**Homework 7 Answer**

2. What is a database model?
   Database model is a type of data model that determines the logical structure of a database and fundamentally determines in which manner data can be stored, organized, and manipulated.

4. What is the difference between a tuple and an attribute?
   - Tuple: set of attributes. That is, row in table.
   - Attributes: a property of data. That is, column in table.

5. Identify two benefits of separating application software from the DBMS.
   - Security
   - Simplified design of the application

13. Using the commands SELECT, PROJECT, and JOIN, write a sequence of instructions to answer each of the following questions about branches and their courses in terms of the following database:

   **Course relation**
<table>
<thead>
<tr>
<th>CName</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networks</td>
<td>IT655</td>
</tr>
<tr>
<td>Database</td>
<td>CS543</td>
</tr>
<tr>
<td>VLSI</td>
<td>EC653</td>
</tr>
</tbody>
</table>

   **Branch relation**
<table>
<thead>
<tr>
<th>BName</th>
<th>ID</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science</td>
<td>CS543</td>
<td>4</td>
</tr>
<tr>
<td>Computer Science</td>
<td>EC653</td>
<td>5</td>
</tr>
<tr>
<td>Electronics &amp; Communication</td>
<td>IT655</td>
<td>4</td>
</tr>
<tr>
<td>Electronics &amp; Communication</td>
<td>EC653</td>
<td>5</td>
</tr>
<tr>
<td>Information Technology</td>
<td>CS543</td>
<td>4</td>
</tr>
<tr>
<td>Information Technology</td>
<td>IT655</td>
<td>4</td>
</tr>
</tbody>
</table>

   a. Which branches offer IT665?
   \[
   \text{TEMP} \rightarrow \text{SELECT from Branch relation where ID = "IT655";} \\
   \text{RESULT} \rightarrow \text{PROJECT BName from TEMP.}
   \]

   b. List all the branches present in Branch relation.
   \[
   \text{RESULT} \rightarrow \text{PROJECT BName from Branch relation}
   \]

   c. Which branches offer 4-credit courses?
   \[
   \text{TEMP} \rightarrow \text{SELECT from Branch relation where Credits='4'} \\
   \text{RESULT} \rightarrow \text{PROJECT BName from TEMP.}
   \]
14. Answer question 13 using SQL.
   a. Which branches offer IT665?
      ```sql
      select BName
      from Branch relation
      where ID = "IT665"
      ```
   b. List all the branches present in Branch relation.
      ```sql
      select BName
      from Branch relation
      ```
   c. Which branches offer 4-credit courses?
      ```sql
      select BName
      from Branch relation
      where Credits = "4"
      ```

15. Using the commands SELECT, PROJECT, and JOIN, write sequences to answer the following questions about the information in the EMPLOYEE, JOB, and ASSIGNMENT relations in Figure 9.5:
   a. Obtain the name of an employee whose Job ID is S25X.
      ```sql
      TEMP1 ← SELECT from ASSIGNMENT where ASSIGNMENT.JobId = "S25X"
      TEMP2 ← PROJECT EmplId from TEMP1
      TEMP3 ← JOIN TEMP2 and EMPLOYEE where EMPLOYEE.EmplId = TEMP2.EmplId
      RESULT ← PROJECT Name from TEMP3.
      ```
   b. Obtain a list of the department, skill code and job title of the employee named G. Jerry Smith.
      ```sql
      TEMP1 ← SELECT from EMPLOYEE where EMPLOYEE.Name = "G. Jerry Smith"
      TEMP2 ← PROJECT EmplId from TEMP1
      TEMP3 ← JOIN TEMP2 and ASSIGNMENT where ASSIGNMENT.EmplId = TEMP2.EmplId
      TEMP4 ← PROJECT JobId from TEMP3
      TEMP5 ← JOIN TEMP4 and JOB where JOB.JobId = TEMP4.JobId
      RESULT ← PROJECT Department, SkillCode and JobTitle from TEMP5.
      ```
   c. Obtain a list of the name and address of the employee whose start date is 5-1-2010.
      ```sql
      TEMP1 ← SELECT from ASSIGNMENT where ASSIGNMENT.StartDate = "5-1-2010"
      TEMP2 ← PROJECT EmplId from TEMP1
      TEMP3 ← JOIN TEMP2 and EMPLOYEE where EMPLOYEE.EmplId = TEMP2.EmplId
      RESULT ← PROJECT Name, Address from TEMP3.
      ```
28. What is the difference in the information supplied by the single relation and the two relations

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>TelephoneNumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones</td>
<td>Sales</td>
<td>555-2222</td>
</tr>
<tr>
<td>Smith</td>
<td>Sales</td>
<td>555-3333</td>
</tr>
<tr>
<td>Baker</td>
<td>Personnel</td>
<td>555-4444</td>
</tr>
</tbody>
</table>

In contrast to the single relation system, one cannot precisely determine the telephone number of either Jones or Smith in the two relation system.

35. On the basis of the database represented in Figure 9.5, state the question that is answered by the following program segment:

TEMP1 ← JOIN EMPLOYEE and JOB where EMPLOYEE.EmplId = JOB.EmplId
No answer. There is no EmplId in JOB.

36. Translate the query in the previous problem into SQL.
No answer.

38. Translate the SQL statement into a sequence of SELECT, PROJECT, and JOIN operations.

```sql
SELECT Assignment.StartDate
FROM Assignment, Employee
WHERE Assignment.EmplId = Employee.EmplId
AND Employee.Name = 'Joe E. Baker';
```

TEMP1 ← JOIN ASSIGNMENT and EMPLOYEE
where ASSIGNMENT.EmplId = EMPLOYEE.EmplId
TEMP2 ← SELECT from TEMP1 where EMPLOYEE.Name = "Joe E. Baker"
RESULT ← PROJECT StartDate from TEMP2