

CSC 742

Database Management Systems

Topic #7: Relational Algebra - Supplement

Spring 2002

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Employee

Fname	Lname	SSN
Alice	Zelaya	999-88-7777
Jennifer	Wallace	111-22-3333
Joyce	White	222-33-4444

Dependent

Fname	Lname	ESSN
Eric	Zelaya	999-88-7777
Alex	Wallace	111-22-3333

Employee $\bowtie_{\rho(\text{DFname, DLname, SSN})}$ **Dependent**

Fname	Lname	SSN	DFName	DLname
Alice	Zelaya	999-88-7777	Eric	Zelaya
Jennifer	Wallace	111-22-3333	Alex	Wallace
Joyce	White	222-33-4444	NULL	NULL

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Faculty				
Name	<u>SSN</u>	Rank	Department	
Alice	999-88-7777	Professor	CSC	
Jennifer	111-22-3333	Assistant Prof.	ECE	
Joyce	222-33-4444	Associate Prof.	CSC	

Student			
Name	<u>SSN</u>	Advisor	Department
Eric	999-88-7777	Alice	CSC
Alex	111-22-3333	Jennifer	ECE

Faculty OUTER UNION Student

Name	<u>SSN</u>	Rank	Advisor	Department
Alice	999-88-7777	Professor	NULL	CSC
Jennifer	111-22-3333	Assistant Prof.	NULL	ECE
Joyce	222-33-4444	Associate Prof.	NULL	CSC
Eric	999-88-7777	NULL	Alice	CSC
Alex	111-22-3333	NULL	Jennifer	ECE

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A Complete Set of Relational Algebra

- The complete set of operations
 - ◆ $\{\sigma, \pi, \cup, -, \times\}$
 - ◆ Any of the other relational algebra operations can be expressed as a sequence of operations from this set.
 - ◆ Examples:
 - ◆ $R \cap S =$
 - ◆ $R \bowtie_{<c>} S =$

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Take-home Exercise

- Prove that \cup is not redundant in the set of relational algebra operations $\{\sigma, \pi, \cup, -, \times\}$.

Division Operation

- $R(Z) \div S(Z)$, where $X \subseteq Z$. Let $Y = Z - X$.
- The result is a relation $T(Y)$ that includes a tuple t
 - ◆ if tuples t_R appear in R with $t_R[Y] = t$,
 - ◆ and with $t_R[X] = t_S$ for every tuple t_S in S .

A	B
a1	b1
a2	b1
a3	b1
a4	b1
a1	b2
a3	b2
a2	b3
a3	b3
a1	b4
a2	b4
a3	b4

A
a1
a2
a3

B
b1
b4

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Exercise 1

- Find names of employees in the research dept

Employee(Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, Dno)

Department(Dname, Dnumber, MgrSSN, MgrStartDate)

↙

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Exercise 2

- For every project in 'Stafford' list the controlling dept number and the dept manager's last name

Employee(Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, Dno)

Department(Dname, Dnumber, MgrSSN, MgrStartDate)

Project(Pname, Pnumber, Plocation, Dnum)

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Exercise 3

- Find SSNs of employees who work on all the projects controlled by dept 5.

Employee(Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, Dno)

Works_on(ESSN, Pno, Hours)

Project(Pname, Pnumber, Plocation, Dnum)

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