

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- Schedule executes transactions equivalent to a serial schedule
- (needs two assumptions for this: non-database operations can be ignored and if a schedule is serial, then it is consistent)
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This is intuition.
Exact def. is different

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ACID continued

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- Ensured by Cascadeless and Strict schedules (incl. Strict 2PL and Strict Timestamp-based schedules)

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SET TRANSACTION READ WRITE
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ACID continued

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Durability

- If a transaction is committed, it does not disappear
- Ensured by Redo logging, Undo/Redo logging or No Steal
- Recoverable schedules are also required

Summary

The different database implementations do things differently in regards to transactions

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In this part we saw how DBMS ensures the ACID properties (far too much to summarize)