NOVEMBER 6, 2024

HOMEWORK 4 B

CS 457 B

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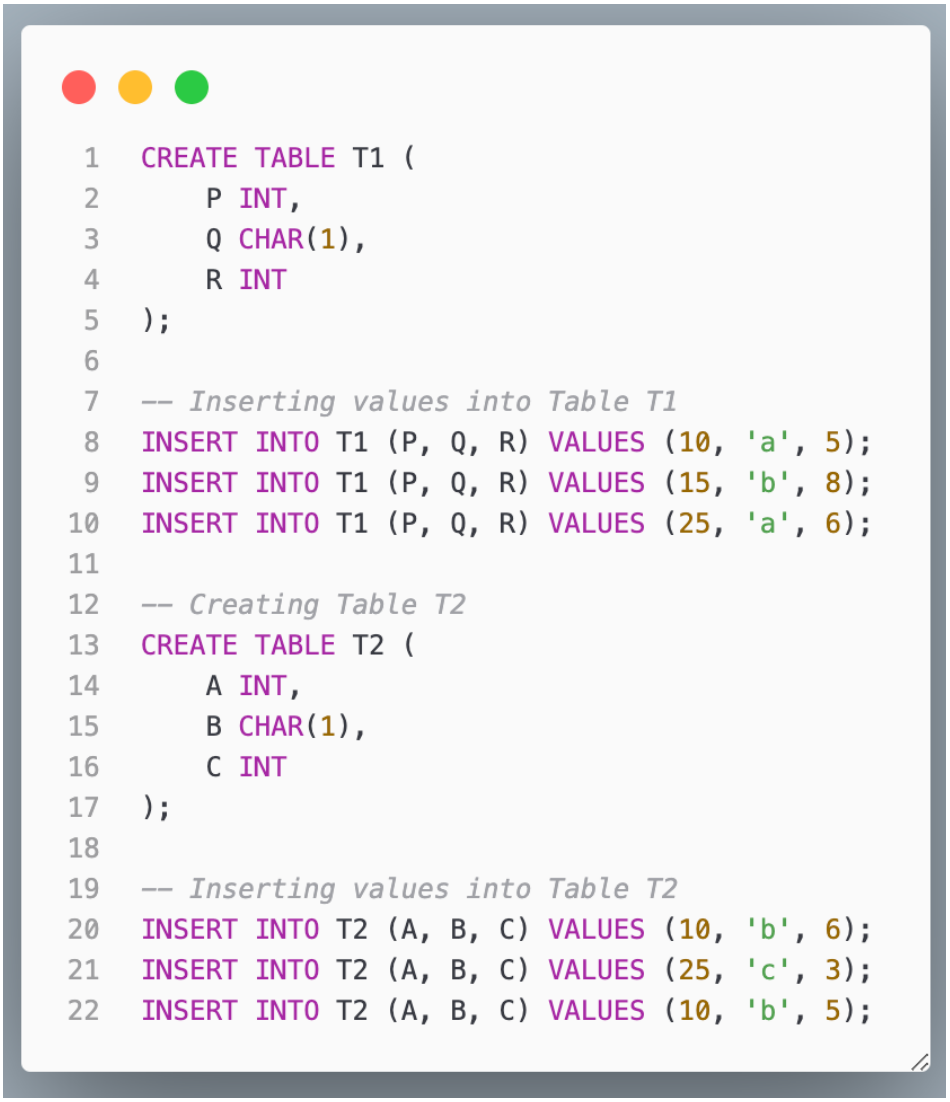
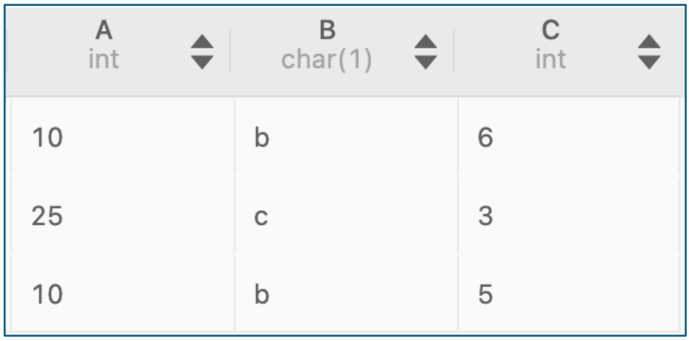
2O281 - SFBU

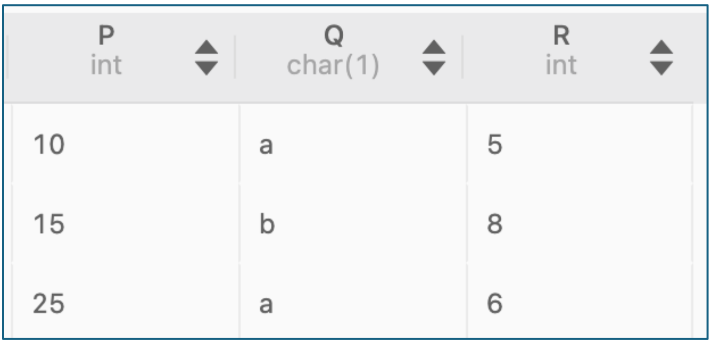
(TABLES)



```sql
CREATE TABLE T1 (
    P INT,
    Q CHAR(1),
    R INT
);

-- Inserting values into Table T1
INSERT INTO T1 (P, Q, R) VALUES (10, 'a', 5);
INSERT INTO T1 (P, Q, R) VALUES (15, 'b', 8);
INSERT INTO T1 (P, Q, R) VALUES (25, 'a', 6);

-- Creating Table T2
CREATE TABLE T2 (
    A INT,
    B CHAR(1),
    C INT
);

-- Inserting values into Table T2
INSERT INTO T2 (A, B, C) VALUES (10, 'b', 6);
INSERT INTO T2 (A, B, C) VALUES (25, 'c', 3);
INSERT INTO T2 (A, B, C) VALUES (10, 'b', 5);
```



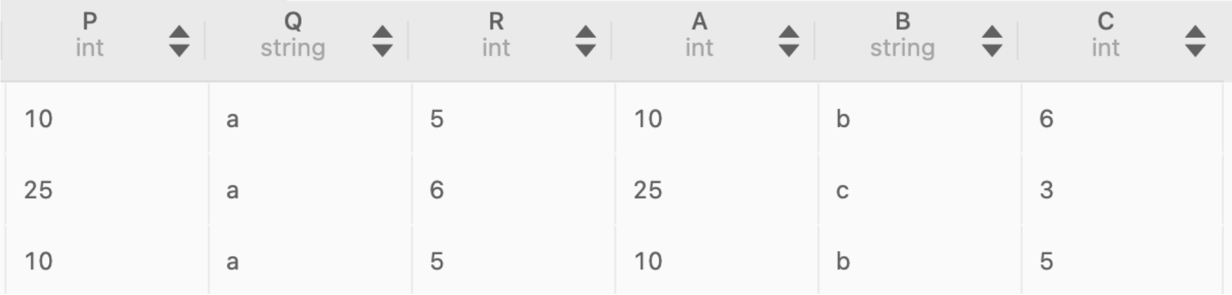
A int	B char(1)	C int
10	b	6
25	c	3
10	b	5



P int	Q char(1)	R int
10	a	5
15	b	8
25	a	6

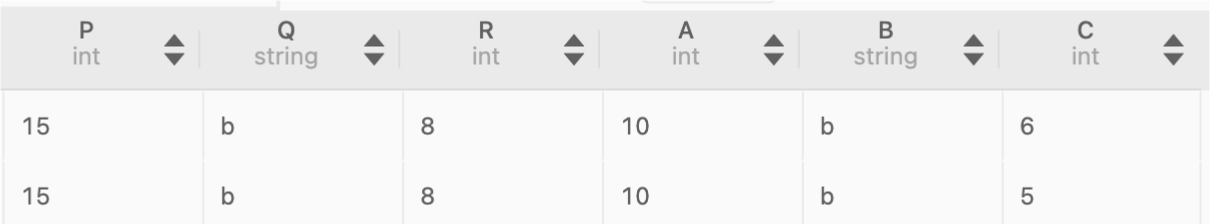
(8.22)

a) SELECT * FROM T1 JOIN T2 ON T1.P = T2.A;



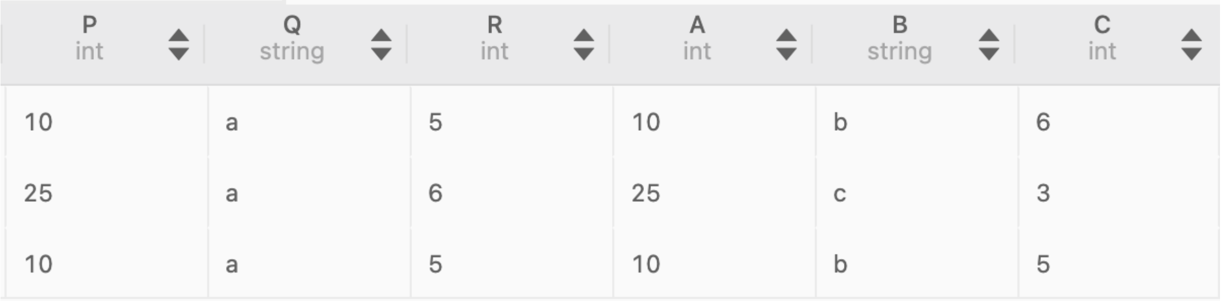
P int	Q string	R int	A int	B string	C int
10	a	5	10	b	6
25	a	6	25	c	3
10	a	5	10	b	5

b) SELECT * FROM T1 JOIN T2 ON T1.Q = T2.B;



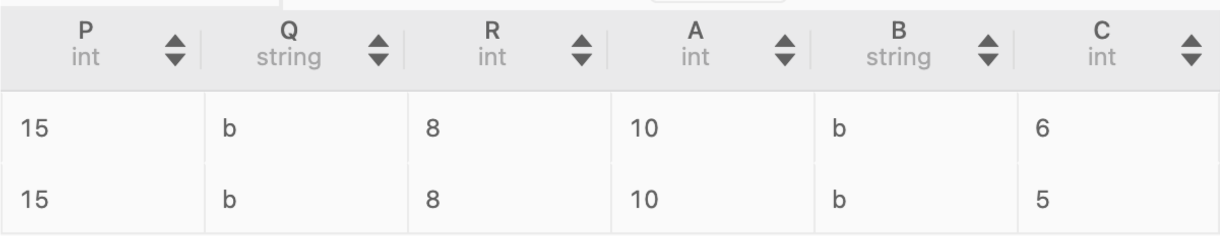
P int	Q string	R int	A int	B string	C int
15	b	8	10	b	6
15	b	8	10	b	5

c) SELECT * FROM T1 JOIN T2 ON T1.P = T2.A;



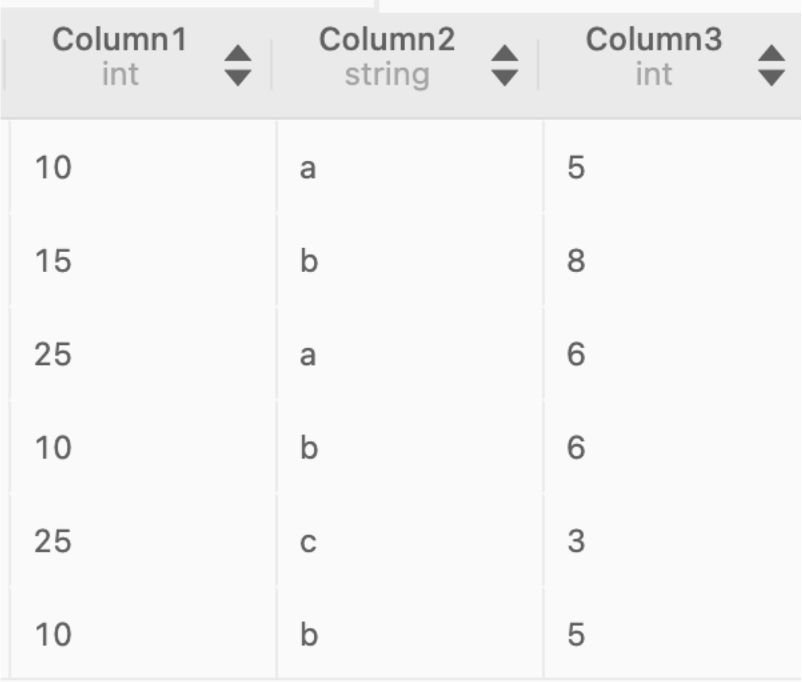
P int	Q string	R int	A int	B string	C int
10	a	5	10	b	6
25	a	6	25	c	3
10	a	5	10	b	5

d) SELECT * FROM T1 JOIN T2 ON T1.Q = T2.B;



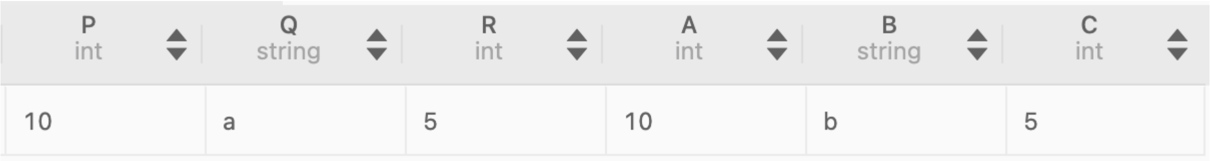
P int	Q string	R int	A int	B string	C int
15	b	8	10	b	6
15	b	8	10	b	5

e) SELECT P AS Column1, Q AS Column2, R AS Column3 FROM T1 UNION SELECT A AS Column1, B AS Column2, C AS Column3 FROM T2;



Column1 int	Column2 string	Column3 int
10	a	5
15	b	8
25	a	6
10	b	6
25	c	3
10	b	5

f) SELECT * FROM T1 JOIN T2 ON T1.P = T2.A AND T1.R = T2.C;



P int	Q string	R int	A int	B string	C int
10	a	5	10	b	5

(8.24) - Tuple Relational Calculus (TRC) / Domain Relational Calculus (DRC)

a) .

I. **TRC -** {e.Fname, e.Lname | EMPLOYEE(e) ∧ WORKS_ON(w) ∧ e.Ssn = w.Essn ∧ e.Dno = 5 ∧ w.Pno = 1 ∧ w.Hours > 10}

II. **DRC -** {Fname, Lname | ∃ Ssn, Dno, Pno, Essn, Hours (EMPLOYEE(Fname, Lname, Ssn, Dno, _, _) ∧ WORKS_ON(Essn, Pno, Hours) ∧ Ssn = Essn ∧ Dno = 5 ∧ Pno = 1 ∧ Hours > 10)}

b) **.**

I. **TRC –** {e.Fname, e.Lname | EMPLOYEE(e) ∧ DEPENDENT(d) ∧ e.Ssn = d.Essn ∧ e.Fname = d.Dependent_name}

II. **DRC –** {Fname, Lname | ∃ Ssn, Dependent_name (EMPLOYEE(Fname, Lname, Ssn, _, _, _) ∧ DEPENDENT(Ssn, Dependent_name, _, _, _, _) ∧ Fname = Dependent_name)}

c) **.**

I. **TRC –** {e.Fname, e.Lname | EMPLOYEE(e) ∧ ∃ s (EMPLOYEE(s) ∧ s.Fname = 'Franklin' ∧ s.Lname = 'Wong' ∧ e.Super_ssn = s.Ssn)}

II. **DRC –** {Fname, Lname | ∃ Ssn, Super_ssn (EMPLOYEE(Fname, Lname, Ssn, Super_ssn, _, _) ∧ ∃ Ssn2 (EMPLOYEE(_, 'Franklin', 'Wong', Ssn2, _, _) ∧ Super_ssn = Ssn2))}

d) **--**

e) **.**

I. **TRC –** {e.Fname, e.Lname | EMPLOYEE(e) ∧ ¬∃ p (PROJECT(p) ∧ ¬∃ w (WORKS_ON(w) ∧ w.Essn = e.Ssn ∧ w.Pno = p.Pnumber))}

II. **DRC –** {Fname, Lname | ∃ Ssn (EMPLOYEE(Fname, Lname, Ssn, _, _, _) ∧ ¬∃ Pnumber (PROJECT(Pnumber, _, _) ∧ ¬∃ Pno (WORKS_ON(Ssn, Pno, _) ∧ Pno = Pnumber)))}

f) **.**

I. **TRC –** {e.Fname, e.Lname | EMPLOYEE(e) ∧ ¬∃ w (WORKS_ON(w) ∧ w.Essn = e.Ssn)}

II. **DRC –** {Fname, Lname | ∃ Ssn (EMPLOYEE(Fname, Lname, Ssn, _, _, _) ∧ ¬∃ Essn (WORKS_ON(Essn, _, _) ∧ Essn = Ssn))}

g) **--**

h) **--**

i) **.**

I. **TRC –** {e.Lname | EMPLOYEE(e) ∧ ∃ d (DEPARTMENT(d) ∧ d.Mgr_ssn = e.Ssn) ∧ ¬∃ dep (DEPENDENT(dep) ∧ dep.Essn = e.Ssn)}

II. **DRC –** {Fname, Lname, Address | ∃ Ssn, Dno (EMPLOYEE(Fname, Lname, Ssn, Dno, Address, _) ∧ ∃ Pnumber (PROJECT(Pnumber, _, 'Houston') ∧ ∃ Pno (WORKS_ON(Ssn, Pno, _) ∧ Pno = Pnumber)) ∧ ¬∃ Dnumber (DEPT_LOCATIONS(Dnumber, 'Houston') ∧ Dnumber = Dno))}

j) **.**

I. **TRC –** {e.Lname | EMPLOYEE(e) ∧ ∃ d (DEPARTMENT(d) ∧ d.Mgr_ssn = e.Ssn) ∧ ¬∃ dep (DEPENDENT(dep) ∧ dep.Essn = e.Ssn)}

II. **DRC –** {Lname | ∃ Ssn (EMPLOYEE(_, Lname, Ssn, _, _, _) ∧ ∃ Mgr_ssn (DEPARTMENT(Mgr_ssn, _, _) ∧ Mgr_ssn = Ssn) ∧ ¬∃ Essn (DEPENDENT(Essn, _, _, _, _, _) ∧ Essn = Ssn))}

(8.26) - Tuple Relational Calculus (TRC) / Domain Relational Calculus (DRC)

a) --

b) --

c) .

   a. **TRC -** {name | BORROWER(b) ∧ ¬∃ l (BOOK_LOANS(l) ∧ l.Card_no = b.Card_no) ∧ b.Name = name}

   b. **DRC -** {Name | ∃ Card_no, Address (BORROWER(Name, Card_no, Address, _, _) ∧ ¬∃ Book_id, Due_date, Branch_id (BOOK_LOANS(Card_no, Book_id, Due_date, Branch_id)))}

d) .

   a. **TRC -** {b.Title, br.Name, br.Address | BOOK_LOANS(l) ∧ LIBRARY_BRANCH(lb) ∧ lb.Branch_name = 'Sharpstown' ∧ l.Due_date = TODAY ∧ l.Branch_id = lb.Branch_id ∧ BORROWER(br) ∧ BOOK(b) ∧ l.Card_no = br.Card_no ∧ l.Book_id = b.Book_id}

   b. **DRC -** {Title, Name, Address | ∃ Book_id, Card_no, Branch_id (BOOK_LOANS(Card_no, Book_id, TODAY, Branch_id) ∧ ∃ Branch_name (LIBRARY_BRANCH(Branch_id, Branch_name, _) ∧ Branch_name = 'Sharpstown') ∧ ∃ BorrowerName, BorrowerAddress (BORROWER(BorrowerName, Card_no, BorrowerAddress, _, _) ∧ ∃ BookTitle (BOOK(Book_id, BookTitle, _) ∧ Title = BookTitle ∧ Name = BorrowerName ∧ Address = BorrowerAddress)))}

e) –

f) .

   a. **TRC -** {name, address, count | BORROWER(b) ∧ ∃ lc (BOOK_LOANS(lc) ∧ lc.Card_no = b.Card_no ∧ COUNT(Book_id) > 5 ∧ name = b.Name ∧ address = b.Address ∧ count = COUNT(Book_id))}

   b. **DRC -** {Name, Address, LoanCount | ∃ Card_no (BORROWER(Name, Card_no, Address, _, _) ∧ ∃ LoanCount (LoanCount > 5 ∧ ∃ Book_id (BOOK_LOANS(Card_no, Book_id, _, _) ∧ COUNT(Book_id) = LoanCount)))}