Chapter 3: Specifics on The Relational Model

CSCI 475

Relational Algebra - Join

Combines information from two or more entities.

Natural Join - Joins two tables with common values.

Ex:

SELECT * FROM Officers, Tickets WHERE Officers.OfficerID = Tickets.OfficerID;

SELECT * FROM Officers NATURAL JOIN Tickets;

Relational Algebra - Join Examples

Student Entity

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

Professor Entity

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

Relational Algebra - Natural Join Example

Step 1: Take Cross PRODUCT

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
100278		1	2
100278		2	6
100278		3	6
100278		4	4
128569	2	1	2
128569	2	2	6
128569	2	3	6
128569	2	4	4
512272	4	1	2
512272	4	2	6
512272	4	3	6
512272	4	4	4
531235	2	1	2
531235	2	2	6
531235	2	3	6
531235	2	4	4
531268		1	2
531268		2	6
531268		3	6
531268		4	4
553427	1	1	2
553427	1	2	6
553427	1	3	6
553427	1	4	4

Relational Algebra - Natural Join Example

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
100278		1	2
100278		2	6
100278		3	6
100278		4	4
128569	2	1	2
128569	2	2	6
128569	2	3	6
128569	2	4	4
512272	4	1	2
512272	4	2	6
512272	4	3	6
512272	4	4	4
531235	2	1	2
531235	2	2	6
531235	2	3	6
531235	2	4	4
531268		1	2
531268		2	6
531268		3	6
531268		4	4
553427	1	1	2
553427	1	2	6
553427	1	3	6
553427	1	4	4

Step 2: SELECT Like Terms on Common Attribute

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
128569	2	2	6
512272	4	4	4
531235	2	2	6
553427	1	1	2

Relational Algebra - Natural Join Example

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
128569	2	2	6
512272	4	4	4
531235	2	2	6
553427	1	1	2

Step 3: SELECT Non-Duplicate Attributes

STU_CODE	PROF_CODE	DEPT_CODE
128569	2	6
512272	4	4
531235	2	6
553427	1	2

Relational Algebra - Left Outer Join: Student LOJ Professor

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
100278		NULL	NULL
128569	2	2	6
512272	4	4	4
531235	2	2	6
531268		NULL	NULL
553427	1	1	2

Relational Algebra - Right Outer Join Student ROJ Professor

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
128569	2	2	6
512272	4	4	4
531235	2	2	6
553427	1	1	2
NULL	NULL	3	6

Professor LOJ Student
(same as Student ROJ Professor)

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

Professor.PROF_CODE	DEPT_CODE	STU_CODE	Student.PROF_CODE
2	6	128569	6
4	4	512272	4
2	6	531235	6
1	2	553427	2
3	6	NULL	NULL

Left Outer Join *revisited*
Student LOJ Professor

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

STU_CODE	Student.PROF_CODE	Professor.PROF_CODE	DEPT_CODE
100278		NULL	NULL
128569	2	2	6
512272	4	4	4
531235	2	2	6
531268		NULL	NULL
553427	1	1	2

Professor ROJ Student
(same as Student LOJ Professor)

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

Professor.PROF_CODE	DEPT_CODE	STU_CODE	Student.PROF_CODE
NULL	NULL	100278	
2	6	128569	2
4	4	512272	4
2	6	531235	2
NULL	NULL	531268	
1	2	553427	2