ITBIS373 Database Development
RenToGo.com (Car Rental System)
First Semester 2009/2010

1. Purpose of the Project
Analyze, specify, design, implement, document and demonstrate an information system application to support the operation of RenToGo.com, an online car rental service. You are required to use the Classical Methodology for Database Development. The system must be implemented on ORACLE.

2. Project Phases
The three phases of the project cover the following work processes from the Methodology for Database Development:

   Phase
   I.  Analysis and Specification
   II. Design and Database Load
   III. Implementation and Testing
   IV. Demonstration

3. Groups
3- 5 members. If you have difficulty in finding enough members, proceed with Phase 1 and we will help you with group formation later.

4. Reports
A typed report is handed in for grading at the end of each phase. The Phase I Report must contain a description of the purpose of the project and the purpose of this phase of the project. It must describe the problems encountered in the technical requirements of this phase and justify the solutions. It must contain all documentation produced in this phase, including
   • Information Flow Diagrams,
• E-R Diagrams,
• The relational schema specification should include integrity constraints, foreign keys, primary keys, and domain constraints.
• A brief users’ manual for the system.
• The specific contribution of each member must be indicated.

5. Grading
The project will consist of deliverables (document and source code) as well as a final demonstration.

1. Documents of the project worth 20% credit.
2. Implementation of the project worth 60% credit.
3. Demonstration of the project worth 20% credit.

6. Overview of RentToGo.com
For this project, you will develop RentToGo.com, an information management system that supports some of the services involved in an online car rental service (e.g., Alamo.com, Hertz.com).

RentToGo.com will have three types of users, namely, customer, clerk on duty, and system administrator. Customer is any user willing to rent a car. Clerk on duty represents the employee responsible for checking out and checking in a rental. System administrator is responsible for operating the system.

In the rest of this document, we first describe the system interface for each customer type. Then, we present aspects of the system as a whole. Throughout the document, we assume that RentToGo.com has the entry point shown in Figure 1.
7. The Customer

The customer enters the system by selecting “Car Rental Service” option in the Welcome screen (Figure 1) and clicking “ENTER.” RenToGo.com then pops up the screen in Figure 2.

![Welcome Screen](image1.png)

**Figure 1: Welcome Screen**

![Customer Main Menu](image2.png)

**Figure 2: Customer Main Menu screen**
7.1 Rates and Reservation
If the user clicks on “Rates and Reservation” button, the system will display the screen shown in Figure 3, which explains the three simple steps for checking on car rates and making a reservation.

![Figure 3: Simple explanation for checking on car rates and making reservation](image)

As shown in Figure 4, for the first step in the car reservation process, the user must indicate when and where she will pick and return the car. For this project, we consider that there are only five locations: Atlanta, Macon, Savannah, Birmingham, and Montgomery. Each location must keep information of which cars it has (or it will have) available for rental. However, we will assume that the database is centrally managed from one location, say Atlanta. Based on this information, the system is able to provide the rental availability information in Step 2.
In Step 2 (Figure 5), the user selects the car type that she wants to rent from a list of available ones. For each car option, the system presents the total cost and the respective daily rate. For this project, you don’t need to worry with the sales tax. The total cost is calculated by just multiplying the number of days by the respective daily rate. The daily rate will be $$cc in dollars and cents.

IMPORTANT: The screen in Figure 5 is automatically generated based on the availability of car types at the location selected. If no cars are available for the pick-up and drop-offs dates requested, the system should display an “error” message, and request the user to either change the dates and/or pickup location.
In Step 3, the system presents a summary of the rental reservation to the customer. If the customer agrees with the summary, she then clicks on “Complete Reservation” button. Alternatively, she can go back to Step 2 or decide to cancel the reservation at once. We observe that up to this point, no modification has been made to the underlying database. Reservations are only committed when the customer clicks on the “Complete Reservation” button.
Figure 6: Step 3: Reservation Summary screen.
If the customer decides to complete the reservation, the system will pop up the screen in Figure 7. For this project, if a customer wants to make a reservation, she will need to register to RenToGo.com first. In case she has already registered to the system, she needs just to enter her e-mail and password and then click the “Login” button. As we discuss next, the system identifies each registered customer by his or her e-mail address.
If the user is a new customer, when she clicks on the “Register” button, the system shows the screen depicted in Figure 8.

![Image of a new customer registration screen](image)

**Figure 8**: New Customer registration screen.

The system uses the e-mail address of the customer to uniquely identify her. We will assume that the e-mail address is a valid one. Therefore, there should not exist any duplication. But the system should still check whether the e-mail address provided by the user has been used before. If this is the case, an error message is displayed, and the customer is requested to enter another e-mail address. The password can be anything that the customer provides.

When the customer comes for picking up the car at the selected location, the clerk-on-duty will ask her for a credit card, which will be charged when the car is returned. The customer may decide to provide information on her credit card at pick-up time or at registration time. In case she decides for providing the credit card information at registration time, she clicks the “File Credit Card Information” button in Figure 8, and the system pops up the screen in Figure 9.
The customer can file as many credit cards as she wants. Credit card information can then be deleted or updated using the “Update Profile” option shown in Customer Main Menu screen (see Section 7.3-). 

To file a credit card, the customer enters the requested information and clicks “Add Card” button. The system then includes the credit card data and display again the screen shown in Figure 9, this time with the fields cleared. Once the customer has finished entering the credit card information, she clicks “Done” and the screen in Figure 8 is displayed again. The system needs to guarantee that the customer will not enter more than once the same credit card information.

If the customer decides to cancel her registration, no reservation will be made, and the Customer Main Menu screen is displayed. However, if the customer clicks the “Register” button in Figure 8, the system will display the screen depicted in Figure 10 and complete the rental reservation.
Before displaying Reservation Completed screen, the system updates the underlying database with the reservation. We observe that the system will only change the database when the reservation is completed.

7.2 Location-Car Current Availability
This option presents a snapshot of the current available cars of each type at each location. Using this option, the user can have a general idea of what is available at RenToGo.com at a given moment.

7.3 Manage (Customer) Profile
When the customer selects the “Edit Profile (Registered Customers Only)” option from the Customer Main Menu screen, the system pops up the following screen:
Upon successful login, the customer will be presented with the screen shown in Figure 12, from which she will be able to update her first and last name, manage her credit card on file, and check on her rental history. The customer cannot update her e-mail because RenToGo.com uses it as a mechanism for uniquely identifying her within the system.

![Manage Customer Profile screen](image)

Figure 12: Manage Customer Profile screen.

If the customer clicks the “Done” button, the system first commits the changes to her name and driver’s license (if any) and then shows the Customer Main Menu screen.

If the customer clicks on “Manage Credit Cards on File”, the system pops up the screen depicted in Figure 13. From this screen, she can browse through all her credit cards on file and update or delete any of them. If she clicks the “Update” button, the system updates the credit card with the new information and remains on the same screen. If the customers clicks the “Delete” button, the respective credit card is removed from the database, and the next filed credit card (if any) is displayed. Finally, if the customer clicks on the “New” button, the system clears all the fields in the screen so she can enter the information for the new credit card. The new credit card will be stored in the database.
when the customer clicks the “Update” button. If the customer clicks on the “Done” button, the system shows the Manage Customer Profile screen again.

Figure 13: Manage Credit Cards on File screen.

If the customer clicks on “View Rental History” button on Manage Customer Profile screen, the system pops up the screen shown in Figure 14, which shows the customer rental history in the last month. The status of a rental is one of the following:

- Pending: the customer has completed the reservation but hasn’t picked up the car yet.
- In-process: the customer is using the car.
- Completed: the customer has returned the car.
Observe that a customer may have rented a car from RenToGo.com more than once in the last month. The View Rental History screen should display all rentals (note the scroll bar on the right of the rental history in Figure 14).

When the customer clicks the “Done” button in screen of Figure 14, the system shows the Manage Customer Profile again.

8. The Clerk on Duty

Up to this point, we have described how the customer makes a rental reservation and manage her profile stored in RenToGo.com. In this section, we describe how RenToGo.com handles the car pickup and drop-off processes. We refer to the clerk on duty as the person (user) responsible to taking care of these processes.

8.1 Pick-up Rental

When the customer arrives at the location for picking up the rental, the clerk on duty, who from now on we refer as the clerk, logs in to the system by selecting “Clerk on Duty” in the Welcome screen and providing his login and password information in the Login screen shown in Figure 15. Upon successful login, the system pops up the Clerk on Duty Main Menu screen depicted in Figure 16.
The rental pickup process consists of two main steps:

Step 1: Get customer e-mail address and rental number (Figure 17).

Step 2: Get customer credit card information to be used for this rental (Figure 18).

Step 1 is straightforward. In Step 2, the clerk asks for the customer to provide the credit card number to be used with this rental. If the credit card has been filed before, then the system pops up the file rental contract shown in Figure 19. Before handing the contract to the customer, the clerk asks the customer for her driver’s license to do a final check. If everything looks ok, the customer signs the contract, and the clerk gives her the car keys and directions to where the car is parked in the parking lot.

If in Step 2 the system indicates that the credit card number does not exist in the customer profile, the clerk asks the customer if she wants to provide another credit card number, or if she would like to file this new number in her profile. In case she decides to file the new
number, the clerk enters the respective credit information through a screen similar to the one shown in Figure 9.

Figure 17: Step 1 for rental pickup.

Figure 18: Step 2 for rental pickup.
8.2 Drop-off Rental

When the customer arrives at a location for dropping of the car, the clerk clicks on the “Rental Drop-off” button in Clerk on Duty Main Menu screen and follows two simple steps:

Step 1: Get customer e-mail address and rental number (similar to screen in Figure 17)

Step 2: Print the final receipt for the rental (Figure 20)

After calculating the final rental cost, the customer credit card is charged and the clerk gives the customer the final receipt (Figure 20).
When the clerk finishes the pickup and/or drop-off process, he logs out by clicking on the “Logout” button in the Clerk on Duty Main Menu screen (Figure 16).

9. The System Administrator

The third type of RenToGo.com user is the system administrator, who is responsible for operating the online car rental system. The screen on Figure 21 lists all the administrator tasks. The administrator enters the system by selecting “System Administrator” in the Welcome screen and providing his login information. Login information for the administrator is determined by the DBA.
9.1 Manage Employees Information

When the administrator clicks on “Manage Employees Information” button shown in Figure 21, the system pops up the screen in Figure 22. Using this screen, the administrator can either enter the ID of an existing employee or request for creating a new one. If the administrator enters the employee ID and clicks the “Search” button, the system will first check whether there exists an employee with the provided ID. If there is, then the system displays the associated information as shown in the screen of Figure 23. If there is no employee with the provided ID, the system displays a message indicating that the ID is invalid and pops up again the screen in Figure 22.

If the administrator wants to insert a new employee into the system, he clicks on the “New Employee” button. The system then automatically generates the ID for the new employee and displays the screen in Figure 22 with the blank fields. Once the administrator has entered the information of the new employee, he clicks the “Update” button to store the data in the system database.

We cannot delete information of an employee from the database because we associate this information with each pick-up and drop-off rental (see Figure 19 and Figure 20, respectively). If the system deletes an employee, the database will become inconsistent.
9.2 Manage Cars and Location Information
When RenToGo.com acquires new cars or expand its business for servicing new locations, then administrator needs to update the system accordingly. When the administrator clicks on “Manage Cars and Location Information” button shown in the Administrator Main Menu screen, the system pops up the screen shown in Figure 24.
Through this screen, the administrator can also insert new car types and add the daily rates of each car type. Observe that any of the information inserted and/or manipulated in this screen cannot be removed from the database for the same reason that we cannot delete employee data.

![Manage Cars and Location Information screen](image)

Figure 24: Manage Cars and Location Information screen.

9.3 Generate Reports

Finally, when the administrator wants to check on how the company is doing, he can request the system to generate one of the following reports:

1. For the last month, the average number of cars that were picked and returned to the same location, grouped by location and car type.
2. For the last month, the average number of cars that were picked in one location and returned in another, grouped by car type. Also, indicate the location that the car was picked and the location that it was returned.

3. For the last month, the average number of cars that were dropped off late, grouped by car type and location that received the car.

4. Number of new registered users in each location in the last month

5. For each location, which car type was the most rented and which car type was the least rented in the previous month

6. Total sales for each car type, in each location in the previous month

10. General Comments

For this project, we assume that all data for RenToGo.com including availability of cars and rental transactions at the five cities is stored in a central database at Atlanta.