Chapter 6 Review

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1. What are the differences between a database state and a database schema? Explain with examples.

The difference between a database schema is the description of a database while a database state is the actual data stored in a database at a particular moment in time. For example, in the 1.2 diagram, schema: Name, Student\_number, Class,

Major. State: Smith, 17, 1, CS

1. How does SQL allow implementation of the entity integrity and referential integrity

constraints described in Chapter 3? What about referential triggered actions?

SQL uses a primary key and unique clause to ensure a primary key is used and not

null for entity integrity.

Referential integrity is kept by either being a primary key or null.

Referential triggered actions are attached on the foreign key clause.

1. Write appropriate SQL DDL statements for declaring the LIBRARY relational database schema of Figure 6.6. Specify the keys and referential triggered actions.

CREATE TABLE BOOK (Book\_id INTEGER NOT NULL,

Title VARCHAR(30) NOT NULL,

Publisher\_name VARCHAR(30) NOT NULL REFERENCES

PUBLISHER(Name),

PRIMARY KEY (Book\_id));

CREATE TABLE BOOK\_AUTHORS (Book\_id INTEGER NOT NULL,

Author\_name VARCHAR(30) NOT NULL,

PRIMARY KEY (Book\_id) REFERENCES

BOOK(Book\_id),

CREATE TABLE PUBLISHER ( Name VARCHAR(30) NOT NULL,

Address VARCHAR(30) NOT NULL,

Phone INTEGER NOT NULL,

PRIMARY KEY (Name),

CREATE TABLE BOOK\_COPIES ( BOOK\_COPIES INTEGER NOT NULL,

Branch\_id INTEGER,

No\_of\_copies INTEGER,

PRIMARY KEY (Book\_id) REFERENCES

BOOK(Book\_id),

FOREIGN KEY(Branch\_id) REFERENCES

LIBRARY\_BRANCH(Branch\_id),

CREATE TABLE BOOK\_LOANS ( BOOK\_id INTEGER NOT NULL,

Branch\_id INTEGER,

Card\_no INTEGER,

Date\_out Char(8) NOT NULL,

Due\_date(8) NOT NULL,

PRIMARY KEY (Book\_id) REFERENCES

BOOK(Book\_id),

FOREIGN KEY(Branch\_id) REFERENCES

LIBRARY\_BRANCH(Branch\_id),

PRIMARY KEY(Card\_no) REFERENCES

BORROWER(Card\_no),

CREATE TABLE LIBRARY\_BRANCH ( Branch\_id INTEGER,

Branch\_name VARCHAR(30) NOT NULL,

Address VARCHAR(30),

CREATE BORROWER ( Card\_no NOT NULL,

Name VARCHAR(30) NOT NULL,

Address VARCHAR(30) NOT NULL,

Phone INTEGER NOT NULL,

4. How can the key and foreign key constraints be enforced by the DBMS?

The key constraints ensure unique values in a column, while foreign key constraints enforce referential integrity by ensuring that values in one column match values in another column. DBMS enforces these constraints by automatically checking them during data operatins.

5.Briefly describe the UPDATE command with a suitable example.

An update command is used to modify existing records in a database. For example, in the 1.2 diagram,

Update Student

Set class=2

Where name=’Smith’ ;

Now where the student table has the name smith, the class will be charged to 2 instead of 1.

1. State the difference between PRIMARY KEY clause and UNIQUE clause.

The difference between a primary key clause and a unique clause is that a primary key’s constraint is used to identify each record in a table uniquely. While a unique clause’s constraint is used to ensure that values in one or more columns are all different across all records in a table.

1. Specify the following queries in SQL on the database schema of Figure 6.6.
2. List names of borrowers and the corresponding book titles that they borrowed.

SELECT BR.Name AS BorrowerName, B.Title AS BookTitle

FROM BORROWER AS BR

INNER JOIN BOOK\_LOANS AS BL ON BR.Card\_no = BL.Card\_no

INNER JOIN BOOK AS B ON BL.Book\_ID = B.Book\_ID;

1. List book titles followed by their author’s name.

SELECT B.Title, BA.Author\_name

FROM BOOK AS B

INNER JOIN BOOK\_AUTHOR AS BA ON B.Book\_ID = BA.Book\_ID;

1. List publisher’s name for books authored by ‘jk rowling’.

SELECT DISTINCT B.Publisher\_name

FROM BOOK AS B

INNER JOIN BOOK\_AUTHOR AS BA ON B.Book\_ID = BA.Book\_ID

WHERE BA.Author\_name = 'JK Rowling';

1. List branch addresses that house the book titled ‘Don Quixote’.

SELECT LB.address

FROM LIBRARY\_BRANCH AS LB

INNER JOIN BOOK\_COPIES AS BC ON LB.Branch\_id = BC.Branch\_id

INNER JOIN BOOK AS B ON BC.Book\_ID = B.Book\_ID

WHERE B.Title = 'Don Quixote';

8. Specify the following queries in SQL on the database schema of Figure 1.2.

1. Retrieve the names of all senior students majoring in ‘cs’ (computer science).

SELECT S.Name

FROM STUDENT AS S

WHERE S.Class = 4 AND S.Major = 'CS';

1. Retrieve the names of all courses taught by Professor King in 2007 and 2008.

SELECT DISTINCT C.course\_name

FROM COURSE AS C

INNER JOIN SECTION AS SC ON C.course\_number = SC.course\_number

WHERE SC.instructor = 'KING' AND (SC.year = '07' OR SC.year = '08');

1. For each section taught by Professor King, retrieve the course number, semester, year, and number of students who took the section.

SELECT SC.course\_number, SC.semester, SC.year, COUNT(G.student\_number) AS num\_students

FROM SECTION AS SC

JOIN GRADE\_REPORT AS G ON SC.section\_id = G.section\_id

WHERE SC.instructor = 'KING'

GROUP BY SC.course\_number, SC.semester, SC.year;

1. Retrieve the name and transcript of each senior student (Class = 4) majoring in CS. A transcript includes course name, course number, credit hours, semester, year, and grade for each course completed by the student.

SELECT SC.course\_number, SC.semester, SC.year,COUNT(GR.student\_number) AS num\_students

FROM SECTION AS SC

JOIN GRADE\_REPORT AS GR ON SC.section\_id = GR.section\_id

WHERE SE.instructor = 'KING'

GROUP BY SE.course\_number, SE.semester, SE.year;

9. Write SQL update statements to do the following on the database schema shown in Figure 1.2. a. Insert a new student, , in the database.

Insert into student

Values(‘Johnson’, 25, 1, ‘Math’);

1. Change the class of student ‘Smith’ to 2.

Update Student

Set class=2

Where name=’Smith’ ;

1. Insert a new course, .

Insert into Course

Values(<‘Knowledge Engineering’, ‘cs4390’, 3, ‘cs’);

1. Delete the record for the student whose name is ‘Smith’ and whose student number is 1

Delete from student

Where Name=’Smith’ and student\_number=17;