**COMP 3610 Review for Midterm I**

**Exam date: Thursday, October 19, 2017, 9:30 – 11:20**

**(2 hours in total) in LAB OM1360 (regular location)**

**Two parts:**

**Part 1 (30 minutes suggested or as soon as you finish and start Part 2). This part will be a closed book exam.**

* **The use of dictionaries, calculators, computers, phones is not allowed during part 1 of the exam.**

**Coverage:**

**Textbook Database Systems Chapters 1,2,3,4,5,6,7**

Exam will cover all chapters, but it will focus on three main topics:

1. Database concepts (Chapter 1-3)
2. The relational model (Chapter 4)
3. Relational Algebra (Chapter 5)
4. Knowledge/understanding of SQL (reading/correcting and writing short statements)

**The following are examples of questions from previous years:**

1. In databases, the data about data is called Meta data
2. How does SEQUENCE is used as unique identifier in Oracle?
3. What is the difference between DATE and TIMESTAMP data types in Oracle?
4. Why dates should be stored using special data types for dates? Why dates should not be stored as a string of characters?
5. What is the difference between a candidate key and a primary key?
6. In 1970, E. Codd introduced a new data model for databases. What was the name of that model?
7. Why Oracle 11g can be called an ORDBMS, but not OODBMS?
8. What is the difference between these two data types: CHAR and VARCHAR?
9. What is the difference between SQL\*Plus and SQLDeveloper?
10. Give example of two DBMSs which support relational model.
11. A conceptual data model heavily relies on the target DBMS (TRUE/FALSE)\_\_\_\_\_.
12. Database integrity refers to the correctness and consistency of stored data. List three main integrity constraints (rules) for the relational model:
13. What is the main difference between a base relation and a view.
14. Name three binary set operations (in relational algebra) which require that the two relations must be “union-compatible.”
15. Write an SQL statement to display the current date and time on the Oracle server. Use the **ISO standard** for **day** and time with **hours, minutes, and seconds.**
16. The DDL language allows for creation of the database objects. The DML language allows for the following four operations: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
17. SQL is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(declarative/procedural) language, because SQL states what the data is needed rather than how it is to be retrieved. Network and hierarchical DML statements are normally \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(declarative/procedural).
18. The relational data model is based on the concept of mathematical relations. In the relational model, the relationships between entities are represented by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
19. We discussed in class the difference between the conceptual model and logical model. The textbook makes also a distinction between these two models. What is the underlying difference between a conceptual data model and a logical data model?
20. What is the function of a system catalogue in a DBMS? In Oracle DBMS the system catalog is often called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
21. In the relational mode, each attribute must have a domain, and more than one attribute may use the same domain\_\_\_\_\_\_(True/False)
22. In relational model, when a key consists of more than one attribute, it is called a \_\_\_\_\_\_\_\_\_\_\_key.
23. Why Nulls are needed in the databases?
24. Oracle uses DUAL in the following SQL statement: SELECT SYSDATE FROM DUAL; WHAT is DUAL and WHY is needed in Oracle?
25. BNF (Backus Naur Form) notation is often used to define the syntax of SQL statements. What is the meaning of the | (vertical bar) and [ ] (square brackets) in the following definition of a pet

pet ::= [white] dog | [black] cat

1. In database systems class, we define data and information as two terms. What is the difference between data and information?
2. Write Relational Algebra operation(s) to find hotels in Kamloops based on a relation schema Hotel (hotel\_id, name, city).
3. What is the difference between CLOB and BLOB (other than 1 letter)?
4. The following is a relation schema BRANCH (branchNo, street, city, province). Give an example of a possible tuple. What is the degree of the relation BRANCH? Describe the **Entity Integrity** for the relation BRANCH.
5. List the unary operations in Relational Algebra. Which unary operation changes the **Cardinality** of the relation?
6. A **large object** is a data type in ISO SQL. List two names of large object types supported by Oracle 11g and/or Oracle 12c.

Assume that the table VEHICLE has the following data:

|  |  |  |
| --- | --- | --- |
| V\_ID | V\_MAKE | COST\_PER\_DAY |
| 9090 | BMW | 100.00 |
| 9111 | FIAT | 100.00 |
| 9191 | FORD | 51.00 |
| 9192 | FORD | 88.00 |
| 1001 | NISSAN | 40.00 |

How many rows will be deleted by the following SQL statements:

DELETE FROM VEHICLE  
 WHERE MAKE = ‘NISSAN’ AND MAKE = ‘BMW’; \_\_\_\_\_\_?

DELETE FROM VEHICLE  
 WHERE MAKE = ‘NISSAN’ OR MAKE = ‘FORD’; \_\_\_\_\_\_?

1. The following CREATE statement creates the table Vehicle:

CREATE TABLE vehicle

(v\_id INTEGER PRIMARY KEY,

v\_make VARCHAR2 (15) NOT NULL,

cost\_per\_day NUMBER (5,2) NOT NULL);

What is the maximum cost\_per\_day that can be entered into the database? \_\_\_\_\_\_\_\_\_\_\_

Given two relations (tables) **R**  and **S:**

**R S**

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **D** |
| a1 | b1 | d1 |
| a3 | b1 | d2 |
| a5 | b2 | d5 |
| a4 | b1 | d2 |
| a2 | b2 | d5 |

|  |  |
| --- | --- |
| **E** | **A** |
| e1 | a4 |
| e2 | a6 |
| e3 | a9 |

Answer the following questions:

1. What is the result of a Projection over **R**: **π** D (**R**) ? (1 mark)
2. Write an **SQL query** which will produce **the same results** as **π** D (**R**) (1 mark)
3. What is the **degree** of the relation **R**? (1 mark) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What is the **cardinality** of the result of a Projection over **S**: **π** A (R) ? (1 mark) \_\_\_\_\_\_\_\_\_\_
5. What is the result of **R** RIGHT OUTER **JOIN** **S**? The join condition is R.A = S.A (1 mark)
6. What is the result of **R** **LEFT OUTER** **JOIN** **S**? The join condition is R.A = S.A (1 mark)
7. What is the result of **R** **UNION** **S.** (1 mark)

**PART II**

**Practical DDL and DML SQL using Oracle database. Access to your own materials (on-line and printed) is allowed.**

**Coverage:**

**Please review the Labs 1,2,3 and Assignment 1**

**SQL book Chapters 1-5, 8-13**

**Oracle 11g SQL book**

**Main Chapters:**

Chapter 2 SELECT, SELECT DISTINCT, virtual columns, NULL

column\_name [datatype] [GENERATED ALWAYS] AS (expression) [VIRTUAL]

Chapter 3 CREATE TABLE

Chapter 4 CONSTRAINTS: PRIMARY KEY, FOREIGN KEY , CHECK, NOT NULL

CREATE TABLE supplier

( supplier\_id numeric(10) not null,

supplier\_name varchar2(50) not null,

contact\_name varchar2(50),

CONSTRAINT supplier\_pk PRIMARY KEY (supplier\_id)

);

CREATE TABLE products

( product\_id numeric(10) not null,

supplier\_id numeric(10) not null,

CONSTRAINT fk\_supplier FOREIGN KEY (supplier\_id) REFERENCES supplier(supplier\_id)

);

ALTER TABLE dept\_20

ADD CONSTRAINT fk\_empid\_hiredate

FOREIGN KEY (employee\_id, hire\_date)

REFERENCES employee(employee\_id, start\_date)

The above constraint ensures that in the employee table, each employee has a id and start date combination.

Chapter 5 UPDATE, DELETE, INSERT Values and INSERT using a subselect,

Chpater 8 WHERE clause, IN, LIKE, IS NULL, IS NOT NULL

Chapter 9 JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN

A RIGHT OUTER JOIN B = > All columns from B included even if they don’t have matching column in A

A LEFT OUTER JOIN B = > All columns from A included even if they don’t have matching column in B

Chapter 10 TO\_DATE, TO\_CHAR (skip other functions for now)

Chapter 11 GROUP BY, COUNT(\*), COUNT, MAX, MIN, AVG, SUM (skip pp. 405-425)

Chapter 12 SUBQUERIES (UNCORRELATED and CORRELATED), EXISTS, NOT EXISTS (skip pp. 455-459)

SELECT department\_id

FROM departments d

WHERE EXISTS

(SELECT \* FROM employees e

WHERE d.department\_id

= e.department\_id);

Chapter 13 CREATE VIEW (only CREATE simple view; skip all pages after 480)

CREATE VIEW emp\_view AS

SELECT last\_name, salary\*12 annual\_salary

FROM employees

WHERE department\_id = 20;