Final Project

High Spirits Imports (40%)

DUE DATE

Session 15

OBJECTIVE

During this project, you will:

- Translate user requirements into a logical data model.
- Normalize a database design.
- Create a database, tables, and constraints using T-SQL.
- Create a default database diagram.
- Create relationships.
- Populate a database with test data.
- Write scripts containing T-SQL statements that perform frequently-used tasks.

DESCRIPTION

Introduction

You are a Database Administrator working for a small software solutions firm. You have been assigned to help develop a beverage imports management system.

High Spirits is a small importing company that specializes in wines imported from Australia, Chile, the United States, and the United Kingdom. The owner, Tim Tipple, has been considering expanding his inventory to include beer, liquor, and liqueurs. Due to the increased complexity in record keeping, Tim wants to improve the Shipping/Receiving and Sales management system. Currently, each department completes its own paperwork and maintains its own records with its own software application. Departments communicate details by telephone or paper. Several costly mistakes have resulted in the loss of too many good customers.

To improve customer service and avoid communication errors, Mr. Tipple wants one system that provides employees with access to all administrative functions. The new application will provide an integrated interface, so Shipping/Receiving can manage inventory levels, and Sales Managers can easily invoice customers and obtain customer account information. Mr. Tipple wants access to all features of the new application.

Naturally, built-in security features prevent unauthorized individuals from obtaining sensitive information. Mr. Tipple's long-term plans include company expansion into new markets. He would like to open new branches in the future.

You are part of a team of IT professionals hired to implement a business solution for High Spirits' administrative problem. Your team understands the importance of integrating current business practices, rules and documentation into any new system.

Time Required
You are given 10 hours of class time for this project.

Materials Required
The following software and textbook resources are required:

Software

- Windows operating system (Windows 10)
- DBMS (MySQL recommended, or Microsoft SQL Server)

Textbooks

- *Concepts of Database Management* (9th Ed.)
- *Sams Teach Yourself SQL in 10 Minutes* (5th Ed.)

INSTRUCTIONS

General Requirements
The High Spirits Imports Management System enables Shipping/Receiving and Sales Managers to effectively manage inventory and sales. The systems analyst on your team has produced a system chart that describes the proposed application based on interviews to discover Mr. Tipple's requirements, company documents, and employee work habits and requirements.

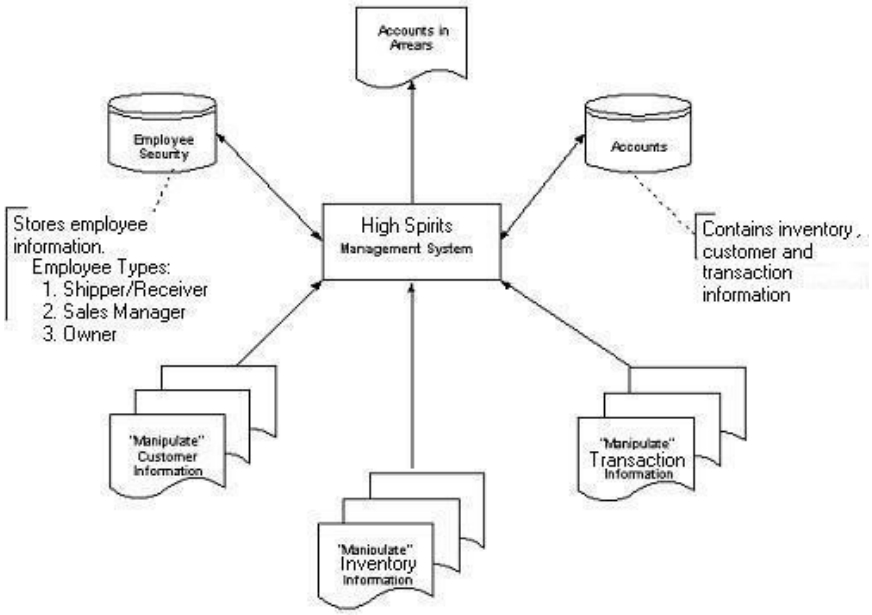

Figure 1: System flowchart for the High Spirits Imports Management System

Sales Managers complete the initial paper-based sales contract, recording product particulars between the customer and High Spirits. They are responsible for inputting new customers and new sales into the system and generating invoices. They maintain customer relationships and deal with customer concerns or complaints.
Shipper and receivers adjust inventory information, recording inventory particulars and quantities based on purchases and sales (transactions) of product. They are responsible for inputting new inventory into the system.
Tim Tipple, the owner, can perform all functions including purchase new inventory.

Data Requirements
This section describes which databases are required and what information must be stored in each.
The High Spirits Imports Management System consists of the following two databases:

- HS_Employee database
- HighSpirits database

Currently, the HS_Employee database is a Microsoft Excel spreadsheet that stores employee information including loginIDs and passwords. There are no tables defined within this database.
For future scalability and access from different regions possibly by the Internet, the systems analyst suggests that the HighSpirits application use MySQL or SQL Server as the backend database instead of Microsoft Access. The HighSpirits database will be used for storing information about products, customers, and billing. Eventually, if Mr. Tipple opens new branches, the database will need to accommodate locations.

The systems analyst suggests that, for additional security, the employee data in the existing Excel spreadsheet be moved to its own SQL Server database. He has provided you with a copy of the Excel spreadsheet (HS_Employees.xls), which is available on your project work disk.
Both the HighSpirits database and the HS employees database can, for now, exist on one server.

Data Rules
Mr. Tipple wants you to include the following business rules in the HighSpirits database:

- Product types are beer (1), liqueur (2), liquor (3) and wine (4). The most popular Product Type is wine.
- The most popular Size is 750ml. Common sizes are 375ml (1), 750ml (2), and 1 litre (3), and 12-case (4).
- Transaction numbers start at 100 and increment by 5.
- Transaction types are purchase (1) and sale (2). Most Transactions are sales.
- Payment due dates are 30 days from transaction date.
- The minimum transaction quantity is 5.
- Inventory levels are kept to at least 50 of each product.
- Countries are identified by IDs composed of a single digit integer Australia (1) Chile (2), UK (3) and US (4).

The systems analyst has already begun analyzing the data requirements of this database.

The four main tables include:

- Customers
- Products
- Transactions
- Transaction Details

The database includes various lookup tables:

- Country
- Size
- Product Types
- Transaction Types

The following information needs to be recorded about Customers:

- Company Name
- Address
- City
- Province
- Postal Code
- Phone Number

The following information needs to be recorded about Products:

- Product number
- Name
- Type
- Size
- Country of origin
- Supplier name
- Quantity in stock
- Cost per unit

The following information needs to be recorded about Transactions:

- Transaction ID
- Type of transaction
- Date of the transaction
- Customer or supplier
- Invoice number
- Payment due date

The following information needs to be recorded about TransactionDetails:

- TransactionID
- ProductID
- Quantity of product bought or sold
- Price of product bought or sold

The following information needs to be recorded about Payments. A payment is applied to a **transaction** rather than to a customer:

- Date
- Amount
- Invoice number
- Transaction ID

The following information needs to be recorded about Audits:

- Date of change
- The Changed field
- The old value for each field
- The new value for each field
- Transaction ID

The Changed field is a true or false field. It should hold a 0 if the field's data did not change and a 1 if it did. For example, if only the first payment date changed, a PaymentDueDateChanged field requires a 1 value but all other fields in the record require a 0 to indicate they did not change.

Database Usage

The systems analyst has discovered the following facts about how the database will be used:

- Since the way the database is described is fairly normalized, joins will be frequently used in the HighSpirits application.
- Typically, a sales manager will search for a customer by phone number. They will want to know the customer's first and last name initially and may opt to do a search for other information later on.
- Searches in the Products table typically involve a Product number and any or all of name, country, quantity, price, and type. Most often the search involves Product number, quantity, and price.
- Searches in the Transaction table typically involve a Transaction number, type, and date.
- Searches in the TransactionDetails table typically involve the Product or Transaction ID, price, and quantity.
- The Country, Size, Product Types, and Transaction Type tables are searched for each new transaction.
- Product stock information tends to change often. New customers and transactions are added continuously throughout the year.
- Retail prices are at least 110% of cost. Discounts or higher retail prices apply at Mr. Tipple's discretion.
- Unit cost price includes any duties or taxes. Cost is 91% or less of retail price.

Payment Procedures

Payments entered into the database incorrectly cannot be deleted. Instead, they are *voided*. A voided payment has a payment value of $0.00. A reason should always be given for a voided payment. By voiding a payment instead of deleting it, HighSpirits ensures that it has an accurate record of all

payments made, even if some of the entries were originally incorrect. Also, voiding payments prevents employee theft.

Auditing System

In order to keep track of amendments to transactions, Mr. Tipple would like an auditing system implemented. The auditing system should record whenever changes have been made to the **Transactions** table. Specifically, you should record when the changes were made, what fields were affected, and what their old and new values were.

Your Task

Based on the preliminary findings of the systems analyst, you will need to formalize the database design and use a DBMS (SQL Server, MySQL, etc.) to build the database. You will NOT be required to build all the functionality as described above as part of this initial project. You will be responsible only for specific parts of the system and implementing specific features as described below. You should complete the following steps:

1. Analyze the data requirements described in the previous section. Decide which tables are required and which fields should go in which table. Normalize your design. If you wish, you may use an entity-relationship diagram. Create your table design showing the relationships between each table.

It is now time for your instructor to check your progress. After you have finished the preliminary design for the High Spirits Imports Management System, contact your instructor for a brief review.

2. Using your DBMS, create an SQL script to create the High Spirits database. Name the database **HSxxxxx**, where xxxxx is your student number. Save your script as ***step2.sql***. If you are using MySQL, save screen captures of the database creation steps and submit them instead.
3. Create the tables in the HighSpirits database. You do not need to specify relationships in this script. Save your script as ***step3.sql***.
4. Create a default database diagram. Add primary keys and relationships where they make sense. Create a script that will add the necessary primary keys and foreign keys to the appropriate tables. Save your script as ***step4.sql***.
5. Create a script that will create the needed constraints to enforce the data rules Mr. Tipple has specified. Save your script as ***step5.sql***.
6. Using the provided source documents (see pages 11-17 for customer invoices and purchase orders), populate your database with test data. Minimally, you need:
    - 4 customers (include High Spirits as a customer so you can track purchase transactions).
    - 5 transactions — at least 3 are sales type, 2 of which must be paid.
    - 4 countries, types and sizes
    - 6 products, each with a quantity specified. Save your script as ***step6.sql***.

7. Create a script that will show a list of customers (first name, last name, and phone number) and the total number of sales transactions they have made. Save your script as ***step7.sql***. After running the script, save a screen capture of the output and save it as step7-output.jpg.
8. Create a script that will show a list of products (product name, type, size) that have been purchased. **Note:** You must use an outer join for this query; a subquery is not acceptable. Save your script as ***step8.sql***. After running the script, save a screen capture of the output and save it as step8-output.jpg.
9. Create a script that will show a list of products (product name, type, size, and supplier) that are from Australia. Save your script as ***step9.sql***. After running the script, save a screen capture of the output and save it as step9-output.jpg.
10. Create a script that will show a list of products (product name, type, size, customer, retail price, and quantity sold). The script should also calculate the **sum** of the *price* field and the **sum** of the *quantity sold* from all times the products were sold and display it as a calculated field. Do not include purchases (Remember the status field is set to 0 for sales and 1 for purchases). Save your script as ***step10.sql***. After running the script, save a screen capture of the output and save it as step10-output.jpg.
11. Using your DBMS Help feature, explore the use of the SHOW command to display the contents of your database. Create a script that will display a list of tables in the database. Save this script as ***step11a.sql***. Then create a script for each of the four main tables (Customers, Transactions, Products, Transaction details) that will display all of the columns in the table. Save your scripts as ***step11b.sql*** to ***step11e.sql***.
12. Finally, you will need to create the HS_Employees database. Using the data in the HS-Employees.xls spreadsheet, create a script to populate the Employees database with the data found there. Employee ID's should be unique and start with the two employee initials and then increment by a value of 1. It should be the primary key. Social Insurance numbers are unique for each individual. However, this does not make for a good Primary Key. You must ensure that there is not the ability to incorrectly enter someone else's SI number by mistake by making this field unique. Create the employee database and populate the employees table with the data as indicated above. Save your scripts as ***step12.sql*** and ***step12a.sql***.

NOTE: The project may be used as a source for future course projects requiring you to work on the database you just created. You may want to keep a backup of your work.

High Spirits Imports – Sales Invoice HS00334567

Sold to:
Customer ID: 102209
Crosskey Diner
1000 Lollipop Lane Halifax, NS
B1X 1X1
Phone: (902) 123-4567

Products Sold:

Product Number	Name	Company	Quantity
B140	**Roo Brew**	**Outback Beers, Inc.**	**10**
Type	**Size**	**Country**	**Price per unit**
☒ Beer ☐ Liqueur ☐ Liquor ☐ Wine	☒ **12-case** ☐ **375ml** ☐ **750ml** ☐ **1 litre**	☒ Australia ☐ Chile ☐ UK ☐ US	**$17.00** **Total Price** **$170.00**
Product Number	**Name**	**Company**	**Quantity**
B118	**Andes Light**	**Chilean Brewing**	**20**
Type	**Size**	**Country**	**Price per unit**
☒ Beer ☐ Liqueur ☐ Liquor ☐ Wine	☒ 12-case ☐ 375ml ☐ 750ml ☐ 1 litre	☐ Australia ☒ Chile ☐ UK ☐ US	$18.00 **Total Price** $360.00
		Total Due:	**$530.00**

Sale Terms

Contract Date: 2020/01/02
Net terms: 30 days
Interest: 2% per annum

All taxes included in price

High Spirits Imports – Sales Invoice HS00334571

Sold to:
Customer ID: 145264
Scalli Wags Waterfront Bar
80 Plank Walk
Halifax, NS B2L 1L1
Phone: (902) 812-4829

Product Sold:

Product Number	Name	Company	Quantity
L032	Southern Home	Johnson Co.	25
Type	**Size**	**Country**	**Price per unit**
☐ Beer ☐ Liqueur ☒ Liquor ☐ Wine	☐ 12-case ☒ 375ml ☐ 750ml ☐ 1 litre	☐ Australia ☐ Chile ☒ UK ☐ US	$12.00 **Total Price** $300.00
		Total Due:	**$300.00**

Sale Terms

Contract Date: 2020/01/10
Net terms: 30 days
Interest: 2% per annum

All taxes included in price

High Spirits Imports – Sales Invoice HS00334613

Sold to:
Customer ID: 168023

Law Chambers Pub
2 Politician Street
Halifax, NS B3M 1M1
Phone: (902) 341-4212

Product Sold:

Product Number	Name	Company	Quantity
B140	**Roo Brew**	**Outback Beers, Inc.**	**5**
Type	**Size**	**Country**	**Price per unit**
☐ Beer ☒ Liqueur ☐ Liquor ☐ Wine	☐ 12-case ☒ 375ml ☐ 750ml ☐ 1 litre	☐ Australia ☐ Chile ☒ UK ☐ US	$28.00 **Total Price** **$140.00**
Product Number	**Name**	**Company**	**Quantity**
B118	**Andes Light**	**Chilean Brewing**	**5**
Type	**Size**	**Country**	**Price per unit**
☐ Beer ☐ Liqueur ☐ Liquor ☒ Wine	☐ 12-case ☐ 375ml ☒ 750ml ☐ 1 litre	☒ Australia ☐ Chile ☐ UK ☐ US	$13.00 **Total Price** $65.00
		Total Due:	**$205.00**

Sale Terms

Contract Date: 2019/12/15
Net terms: 30 days
Interest: 2% per annum

All taxes included in price

Glayva of Eire – Purchase Order 112

Sold to:
Customer ID: 100000
High Spirits Imports
1200 Motor Way Halifax, NS B5A 1K1
Phone: (902) 821-4319

Product Ordered:

Product Number	Name	Company
Q320	IrishDew	Glayva
Type	**Size**	**Country**
☐ Beer	☐ 12-case	☐ Australia
☒ Liqueur	☒ 375ml	☐ Chile
☐ Liquor	☐ 750ml	☒ UK
☐ Wine	☐ 1 litre	☐ US

Sale Terms

Quantity: 12
Price per: $12.11
Subtotal: $145.32
Import taxes and duties: $27.23
Total Due: $172.55

Contract Date: 2019/12/17
Net terms: 30 days

All import taxes and duties included in price

Gallow Mountain Wines – Purchase Order 113

Sold to:
Customer ID: 100000 High Spirits Imports 1200 Motor Way Halifax, NS
B5A 1K1

Phone: (902) 821-4319

Product Ordered:

Product Number	Name	Company
W206	Chablis	Gallow
Type	**Size**	**Country**
☐ Beer	☐ 12-case	☐ Australia
☐ Liqueur	☐ 375ml	☐ Chile
☐ Liquor	☐ 750ml	☐ UK
☒ Wine	☒ 1 litre	☒ US

Sale Terms

Quantity: 24
Price per: $15.21
Subtotal: $365.04
Import taxes and duties: $32.23
Total Due: $397.27

Contract Date: 2020/01/06
Net terms: 30 days

All import taxes and duties included in price

SUBMISSION INSTRUCTIONS

For full marks, you must submit the following items:

- A title page including your name, student number, instructor's name, and course name on an appropriate cover.
- A PDF file of all the T-SQL scripts you created in steps 2, 3, 5, 7, 8, 9, 10, 11 and 12.
- A ZIP file containing scripts for steps 2, 3, 5, 6, 7, 8, 9, 10, 11 and 12.

Work must be submitted in the correct file type and be properly labelled as per the College naming convention:
NAME_COURSE_ASSIGNMENT. E.g. XuXiaLing_FM50D_A01.

GRADING CRITERIA

Assignment Value: **40%**

Grading Criteria	Grading
Logical Database Design	/15
• Suitable logical data model based on user requirements	/10
• Normalized design	/5
Physical Database Design and Creation	/60
• Correct database creation script	/10
• Correct table creation script	/10
• Appropriate selection of constraints for rules	/10
• Correct constraint creation for rules	/10
• Correct creation of relationships using constraints	/10
• Database population	/10
T-SQL Scripting	/25
• Correct script for step 7	/5
• Correct script for step 8	/5
• Correct script for step 9	/5
• Correct script for step 10	/5
• Correct script for step 11	/2
• Correct script for step 12	/3
TOTAL	**/100**

Penalties

- Late submissions receive a penalty of 5% per day.
- Projects that are more than three days late can be submitted for a maximum grade of 60%.
- Projects contaminated with a virus must be resubmitted and will receive a maximum grade of 60%.