QUEENSLAND UNIVERSITY OF TECHNOLOGY

School of Information Systems
Faculty of Science and Engineering

IFN554 Databases

Assessment 2

Semester 1 - 2019

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Contents

Task 1

Write an SQL script that builds a database to match the relational model provided to you. These SQL statements in the script must be provided in the correct order.
You are required to create a database for the fictitious bookstore Oktomook for Task 1. The database is based on the following model.

OKTOMOOK RELATIONAL MODEL

Branch (branchNumber, branchName, streetNo, streetName, branchCity, branchState, numberEmployees)
Publisher (publisherCode, publisherName, publisherCity, publisherState)
Author (authorID, firstName, lastName)
Book (ISBN, title, publisherCode, genre, retailPrice, paperback)
Wrote (ISBN, authorID)
Inventory (ISBN, branchNumber, quantityInStock)

FOREIGN KEYS

- Book(publisherCode) is dependent on Publisher (publisherCode)
- Wrote (ISBN) is dependent on Book (ISBN)
- Wrote (authorID) is dependent on Author (authorID)
- Inventory (ISBN) is dependent on Book (ISBN)
- Inventory (branchNumber) is dependent on Branch (branchNumber)

OTHER CONSTRAINTS and REMARK

- branchNumber comprises three digits.
- ISBN comprises 10 digits.
- publisherCode comprises one letter and two digits.
- authorID comprises four digits.
- INTEGER type must be used for retailPrice, numberEmployees and quantityInStock.
- TEXT type must be used for other attributes (except retailPrice, numberEmployees and quantityInStock).
- Book title always contains a value.
  (i.e., you cannot insert a new record, or update a record without adding a value to this field).

Answer for task 1

```
Sqlite3 Oktomook;

CREATE TABLE Branch (
   branchNumber TEXT(3) NOT NULL PRIMARY KEY,
   branchName  TEXT NULL,
   streetNo    TEXT NULL,
   streetName  TEXT NULL,
   branchCity  TEXT(20) NULL,
   branchState TEXT  NULL,
   numberEmployees INTEGER,
   CHECK (branchNumber like '[0-9][0-9][0-9]')
);

CREATE TABLE Publisher (
```

```
    publisherCode  TEXT(3)  NOT NULL PRIMARY KEY,
    publisherName  TEXT  NULL,
    publisherCity  TEXT  NULL,
    publisherState TEXT  NULL,
    CHECK (publisherCode like '[a-z][0-9][0-9]')
);

CREATE TABLE Author (
    authorID  TEXT(4)  NOT NULL PRIMARY KEY,
    firstName TEXT NULL,
    lastName  TEXT NULL,
    CHECK (authorID like '[0-9][0-9][0-9][0-9]')
);

CREATE TABLE Book (
    ISBN  TEXT(10) NOT NULL PRIMARY KEY,
     title TEXT(15) NOT NULL,
     publisherCode  TEXT(3) NULL,
     genre TEXT NULL,
     retailPrice INTEGER NULL,
     paperback   TEXT NULL,
     CHECK (publisherCode like '[a-z][0-9][0-9]'),
     CHECK (ISBN like '[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]'),
     FOREIGN KEY (publisherCode)
    REFERENCES Publisher (publisherCode)
);

CREATE TABLE Wrote (
    ISBN  TEXT(10) NOT NULL,
    authorID  TEXT(4)  NOT NULL,
    CHECK (ISBN like '[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]'),
    CHECK (authorID like '[0-9][0-9][0-9][0-9]')
    PRIMARY KEY (ISBN, authorID),
    FOREIGN KEY (ISBN)
    REFERENCES Book (ISBN),
    FOREIGN KEY (authorID)
    REFERENCES Author (authorID)
);

CREATE TABLE Inventory (
    ISBN  TEXT(10) NOT NULL,
    branchNumber    TEXT(3) NOT NULL,
    quantityInStock INTEGER NOT NULL,
    CHECK (branchNumber like '[0-9][0-9][0-9]'),
    CHECK (ISBN like '[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]'),
    PRIMARY KEY (ISBN, branchNumber),
    FOREIGN KEY (ISBN)
    REFERENCES Book (ISBN),
    FOREIGN KEY (branchNumber)
    REFERENCES Branch (branchNumber)
)
```

Task 2

We have provided you the Hotel database to be used with SQLite DBMS. You should use this database in SQLite to extract the necessary information as per the following query requirements.

The script is based on the following relational schema:

• Hotel (hotelNo, hotelName, city)

- Room (roomNo, hotelNo, type, price)
- Booking (hotelNo, guestNo, dateFrom, dateTo, roomNo)
- Guest (guestNo, guestName, guestAddress)

Note the following details of the hotel database;

- Hotel contains hotel details and hotelNo is the primary key;
- Room contains room details for each hotel and (roomNo, hotelNo) forms the primary key;
- Booking contains details of bookings and (hotelNo,guestNo,dateFrom) forms the primary key;
- Guest contains guest details and guestNo is the primary key.

Write an SQL script for querying data.

- List hotelNo, type and price of each double or deluxe room with a price more than $99.

Answer for task 2

```
select TYPE, PRICE
  from ROOM
where TYPE in ('Double', 'Deluxe')
and PRICE > 99
```

List hotelNo who have more than 2 double rooms.

```
select HOTELNO
  from ROOM
 where TYPE = 'Double'
  group by HOTELNO
 having count(TYPE) > 2
```

List number of different guests who visited Ridge Hotel.

```
select G.guestNo
  from BOOKING AS B
     , GUEST AS G
     , HOTEL AS H
 WHERE B.guestNo = G.guestNo
   AND B.hotelNo = H.hotelNo
   AND H.hotelName = 'Ridge Hotel'
```

What is the total income from bookings for the Grosvenor Hotel?

```
select sum(R.PRICE) AS TOTAL_INCOME
  from BOOKING AS B
     , HOTEL AS H
     , ROOM AS R
 where B.HOTELNO   = H.HOTELNO
   AND R.HOTELNO   = H.HOTELNO
   AND H.HOTELNAME = 'Grosvenor Hotel'
```

List all the guests who have stayed in a hotel.

```
select G.*
  from BOOKING AS B
     , GUEST AS G
     , HOTEL AS H
 WHERE B.guestNo = G.guestNo
   AND B.hotelNo = H.hotelNo
```

Task 3

Perform the following tasks.

Write commands to insert rows in each of the Hotel database tables.

```
insert into HOTEL(HOTELNO, HOTELNAME, CITY)
values ('H8', 'Test hotel', 'Brisbane')

insert into GUEST(GUESTNO, GUESTNAME, GUESTADDRESS)
values ('G6', 'Roberto', 'Brisbane')

insert into ROOM(ROOMNO, HOTELNO, TYPE, PRICE)
values ('R1', 'H8', 'Single', '100')

insert into BOOKING(HOTELNO, GUESTNO, DATEFROM, DATETO, ROOMNO)
values ('H8', 'G6', '2020-03-02', '2020-03-10',  'R1')
```

Write a command to delete the row you inserted in the table Guest.

The code to delete the row inserted by me in the table Guest would be **delete from** GUEST **where** guestno = 'G6'. However, as this table have relationships with other tables would be necessary to undo the inserts in the tables which have relationships with it (GUEST). Such as:

Answer for task 3

```
delete
  from GUEST
  where GUESTNO      = 'G6'

delete
from BOOKING
  where GUESTNO  = 'G6'
```

Write a command to update the price of all rooms by 10%

```
update ROOM
  set price = (price + (price * 0.1))
```

Task 4

Perform the following tasks.

Currently the database only contains a small number of records, however the data contained within it is expected to grow significantly in the future. Creating indexes on commonly searched columns is a way performance issues can be minimised. Write a command to create an index on guestName of the Guest table.

Answer for task 4

```
CREATE UNIQUE INDEX idx_Guest_guestName
ON Guest (guestName);
```

Write a command to create a view to list the information (hotelName, roomType and the total number of rooms booked) of the hotels which are in Cairns.

```
CREATE VIEW v_rooms_booked_in_cairns
AS
select H.HOTELNAME,
       R.TYPE,
       count(B.ROOMNO) as NUMBER_OF_ROOMS_BOOKED
  from BOOKING as B
     , HOTEL as H
     , ROOM as R
 where B.HOTELNO = H.HOTELNO
   and B.ROOMNO  = R.ROOMNO
   and R.HOTELNO = H.HOTELNO
   and H.CITY = 'Cairns'
  group by H.HOTELNAME
         , R.TYPE
```

Task 5

Nikki and Phil work with the Hotel database as database administrator. Provide the commands required to grant or revoke access so the following security requirements are met:

Perform the following tasks.

- User Nikki must be able to add records to the Booking table.
- User Nikki must be able to remove records from the Booking table.
- User Phil is no longer allowed to add data to the Guest table.
- User Phil is no longer allowed to delete records from the Guest table.

Assume usernames of employees Nikki and Phil are nikki and phil respectively.

Answer for task 5

GRANT INSERT, DELETE ON Booking TO Nikki;

REVOKE INSERT, DELETE ON Guest TO Phil;

Task 6

Write a 300 – 500 words report on the possible considerations for ethical use of data from the perspective of data management.

Marks will be awarded for the following:

- The key considerations for ethical use of data are clearly articulated and comprehensively discussed & Excellent formatting and impeccable grammar.
- The key considerations for ethical use of data are clearly identified and discussed & Good formatting and very minor grammatical errors.
- The key considerations for ethical use of data are adequately identified and discussed & Satisfactory formatting and a few grammatical errors.

- Some of the key considerations for ethical use of data are identified and discussed & Poor formatting and many grammatical errors.
- None of the key considerations for ethical use of data are identified or discussed & Non-existent formatting and rife with fundamental grammatical errors.

Task 7

Using the following table structure, identify all functional dependences and then decompose this table into a set of 3NF relations.

Assumptions

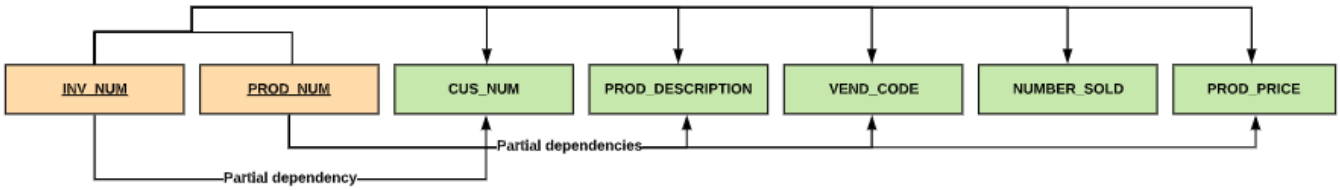
In the following table, these assumptions can be made:

1. there are no multivalued dependencies
2. any invoice numbers may reference more than one product
3. any given product is supplied by a single vendor, but a vendor can supply many products

INV_NUM	PROD_NUM	CUS_NUM	PROD_DESCRIPTION	VEND_CODE	NUMBER_SOLD	PROD_PRICE
211347	AA-E3422QW	C001	Rotary Sander	211	1	$49.95
211347	QD-300932X	C001	0.25-in. drill bit	211	8	$3.45
211347	RU-995748G	C001	Band Saw	309	1	$39.99
211348	AA-E3422QW	C004	Rotary Sander	211	2	$49.95
211349	GH-778345P	C004	Power Drill	157	1	$87.75

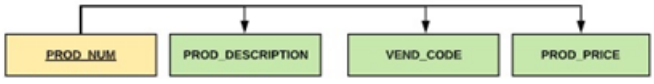
Answer for task 7

Following the table structure given, the functional dependences are identified below.



The decomposition into a set of 3NF relations from the table Invoice is represented as follow.

Whereas the example bellow represents the decomposition from the table Product.



In the exercise given the decomposition should occur also to a table of Vendors and Customer, which for this would be necessary the existence of a field VEND_NAME and CUS_NAME. In this case VEND_NAME would be a Transitive dependence to VEND_CODE.

Appendix A – Declaration template

By submitting this assignment, I am aware of the University rule that a student must not act in a manner which constitutes academic dishonesty as stated and explained in the QUT Manual of Policies and Procedures. I confirm that this work represents my individual effort. I declare that it does not contain plagiarized material.

Full Name	**Student No.**	**Signature**
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