

## CS122 Using Relational Databases and SQL Joins

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## Combine Information from Different Tables

◆ Find the shipping address of Order #2

orders

id	customer_id	date_ordered	date_shipped
1	1	5/29/2007	6/5/2007
2	2	6/1/2007	null

customers

id	first_name	last_name	address
1	John	Doe	123 Main Street
2	Jane	Doe	123 Main Street
3	Tom	Smith	456 State Street

## Put Two Tables Together – The Cartesian Product

◆ A.K.A. Cross Join

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

 × 

C	D
c <sub>1</sub>	d <sub>1</sub>
c <sub>2</sub>	d <sub>2</sub>
c <sub>3</sub>	d <sub>3</sub>

 = 

A	B	C	D
a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub>
a <sub>1</sub>	b <sub>1</sub>	c <sub>2</sub>	d <sub>2</sub>
a <sub>1</sub>	b <sub>1</sub>	c <sub>3</sub>	d <sub>3</sub>
a <sub>2</sub>	b <sub>2</sub>	c <sub>1</sub>	d <sub>1</sub>
a <sub>2</sub>	b <sub>2</sub>	c <sub>2</sub>	d <sub>2</sub>
a <sub>2</sub>	b <sub>2</sub>	c <sub>3</sub>	d <sub>3</sub>

```
select * from orders, customers;  
select * from orders cross join customers;
```

## Problem of Cross Join

◆ Suppose Table A has 1000 rows, Table B has 1000 rows, how many rows does the result of A cross join B has??

## An Equi-Join Query

```
select orders.id, c.address  
from orders, customers c  
where orders.customer_id = c.id  
and orders.id = 2;
```

Table  
Alias

## Inner Join

```
select orders.id, c.address  
from orders inner join customers c  
on orders.customer_id = c.id  
and orders.id = 2;
```

## Some Join Examples

- ◆ List the names of the customers who placed orders on September 1, 2011
- ◆ List the descriptions of all the products ordered on September 1, 2011
- ◆ List the descriptions of the products ordered by John Doe on September 1, 2011

## The Unmatched Rows ...

- ◆ List the names of the customers and the id's of their orders

```
select c.first_name, c.last_name, o.id
from customers c inner join orders o
on c.id = o.customer_id;
```



first_name	last_name	id
John	Doe	1
Jane	Doe	2

## ... The Unmatched Rows

- ◆ What if we want the following results:

first_name	last_name	id
John	Doe	1
Jane	Doe	2
Tom	Smith	null

## Outer Joins

- ◆ Include the results of an Inner Join and the unmatched rows from *one or both* join tables

table1

A	B
1	10
2	12

table2

C	D
1	23
3	32
4	34

## Left Outer Join

- ◆ A.K.A. Left Join

table1 *left outer join* table2 on A=C

A	B	C	D
1	10	1	23
2	12	null	null

## Right Outer Join

- ◆ A.K.A. Right Join

table1 *right outer join* table2 on A=C

A	B	C	D
1	10	1	23
null	null	3	32
null	null	4	34

## Full Outer Join

- ◆ A.K.A. Full Join
- ◆ MySQL does not support full outer join

table1 *full outer join* table2 on A=C

A	B	C	D
1	10	1	23
2	12	null	null
null	null	3	32
null	null	4	34

## Outer Join Example

- ◆ Find the customers who have never ordered anything
- ◆ Find the products that have never been ordered

## Self Join

- ◆ Find the pairs of customers who live together