Final Project Design Specification

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SDEV 240 - C++ Programming I – Summer 2019

Instructions for Running

Project was compiled using Msys2 mingw-w64 compiler (https://mingw-w64.org/doku.php/download).

See screenshots of example program run through below.

Project Description

For my project I will be designing a simple customer database application. A database application is an application that allows users to easily store (write), update, and read information for a specific purpose. Database applications can be used for almost anything from hospital record keeping to company sales storage to data warehousing for statistical analysis of data.

The application for this project is a simple database application built for storing and tracking information about customers or clients. The application shows a neatly formatted table interface. It allows users to enter information to add new customers, update old customer information, or delete existing customer records. The user can also select a subset of the table for viewing or show total company sales of all customer records. This data will be saved to a local database file so that data will be kept for later use even after the user exits the program.

Class Design

There are four main classes in this application:

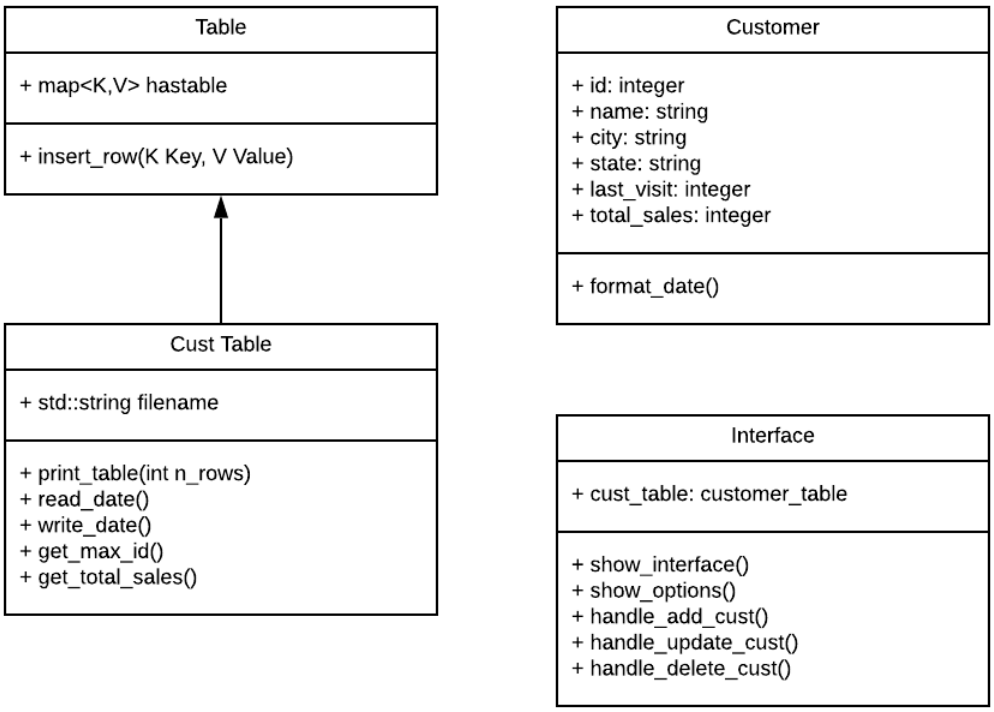
Customer: Holds information about an individual customer record

Table: Base table class that other table classes are children of

Cust Table: Customer table class. Inherits from parent table class

Interface: Interface class that handles menu options and user input

Class Diagram



Implementation

Normally, database applications are built on some sort of more powerful database engine like MySQL or MS SQL Server. However, for our purposes we use a CSV (Comma separated value) file as our makeshift database.

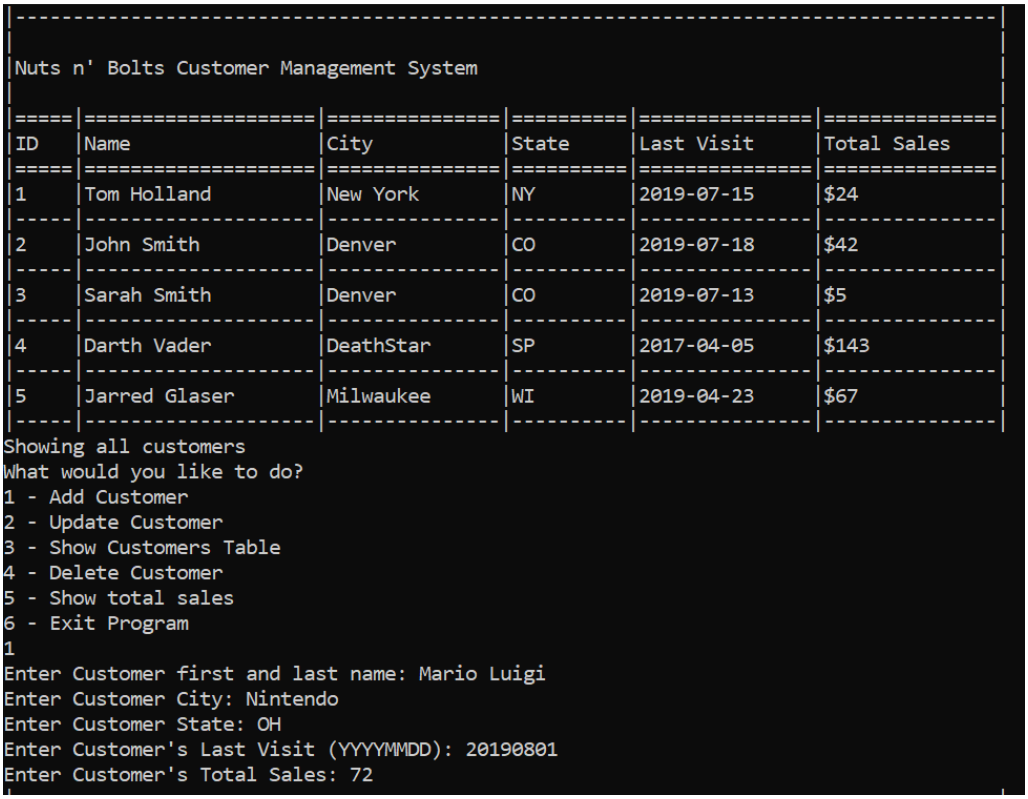
The constructor for the **Cust Table** class automatically reads in data from the local database file. The destructor for the **Cust Table** class automatically truncates all existing data in the csv file and writes the new data to it. This ensures that all necessary database actions happen behind the scenes, without any need for use interaction. Putting the truncate/write function in the destructor ensures that all data is saved anytime the program exits (or when the **Cust Table** class goes out of scope), and the user does not have to manually execute a save command.

The table objects are created using the map object from the STL. Maps allow a simple way of storing data in a Key, Value structure. The keys in this case are the customer IDs and the values are the customer objects themselves. Using the map object instead of unordered_map means that, algorithmically, our program operates with slightly less speed (log(n) for map vs. O(1) for unordered_map on average for searching records). However, I found that the benefit of having automatically sorted keys in map, outweighed the cost. Since each customer ID is just an increment of the previous ID, having sorted IDs makes inserting a new record very easy.

Expansion

Because this program follows OOP paradigms, it would be easy for more functionality to be added. For instance, we could easily add other table child classes, perhaps for orders or products. We could also add more functionality to the child table classes such as searching for records based on fields (for example search for customer by name). In addition, a security system could be added that would allow users to login or sign out of their accounts. This could easily be implemented as just another child of the base table class.

Sample Run



```
|-------------------------------------------------------------------------------|
|                                                                               |
|Nuts n' Bolts Customer Management System                                       |
|                                                                               |
|=====|====================|===============|==========|===============|===============|
|ID   |Name                |City           |State     |Last Visit     |Total Sales    |
|=====|====================|===============|==========|===============|===============|
|1    |Tom Holland         |New York       |NY        |2019-07-15     |$24            |
|-----|--------------------|---------------|----------|---------------|---------------|
|2    |John Smith          |Denver         |CO        |2019-07-18     |$42            |
|-----|--------------------|---------------|----------|---------------|---------------|
|3    |Sarah Smith         |Denver         |CO        |2019-07-13     |$5             |
|-----|--------------------|---------------|----------|---------------|---------------|
|4    |Darth Vader         |DeathStar      |SP        |2017-04-05     |$143           |
|-----|--------------------|---------------|----------|---------------|---------------|
|5    |Jarred Glaser       |Milwaukee      |WI        |2019-04-23     |$67            |
|-----|--------------------|---------------|----------|---------------|---------------|
Showing all customers
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
1
Enter Customer first and last name: Mario Luigi
Enter Customer City: Nintendo
Enter Customer State: OH
Enter Customer's Last Visit (YYYYMMDD): 20190801
Enter Customer's Total Sales: 72
```

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|--------------------------------------------------------------------------------|
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|Nuts n' Bolts Customer Management System                                        |
|                                                                                |
|=====|====================|===============|==========|==============|==============|
|ID   |Name                |City           |State     |Last Visit    |Total Sales   |
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|-----|--------------------|---------------|----------|--------------|--------------|
|3    |Sarah Smith         |Denver         |CO        |2019-07-13    |$5            |
|-----|--------------------|---------------|----------|--------------|--------------|
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|-----|--------------------|---------------|----------|--------------|--------------|
|5    |Jarred Glaser       |Milwaukee      |WI        |2019-04-23    |$67           |
|-----|--------------------|---------------|----------|--------------|--------------|
|6    |Mario Luigi         |Nintendo       |OH        |2019-08-01    |$72           |
|-----|--------------------|---------------|----------|--------------|--------------|
Showing all customers
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
```

```
2
Enter customer ID to update: 10
No customer ID 10 exists.
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
2
Enter customer ID to update: 3
Found customer ID 3
Enter updated name: (Currently: Sarah Smith): Sarah Smith
Enter updated city: (Currently: Denver): Denver
Enter updated state: (Currently: CO): CO
Enter updated last visit as YYYYMMDD (Currently: 20190713): 20190802
Enter updated total sales (Currently: 5): 15
Customer 3 updated.
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
```

```
3
Select number of customers to show (Enter '*' to show all):
3
|-------------------------------------------------------------------------------|
|                                                                               |
|Nuts n' Bolts Customer Management System                                       |
|                                                                               |
|=====|====================|===============|==========|===============|===============|
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|-----|--------------------|---------------|----------|---------------|---------------|
|2    |John Smith          |Denver         |CO        |2019-07-18     |$42            |
|-----|--------------------|---------------|----------|---------------|---------------|
|3    |Sarah Smith         |Denver         |CO        |2019-08-02     |$15            |
|-----|--------------------|---------------|----------|---------------|---------------|
Showing 3 of 6 customers.
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
```

```
3
Select number of customers to show (Enter '*' to show all):
*
|-------------------------------------------------------------------------------|
|                                                                               |
|Nuts n' Bolts Customer Management System                                       |
|                                                                               |
|=====|====================|===============|==========|===============|===============|
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|-----|--------------------|---------------|----------|---------------|---------------|
|2    |John Smith          |Denver         |CO        |2019-07-18     |$42            |
|-----|--------------------|---------------|----------|---------------|---------------|
|3    |Sarah Smith         |Denver         |CO        |2019-08-02     |$15            |
|-----|--------------------|---------------|----------|---------------|---------------|
|4    |Darth Vader         |DeathStar      |SP        |2017-04-05     |$143           |
|-----|--------------------|---------------|----------|---------------|---------------|
|5    |Jarred Glaser       |Milwaukee      |WI        |2019-04-23     |$67            |
|-----|--------------------|---------------|----------|---------------|---------------|
|6    |Mario Luigi         |Nintendo       |OH        |2019-08-01     |$72            |
|-----|--------------------|---------------|----------|---------------|---------------|
Showing all customers
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
```

```
4
Enter customer ID to delete: 10
No customer ID 10 exists.
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
4
Enter customer ID to delete: 5
Found customer ID 5 with the following information:
Name: Jarred Glaser
City: Milwaukee
State: WI
Last Visit: 2019-04-23
Total Sales: $67
Are you sure you want to delete this customer? (Y or N)N
Customer not deleted.
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
4
Enter customer ID to delete: 3
Found customer ID 3 with the following information:
Name: Sarah Smith
City: Denver
State: CO
Last Visit: 2019-08-02
Total Sales: $15
Are you sure you want to delete this customer? (Y or N)Y
Customer deleted.
```

```
3
Select number of customers to show (Enter '*' to show all):
*
|-------------------------------------------------------------------------------|
|                                                                               |
|Nuts n' Bolts Customer Management System                                       |
|                                                                               |
|=====|====================|==============|==========|==============|==============|
|ID   |Name                |City          |State     |Last Visit    |Total Sales   |
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|5    |Jarred Glaser       |Milwaukee     |WI        |2019-04-23    |$67           |
|-----|--------------------|--------------|----------|--------------|--------------|
|6    |Mario Luigi         |Nintendo      |OH        |2019-08-01    |$72           |
|-----|--------------------|--------------|----------|--------------|--------------|
Showing all customers
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
```

```
5
Total company sales are: $348
What would you like to do?
1 - Add Customer
2 - Update Customer
3 - Show Customers Table
4 - Delete Customer
5 - Show total sales
6 - Exit Program
```

Resources

(Map in C++ Standard Template Library (STL), Aug. 15, 2019). Retrieved from https://www.geeksforgeeks.org/map-associative-containers-the-c-standard-template-library-stl/

(map vs unordered_map in C++, Aug. 15, 2019). Retrieved from https://www.geeksforgeeks.org/map-vs-unordered_map-c/