

Database Query Example

S

S#	SNAME	STATUS	CITY
S1	Smith	20	London
S2	Jones	10	Paris
S3	Blake	30	Paris
S4	Clark	20	London
S5	Adams	30	Athens

SP

S#	P#	QTY
S1	P1	300
S1	P2	200
S1	P3	400
S1	P4	200
S1	P5	100
S1	P6	100
S2	P1	300
S2	P2	400
S3	P2	200
S4	P2	200
S4	P4	300
S4	P5	400

P

P#	PNAME	COLOR	WEIGHT	CITY
P1	Nut	Red	12	London
P2	Bolt	Green	17	Paris
P3	Screw	Blue	17	Rome
P4	Screw	Red	14	London
P5	Cam	Blue	12	Paris
P6	Cog	Red	19	London

Database Query Example

– Simple Query

- Q1: Get S# of all the suppliers

A1:

```
SELECT S#  
FROM S
```

- Q2: Get S# of all the suppliers that supplies parts

A2:

```
SELECT DISTINCT S#  
FROM SP
```

Database Query Example

- Query with ordering
 - Q3: Get all the suppliers, ordered ascendently by CITY

A3:

```
SELECT *  
FROM S  
ORDER BY CITY (ASC)
```

- Q4: Get all the suppliers, ordered descendently by CITY

A4:

```
SELECT *  
FROM S  
ORDER BY CITY DESC
```

Database Query Example

- Query with conditions
 - Q5: Get all the suppliers located in London and status greater than 20

A5:

```
SELECT *  
FROM S  
WHERE CITY = 'LONDON'  
AND STATUS > 20
```

– AND, OR, NOT

– =, >, <, >=, <=, <>

Database Query Example

- Query with computation
 - Q6: Get weights of all the parts in gram

A6:

```
SELECT P#, 'Weight in gram'=WEIGHT*454  
FROM P
```

Result:

P#	Weight in gram
P1	5448
P2	7718

Database Query Example

- Query with ordering
 - Q7: Get part number, part name and weight of the parts located in London and ordered *ascendently* by weight.

A7:

```
SELECT P#, PNAME, WEIGHT
FROM P
WHERE CITY = 'London'
ORDER BY WEIGHT ASC;
(or ORDER BY WEIGHT;)
```

Database Query Example

- Query with ordering
 - Q8: Get part number, part name and weight of the parts located in London and ordered *descendently* by weight.

A8:

```
SELECT P#, PNAME, WEIGHT  
FROM P  
WHERE CITY = 'London'  
ORDER BY WEIGHT DESC;
```

Database Query Example

- Query with ordering
 - ORDER BY WEIGHT, P# **DESC**;
 - ORDER BY WEIGHT **DESC**, P# **DESC**;
 - ORDER BY 3, P#;
 - ORDER BY 3, 1;

Database Query Example

- Join Query with two tables
 - Q9: Get pairs of S# and P# where the supplier is located in the same city as the part.

A9:

```
SELECT S#, P#  
FROM S, P  
WHERE S.CITY = P.CITY
```

- Explicit join

Database Query Example

- Join Query with two tables
 - Q10: Get supplier name of all the suppliers who supplies part P2

A10:

```
SELECT SNAME
FROM S, SP
WHERE S.S# = SP.S#
AND SP.P# = 'P2'
```

- Implicit join
- Most of the joins in relational database are implicit join
- EX: Get part names that are supplied by S1

Database Query Example

- Join Query with three tables
 - Q11: Get supplier names of all the suppliers who supplies red part
- A11:
- ```
SELECT SNAME
FROM S, P, SP
WHERE S.S# = SP.S#
AND P.P# = SP.P#
AND P.COLOR = 'Red'
```
- EX: Get Part names that supplied by London Suppliers.

# Database Query Example

- Join by itself
  - Q12: Get pairs of supplier numbers where they are located in the same city.

A12:

```
SELECT FIRST.S#, SECOND.S#
FROM S FIRST, S SECOND
WHERE FIRST.CITY = SECOND.CITY
AND FIRST.S# < SECOND.S#
```

- Explicit

# Database Query Example

- Join by itself
  - Consider EMP(E#, ENAME, SALARY, MGR#) where MGR# is a foreign key references E#
  - Q13: Get manager's name of the employee John.

A13:

```
SELECT M.ENAME
FROM EMP E, EMP M
WHERE E.MGR# = M.E#
AND E.ENAME = 'John'
```

- Implicit
- EX: Get Employee's names whose manager is David.

# Database Query Example

- Query with subqueries
  - Q14: Get the supplier names who supplies part P2

A14:

```
SELECT SNAME
FROM S
WHERE S# IN
 (SELECT S#
 FROM SP
 WHERE P#='P2')
```

- Innermost query is evaluated first
- Cf. Q10
- EX: Using subquery to get supplier names of all the suppliers who supplies red part

# Database Query Example

- Query with subqueries (singleton subquery)
  - Q15: Get the supplier numbers who locate in the same city as part P2

A15:

```
SELECT S#
FROM S
WHERE CITY=
 (SELECT CITY
 FROM P
 WHERE P#='P2')
```

- Innermost query returns only one result

# Database Query Example

- Query with existential quantifier
  - Q16: Get the supplier names who supply parts P2

A16:

```
SELECT SNAME
FROM S
WHERE EXISTS
 (SELECT *
 FROM SP
 WHERE SP.S# = S.S#
 AND SP.P# = 'P2')
```

- Cf.: Q10, Q14



# Database Query Example

– Query with existential quantifier

- Q17: Get the supplier names who don't supply P2

A17:

```
SELECT SNAME
FROM S
WHERE NOT EXISTS
 (SELECT *
 FROM SP
 WHERE SP.S# = S.S#
 AND SP.P# = 'P2')
```

- Can this query be completed with Join or subqueries?

# Database Query Example

- Query with existential quantifier
  - Q18: Get the supplier numbers who supply every parts

A18:

```
SELECT S#
FROM S
WHERE NOT EXISTS
 (SELECT *
 FROM P
 WHERE NOT EXISTS
 (SELECT *
 FROM SP
 WHERE SP.S# = S.S#
 AND SP.P# = P.P#))
```

- Can this query be completed with Join or subqueries?

# Database Query Example

- Query with aggregate functions
  - Q19: Get the number of suppliers who located in London

A19:

```
SELECT COUNT(*)
FROM S
WHERE CITY = 'LONDON'
```

- SUM, AVG, COUNT, MIN, MAX,....

# Database Query Example

- Query with groups
  - Q20: Get the total quantities of part supplied by each supplier.

A20:

```
SELECT S#, SUM(QTY)
FROM SP
GROUP BY S#
```

# Database Query Example

- Query with groups
  - Q21: Get the total quantities of red parts supplied by each supplier.

A21:

```
SELECT S#, SUM(QTY)
FROM P,SP
WHERE P.COLOR = 'Red'
AND P.P# = SP.P#
GROUP BY S#
```

- EX: Get the total quantities of parts that supplied by London suppliers

# Database Query Example

- Query with selected groups
  - **Q22: Get the total quantities of red parts supplied by each supplier with total quantities greater than 1000.**

**A22:**

```
SELECT S#, SUM(QTY)
FROM P,SP
WHERE P.COLOR = 'Red'
AND P.P# = SP.P#
GROUP BY S#
HAVING SUM(QTY)>1000
```

- **EX: Get the average quantities of parts that supplied by London suppliers with average quantity less than 500**

# Database Query Example

## – Query with Union

- **Q23: Get the part numbers for parts that either weigh more than 16 pounds or are supplied by supplier S2, or both.**

**A23:**

```
SELECT P#
FROM P
WHERE WEIGHT > 16
```

**UNION**

```
SELECT P#
FROM SP
WHERE S# = 'S2'
```

# Database Query Example

- Query with partial match
  - Q24: Get the details of the part/parts begins with a 'c'.

A24:

```
SELECT *
FROM P
WHERE P.PNAME LIKE 'c%'
```

- '%'  $\cong$  '\*' in DOS, substitute all possible strings
- '\_'  $\cong$  '?' in DOS, substitute all possible character



# Database Query Example

- Query with null value
  - Q25: Get the supplier whose status is unknown

A25:

```
SELECT *
FROM S
WHERE STATUS IS NULL
```

# Database Query Example

## – UPDATE

- Q26: Increase the status of all the London suppliers by 5.

A26:

```
UPDATE S
 SET STATUS = STATUS + 5
 WHERE CITY = 'London'
```

# Database Query Example

## – DELETE

- Q27: Delete the suppliers who only supply red parts.

A27:

```
DELETE
FROM S
WHERE NOT EXISTS
 (SELECT *
 FROM P, SP
 WHERE P.P#=SP.P#
 AND S.S#=SP.S#
 AND P.COLOR <> 'Red')
```

# Database Query Example

## – INSERT

- Q28: Insert a supplier with supplier number 'S6', supplier name 'John', Status 30, City 'Taipei'

A28:

```
INSERT
 INTO S
 VALUES ('S6', 'John', 30, 'Taipei')
```

# SQL Query 習題 (1/4)

S

| 學號       | 姓名    | 性別  | 電話          | 住址                    |
|----------|-------|-----|-------------|-----------------------|
| sid      | sname | sex | phone       | address               |
| 92213018 | 林珈瑋   | 女   | 049-2987215 | 南投縣埔里鎮新市二巷 33 號       |
| 92213019 | 陳曉君   | 女   | 049-2421110 | 南投縣埔里鎮忠孝一路 19 號 306 室 |
| 92213020 | 林志和   | 男   | 049-2991235 | 南投縣埔里鎮光遠三街 69 號       |
| 92213021 | 何幸聰   | 男   | 049-2681749 | 南投縣埔里鎮中正路 630-6 號     |
| 92213022 | 黃詩婷   | 女   | 049-2424138 | 南投縣埔里鎮東門里宏仁路 29 號     |
| 92213023 | 林書平   | 男   | 049-2427781 | 南投縣埔里鎮英一街 16 號        |
| 92213024 | 王瑞然   | 男   | 049-2998159 | 南投縣埔里鎮中正路 630-6 號     |
| 92213025 | 施翔昇   | 男   | 04-8923746  | 彰化縣福興鄉龍舟路 110 巷 84 號  |

## SQL Query 習題 (2/4)

C

| 課程代號 | 課程名稱  | 學分數    | 教師代號 |
|------|-------|--------|------|
| cid  | cname | credit | tid  |
| 2310 | 國文    | 4      | T042 |
| 2311 | 英文    | 4      | T011 |
| 2312 | 物理    | 3      | T012 |
| 2313 | 數學    | 3      | T013 |
| 2314 | 化學    | 3      | T012 |
| 2315 | 生物    | 3      | T015 |
| 2316 | 化學    | 3      | T014 |
| 2317 | 家政    | 2      | T016 |
| 2318 | 家政    | 2      | T043 |
| 2319 | 化學實驗  | 1      | T014 |
| 2320 | 商用英文  | 2      | T011 |

## SQL Query 習題 (3/4)

### T

| 教師代號 | 教師姓名  | 性別  | 電話          | 住址                        |
|------|-------|-----|-------------|---------------------------|
| tid  | tname | sex | phone       | address                   |
| T042 | 湯淑貞   | 女   | 0911-558279 | 南投縣埔里鎮清新里育嬰街 109 號 5 樓    |
| T011 | 楊志彬   | 男   | 0931-492224 | 南投縣埔里鎮南興街 16 號            |
| T043 | 李嘉芳   | 女   | 0921-340013 | 南投縣埔里鎮安八街 28 號            |
| T012 | 詹曜榕   | 男   | 0910-566511 | 南投縣埔里鎮愛蘭里鐵三路 100 巷 5 號    |
| T013 | 楊智欽   | 男   | 0935-478569 | 南投縣埔里鎮大城路 35-2 號          |
| T014 | 陳順吉   | 男   | 0920-456789 | 南投縣埔里鎮樹人二街 2-15 號         |
| T015 | 陳建一   | 男   | 0921-012225 | 南投縣埔里鎮大學路 42 號            |
| T016 | 馬幼明   | 男   | 0918-988482 | 南投縣埔里鎮桃米里桃米巷 54-5 號 312 室 |

## SQL Query 習題 (4/4)

SC

| 學號       | 課程代號 | 成績    |
|----------|------|-------|
| sid      | cid  | Score |
| 92213018 | 2310 | 60    |
| 92213018 | 2311 | 70    |
| 92213018 | 2312 | 88    |
| 92213019 | 2310 | 52    |
| 92213019 | 2311 | 90    |
| 92213019 | 2312 | 23    |
| 92213019 | 2313 | 78    |
| 92213019 | 2314 | 76    |
| 92213019 | 2315 | 75    |
| 92213019 | 2316 | 80    |
| 92213020 | 2310 | 88    |
| 92213020 | 2313 | 82    |
| 92213020 | 2314 | 93    |
| 92213020 | 2315 | 96    |

|          |      |    |
|----------|------|----|
| 92213020 | 2316 | 80 |
| 92213021 | 2311 | 92 |
| 92213022 | 2310 | 95 |
| 92213022 | 2312 | 66 |
| 92213022 | 2314 | 65 |
| 92213022 | 2315 | 48 |
| 92213023 | 2314 | 88 |
| 92213023 | 2315 | 68 |
| 92213023 | 2316 | 33 |
| 92213024 | 2310 | 78 |
| 92213024 | 2311 | 76 |
| 92213024 | 2314 | 79 |
| 92213024 | 2316 | 76 |
| 92213025 | 2311 | 56 |
| 92213025 | 2315 | 98 |
| 92213025 | 2317 | 57 |



## SQL Query 習題 - 問題

1. 找出全校男老師的資料
2. 找出國文課的學分數
3. 找出修國文課的學生姓名
4. 找出黃詩婷修的課的課程代號、課程名稱及學分數
5. 找出女同學修的課的課程代號、課程名稱及學分數
6. 找出修詹曜榕'所開的課的學生姓名、電話及住址
7. 找出陳曉君修的課的總學分數
8. 找出個別男同學修的課的總學分數
9. 找出共有多少學生修化學實驗課
10. 找出共修超過5門課的學生學號、姓名及電話
11. 找出共修超過8個學分的學生學號、姓名及電話
12. 找出開不只1門課的老師姓名、電話及住址
13. 找出同時修化學課及生物課的學生姓名、電話及住址
14. 找出同時修詹曜榕及湯淑貞開的課的學生姓名、電話及住址
15. 找出各科成績最高的學生姓名
16. 找出每個學生成績最低的科目及分數
17. 找出平均成績超過75分的學生學號、姓名、電話及平均成績，並依平均成績排列