

# Multi-table Queries

September, 2023

SALESREPS Table

| EMPL_NUM | NAME       | AGE | REP_OFFICE | TITLE     | HIRE_DATE  | MANAGER | QUOTA        | SALES        |
|----------|------------|-----|------------|-----------|------------|---------|--------------|--------------|
| 105      | Bill Adams | 37  | 13         | Sales Rep | 2006-02-12 | 104     | \$350,000.00 | \$367,911.00 |
| 109      | Mary Jones | 31  | 11         | Sales Rep | 2007-10-12 | 106     | \$300,000.00 | \$392,725.00 |
| 102      | Sue Smith  | 48  | 21         | Sales Rep | 2004-12-10 | 108     | \$350,000.00 | \$474,050.00 |

PRODUCTS Table

| MFR_ID | PRODUCT_ID | DESCRIPTION    | PRICE      | QTY_ON_HAND |
|--------|------------|----------------|------------|-------------|
| REI    | 2A45C      | Ratchet Link   | \$79.00    | 210         |
| ACI    | 4100Y      | Widget Remover | \$2,750.00 | 25          |
| QSA    | Xk47       | Reducer        | \$355.00   | 38          |

ORDERS Table

| ORDER_NUM | ORDER_DATE | CUST | REP | MFR | PRODUCT | QTY | AMOUNT      |
|-----------|------------|------|-----|-----|---------|-----|-------------|
| 112961    | 2007-12-17 | 2117 | 106 | REI | 2A44L   | 7   | \$31,500.00 |
| 113012    | 2008-01-11 | 2111 | 105 | ACI | 41003   | 35  | \$3,745.00  |
| 112989    | 2008-01-03 | 2101 | 106 | FEA | 114X    | 6   | \$1,458.00  |

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 |

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  |

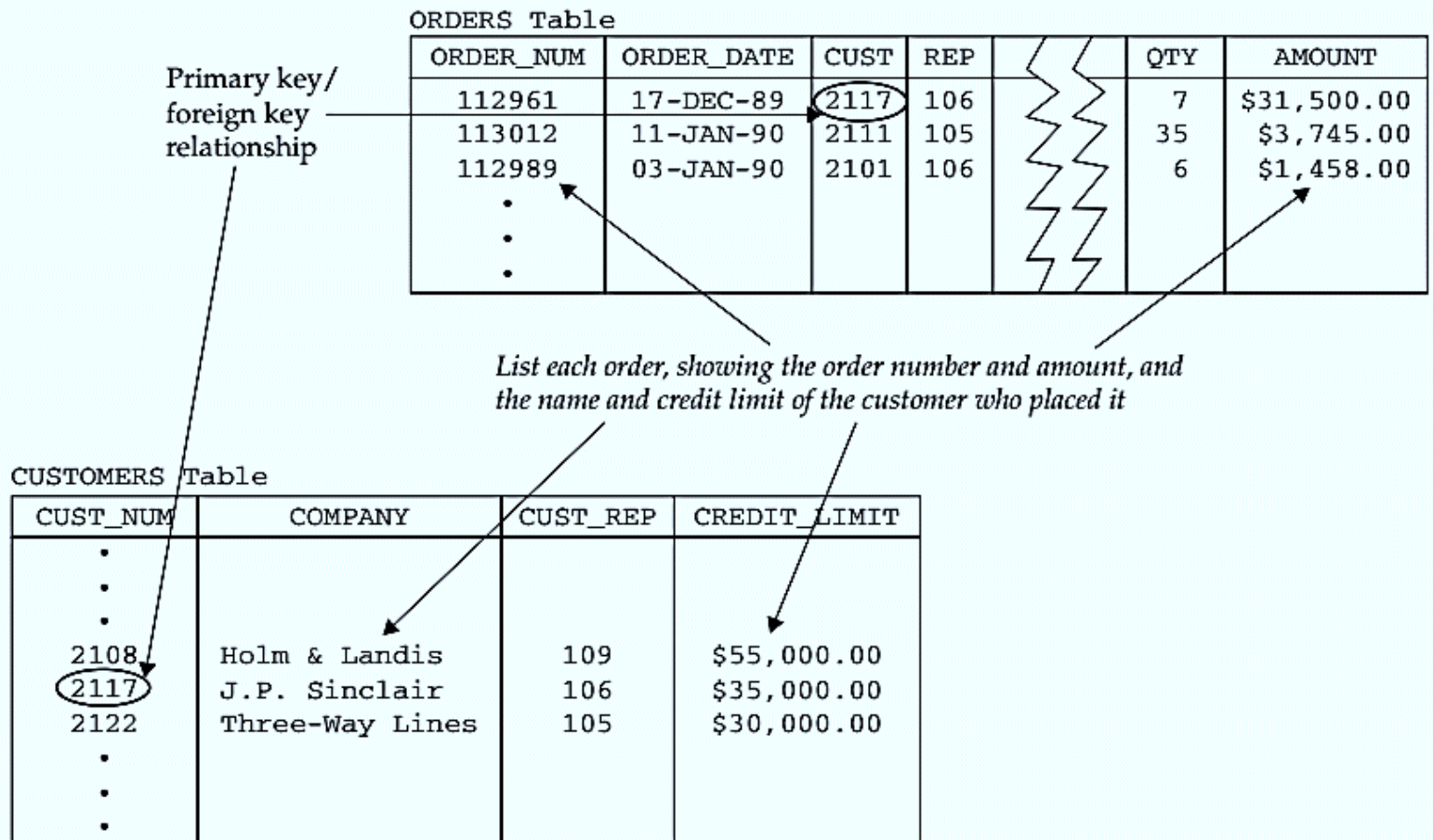
Remember  
Sample  
Database

# 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

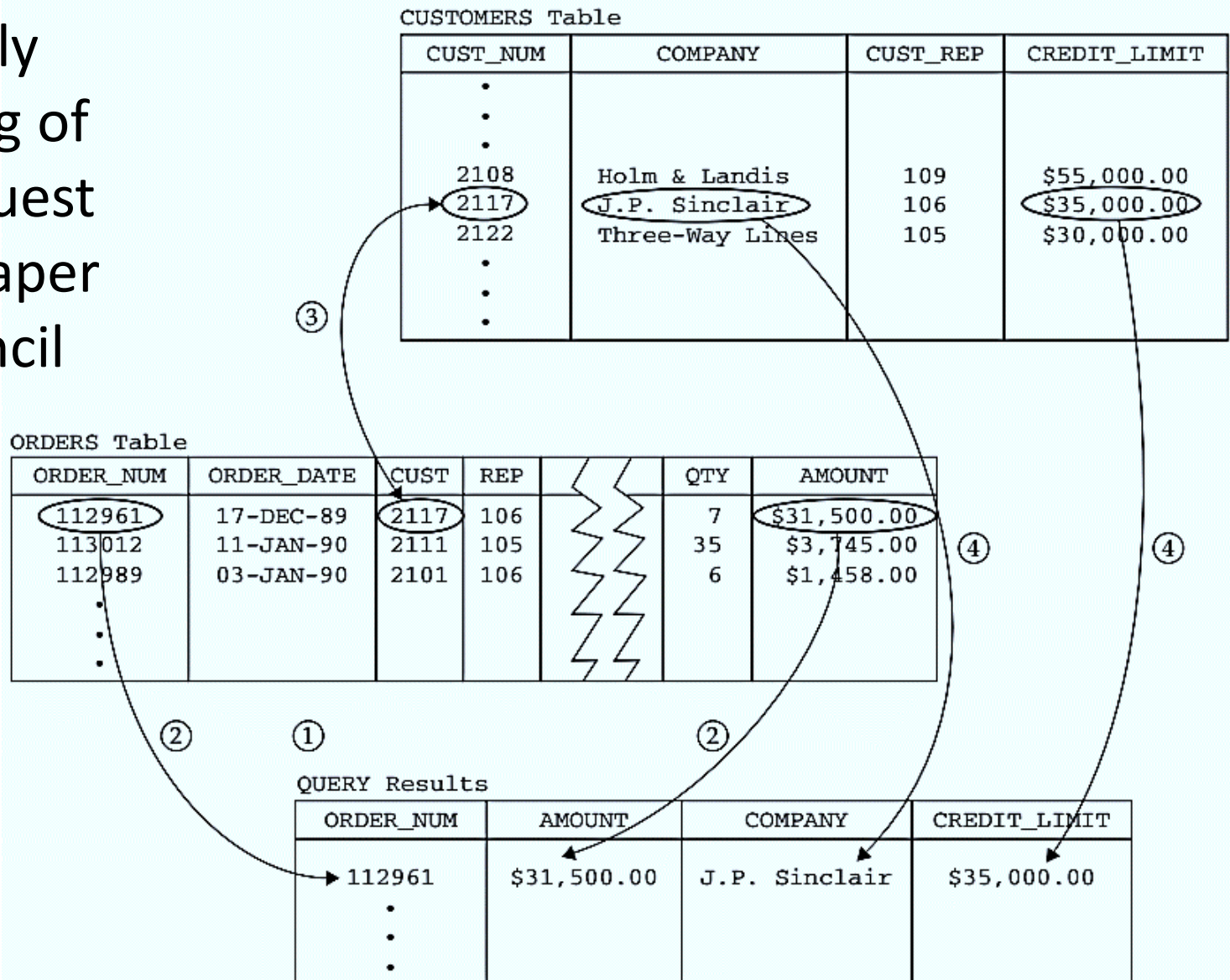
# Two Table Query

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



- 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



# 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
```

```
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;
```

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 |

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

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 |

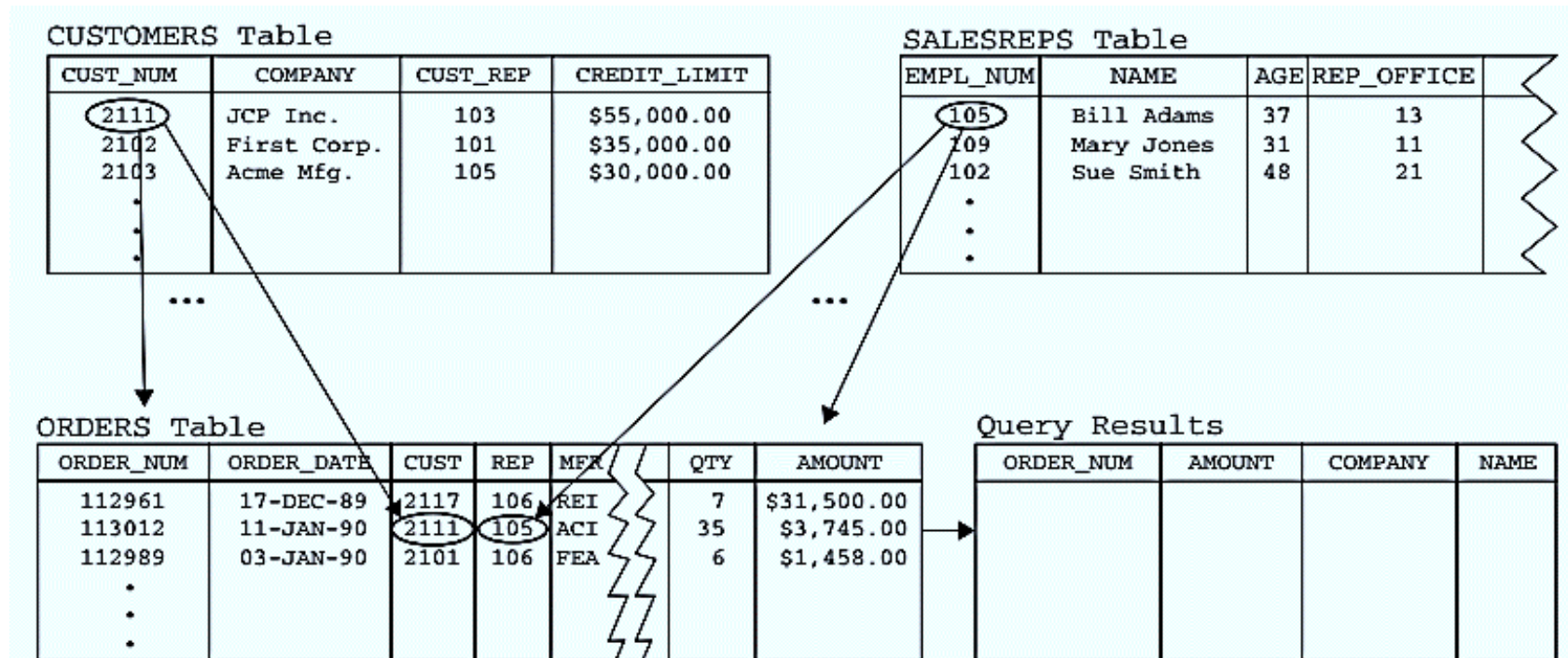
# Multiple Matching Columns

- 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.



# 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;
```

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 |

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 |

# 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.

SALESREPS Table

| EMPL_NUM | NAME       | AGE | REP_OFFICE | TITLE     | HIRE_DATE  | MANAGER | QUOTA        | SALES        |
|----------|------------|-----|------------|-----------|------------|---------|--------------|--------------|
| 105      | Bill Adams | 37  | 13         | Sales Rep | 2006-02-12 | 104     | \$350,000.00 | \$367,911.00 |
| 109      | Mary Jones | 31  | 11         | Sales Rep | 2007-10-12 | 106     | \$300,000.00 | \$392.725.00 |
| 102      | Sue Smith  | 48  | 21         | Sales Rep | 2004-12-10 | 108     | \$350,000.00 | \$474,050.00 |

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

Make 2 copies of  
SALESREPS

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

# Self Joins

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

## Table Aliases

Do we really need 2 copies of  
SALESREPS

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     |

# Self Joins

- List the names of all salespeople and their managers.

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

# 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;
```