

Computer Science & IT

Database Management System

Transaction
&
Concurrency control

Lecture No. 01



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Recap of Previous Lecture



✓
Topic

Unsafe TRC

✓
Topic

Practice questions

Topics to be Covered



CH-02

Topic

Domain relational calculus (TRC)

Topic

Transaction ✓

CH-03

Topic

ACID properties ✓

Topic

Atomicity

Topic

Durability





Topic : Syntax of DRC

Syntax of TRC : $\{t \mid P(t)\}$



- Each query is an expression of the form

Syntax of DRC: $\{ \langle \underline{x_1}, \underline{x_2}, \dots, \underline{x_n} \rangle \mid P(x_1, x_2, \dots, x_n) \}$

- Where $\underline{x_1}, \underline{x_2}, \dots, \underline{x_n}$ represent domain variables.
- $P(x_1, x_2, \dots, x_n)$ is the predicate formula.

Q: Consider the following relation
Employee (Eid, name, Salary)

Retrieve complete Employee table.

TRC: { t | t ∈ Employee }

DRC: { <E, N, S> | <E, N, S> ∈ Employee }

Eid
name
Salary

1st attribute
2nd attribute
3rd attribute

Q: Consider the following relation
Employee (Eid, name, Salary)

Retrieve names of all the Employee from Employee relation

TRC: $\{ t.name \mid t \in \text{Employee} \}$

DRC: $\{ \langle N \rangle \mid \langle E, N, S \rangle \in \text{Employee} \}$

1st attribute
2nd attribute
3rd attribute

#Q.

Consider the following relational schemas

Employee(EmpId, EmpName, salary)

Select distinct EmpName from Employee table where salary > 2000

TRC: $\{ t.\text{EmpName} \mid t \in \text{Employee} \wedge t.\text{Salary} > 2000 \}$

DRC: $\{ \langle N \rangle \mid \langle E, N, S \rangle \in \text{Employee} \wedge S > 2000 \}$

#Q.

Consider the following relational schemas

Student(Rollno, name, marks)

Select distinct name and marks of the student from Student table where Rollno = 10

TRC: $\{ t.name, t.marks \mid t \in \text{Student} \wedge t.Rollno = 10 \}$

DRC: $\{ \langle N, M \rangle \mid \langle \underline{R}, \underline{N}, \underline{M} \rangle \in \text{Student} \wedge R = 10 \}$

(or)
 $\{ \langle N, M \rangle \mid \langle 10, N, M \rangle \in \text{Student} \}$

#Q. Consider the following relational schema.

✓ Students(rollno: integer, sname: string)
 ✗ Courses(courseno: integer, cname: string)
 ✓ Registration(rollno: integer, courseno: integer, percent: real)

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Which of the following queries are equivalent to this query in English?

- "Find the distinct names of all students who score more than 90% in the course numbered 107"

I. SELECT DISTINCT S.sname FROM Students as S, Registration as R WHERE R.rollno=S.rollno AND R.courseno=107 AND R.percent > 90

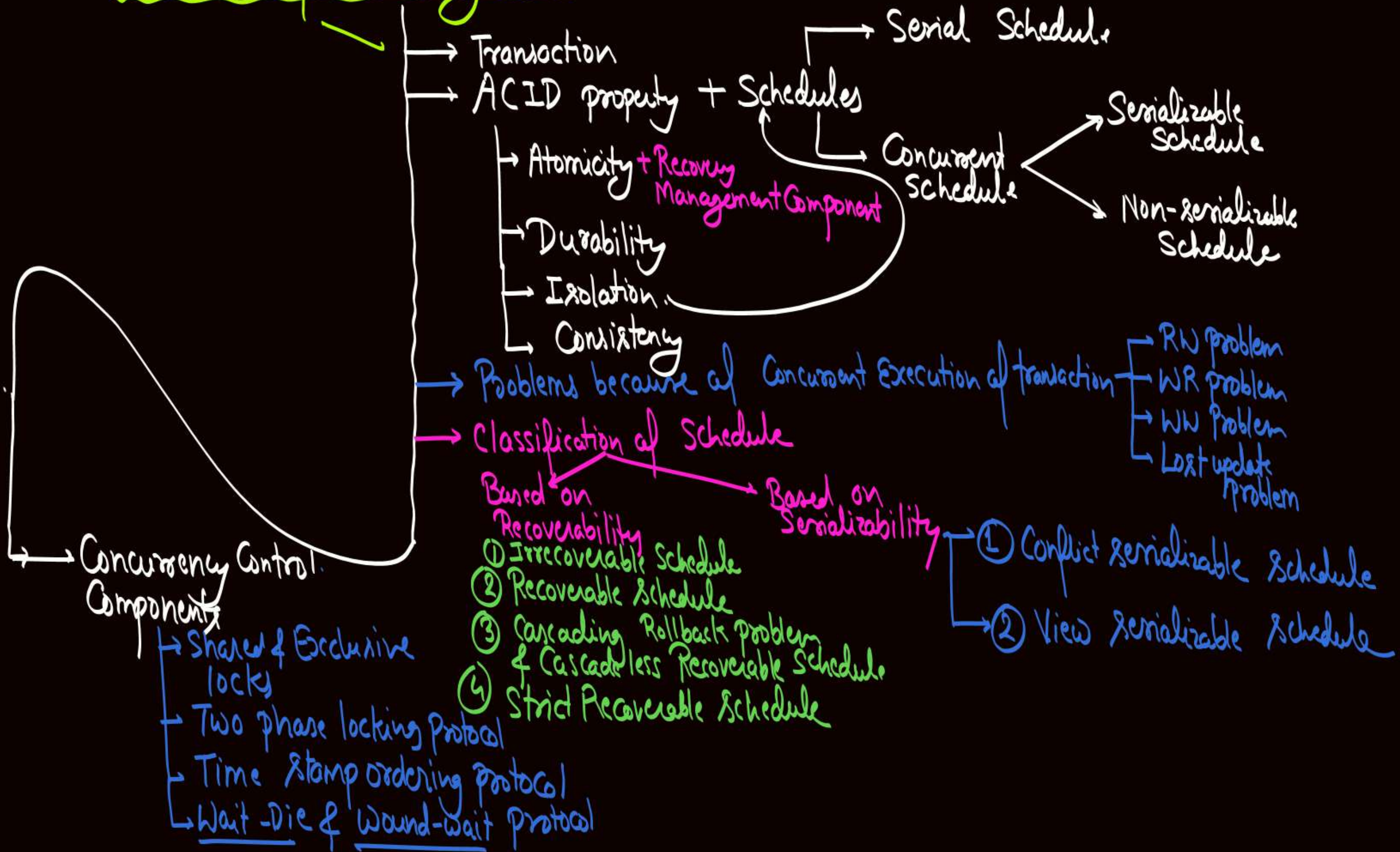
II. $\Pi_{sname}(\sigma_{courseno=107 \wedge percent > 90} (Registration \bowtie Students))$

III. $\{T \mid \exists S \in Students, \exists R \in Registration (S.rollno=R.rollno \wedge R.courseno=107 \wedge R.percent > 90 \wedge T.sname=S.sname)\}$

IV. $\{ \langle S_N \rangle \mid \exists S_R \exists R_P (\langle S_R, S_N \rangle \in Students \wedge \langle S_R, 107, R_P \rangle \in Registration \wedge R_P > 90) \}$

A. I, II, III and IV } $\langle S_N \rangle \mid \exists S_R \exists R_P \exists R_C \exists R_P (\langle S_R, S_N \rangle \in Student \wedge \langle R_R, R_C, R_P \rangle \in Registration$
 B. I, II and III only } $\wedge S_R = R_R \wedge R_C = 107 \wedge R_P > 90)$
 C. I, II and IV only }
 D. II, III and IV only }

Transactions & Concurrency Control:





Topic : Transaction



→ A sequence of logically related operation which are used to perform a particular task is called a transaction

^{dataitem}
Read(A): This operation is used to access the value of dataitem 'A' from database (i.e., from disk) to main memory

Write(A): Update the current value of dataitem 'A' { i.e. the value present in main memory } into the disk i.e., in Database

Consider the following transaction,

Transaction: Transfer Rs 500/- from account A to account B.

Let, initial amount in account A = 1000
& initial amount in account B = 0

{Sequence of opⁿ} Transaction

Read(A) // Copy of dataitem A
will be created in M.M.

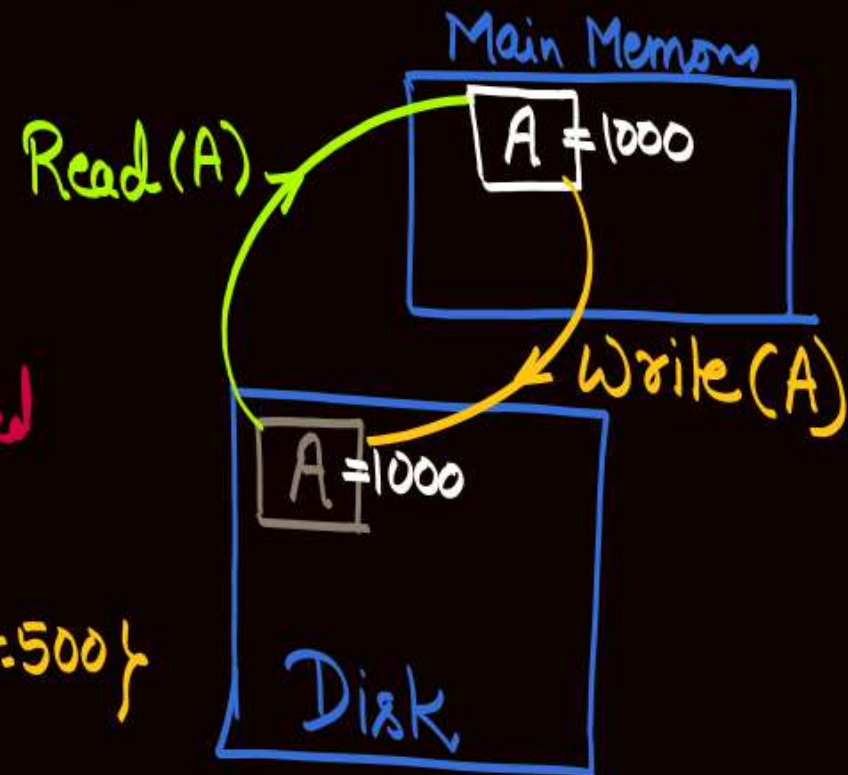
A = A - 500 // This updation will be performed
only in Main Memory
(Not in disk)

W(A) // Current value of dataitem A {i.e. A=500}
is updated in the disk

R(B)

B = B + 500

W(B) ✓



Not important
from
database
point of view



Topic : Blind write

Transaction

Sequence
of
Operation

(i) R(A)

(ii) $A = A - 100$ // Performed only in M.M.

(iii) W(A) // When transaction is trying to perform the write opⁿ on data item A, it has already read the data item A from the disk. \therefore Write opⁿ of data item A is not a Blind write

(iv) W(B) // Transaction did not read the value of dataitem B from the disk, and it is trying to update the new value of dataitem 'B' irrespective of its previous value \therefore W(B) is blind write opⁿ

(v) Commit // Transaction Committed means transaction Executed Successfully {from User point of view}

If a transaction tries to update the value of a dataitem into the disk without reading the value of that dataitem from the disk, then such write opⁿ are called blind write opⁿ





Topic : ACID properties



- Atomicity
- Consistency
- Isolation
- Durability



2 mins Summary



✓
Topic

Domain relational calculus (TRC)

✓
Topic

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}
Next
Class

THANK - YOU