Today’s Plan

- Admin
- Last week’s homework
- Your questions and topics
- Sample exam questions
List of Classes and Algorithms (1/3)

When specific knowledge about a red class/algorithm is needed in the exam, it will be provided. Beside classes and algorithms, you also need to know about e.g. ACID properties, page and object model, dirty read problem, relationships between classes, the MVCC version function, . . .

ch. 3  FSR (thus: Herbrand semantics, reads-from, . . .) VSR CSR (thus: conflict graph, . . .) OCSR, COCSR, CMFSR, CMVSR, CMCSR Interleaving Specifications (NEW: includes indiv. units and the relative serialization graph
List of Classes and Algorithm (2/3)

ch. 4 2PL/C2PL/S2PL/SS2PL, deadlock prevention and resolution
O2PL
Altruistic Locking
write-only and read-write tree locking
BTO
SGT
BOCC, FOCC
Hybrid protocols and TWR

ch. 5 MVSR (thus: MVSG, . . . )
MCSR (thus: MVCG, . . . )
MVTO
MV2PL, 2V2PL
MVSGT
ROMV
List of Classes and Algorithm (3/3)

ch. 6 State-independent CT
   Return-value CT
   Commutativity-based reducibility, CSR
   Tree reducibility

ch. 7 2PL for flat object schedules
   general object-model 2PL (NEW), layered 2PL, selective layered 2PL
   Hybrid algorithms, Escrow locking

ch. 8 Predicate locking, precision locking
   FSR-IDM and CSR-IDM (do not learn the rules!), transaction chopping

ch. 9 simple and incremental key range locking, lock coupling
Your questions and topics

- assignment 7.2
- commutativity tables: do not learn the tables for queues, ..., but be able to construct tables based on your general knowledge about data structures
- object model: layered and flat schedules, reducibility
- BTO, BOCC, FOCC
Sample exam questions

- 5 points/minutes
- Give an example of a schedule that is strict but cannot be generated by Strict 2PL (S2PL).
Sample exam questions

- 7+8 points/minutes
- Describe the transactional workloads for which FOCC will provide the best throughput (among all page model protocols). Give a short explanation.
- Describe the transactional workload for which a combination of 2PL at the object level and FOCC at the page level will provide the best throughput (among all object model protocols). Give a short explanation.
Sample exam questions

- 13 points/minutes
- The SQL standard defines levels of isolation (read uncommitted, ...) in terms of the following phenomena that may occur during concurrent execution of transactions:
  - dirty read: a transaction can read the item that is written by the concurrent uncommitted transaction.
  - non-repeatable read: a transaction re-reads the item it has previously read, and finds that its value was changed (by a transaction that has committed between those two reads).
  - phantom read: a transaction re-executes a query returning a set of rows that satisfy a search condition and finds that the set of rows satisfying the condition has changed (ditto).

Let us define a new class of histories, SQL-Serializable (SQLSR), as follows: SQLSR consists of all the histories that do not have any of the phenomena mentioned above. Additionally, in SQLSR two concurrently running transactions can not write the same data item.

Obviously, CSR ⊆ SQLSR. Does the following hold: SQLSR = CSR? Prove it or give a counter-example.
Sample exam questions

- 5 points/minutes
- Write a SQL statement that locks the entire table $R$ (with attributes $a$ and $b$) for reading under the 2PL scheduler. The statement should output only one row.
Sample exam questions

- 5+5 points/minutes
- For the following schedule

\[ s = r_1(x) \quad w_1(x) \quad c_1 \quad r_2(x) \quad r_3(y) \quad w_2(y) \quad c_2 \quad r_3(z) \quad c_3 \]

- Give the output schedule produced by SS2PL.
- Give the output schedule produced by FOCC.
More questions?