Chapter 07
More SQL

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Gender	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPT_LOCATIONS

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0

DEPENDENT

Essn	Dependent_name	G	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

Aggregate Functions in SQL

Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary

Solution

Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary

```
SELECT      SUM (Salary) AS Total_Sal, MAX (Salary) AS Highest_Sal,
            MIN (Salary) AS Lowest_Sal, AVG (Salary) AS Average_Sal
FROM        EMPLOYEE;
```

Query 02

Find the sum of the salaries of all employees of the 'Research' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

Find the sum of the salaries of all employees of the 'Research' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

```
SELECT    SUM (Salary), MAX (Salary), MIN (Salary), AVG (Salary)
FROM      (EMPLOYEE JOIN DEPARTMENT ON Dno = Dnumber)
WHERE     Dname = 'Research';
```

Query 03

Retrieve the total number of employees in the company.

Retrieve the number of employees in the 'Research' department

Query 03

Retrieve the total number of employees in the company.

Retrieve the number of employees in the 'Research' department

```
SELECT      COUNT (*)
FROM        EMPLOYEE;

SELECT      COUNT (*)
FROM        EMPLOYEE, DEPARTMENT
WHERE       DNO = DNUMBER AND DNAME = 'Research';
```

Query 04

For each department, retrieve the department number, the number of employees in the department, and their average salary.

Query 04

For each department, retrieve the department number, the number of employees in the department, and their average salary.

```
SELECT       Dno, COUNT (*), AVG (Salary)
FROM         EMPLOYEE
GROUP BY     Dno;
```

Group By

(a) Fname	Minit	Lname	Ssn	...	Salary	Super_ssn	Dno
John	B	Smith	123456789		30000	333445555	5
Franklin	T	Wong	333445555		40000	888665555	5
Ramesh	K	Narayan	666884444		38000	333445555	5
Joyce	A	English	453453453	...	25000	333445555	5
Alicia	J	Zelaya	999887777		25000	987654321	4
Jennifer	S	Wallace	987654321		43000	888665555	4
Ahmad	V	Jabbar	987987987		25000	987654321	4
James	E	Bong	888665555		55000	NULL	1

Grouping EMPLOYEE tuples by the value of Dno

Dno	Count (*)	Avg (Salary)
5	4	33250
4	3	31000
1	1	55000

Result of Q24

Query 05

For each project *on which more than two employees work,* retrieve the project number, the project name, and the number of employees who work on the project.

Query 05

For each project *on which more than two employees work,* retrieve the project number, the project name, and the number of employees who work on the project.

```
SELECT      Pnumber, Pname, COUNT (*)
FROM        PROJECT, WORKS_ON
WHERE       Pnumber = Pno
GROUP BY    Pnumber, Pname
HAVING      COUNT (*) > 2;
```

Having Clause

Pname	Pnumber	...	Essn	Pno	Hours	
ProductX	1		123456789	1	32.5	These groups are not selected by the HAVING condition of Q26.
ProductX	1		453453453	1	20.0	
ProductY	2		123456789	2	7.5	
ProductY	2		453453453	2	20.0	
ProductY	2		333445555	2	10.0	
ProductZ	3		666884444	3	40.0	
ProductZ	3		333445555	3	10.0	
Computerization	10	...	333445555	10	10.0	
Computerization	10		999887777	10	10.0	
Computerization	10		987987987	10	35.0	
Reorganization	20		333445555	20	10.0	
Reorganization	20		987654321	20	15.0	
Reorganization	20		888665555	20	NULL	
Newbenefits	30		987987987	30	5.0	
Newbenefits	30		987654321	30	20.0	
Newbenefits	30		999887777	30	30.0	

(b)

After applying the WHERE clause but before applying HAVING

Having Clause

Pname	Pnumber	· · ·	Essn	Pno	Hours
ProductY	2		123456789	2	7.5
ProductY	2		453453453	2	20.0
ProductY	2		333445555	2	10.0
Computerization	10		333445555	10	10.0
Computerization	10	· · ·	999887777	10	10.0
Computerization	10		987987987	10	35.0
Reorganization	20		333445555	20	10.0
Reorganization	20		987654321	20	15.0
Reorganization	20		888665555	20	NULL
Newbenefits	30		987987987	30	5.0
Newbenefits	30		987654321	30	20.0
Newbenefits	30		999887777	30	30.0

Pname	Count (*)
ProductY	3
Computerization	3
Reorganization	3
Newbenefits	3

Result of Q26
(Pnumber not shown)

After applying the HAVING clause condition