**Computing 3610**

**Midterm Examination II Part 1**

**Fall 2017**

Answers

1. Using the following **ERD** (crow’s feet notation), answer questions a – e. **(5 marks)**

**Order Line**

**Order**

Line Id

Order Number

Quantity

Order Date

Includes

Relates

**Product**

**Price**

Product Id

Product description

Start Date

End Date

Price

Has

1. Each product must be ordered at least once. \_\_\_\_FALSE\_\_\_\_\_\_\_\_\_True/False.
2. Each order must have at least \_\_1\_\_\_\_\_order line(s) and maximum \_\_MANY\_\_\_order line(s).
3. What is the **degree** of the relationship “Includes”? \_\_2\_\_OR\_\_BINARY\_\_.
4. What is the **cardinality** of the relationship “Has”? \_\_MANY-TO-ONE\_\_OR\_\_ONE-TO-MANY\_\_.
5. There are three phases of database design. The above ERD model represents a \_\_\_CONCEPTUAL\_\_\_\_\_\_ phase.

1. Using the following instance of a relation (COLOR), answer questions a-e. **(5 marks)**

COLOR

|  |  |  |  |
| --- | --- | --- | --- |
| ***C*** | ***A*** | ***B*** | ***D*** |
| 10 | 100 | silver | S |
| 20 | 300 | black | B |
| 30 | 300 | gold | G |
| 40 | 500 | gold | G |
| 45 | 500 | black | B |
| 50 | 500 | white | W |
| 60 | 300 | white | W |

a. Is ***B*** functionally dependent on ***A, A*** 🡪 ***B*** ?\_\_\_\_\_NO\_\_\_\_ yes/no

b. Is ***A*** functionally dependent on ***B,***  ***B*** 🡪 ***A*** ?\_\_\_\_\_NO\_\_\_\_\_\_yes/no

c. Is ***A*** functionally dependent on ***C,***  ***C*** 🡪 ***A*** ?\_\_\_\_YES\_\_\_\_\_\_\_yes/no

d. Is the relation COLOR in 2NF? \_\_\_\_\_YES\_\_\_\_\_\_\_ yes/no why? \_\_\_\_\_IT IS IN 1NF AND THE PK IS NOT A COMPOSITE ATTRIBUTE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Is the relation COLOR in 3NF? NO yes/no why? B,D ARE NON-PK AND B🡪 D\_
2. **(2 marks)** Use the following ERD (in UML notation).

Employee

EmpID {PK}

Dependent

DName {PPK}

1..\*

Has

0..\*

The above ERD will be mapped into a relational model. List **the relations** required to represent the above ERD. Include primary keys and foreign keys.

EMPLOYEE(EMPID)

HAS\_DEPENDENT(*EMPID, DEPENDENT\_ID*)

DEPENDENT(DEPENDENT\_ID, DNAME)

**Note: The primary key could be constructed in two ways:**

* **Natural key** A key that is formed of given (application-related) attributes and thus they have business meaning
* **Surrogate (artificial) key** A key with no business meaning (in most cases this will be a sequential number (sequence in Oracle) or other unique identifiers generated by the DBMS, for example, globally unique identifier (GUID) sys\_guid(), .

1. **(3 marks**) Consider 1NF relation Employee (Employee\_No, SIN, DOB). Social Insurance Number (SIN) is a candidate key.

Is it allowed to have NULL for the SIN attribute? \_\_\_NO\_\_\_\_ (yes/no) why? \_CANDIDATE KEY UNIQUELY IDENTIFIES EACH TUPLE p.110\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Is this relation in 3NF? \_\_\_\_NO\_\_(yes/no) why? \_\_\_\_\_\_\_SIN 🡪 DOB\_\_\_\_\_\_\_.

Is this relation in a Generalized 3NF? \_\_YES\_\_\_\_(yes/no) why? \_\_\_\_\_NO NON-CANDIDATE ATTRIBUTE IS TRANSITIVELY DEPENDENT ON ANY CANDIDATE KEY\_\_\_\_\_\_\_\_\_\_\_\_Chapter 14 Normalization\_\_\_\_\_\_\_\_\_ .

1. **(1 mark)** PowerDesigner uses two models for the database modeling: CDM and PDM. Which model requires a specification of the DBMS?\_\_\_\_PDM\_\_\_\_\_\_\_\_\_\_\_
2. **(1 mark)** What is the **main difference** between stored procedures and triggers?\_\_\_\_\_

Stored procedures could have parameters – triggers do not have parameters

Stored procedures are explicitly executed EXEC – triggers are automatically executed when some database events occur (e.g., changes to data INSERT, UPDATE, DELETE)

1. **(1 mark)** The four basic properties for transactions are called ACID. The first letter, A, stands for atomicity. SQLDeveloper is a client application which uses AUTCOMMIT setting.

To maintain the atomicity of a transaction, you should SET AUTOCOMIT ON \_FALSE\_\_\_\_\_\_(true/false).

Explain why? Database transactions may have several update/insert/delete statements which have to be executed as one unit of work (entirely). Atomicity means that transaction is an indivisible unit and it has to be performed in its entirety or not at all. AUTOCOMMIT ON means that each individual update/insert/delete statement is automatically (AUTO) committed (COMMIT).

1. **(2 marks)** The following table is not in 1NF. Assume that each branch may have multiple phone numbers (possibly more than 10). **List the relation(s) in 3NF** required to represent the data. Include primary and foreign keys.

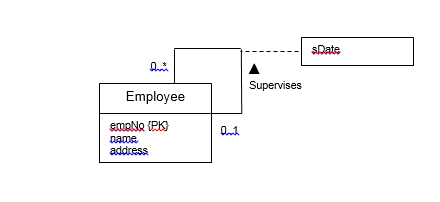
| *Branch No* | *Telephone Numbers* |
| --- | --- |
| B001 | 503-555-3618, 503-555-2727, 555-904-7777, 501-444-8888, 601-557-7896 |
| B002 | 206-555-6756, 206-555-8836 |
| B003 | 212-371-3000 |
|  |  |
|  |  |

**BRANCH (BRANCH\_NO)**

**BRANCH\_PHONE (*BRANCH\_NO*, PHONE\_NUMBER)**

**BONUS**

1. **(2 marks)** Map the following ERD into a relational model. Your logical model should have **one relation**.



EMPLOYEE (EMP\_NO, NAME, ADDRESS, *SUP\_EMP\_NO*, SUP\_DATE)

SUP\_EMP\_NO NULL allowed (NULL means no supervisor)

SUP\_DATE NULL allowed