Final Examination
Semester 2 / Year 2011

COURSE : DATABASE SYSTEM DESIGN
COURSE CODE : CSIS2023
TIME : 2 1/2 HOURS
DEPARTMENT : COMPUTER SCIENCE
LECTURER : SO YONG QUAY

Student’s ID:
Batch No:

Notes to candidates:
1) The question paper consists of 2 pages and 5 questions.
2) There are two sections in this paper. Students are required to answer both sections.
   a) Section A: Answer any 2 out of 3 questions.
   b) Section B: Answer all questions.
3) Return the question paper with your answer booklet.
Section A: Answer any 2 out of 3 Questions.

1. (a) Describe the main phases involved database design? (15 marks)
   (b) There are three main approaches to manage database application with multiple user views: centralized approach, view integration approach and combination of both approaches. Explain centralized approach and view integration approach. (10 marks)

2. (a) Describe the purpose of normalizing data. (4 marks)
   (b) The data in the table below is susceptible to update anomalies. Provide examples of how insertion, deletion, and modification anomalies could occur on this table. (9 marks)

<table>
<thead>
<tr>
<th>staffNo</th>
<th>sName</th>
<th>position</th>
<th>salary</th>
<th>branchNo</th>
<th>bAddress</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL21</td>
<td>John White</td>
<td>Manager</td>
<td>30000</td>
<td>B005</td>
<td>22 Deer Rd, London</td>
</tr>
<tr>
<td>SG37</td>
<td>Ann Beech</td>
<td>Assistant</td>
<td>12000</td>
<td>B003</td>
<td>163 Main St, Glasgow</td>
</tr>
<tr>
<td>SG14</td>
<td>David Ford</td>
<td>Supervisor</td>
<td>18000</td>
<td>B003</td>
<td>163 Main St, Glasgow</td>
</tr>
<tr>
<td>SA9</td>
<td>Mary Howe</td>
<td>Assistant</td>
<td>9000</td>
<td>B007</td>
<td>16 Argyll St, Aberdeen</td>
</tr>
<tr>
<td>SG5</td>
<td>Susan Brand</td>
<td>Manager</td>
<td>24000</td>
<td>B003</td>
<td>163 Main St, Glasgow</td>
</tr>
<tr>
<td>SL41</td>
<td>Julie Lee</td>
<td>Assistant</td>
<td>9000</td>
<td>B005</td>
<td>22 Deer Rd, London</td>
</tr>
</tbody>
</table>

   (c) Discuss the difference between the two-level storage model used by conventional DBMSs and the single-level storage model used by OODBMSs. (12 marks)

3. (a) Explain what are meant by Concurrency Control and Database Recovery. (6 marks)
   (b) Discuss what is meant by Distributed Database and DDBMS. (7 marks)
   (c) Discuss the extended capabilities or services that a DDBMS must provide over a centralized DBMS. (12 marks)
Section B: Answer all Questions.

4. Create an ER/EER model for the following descriptions. (32 marks)

A company called Perfect Pets runs a number of clinics. A clinic has many staff and a member of staff manages at most one clinic (not all staff manage clinics). Each clinic has a unique clinic number (clinicNo) and each member of staff has a unique staff number (staffNo).

When a pet owner contacts a clinic, the owner’s pet is registered with the clinic. An owner can own one or more pets, but a pet can only register with one clinic. Each owner has a unique owner number (ownerNo) and each pet has a unique pet number (petNo).

When the pet comes along to the clinic, it undergoes an examination by a member of the consulting staff. The examination may result in the pet being prescribed with one or more treatments. Each examination has a unique examination number (examNo) and each type of treatment has a unique treatment number (treatNo).

5. Present a relational schema for the EER diagram shown below. (18 marks)