Midterm Review

CS 1555: Database Management Systems

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Lectures based: P. Chrysanthis & N. Farnan Lectures

1

Relational Algebra

- Suppose relation Student has 20 tuples. What is the minimum and maximum number of tuples in the result of this expression:

$$\rho_{s1(i1,n1,g,h)} Student \bowtie \rho_{s2(i2,n2,g,h)} Student$$

a) minimum = 0, maximum = 400
b) minimum = 20, maximum = 20
c) minimum = 20, maximum = 400 ✔
d) minimum = 40, maximum = 40

6

Relational Algebra

- Which of the following English sentences describes the result of this expression:

$$\pi_{cName} College - \pi_{cName}(Apply \bowtie (\pi_{sID}(\sigma_{GPA>3.5} Student) \cap \pi_{sID}(\sigma_{major='CS'} Apply)))$$

a) All colleges with no GPA>3.5 applicants who applied for a CS major at that college
b) All colleges with no GPA>3.5 applicants who applied for a CS major at any college ✔
c) All colleges where all applicants either have GPA>3.5 or applied for a CS major at that college
d) All colleges where no applicants have GPA>3.5 or no applicants applied for a CS major at that college

7

Natural JOIN

- Suppose relation R(A,C) has the following tuples and relation S(B,C,D) has the following tuples:
- Compute the natural join of R and S. Which of the following tuples is in the result? Assume each tuple has schema (A,B,C,D).

A	C
3	3
6	4
2	3
3	5
7	1

B	C	D
5	1	6
1	5	8
4	3	9

a) (6, 4, 3, 9)
b) (2, 4, 3, 9) ✔
c) (2, 3, 1, 6)
d) (5, 1, 6, 4)

12

Theta JOIN

- Suppose relation R(A,C) has the following tuples and relation S(B,C,D) has the following tuples:
- Compute the theta-join of R and S with the condition R.B = S.B AND R.A < S.C Which of the following tuples is in the result? Assume each tuple has schema (A, R.B, S.B, C, D).

A	B
1	a
7	t
2	g
4	c
9	t

B	C	D
c	5	6
a	7	8
t	8	9

a) (2, g, c, 5, 6)
b) (4, c, c, 7, 8)
c) (1, a, c, 5, 6)
d) (4, c, c, 5, 6) ✔

13

Projection

- Suppose relation R(A,B,C) has the following tuples
- Compute the projection π C,B (R). Which of the following tuples is in the result?

A	B	C
1	2	3
4	2	3
4	5	6
2	5	3
1	2	6

a) (6,2) ✔
b) (5,6)
c) (5,3)
d) (2,6)

14

Difference

- Suppose relation R(A,B,C) has the following tuples and relation S(A,B,C) has the following tuples:
- Compute (R - S) union (S - R), often called the "symmetric difference" of R and S. Which of the following tuples is in the result?

A	B	C
1	2	3
4	2	3
4	5	6
2	5	3
1	2	6

A	B	C
2	5	3
2	5	4
4	5	6
1	2	3

a) (1,2,3)
b) (2,5,4) ✔
c) (4,5,6)
d) (1,5,6)

15

Intersection

- Suppose relation R(A,B,C) has the following tuples and relation S(A,B,C) has the following tuples:
- Compute the intersection of the relations R and S. Which of the following tuples is in the result?

A	B	C
1	2	3
4	2	3
4	5	6
2	5	3
1	2	6

A	B	C
2	5	3
2	5	4
4	5	6
1	2	3

a) (2,2,6)
b) (2,5,4)
c) (1,2,3) ✔
d) (2,4,3)

16

Views

- Consider tables R(A,B) and S(B,C) and a view V = select A,C from R,S where R.B=S.B. Suppose R={(1,5),(2,5)} and S={(5,10)}, so V={(1,10),(2,10)}. The user wants to delete tuple (2,10) from V. Which of the following modifications to R and/or S does NOT correctly reflect this modification?

a) delete (2,5) from R
b) update (2,5) to (2,6) in R
c) update (2,5) to (1,6) in R
d) delete (5,10) from S ✔

18

Views

- Consider tables R(A,B) and S(B,C) and a query Q = select A,C from R,S where R.B=S.B and A < 10 and C > 20. Which of the following materialized views can NOT be used to help evaluate Q?

a) V1 = select A,C from R,S where R.B=S.B
b) V2 = select A,C from R,S where A < 10 and C > 20 ✔
c) V3 = select A,R.B,S.B,C from R,S where A < 10 and C > 20
d) V4 = select * from R where A < 10

19