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CSCD 327

Lab 1

Section 1 – Basic Concepts

1.) (2 points)

a. Explain the following terms in the context of the relational data model

i. Relation

A relation is a set of n-tuples $(a_1, a_2,\ldots,a_n)$ where each $a_i \in A_i$

ii. Attribute

Attributes are used to describe properties and features of a relation. In the case above, $a_1, a_2,\ldots,a_n$ are attributes. These can be things like customer_name, customer_id, or customer_city

iii. Domain

The domain is the set of allowed values for each attribute

iv. Tuple

A tuple is an element *t* of a relation *r*. In tables, tuples are represented as rows.

v. Degree

The degree of a relation is the number of attributes it contains

vi. Cardinality

The cardinality of a relation is the number of tuples it contains

b. Use Employee-Department database from Appendix 1(at the end of this handout) to provide examples of each term.

i. Relation: we can take all tuples from DEPT as shown below

```
10 ACCOUNTING     NEW YORK
20 RESEARCH       DALLAS
30 SALES          CHICAGO
40 OPERATIONS     BOSTON
```

ii. Attribute: an attribute of EMP is “EMPNO”

iii. Domain:

iv. Tuple: A tuple of DEPT is (10, Accounting, New York)

v. Degree: The degree of EMP is 8, and the degree of DEPT is 3

vi. Cardinality: Cardinality of DEPT is 4

2.) (2 points)

a. Explain the following terms in the context of the relational data model

i. Candidate key

A candidate key is a minimal superkey. *K* is a superkey of *R* if values for *K* are sufficient to identify a unique tuple of each possible relation r(R). *K* is a candidate key if it is a superkey and no subset of it is a superkey.

ii. Primary key

A candidate key chosen as the principal means of identifying tuples within a relation

iii. Foreign key

An attribute that corresponds to the primary key of another relation

b. Use the Employee-Department database from Appendix 1 to provide examples of each term
    i. Candidate key:
    EMPNO values
    ii. Primary key:
    EMPNO values can be used as primary keys
    iii. Foreign key:
    DEPTNO values are foreign keys

Section 2 – Warm-up Exercise

3.) Based on given schemas in the above figure, use appropriate DDl to create a new table named *users*. Set the primary key as auto-increment. **(Include your DDL statements in your submission)**.

```
CREATE TABLE users
(user_id        INT             PRIMARY KEY     AUTO_INCREMENT,
email_address   VARCHAR(100)    NOT NULL,
first_name      VARCHAR(45)     NOT NULL,
last_name       VARCHAR(45)     NOT NULL
);
```

4.) Based on given schemas in the above figure, use appropriate DDL to create a new table named *downloads*. Set the primary key as auto-increment.

```
CREATE TABLE downloads
(download_id    INT             PRIMARY KEY     AUTO_INCREMENT,
user_id         INT             NOT NULL,
download_date   DATETIME        NOT NULL,
filename        VARCHAR(50)     NOT NULL,
product_id      INT             NOT NULL
);
```

5.) Based on given schemas in the above figure, use appropriate DDL to create a new table named *products*. Set the primary key as auto-increment.

```
1  CREATE TABLE products
2  (product_id     INT             PRIMARY KEY     AUTO_INCREMENT,
3  product_name    VARCHAR(45)     NOT NULL
4  );
```

6.) Use appropriate DDL to add two new columns to the *products* table created in Question 5.
    a. Add one column *price* that stores values of up to three digits to the left of the decimal point and two to the right. This column should have a default value of 9.99
    b. Add one column *time_added* to denote the date and time when a product is added to the database

```
ALTER TABLE products
ADD     price    DECIMAL(5,2)    DEFAULT(9.99);
```

```
ALTER TABLE products
ADD     time_added  DATETIME    NOT NULL;
```

7.) Use appropriate DDL to modify the *users* table created in Question 3 so that the *first_name* column cannot store NULL values and can only store a maximum of 20 characters.

```
ALTER TABLE users
DROP COLUMN     first_name,
ADD     first_name      VARCHAR(20)     NOT NULL
;
```

Section 3 – More Exercises

8.) Use appropriate DDL to create two new tables *EMP* and *DEPT*. Please make sure to choose appropriate data type for each attribute, and also add a primary key to each table.

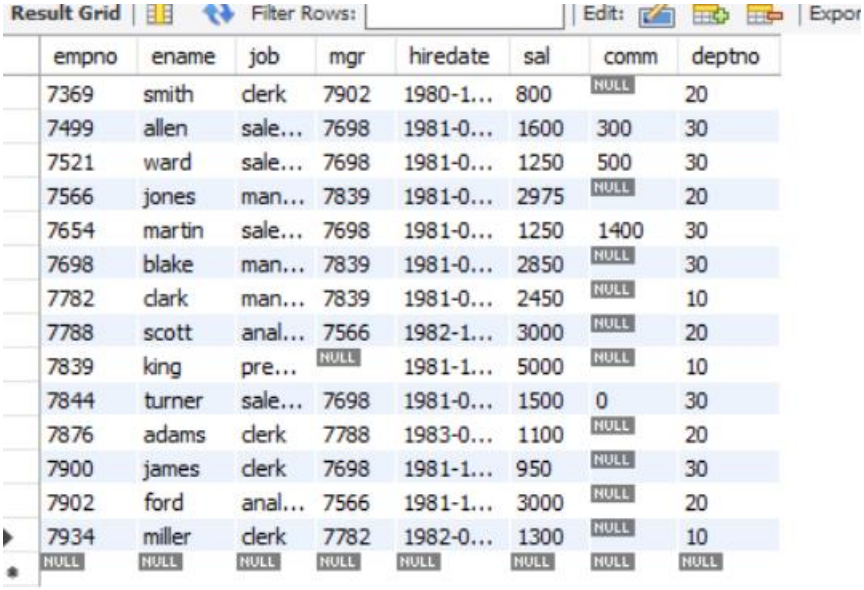
```
CREATE TABLE EMP
(empno      INT             PRIMARY KEY     AUTO_INCREMENT,
ename       VARCHAR(15)     NOT NULL,
job         VARCHAR(15)     NOT NULL,
mgr         INT             NOT NULL,
hiredate    DATETIME        NOT NULL,
sal         INT             NOT NULL,
comm        INT,
deptno      INT             NOT NULL
);
```

```
ALTER TABLE EMP
DROP COLUMN mgr,
ADD mgr INT
;
```

```
CREATE TABLE DEPT
(deptno     INT             PRIMARY KEY     AUTO_INCREMENT,
dname       VARCHAR(20)     NOT NULL,
loc         VARCHAR(20)     NOT NULL
);
```

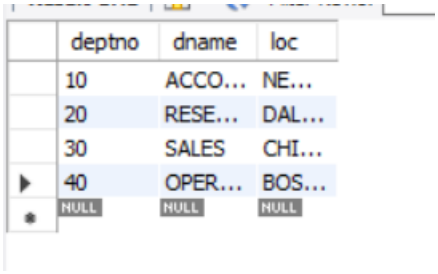
9.) Now you are ready to add new tuples into your tables.

a. Insert all 14 tuples listed in Appendix 1 into *EMP* table.
b. Insert all 4 tuples listed in Appendix 1 into *DEPT* table.
c. Include the screen copies of these two tables in your submission after you have successfully added the tuples



Result Grid | Filter Rows: | Edit: | Expor

empno	ename	job	mgr	hiredate	sal	comm	deptno
7369	smith	clerk	7902	1980-1...	800	NULL	20
7499	allen	sale...	7698	1981-0...	1600	300	30
7521	ward	sale...	7698	1981-0...	1250	500	30
7566	jones	man...	7839	1981-0...	2975	NULL	20
7654	martin	sale...	7698	1981-0...	1250	1400	30
7698	blake	man...	7839	1981-0...	2850	NULL	30
7782	clark	man...	7839	1981-0...	2450	NULL	10
7788	scott	anal...	7566	1982-1...	3000	NULL	20
7839	king	pre...	NULL	1981-1...	5000	NULL	10
7844	turner	sale...	7698	1981-0...	1500	0	30
7876	adams	clerk	7788	1983-0...	1100	NULL	20
7900	james	clerk	7698	1981-1...	950	NULL	30
7902	ford	anal...	7566	1981-1...	3000	NULL	20
7934	miller	clerk	7782	1982-0...	1300	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL



deptno	dname	loc
10	ACCO...	NE...
20	RESE...	DAL...
30	SALES	CHI...
40	OPER...	BOS...
NULL	NULL	NULL

Section 4 – Get Ready for Future

10.) Let's create four more databases and tables for future use. Name these four databases as salesDB, booksDB, universityDB, and productsDB (Remember that all database names must begin with your username following by underscore). Now import four databases from the script files posted on Canvas:

a. Import salesDB.sql file into salesDB. Five tables will be added to your salesDB database (you can either copy the contents of the script file to the SQL editor and then execute the script, or you can use "Data Import" from "Server" menu).
b. Import booksDB.sql file into booksDB. Eight tables will be added to your booksDB database (you can either copy the contents of the script file to the SQL editor and then execute the script, or you can use "Data Import" from "Server" menu).
c. Import universityDB.sql file into universityDB. Eleven tables will be added to your universityDB database (you can either copy the contents of the script file to the SQL editor and then execute the script, or you can use "Data Import" from "Server" menu).

d. Import productsDB.sql file into productsDB. Seven tables will be added to your productsDB database (you can either copy the contents of the script file to the SQL editor and then execute the script, or you can use “Data Import” from “Server” menu).
e. Include the screen copies of the above four databases in your submission (the lists of table names would be good enough) after you have successfully imported the data.