

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING



Midterm Examination: Semester 2

Academic Year: 2007

Date: 30/12/2007

Time: 0900 - 1200

Subject Number: 241-212

Room: R201

Subject Title: Intro to Database and Information

คำสั่ง : อ่านรายละเอียดของข้อสอบ และคำแนะนำให้เข้าใจก่อนเริ่มทำข้อสอบ

อนุญาต : เครื่องเขียนต่าง ๆ เช่น ปากกา หรือ ดินสอ

ไม่อนุญาต : เครื่องคิดเลข, หนังสือ หรือ เอกสารใด ๆ เข้าห้องสอบ

เวลา : 3 ชั่วโมง (180 นาที)

คำแนะนำ

- ข้อสอบมีจำนวน 4 หน้า (ไม่รวมใบปะหน้า) คะแนนรวม 100 คะแนน
- เขียนคำตอบลงสมุดคำตอบ
- ใช้ดินสอทำข้อสอบได้ กรณีเขียนไม่ชัดหรืออ่านไม่ออก จะถือว่าคำตอบนั้นผิด
- คำตอบเป็นภาษาไทยหรือภาษาอังกฤษก็ได้
- อ่านคำสั่งในแต่ละข้อให้เข้าใจก่อนลงมือทำ
- อย่าลืม เขียน ชื่อ-นามสกุล และรหัสนักศึกษา ลงในข้อสอบทุกแผ่น

ทูลริตในการสอบมีโทษขั้นต่ำปรับตกในรายวิชานี้ และพักการเรียน 1 ภาคการศึกษา

-- โทษสูงสุดคือ ไล่ออก --

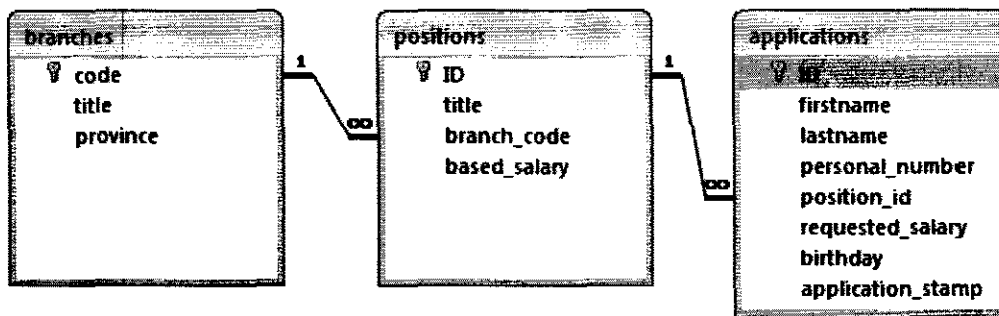
Question 1: Database and DBMS (10 pts)

- 1) Explain why sometimes age is *Information*, sometimes age is *Data*.
- 2) Explain what the functionalities of DBMS are. Give 3 reasons why it shall be used in database applications.

Question 2: SQL (35 pts)

ABC Company has many branches located in different provinces. Many applicants send their job applications to its HR department. Each applicant has to tell what position he/she wants to apply.

Use the following diagram. Write SQL corresponding to given requirements.



- 1) Find applicants who apply for position 'sales manager'.
- 2) Find first-name and last-name of the youngest applicant who apply for position 'developer'.
- 3) Find a number of branches located in province 'Songkhla'.
- 4) Find average *requested_salary* of candidates who apply for position 'developer'.
- 5) Find applicants who have *requested_salary* lower than *based_salary* and apply for position 'developer'.
- 6) Find a number of applicants for each position. (Extra points if Outer-Join is used here.)
- 7) Find first-name and last-name of the applicant who send more than one application to the department. *Personal_number* is preferred to distinguish applicants.

Question 3: Normalization (15 pts)

- 1) "Functional Dependencies is Evil."
Do you agree (Yes/No)? Give your reasons up to 3 lines. (5 pts)
- 2) From the given data sheet, use decomposition techniques to properly design tables. Make sure that your tables are in 3NF. Explain briefly how you get the answers. (10 pts)

Employee Code	Name	Level	Hourly Wages	Category Code	Product	Remarks
40001	Jane	1	50	A1	Pen, Eraser	
38020	John	1	50	A2	Printer, Toner	Good performance
41002	Marry	2	60	A1	Pen, Eraser	
41007	Kent	3	70	A1	Pen, Eraser	

Question 4: E-R Model (12 pts)

Consider the following information. I want to build a simple database about James Bond movies. I come up with the following schema, and build my database.

actor(name_of_star, nationality)

stars_in(name_of_star, title)

movie(title, year_released, director)

There have been 20 James Bond movies since the first in 1962. Sean Connery from Scotland starred in 6; George Lazenby from Australia starred in 1; Roger Moore from England starred in 7; Timothy Dalton from Wales starred in 2; Pierce Brosnan from Ireland starred in 4. The **actor** relation contains only the names of actors starred as 'James Bond' in the movies (i.e. those 5 actors mentioned above), along with their nationalities. Other information regarding the database appears in the table below.

Year	Title	Star	Director
1962	Dr. No	Sean Connery	Terence Young
1963	From Russia with Love	Sean Connery	Terence Young
1964	Goldfinger	Sean Connery	Guy Hamilton
1965	Thunderball	Sean Connery	Terence Young
1967	You Only Live Twice	Sean Connery	Lewis Gilbert (II)
1969	On Her Majesty's Secret Service	George Lazenby	Peter Hunt
1971	Diamonds Are Forever	Sean Connery	Guy Hamilton
1973	Live and Let Die	Roger Moore	Guy Hamilton
1974	The Man With the Golden Gun	Roger Moore	Guy Hamilton
1977	The Spy Who Loved Me	Roger Moore	Lewis Gilbert (II)
1979	Moonraker	Roger Moore	Lewis Gilbert (II)
1981	For Your Eyes Only	Roger Moore	John Glen
1983	Octopussy	Roger Moore	John Glen
1985	A View to a Kill	Roger Moore	John Glen
1987	The Living Daylights	Timothy Dalton	John Glen
1989	License to Kill	Timothy Dalton	John Glen
1995	Goldeneye	Pierce Brosnan	Martin Campbell
1997	Tomorrow Never Dies	Pierce Brosnan	Roger Spottiswoode
1999	The World is Not Enough	Pierce Brosnan	Michael Apted
2002	Die Another Day	Pierce Brosnan	Lee Tamahor

4.1 Based on the information available, draw an ER diagram for the above schema (4 pts)

According to your ER diagram drawn, answer the following questions:

4.2 “actor” in your ER diagram probably refers to a/an {entity, relationship, feature, tuple, instance, etc.} (2 pts)

4.3 “stars in” in your ER diagram probably refers to a/an {entity, relationship, feature, tuple, instance, etc.} (2 pts)

4.4 The primary key of “stars_in” relation is _____ (2 pts)

4.5 The cardinality of the relation “movie” is _____ (2 pts)

Question 5: E-R Diagram (8 pts)

Suppose we informally define the data in the database of a department store as follows:

- Each employee is represented. The data about an employee are his employee number, name, address, and the department he works for. The vehicle that an employee drives is represented by its model, year and license plate.
- Each department is represented. The data about a department are its name, employees, manager, and items sold.
- Each item sold is represented. The data about an item are its name, manufacturer, price, model number (assigned by the manufacturer), and an internal item number (assigned by the store).
- Each manufacturer is represented. The data about a manufacturer are its name, vendor id, address, items supplied to the store, and their prices.

Draw an ER diagram for the above information. Use ERwin (Crow's Foot) notation to answer this question.

Question 6: True or False (4 pts)

Write whether each statement is true (T) or false (F), and provide a short explanation if the answer is false.

6.1 When designing a database, first identify the entities, then determine the attributes, and finally establish the relationships

6.2 A Primary key is used to implement relationships between tables.

Question 7: Database Modeling (4 pts)

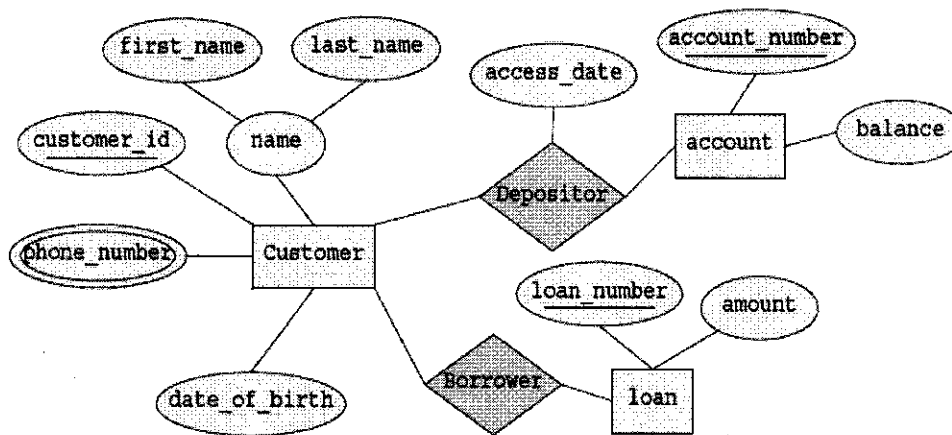
Answer the following question.

7.1 Explain the relationship between entity, entity class, and entity instance.

7.2 Define a surrogate key, describe the ideal primary key and explain how surrogate keys meet this ideal.

Question 8: Database Transformation (12 pts)

Consider the following E-R diagram which represents part of a banking enterprise.



Suppose we wish to implement this diagram in a relational database. List each of the relation schemas that you would generate for this database including each of the participating attributes and underline the primary key. Write your schemas in the following form:

Relation_name(attr1, attr2,..., attr_n)