CHAPTER 14

Databases

(Solutions to Practice Set)

Review Questions

1. The five necessary components of DBMS are hardware, software, data, users, and procedures.
2. The three models of databases are hierarchical, network, and relational. The relational model is the one used today.
3. In the relational model, a relation is a set of data organized in a two-dimensional table. The relations are related together.
4. An attribute is a column in a relation. A tuple is a row in a relation.
5. Some unary operations are *insert*, *delete*, *update*, *select*, and *project*.
6. Some binary operations are *join*, *union*, *intersection* and *difference*.
7. The Structured Query Language (SQL) is a language standardized by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) for use on relational databases. Extensive Markup Language (XML) is a markup language designed to add markup information to text document, but it also has found its application as a query language in databases. SQL is used for relational databases and XML used for objected-oriented databases.

Multiple-Choice Questions

8. c	9. c	10. b	11. b	12. a	13. c
14. a	15. b	16. a	17. c	18. a	19. c
20. a	21. b	22. d	23. d	24. c	25. b

Exercises

26. The resulting relation is shown below:

A1	A2	A3
2	16	102
3	16	103

27. The resulting relation is shown below:

A1	A2
2	16
3	16

28. The resulting relation is shown below:

A3
100
102
103
104

29. The resulting relation is shown below:

B1
24
29

30. The resulting relation is shown below:

C1	C2	C3
32	401	1025
33	405	1065
37	401	1006

31. The following shows the command:

```
select No, Unit
from COURSES
```

32. The following shows the command:

```
select ID, Name
from STUDENTS
```

33. The following shows the command:

```
select Name
from PROFESSORS
```

34. The following shows the command:

```
select Name
from DEPARTMENTS
```

35. The following shows the command:

```
select Courses
from STUDENTS
where ID = 2010
```

36. The following shows the command:

```
select Courses
from PROFESSORS
where Name =’Blake’
```

37. The following shows the command:

```
select *
from COURSE
where Unit = 3
```

38. The following shows the command:

```
select Name
from STUDENTS
where Courses =’CIS015’
```

39. The following shows the command:

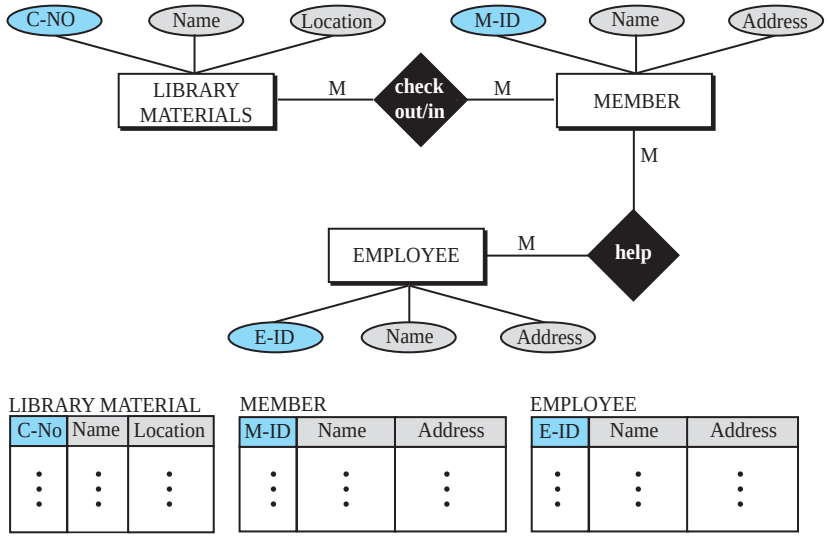
```
select No
from DEPARTMENTS
where Name =’Computer Science’
```

40. The relation is not in the 1NF form. Some intersections of rows and columns have more than one entries. The relation in 1NF is shown below.

A	B	C	D
1	70	65	14
2	25	24	12
2	25	24	18
2	32	24	12
2	32	24	18
2	71	24	12
2	71	24	18
3	32	6	18
3	32	11	18

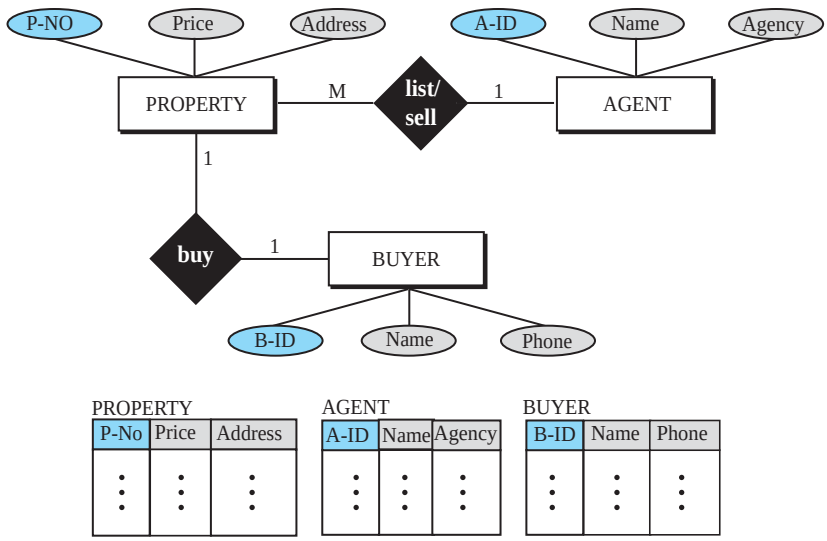
41. There are many different solutions to this question. A simple one is shown in Figure S14.41.

Figure S14.41 *Exercise 41*



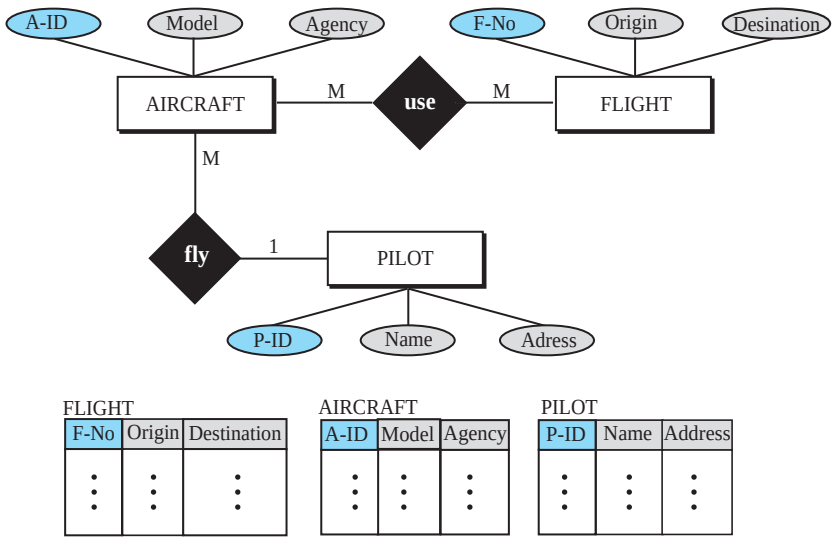
42. There are many different solutions to this question. A simple one is shown in Figure S14.42.

Figure S14.42 *Exercise 42*



43. There are many different solutions to this question. A simple one is shown in Figure S14.43.

Figure S14.43 *Exercise 43*



44. A relation is in a third normal form (3NF) if it satisfies the two following conditions

    a. It meets the requirements of second normal form (2NF)

    b. No non-prime attribute is transitively dependent on the key. For example, consider the following simple table that shows the winners of a International Science Challenge where the key in the table is underlined.

Subject	Winner	Winner's Nationality

    This table does not meet the requirements of 3NF because the non-prime attribute "Winner's Nationality" is transitively dependent on the key "Subject" via the non-prime attribute "Winner". By changing the table into the two following tables we can remove the anomaly.

Subject	Winner

Winner	Winner's Nationality

45. Boyce-Codd normal form (BCNF) is the revised 3NF that covers a special case not covered by 3NF. For more information see the references at the end of the chapter of the text.