Lab 3

Start Assignment

Due Tuesday by 11:59p.m. **Points** 10 **Submitting** a file upload **File Types** txt
Available until Oct 2 at 11:59p.m.

Statement of Authorship

- Lab to be done individually
- In order to be graded, the following Statement of Authorship must be present at the beginning of the script
- I, Firstname Lastname, student number 123456789, certify that this material is my original work. No other person's work has been used without due acknowledgment and I have not made my work available to anyone else.
- Replace Firstname Lastname with your name and 123456789 with your student number

Introduction

In this lab, you will create a database and two tables. You will load the tables with data. You will use the data from lab 2.

If you do this lab in the College, you will have to complete it in one sitting, because there isn't an easy way to save work in progress. Saving the database creation steps will be addressed in lab 4.

Master Table

Remember that the first table name (the "master" table) will be one of the following:

- customers
- items
- *description*_services (where *description* is replaced with something that makes sense for your business, ex. painting, repair, web, etc.)

Do not name the table services because this is a reserved word in SQL Server.

Constraints

The master table will have a primary key and one check constraint. The purpose of the check constraint is to prevent any new row from being added if it contains an unacceptable value for a certain column.

If your master table is:

- customers, the check constraint will be on category
- items, the check constraint will be on category
- *description*_services, the check constraint will be on service type

Sales Table

For your second table, which will be named sales, you will have these fields:

- sales id (Primary Key)
- sales date
- amount
- customer id or item id or service id (Foreign Key)

Naming Conventions

- Do not put spaces in the names of anything you create
- Do not use descriptive prefixes or postfixes such as tbl
- Use all lowercase and divide word boundaries with _, known as snake_case
- See **http://www.sqlstyle.guide (http://www.sqlstyle.guide/#naming-conventions)**

Data

You must have at least 5 records in your master table and at least 15 records in your sales table. The data in your sales records must correspond to the data in your master table. For example, make sure the customer id in each sales record corresponds to an existing customer. In addition, make sure the total of the amounts equals the year to date's sales figure in the corresponding master record.

Requirements

To satisfy the requirements of this lab, you will have to:

1. Create a database
2. Create two tables
3. Load data into your master and sales tables
4. Test the integrity of your database
5. Capture the output of some prescribed SELECT statements

Procedure

1. Creating a Database

- See **lab 0** for instructions on how to use SQL Server and SSMS
- From the Tools menu, select Options, click Designers, uncheck "Prevent saving changes that require table re-creation", click OK (this will prevent some confusing errors)

- In Object Explorer, right-click the Databases node and select New Database...
- Give the database a name (no spaces) that makes sense for your business, accept defaults

2a. Master Table

- Expand your new database, expand the Tables node, right-click the Tables node, and select New / Table...
- Create your master table by filling in Column Name, Data Type and Allow Nulls for each of your columns, other than the primary key (SQL Server will accept column names with spaces in them; do not do this)
- Data types
  - int for primary key and quantities
  - varchar for description, length of 25 will probably be adequate
  - char for category or service type, length of 1
  - money for credit limit, rate, and sales
- Identify your primary key, by selecting the Set Primary Key option in the Table Designer menu while the correct column is highlighted
- Select Save from the File menu and name your table
- Once you have saved your table, you will need to create a check constraint
- Select Check Constraints... from the Table Designer menu
- Click Add
- The convention for naming constraints is CK_table_name_column_name, update the name of your constraint appropriately
- The check constraint must contain an Expression to ensure the validity of the column values, here are some examples:
  - service_type IN ('C', 'E', 'F')
  - gender = 'M' OR gender = 'F'
  - amount >= 0.00
- Click Close once the check constraint is complete
- Save the changes to your table
- In the Object Explorer select the Tables node and click the Refresh button to see your new table
- Close the table

2b. Sales Table

- Repeat the above steps up to and including saving to create your sales table
- Data types
  - int for keys
  - date for sales date
  - money for amount
- Once you have saved your table, you will need to create a foreign key constraint
- Select Relationships... from the Table Designer menu

- Click Add
- The convention for naming constraints is FK_table_name_column_name, update the name of your constraint appropriately
- Click the Tables And Columns Specification field, click the ellipsis (...) button that appears
  - Click the drop-down list for Primary key table and select your master table
  - Click below the Primary key table to get a drop-down list of column names, select the primary key
  - The Foreign key table will already be sales
  - Click below the Foreign key table to get a drop-down list of column names, select the foreign key (should be same column name as primary key of other table)
- Click Close once the foreign key is complete
- Save the changes to your table, you may receive a warning that multiple tables will be affected, if so, click Yes to save
- Close the table
- In Object Explorer, select the Tables node and press F5 to refresh so that both tables appear

3. Loading the Tables with Data

- In Object Explorer, right-click your master table and select Edit Top 200 Rows
- Enter your data, at least 5 records for the master table
- Close the table
- Right-click your Sales table and select Edit Top 200 Rows
- Enter your data, at least 15 records for the sales table
- You can copy and paste your data from Excel (lab2) to save data entry; in order to do this, you will have to select the "empty" row by clicking the row selector, which initially contains a right-pointing triangle icon and an asterisk
- Close the table

4. Testing the Database's Integrity

- Open your Sales table to enter more data as in step 3
- Attempt to add an additional record that has the same primary key as one of your existing records
- This should fail, if it does not fail, something is wrong with your primary key definition
- Start Notepad and create a file named **lab3.txt**, put your name in the file
- Add the heading "Insert Error"
- In the dialog box that has appeared in SSMS, one of the lines is "Error Message: ", type the two sentences that appear here into lab3.txt
- Hit the escape key several times to clear the error
- Close the Sales table
- Open your master table to enter more data as in step 3
- Attempt to delete one of the records; to delete a record, the entire record must be selected by clicking the row selector (right-pointing triangle icon)
- This should fail, if it does not fail, something is wrong with your foreign key definition

- Add the heading "Delete Error"
- In the dialog box that has appeared in SSMS, one of the lines is "Error Message: ", type the two sentences that appear here into lab3.txt
- Close the master table

5. Show the tables and data

You will execute the first 3 SELECT statements exactly as they are. SELECT 4 & 5 are examples that depend on which master table you created.

By default, SQL Server Management Studio displays query results in a grid, but it can also display the results as text.

- Click the New Query button
- Ensure that the selected database is your database
- Click the Query menu, navigate to Results To and select Results To Text
- Copy the following SQL into SQL Server Management Studio, edit SELECT 4 & 5 as necessary, and run
- Copy the output and paste it into lab3.txt

```
PRINT 'SELECT 1 - Show the tables exist'
SELECT SUBSTRING(TABLE_CATALOG, 1, 20) [Database],
       SUBSTRING(TABLE_NAME, 1, 20) [Table]
FROM INFORMATION_SCHEMA.TABLES;

PRINT 'SELECT 2 - Show that the tables have the correct columns'
SELECT SUBSTRING(TABLE_NAME, 1, 20) [Table],
       SUBSTRING(COLUMN_NAME, 1, 20) [Column],
       ORDINAL_POSITION Pos,
       SUBSTRING(DATA_TYPE, 1, 20) [Type],
       CHARACTER_MAXIMUM_LENGTH [Length]
FROM INFORMATION_SCHEMA.COLUMNS;

PRINT 'SELECT 3 - Show that all the constraints (PK, CK and FK) were set up properly'
SELECT SUBSTRING(TC.TABLE_NAME, 1, 15) [Table],
       SUBSTRING(CCU.COLUMN_NAME, 1, 20) [Column],
       SUBSTRING(TC.CONSTRAINT_NAME, 1, 35) [Constraint],
       SUBSTRING(TC.CONSTRAINT_TYPE, 1, 11) [Type],
       COALESCE(SUBSTRING(CC.CHECK_CLAUSE, 1, 75),
                SUBSTRING(KCU.TABLE_NAME, 1 , 15) + '(' + SUBSTRING(KCU.COLUMN_NAME, 1, 20) + ')',
                'Missing') [Constraint_Details]
FROM INFORMATION_SCHEMA.TABLE_CONSTRAINTS TC
LEFT JOIN INFORMATION_SCHEMA.CONSTRAINT_COLUMN_USAGE CCU
ON TC.CONSTRAINT_NAME = CCU.CONSTRAINT_NAME
LEFT JOIN INFORMATION_SCHEMA.CHECK_CONSTRAINTS CC
ON TC.CONSTRAINT_NAME = CC.CONSTRAINT_NAME
LEFT JOIN INFORMATION_SCHEMA.KEY_COLUMN_USAGE KCU
ON TC.CONSTRAINT_NAME = KCU.CONSTRAINT_NAME
ORDER BY [Table], [Constraint] DESC;

PRINT 'SELECT 4 - Show the Master table data'
SELECT *
FROM master_table;

PRINT 'SELECT 5 - Show the Sales table data'
SELECT *
FROM sales;
```

Lab 3

Criteria	Ratings			Pts
Error message from failed INSERT	**1 pts** **Full Marks**	**0.5 pts** **Partial Marks**	**0 pts** **No Marks**	1 pts
Error message from failed DELETE	**1 pts** **Full Marks**	**0.5 pts** **Partial Marks**	**0 pts** **No Marks**	1 pts
Output from SELECT 1 (showing the tables exist)	**2 pts** **Full Marks**	**1 pts** **Partial Marks**	**0 pts** **No Marks**	2 pts
Output from SELECT 2 (showing the columns are correct)	**2 pts** **Full Marks**	**1 pts** **Partial Marks**	**0 pts** **No Marks**	2 pts
Output from SELECT 3 (showing the constraints are correct)	**2 pts** **Full Marks**	**1 pts** **Partial Marks**	**0 pts** **No Marks**	2 pts
Output from SELECT 4 (showing Master table data)	**1 pts** **Full Marks**	**0.5 pts** **Partial Marks**	**0 pts** **No Marks**	1 pts
Output from SELECT 5 (showing sales table data)	**1 pts** **Full Marks**	**0.5 pts** **Partial Marks**	**0 pts** **No Marks**	1 pts
				Total Points: 10