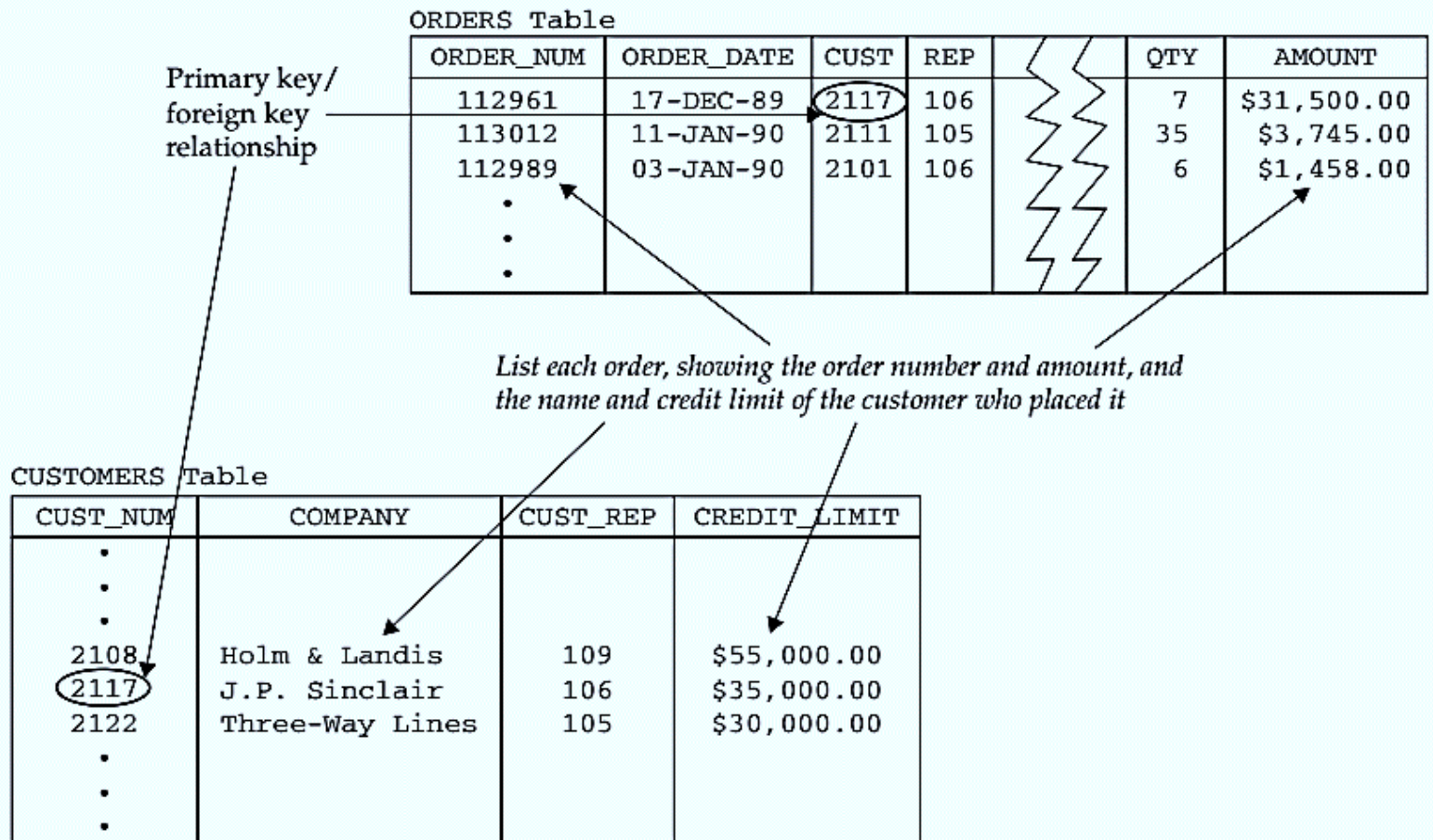# Multi-table Queries

September 26, 28, 2022

Some more Queries

- List the salespeople and the offices (city) where they work
  - SALESREPS and OFFICES table

- List each order placed last week, showing the order amount, the name of the customer who placed it, and the name of the product ordered
  - ORDERS, CUSTOMERS, PRODUCT table

- Show all orders taken by salespeople in the Eastern region, showing the product description and salesperson
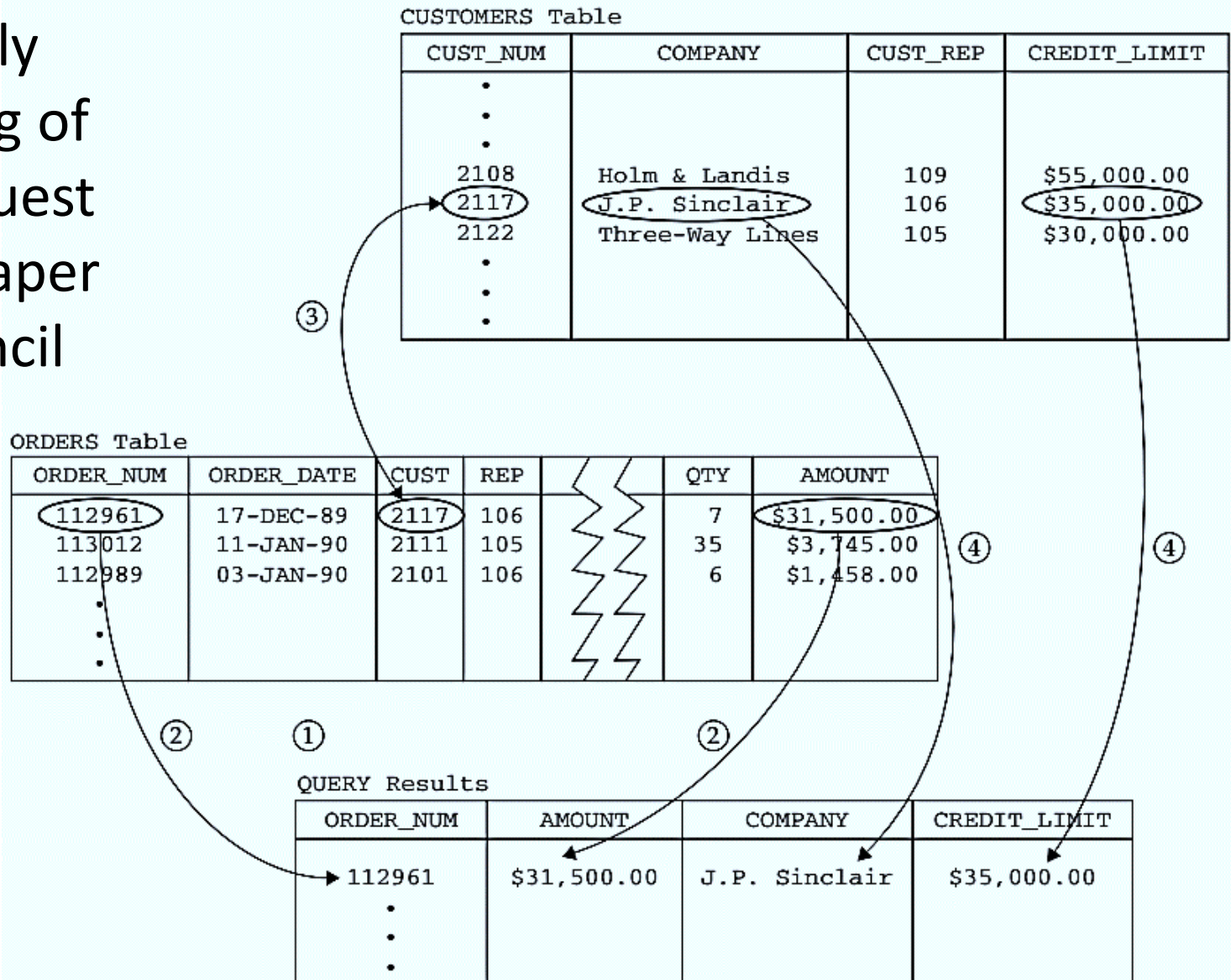 - ORDERS, SALESREPS, OFFICES, and PRODUCT table

Two Table Query

- List all orders, showing the order no. and amount, and the name and credit limit of the customer who placed it.

ORDERS Table

ORDER_NUM	ORDER_DATE	CUST	REP		QTY	AMOUNT
112961	17-DEC-89	2117	106		7	$31,500.00
113012	11-JAN-90	2111	105		35	$3,745.00
112989	03-JAN-90	2101	106		6	$1,458.00

Primary key/ foreign key relationship

List each order, showing the order number and amount, and the name and credit limit of the customer who placed it

CUSTOMERS Table

CUST_NUM	COMPANY	CUST_REP	CREDIT_LIMIT
2108	Holm & Landis	109	$55,000.00
2117	J.P. Sinclair	106	$35,000.00
2122	Three-Way Lines	105	$30,000.00

- List all orders, showing the order no. and amount, and the name and credit limit of the customer who placed it.

Manually handling of the request using paper and pencil

CUSTOMERS Table

CUST_NUM	COMPANY	CUST_REP	CREDIT_LIMIT
.			
.			
.			
2108	Holm & Landis	109	$55,000.00
2117	J.P. Sinclair	106	$35,000.00
2122	Three-Way Lines	105	$30,000.00
.			
.			
.			

③

ORDERS Table

ORDER_NUM	ORDER_DATE	CUST	REP		QTY	AMOUNT
112961	17-DEC-89	2117	106		7	$31,500.00
113012	11-JAN-90	2111	105		35	$3,745.00
112989	03-JAN-90	2101	106		6	$1,458.00
.						
.						
.						

④   ④

②   ①   ②

QUERY Results

ORDER_NUM	AMOUNT	COMPANY	CREDIT_LIMIT
112961	$31,500.00	J.P. Sinclair	$35,000.00
.			
.			
.			

Simple Joins (Equi-joins)

- List all orders, showing the order no. and amount, and the name and credit limit of the customer who placed it.

```
SELECT ORDER_NUM, AMOUNT, COMPANY, CREDIT_LIMIT
  FROM ORDERS, CUSTOMERS
 WHERE CUST = CUST_NUM;
```

- Each order (child) has an associated customer (parent), and each customer (parent) can have many associated orders (children).

- Query results are parent/child row combinations.

Parent/Child Queries

- List each salesperson and the city and region where they work.

```
SELECT NAME, CITY, REGION
  FROM SALESREPS, OFFICES
 WHERE REP_OFFICE = OFFICE;
```

OFFICES Table

OFFICE	CITY	REGION	MGR	TARGET	SALES
22	Denver	Western	108	$300,000.00	$186,042.00
11	New York	Eastern	106	$575,000.00	$692,637.00
12	Chicago	Eastern	104	$800,000.00	$735,042.00
13	Atlanta	Eastern	NULL	$350,000.00	$367,911.00
21	Los Angeles	Western	108	$725,000.00	$835,915.00

The SALESREPS (child) table contains REP_OFFICE, a foreign key for the OFFICES

SALESREPS Table

EMPL_NUM	NAME	AGE	REP_OFFICE	TITLE
105	Bill Adams	37	13	Sales Rep
109	Mary Jones	31	11	Sales Rep
102	Sue Smith	48	21	Sales Rep
106	Sam Clark	52	11	VP Sales
104	Bob Smith	33	12	Sales Mgr
101	Dan Roberts	45	12	Sales Rep
110	Tom Snyder	41	NULL	Sales Rep
108	Larry Fitch	62	21	Sales Mgr
103	Paul Cruz	29	12	Sales Rep
107	Nancy Angelli	49	22	Sales Rep

Query Results

NAME	CITY	REGION

Parent/Child Queries

- List the offices and the names and titles of their managers.

```
SELECT CITY, NAME, TITLE
  FROM OFFICES, SALESREPS
WHERE MGR = EMPL_NUM;
```

Same two tables, but with the parent and child roles reversed

SALESREPS Table

EMPL_NUM	NAME	AGE	REP_OFFICE	TITLE
105	Bill Adams	37	13	Sales Rep
109	Mary Jones	31	11	Sales Rep
102	Sue Smith	48	21	Sales Rep
106	Sam Clark	52	11	VP Sales
104	Bob Smith	33	12	Sales Mgr
101	Dan Roberts	45	12	Sales Rep
110	Tom Snyder	41	NULL	Sales Rep
108	Larry Fitch	62	21	Sales Mgr
103	Paul Cruz	29	12	Sales Rep
107	Nancy Angelli	49	22	Sales Rep

OFFICES Table

OFFICE	CITY	REGION	MGR	TARGET
22	Denver	Western	108	$300,000.00
11	New York	Eastern	106	$575,000.00
12	Chicago	Eastern	104	$800,000.00
13	Atlanta	Eastern	NULL	$350,000.00
21	Los Angeles	Western	108	$725,000.00

Query Results

CITY	NAME	TITLE

Joins with Row Selection Criteria

- List the offices with a target over Rs. 600,000 and their manager information. (print city, manager name and title)

```
SELECT CITY, NAME, TITLE
   FROM OFFICES, SALESREPS
 WHERE MGR = EMPL_NUM;
```

```
SELECT CITY, NAME, TITLE
   FROM OFFICES, SALESREPS
 WHERE MGR = EMPL_NUM
   AND TARGET > 600000.00;
```

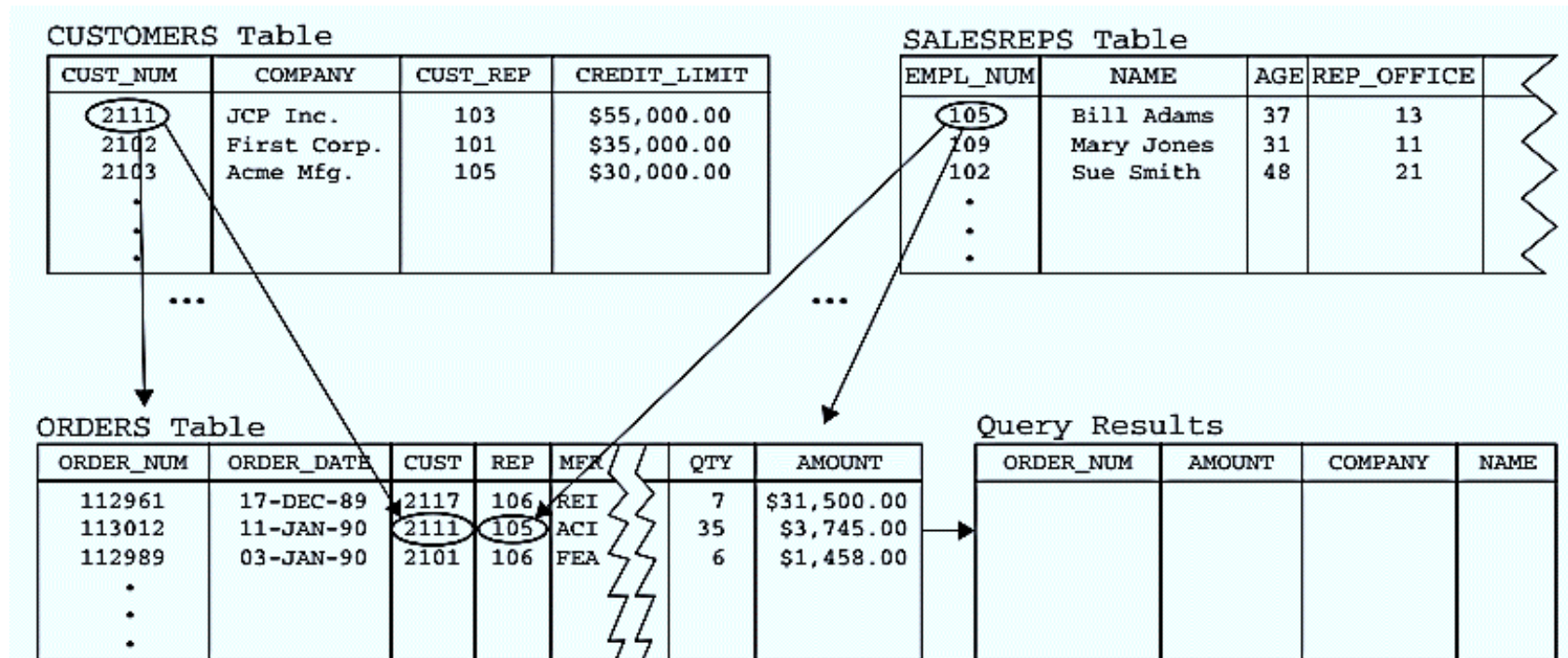| CITY	NAME	TITLE
Chicago	Bob Smith	Sales Mgr
Los Angeles	Larry Fitch	Sales Mgr

Multiple Matching Columns

- List all the orders, showing amount and product descriptions.

```
SELECT ORDER_NUM, AMOUNT, DESCRIPTION
  FROM ORDERS, PRODUCTS
 WHERE MFR = MFR_ID
   AND PRODUCT = PRODUCT_ID;
```

Three Table Queries

- List orders over 25,000, including the name of the salesperson who took the order and the name of the customer who placed it.

CUSTOMERS Table

CUST_NUM	COMPANY	CUST_REP	CREDIT_LIMIT
2111	JCP Inc.	103	$55,000.00
2102	First Corp.	101	$35,000.00
2103	Acme Mfg.	105	$30,000.00

SALESREPS Table

EMPL_NUM	NAME	AGE	REP_OFFICE
105	Bill Adams	37	13
109	Mary Jones	31	11
102	Sue Smith	48	21

ORDERS Table

ORDER_NUM	ORDER_DATE	CUST	REP	MFR	QTY	AMOUNT
112961	17-DEC-89	2117	106	REI	7	$31,500.00
113012	11-JAN-90	2111	105	ACI	35	$3,745.00
112989	03-JAN-90	2101	106	FEA	6	$1,458.00

Query Results

ORDER_NUM	AMOUNT	COMPANY	NAME

Three Table Queries

- List orders over 25,000, including the name of the salesperson who took the order and the name of the customer who placed it.

```
SELECT ORDER_NUM, AMOUNT, COMPANY, NAME
  FROM ORDERS, CUSTOMERS, SALESREPS
 WHERE CUST = CUST_NUM
   AND REP = EMPL_NUM
   AND AMOUNT > 25000.00;
```

Three Table Queries

- List the orders over 25,000 showing the name of the customer who placed the order and the name of the salesperson assigned to that customer.

SALESREPS Table

EMPL_NUM	NAME	AGE	REP_OFFICE	
.				
.				
.				
108	Larry Fitch	62	21	
103	Paul Cruz	29	12	
107	Nancy Angelli	49	22	

```
SELECT ORDER_NUM, AMOUNT, COMPANY, NAME
  FROM ORDERS, CUSTOMERS, SALESREPS
 WHERE CUST = CUST_NUM
   AND CUST_REP = EMPL_NUM
   AND AMOUNT > 25000.00;
```

CUSTOMERS Table

CUST_NUM	COMPANY	CUST_REP	CREDIT_LIMIT
2111	JCP Inc.	103	$50,000.00
2102	First Corp.	101	$65,000.00
2103	Acme Mfg.	105	$50,000.00
.			
.			
.			

ORDERS Table

ORDER_NUM	ORDER_DATE	CUST	REP		QTY	AMOUNT
112961	17-DEC-89	2117	106		7	$31,500.00
113012	11-JAN-90	2111	105		35	$3,745.00
112989	03-JAN-90	2101	106		6	$1,458.00
.						
.						
.						

Query Results

Other Equi-joins

- Find all orders received on days when a new salesperson was hired.

```
SELECT ORDER_NUM, AMOUNT, ORDER_DATE, NAME
  FROM ORDERS, SALESREPS
WHERE ORDER_DATE = HIRE_DATE;
```

ORDERS Table

ORDER_NUM	ORDER_DATE	CUST	
·			
·			
·			
113051	10-FEB-90	2118	
112978	12-OCT-89	2102	
113076	30-JAN-90	2107	
·			
·			
·			
113062	24-FEB-90	2124	
112379	12-OCT-89	2114	
113027	22-JAN-90	2103	
·			
·			
112992	04-NOV-89	2118	
112875	12-OCT-89	2111	
113055	15-FEB-90	2108	
·			
·			
·			

SALESREPS Table

EMPL_NUM	NAME			HIRE_DATE	
105	Bill Adams			12-FEB-88	
109	Mary Jones			12-OCT-89	
102	Sue Smith			10-DEC-86	
106	Sam Clark			14-JUN-88	
104	Bob Smith			19-MAY-88	
101	Dan Roberts			20-OCT-86	
110	Tom Snyder			13-JAN-90	
108	Larry Fitch			12-OCT-89	
103	Paul Cruz			01-MAR-87	
107	Nancy Angelli			14-NOV-89	

Non-Equi-Joins

- List all combinations of salespeople and offices where the salesperson's quota is more than the offices' target.

```
SELECT NAME, QUOTA, CITY, TARGET
  FROM SALESREPS, OFFICES
 WHERE QUOTA > TARGET;
```

SQL Considerations for Multitable Queries

- Qualified column names
- All column selection
- Table aliases
- Self joins

Qualified Column Names

- Show the name, sales, and office for each salesperson.

```
SELECT NAME, SALES, CITY
   FROM SALESREPS, OFFICES
  WHERE REP_OFFICE = OFFICE;
```

```
SELECT NAME, SALESREPS.SALES, CITY
   FROM SALESREPS, OFFICES
  WHERE REP_OFFICE = OFFICE;
```

All Column Selection

- Tell me all about salespeople and offices where they work.

```
SELECT *
  FROM SALESREPS, OFFICES
 WHERE REP_OFFICE = OFFICE;
```

```
SELECT SALESREPS.*, CITY, REGION
  FROM SALESREPS, OFFICES
 WHERE REP_OFFICE = OFFICE;
```

Self Joins

- List the names of all salespeople and their managers.

```
SELECT NAME, NAME
  FROM SALESREPS, SALESREPS
 WHERE MANAGER = EMPL_NUM;
```

```
SELECT NAME, NAME
  FROM SALESREPS
 WHERE MANAGER = EMPL_NUM;
```

```
SELECT EMPS.NAME, MGRS.NAME
  FROM EMPS, MGRS
 WHERE EMPS.MANAGER = MGRS.EMPL_NUM;
```

Self Joins

```
SELECT EMPS.NAME, MGRS.NAME
  FROM EMPS, MGRS
 WHERE EMPS.MANAGER = MGRS.EMPL_NUM;
```

Table Aliases

```
SELECT EMPS.NAME, MGRS.NAME
  FROM SALESREPS EMPS, SALESREPS MGRS
 WHERE EMPS.MANAGER = MGRS.EMPL_NUM;
```

```
SELECT SALESREPS.NAME, MGRS.NAME
  FROM SALESREPS, SALESREPS MGRS
 WHERE SALESREPS.MANAGER = MGRS.EMPL_NUM;
```

MGRS (copy of SALESREPS) Table

EMPL_NUM	NAME	AGE	REP_OFFICE
105	Bill Adams	37	13
109	Mary Jones	31	11
102	Sue Smith	48	21
106	Sam Clark	52	11
104	Bob Smith	33	12
101	Dan Roberts	45	12
110	Tom Snyder	41	NULL
108	Larry Fitch	62	21
103	Paul Cruz	29	12
107	Nancy Angelli	49	22

EMPS (copy of SALESREPS) Table

EMPL_NUM	NAME	AGE	REP_OFFICE	TITLE	HIRE_DATE	MANAGER
105	Bill Adams	37	13	Sales Rep	12-JAN-88	104
109	Mary Jones	31	11	Sales Rep	12-OCT-89	106
102	Sue Smith	48	21	Sales Rep	10-DEC-86	108
106	Sam Clark	52	11	VP Sales	14-JUN-88	NULL
104	Bob Smith	33	12	Sales Mgr	19-MAY-87	106
101	Dan Roberts	45	12	Sales Rep	20-OCT-86	104
110	Tom Snyder	41	NULL	Sales Rep	13-JAN-90	101
108	Larry Fitch	62	21	Sales Mgr	12-OCT-89	106
103	Paul Cruz	29	12	Sales Rep	01-MAR-87	104
107	Nancy Angelli	49	22	Sales Rep	14-NOV-88	108

Table Aliases

- List names, quotas, and birthdays of salespeople.

```
SELECT SALESREPS.NAME, QUOTA, SAM.BIRTHDAYS.BIRTH_DATE
  FROM SALESREPS, SAM.BIRTHDAYS
 WHERE SALESREPS.NAME = SAM.BIRTHDAYS.NAME;
```

```
SELECT S.NAME, S.QUOTA, B.BIRTH_DATE
  FROM SALESREPS S, SAM.BIRTHDAYS B
 WHERE S.NAME = B.NAME;
```

Inner Join

- List salespeople and the offices where they work.

```
SELECT NAME, REP_OFFICE
  FROM SALESREPS;
```

```
NAME              REP_OFFICE
--------------    -----------
Bill Adams                 13
Mary Jones                 11
Sue Smith                  21
Sam Clark                  11
Bob Smith                  12
Dan Roberts                12
Tom Snyder               NULL
Larry Fitch                21
Paul Cruz                  12
Nancy Angelli              22
```

```
SELECT NAME, CITY
  FROM SALESREPS JOIN OFFICES
    ON REP_OFFICE = OFFICE;
```

```
NAME              CITY
--------------    -----------
Mary Jones        New York
Sam Clark         New York
Bob Smith         Chicago
Paul Cruz         Chicago
Dan Roberts       Chicago
Bill Adams        Atlanta
Sue Smith         Los Angeles
Larry Fitch       Los Angeles
Nancy Angelli     Denver
```

Outer Join

- List the salespeople and the cities where they work.

```
SELECT NAME, CITY
   FROM SALESREPS LEFT OUTER JOIN OFFICES
      ON REP_OFFICE = OFFICE;
```

```
NAME              CITY
--------------    ------------
Tom Snyder        NULL
Mary Jones        New York
Sam Clark         New York
Bob Smith         Chicago
Paul Cruz         Chicago
Dan Roberts       Chicago
Bill Adams        Atlanta
Sue Smith         Los Angeles
Larry Fitch       Los Angeles
Nancy Angelli     Denver
```

Includes data for Tom Snyder which was not included in the inner join

```
SELECT NAME, CITY
   FROM OFFICES RIGHT OUTER JOIN SALESREPS
      ON OFFICE = REP_OFFICE;
```

Outer Join

- List the salespeople and the cities where they work.

Suppose the company opens a new sales office in Dallas, but initially the office has no salespeople assigned to it.

```
SELECT CITY, NAME
  FROM OFFICES LEFT OUTER JOIN SALESREPS
    ON OFFICE = REP_OFFICE;
```

FULL OUTER JOIN

```
CITY            NAME
-----------     --------------
New York        Mary Jones
New York        Sam Clark
Chicago         Bob Smith
Chicago         Paul Cruz
Chicago         Dan Roberts
Atlanta         Bill Adams
Los Angeles     Sue Smith
Los Angeles     Larry Fitch
Denver          Nancy Angelli
Dallas          NULL
```

Cross Join

- Another name for the Cartesian product of two tables.

```
SELECT *
  FROM GIRLS CROSS JOIN BOYS;
```

```
SELECT *
  FROM GIRLS, BOYS;
```