

关系代数（上）

讲解人：陆伟

关系模型的特征

关系操作(Relational manipulation)

- The data manipulation on relational model is in fact the manipulation on relation or set.
- The **relational algebra** and **relational calculus** are two formal, non-user-friendly languages but they have been used as the basis for other higher-level Data Manipulation Languages (DMLs) for relational database.
- The relational algebra and relational calculus are equivalent to one another.

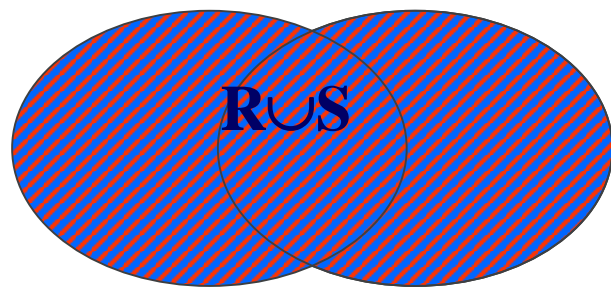
Relations are closed under the algebra

- Both the operands and the results are relations.

关系代数(Relational Algebra)

□ 并(Union)

- The union to two relations R and S defines a relation that contains all the tuples of R, or S, or both R and S, duplicate tuples being eliminated.
- R and S must be union-compatible. – the arities (degree) of the two relations must be equivalent
- $R \cup S = \{t \mid t \in R \vee t \in S\}$



关系代数(Relational Algebra)

R

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

S

A	B	C
3	4	5
7	2	3

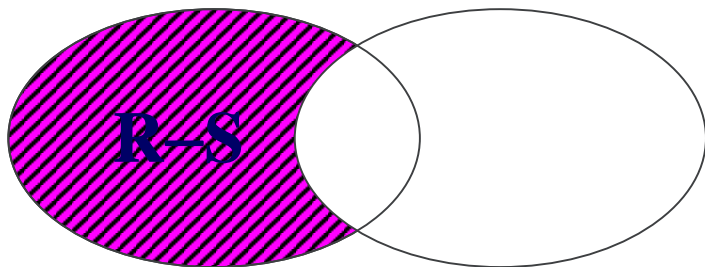
R ∪ S

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

关系代数(Relational Algebra)

□ 差(Difference)

- The set difference operation defines a relation consisting of the tuples that are in relation R, but not in S.
- R and S must be union-compatible.
- $R - S = \{t \mid t \in R \wedge t \notin S\}$



关系代数(Relational Algebra)

R

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

S

A	B	C
3	4	5
7	2	3

R-S

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

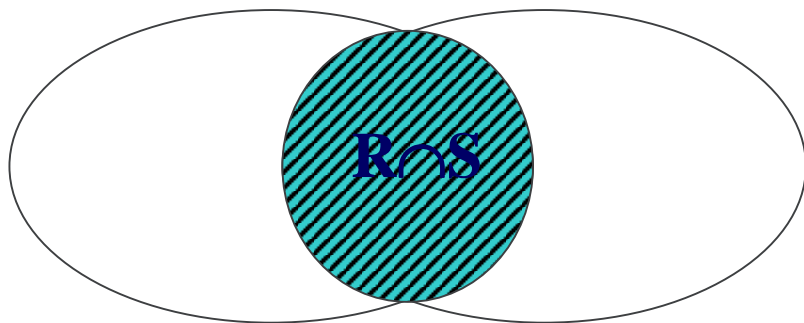
S-R

A	B	C
3	4	5

关系代数(Relational Algebra)

□ 交(Intersection)

- The intersection operation defines a relation consisting of the set of all tuples that are in both R and S.
- R and S must be union-compatible.
- $R \cap S = \{t \mid t \in R \wedge t \in S\}$
- $R \cap S = R - (R - S)$



关系代数(Relational Algebra)

R

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

S

A	B	C
3	4	5
7	2	3

$R \cap S$

A	B	C
7	2	3

关系代数(Relational Algebra)

笛卡尔积(Cartesian product)

- The Cartesian product operation defines a relation that is the concatenation of every tuple of relation R with every tuple of relation S.

$$R \times S = \{t \mid t = \langle t_r, t_s \rangle \wedge t_r \in R \wedge t_s \in S\}$$

- Let the arities of R and S be m and n. Let cardinalities of R and S be k1 and k2.
- The arity (degree) of the new relation will be m+n
- The cardinality of the new relation will be $k1 \times k2$

关系代数(Relational Algebra)

R

A	B
<i>a</i>	1
<i>b</i>	2

S

C	D	E
<i>a</i>	10	<i>x</i>
<i>b</i>	10	<i>x</i>
<i>b</i>	20	<i>y</i>
<i>c</i>	10	<i>y</i>

$R \times S$

A	B	C	D	E
<i>a</i>	1	<i>a</i>	10	<i>x</i>
<i>a</i>	1	<i>b</i>	10	<i>x</i>
<i>a</i>	1	<i>b</i>	20	<i>y</i>
<i>a</i>	1	<i>c</i>	10	<i>y</i>
<i>b</i>	2	<i>a</i>	10	<i>x</i>
<i>b</i>	2	<i>b</i>	10	<i>x</i>
<i>b</i>	2	<i>b</i>	20	<i>y</i>
<i>b</i>	2	<i>c</i>	10	<i>y</i>

关于本讲内容



祝各位学习愉快!

感谢观看！

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