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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Data Base Management System (course)

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Course outline

About NPTEL ()

How does an NPTEL online course work? ()

Week 0 ()

Week 1 ()

Week 2 ()

Week 3 ()

Week 8 : Assignment 8

Your last recorded submission was on 2025-03-09, 19:13 IST Due date: 2025-03-19, 23:59 IST.

1) ***1 point***

Identify the cost estimation of a query evaluation plan, if 9000 blocks are required to transferred from the disk and the required number of disk seeks are 25.

- Time to transfer one block: $t_T = 5$ milliseconds.
- Time for one seek: $t_S = 0.4$ seconds.

a) 40 Seconds

b) 45 Seconds

c) 50 Seconds

d) 55 Seconds

- ○ a
- ○ b
- ○ c
- ◉ d

2) ***1 point***

Assume an immediate database modification scheme. Consider the following log records for transactions T0, T1, T2, T3 and T4:

steps	Details of log
1	⟨T0,start⟩
2	⟨T0,A,500,600⟩
3	⟨T1,start⟩
4	⟨T1,B,300,500⟩
5	⟨T1,commit⟩
6	⟨T2,start⟩
7	⟨checkpoint{T0, T2} ⟩
8	⟨T3,start⟩
9	⟨T2,C,200,400⟩
10	⟨T3,D,700,900⟩
11	⟨T2,commit⟩
12	⟨T3,commit⟩
13	⟨T4,start⟩
14	⟨T4,E,300,700⟩

If there is a crash just after step 14 and the recovery of the system is successfully completed, identify the **correct** action for the above scenario.

a) After recovery completion, value of A will be 600.

b) After recovery completion, value of C will be 200.

c) After recovery completion, value of D will be 900.

d) After recovery completion, value of E will be 300.

- [ ] a
- [ ] b
- [x] c
- [ ] d

3) ***1 point***

Let us consider the following statistics for two relations Instructor and Job_Assignments:

- Number of records of Instructor: $n_{Instructor} = 5050$.
- Number of blocks of Instructor: $b_{Instructor} = 30$.
- Number of records of Job_Assignments: $n_{Job\_Assignments} = 1050$.
- Number of blocks of Job_Assignments: $b_{Job\_Assignments} = 10$.

Let us consider a natural join of Instructor and Job_Assignments relations (Instructor ⋈ Job_Assignments). Identify the required number of block transfers in the worst case (enough memory only to hold one block of each relation) using Nested-loop join and assume Instructor as the outer relation.

a) 40000 block transfers

b) 40030 block transfer

c) 50030 block transfers

d) 50530 block transfers

- ○ a
- ○ b

Quiz: Week 8 : Assignment 8 (assessment?name=217)

Feedback Form (unit?unit=85&lesson=206)

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c

d

4) *1 point*

Consider the following relational schema:

```
INSTRUCTOR(InstructorID, Name, HireDate)
COURSE(CourseID, CourseName, Credits)
JOB_ASSIGNMENTS(InstructorID, CourseID, JobTitle, StartDate, EndDate)
```

Two query trees are given below.

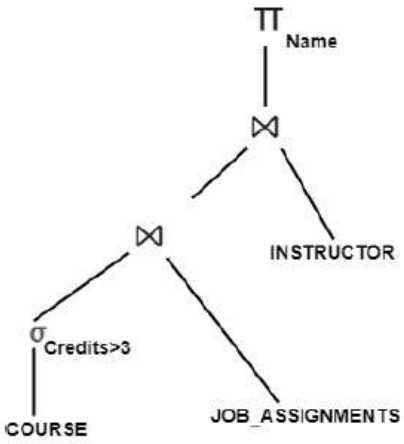


Figure 1:

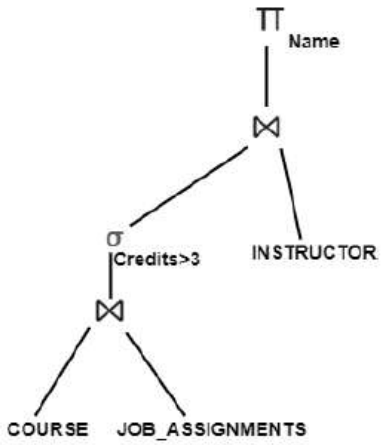


Figure 2:

Identify the correct statement for the above two query trees.

a) Two query trees are equivalent, and the query tree of Figure 2 will lead to more efficient query processing.

b) Two query trees are equivalent, and the query tree of Figure 1 will lead to more efficient query processing.

c) Two query trees are equivalent, as identical operations (irrespective of their positions) are used in both trees.

d) Two query trees are not equivalent as selection or projection operation cannot be carried out before or after the natural join operation.

a

b

c

d

5) *1 point*

Assume deferred database modification scheme. Consider the following log records for transactions T1, T2, T3 and T4:

steps	Details of log
1	⟨T1,start⟩
2	⟨T1,A,500,800⟩
3	⟨T2,start⟩
4	⟨checkpoint{T1, T2} ⟩
5	⟨T1,commit⟩
6	⟨T3,start⟩
7	⟨T2,B,200,400⟩
8	⟨T2,commit⟩
9	⟨T4,start⟩
10	⟨T3, C, 700, 300⟩

If there is a crash just after step 10 and the recovery of the system is successfully completed, identify the **correct** action(s) for the above scenario.

a) After recovery completion, the value of B is 400.

b) After recovery completion, the value of C is 300.

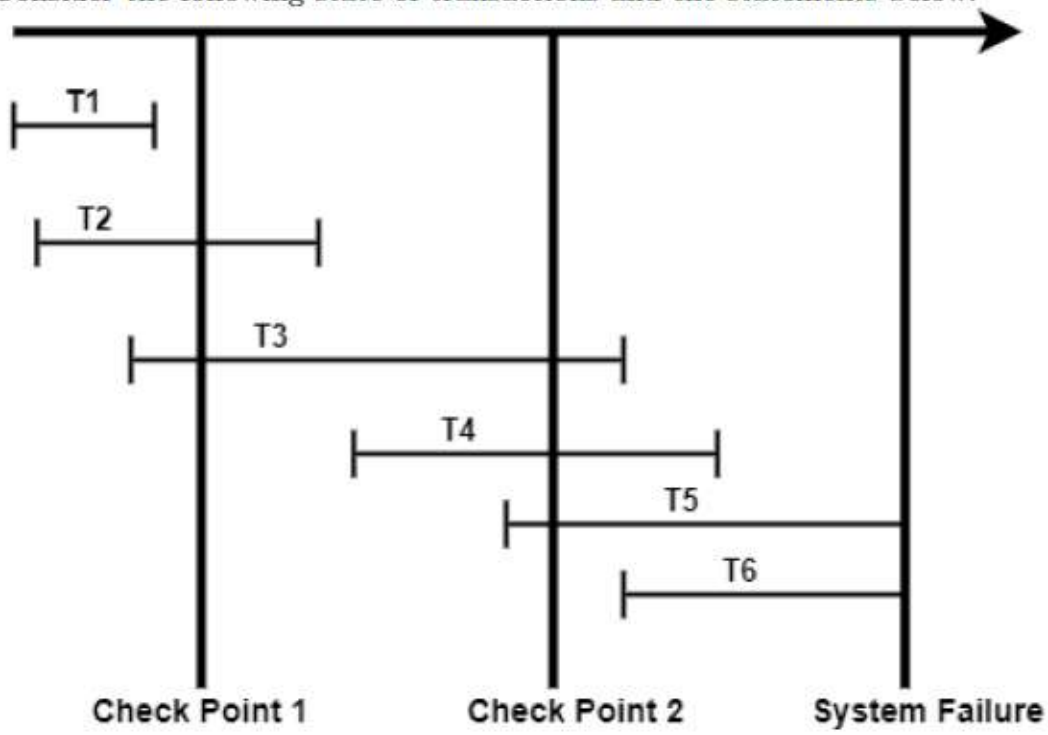
c) Redo list contain transactions {T1, T2} and undo list contains {T3, T4}.

d) Redo list contain transactions {T1, T2} and undo list contains { }.

- [x] a
- [ ] b
- [x] c
- [ ] d

6) ***1 point***

Consider the following state of transactions and the statements below.



1. T_1, T_2 and T_3 can be ignored.
2. T_5 and T_6 need to be undone.
3. T_1 and T_2 can be ignored.
4. T_3, T_4 and T_5 need to be redone.
5. T_3 and T_4 need to be redone.

Identify the correct group of statements from the options below.

a) 1), 2), 3), 5)

b) 1), 3), 4), 5)

c) 1), 4), 5)

d) 2), 3), 5)

- ○ a
- ○ b
- ○ c
- ◉ d

7) ***1 point***

Consider the following relational schema:
INSTRUCTOR(InstructorID, Name, HireDate)
COURSE(CourseID, CourseName, Credits)
JOB_ASSIGNMENTS(InstructorID, CourseID, JobTitle, StartDate, EndDate)

Four relational algebra queries are given below:

Q1: $\sigma_{\texttt{StartDate='2023-01-01'}}(\texttt{INSTRUCTOR} \bowtie \texttt{JOB\_ASSIGNMENTS})$

Q2: $\pi_{\texttt{StartDate, Name}}(\texttt{INSTRUCTOR} \bowtie \texttt{JOB\_ASSIGNMENTS})$

Q3: $\pi_{\texttt{Name}}(\texttt{INSTRUCTOR} \bowtie \texttt{JOB\_ASSIGNMENTS})$

Q4: $\pi_{\texttt{Name}}(\sigma_{\texttt{INSTRUCTOR.InstructorID=JOB\_ASSIGNMENTS.InstructorID}}(\texttt{INSTRUCTOR} \times \texttt{JOB\_ASSIGNMENTS}))$

Identify the correct options from the options given below.

a) Q1 is equivalent to Q2.

b) Q1 is not equivalent to Q2.

c) Q3 is equivalent to Q4.

d) Q3 is not equivalent to Q4.

- [ ] a
- [x] b
- [x] c
- [ ] d

8) ***1 point***

Consider the following relational schema:
INSTRUCTOR(InstructorID, Name, HireDate)
COURSE(CourseID, CourseName, Credits)
JOB_ASSIGNMENTS(InstructorID, CourseID, JobTitle, StartDate, EndDate)

A relational algebra expression is given below:
$\Pi_{\texttt{Name}}(\Pi_{\texttt{InstructorID, Name}}(\sigma_{\texttt{Credits=3}}(\texttt{INSTRUCTOR} \bowtie \texttt{JOB\_ASSIGNMENTS} \bowtie \texttt{COURSE})))$

Identify the most optimized relational algebra expression equivalent to the above relational algebra expression.

a) $\Pi_{\texttt{Name, InstructorID}}(\sigma_{\texttt{Credits=3}}(\texttt{INSTRUCTOR} \bowtie \texttt{JOB\_ASSIGNMENTS} \bowtie \texttt{COURSE}))$

b) $\Pi_{\texttt{Name, InstructorID}}(\texttt{INSTRUCTOR} \bowtie (\texttt{JOB\_ASSIGNMENTS} \bowtie (\sigma_{\texttt{Credits=3}}(\texttt{COURSE}))))$

c) $\Pi_{\texttt{Name, InstructorID}}(\texttt{INSTRUCTOR} \bowtie (\texttt{JOB\_ASSIGNMENTS} \bowtie \Pi_{\texttt{CourseID}}(\sigma_{\texttt{Credits=3}}(\texttt{COURSE}))))$

d) $\Pi_{\texttt{Name}}(\texttt{INSTRUCTOR} \bowtie (\texttt{JOB\_ASSIGNMENTS} \bowtie (\sigma_{\texttt{Credits=3}}(\texttt{COURSE}))))$

- ( ) a
- ( ) b
- (•) c
- ( ) d

9) **1 point**

Consider the following two relational algebra expressions (RA) given below:

RA I: $\Pi_{A,B}(\mathtt{P} \cup \mathtt{Q}) = \Pi_{A,B}(\mathtt{P}) \cup \Pi_{A,B}(\mathtt{Q})$

RA II: $((\mathtt{P} \bowtie \mathtt{Q}) \bowtie \mathtt{R}) = (\mathtt{P} \bowtie (\mathtt{Q} \bowtie \mathtt{R}))$

where P, Q, and R are relational algebra expressions.

Identify the correct statement(s) from the following.

a) Both RA I and RA II are true.

b) Both RA I and RA II are false.

c) RA I is true but RA II is false.

d) RA I is false but RA II is true.

- (●) a
- ( ) b
- ( ) c
- ( ) d

10) **1 point**

Consider the log record of Transaction T1 with two operation instances O1 and O2 used in recovery system with early lock release, B+ tree based concurrency control.

Step	Operation
1	⟨T1, start⟩
2	⟨T1,X, 200, 400⟩
3	⟨T1, O1, operation-begin⟩
4	⟨T1, Y, 100, 500⟩
5	⟨T1, O1, operation-end,(Y, -400)⟩
6	⟨T1, O2, operation-begin⟩
7	⟨T1, Z, 500, 800⟩
8	crash or abort here

Choose the correct set of log entries for the recovery of transactions.

a)

⟨T1,Z,500⟩
⟨T1,Y,500,100⟩
⟨T1,O1,operation-abort⟩
⟨T1,X,400⟩
⟨T1,abort⟩

b)

⟨T1,Z,500⟩
⟨T1,Y,500,100⟩
⟨T1,O1,operation-abort⟩
⟨T1,X,200⟩
⟨T1,abort⟩

c)

⟨T1,Z,500⟩
⟨T1,Y,100,500⟩
⟨T1,O1,operation-abort⟩
⟨T1,X,200⟩
⟨T1,abort⟩

d)

⟨T1,Z,800⟩
⟨T1,Y,500,100⟩
⟨T1,O1,operation-abort⟩
⟨T1,X,400⟩
⟨T1,abort⟩

- (●) a
- ( ) b
- ( ) c
- ( ) d

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers