Rental Car Software System

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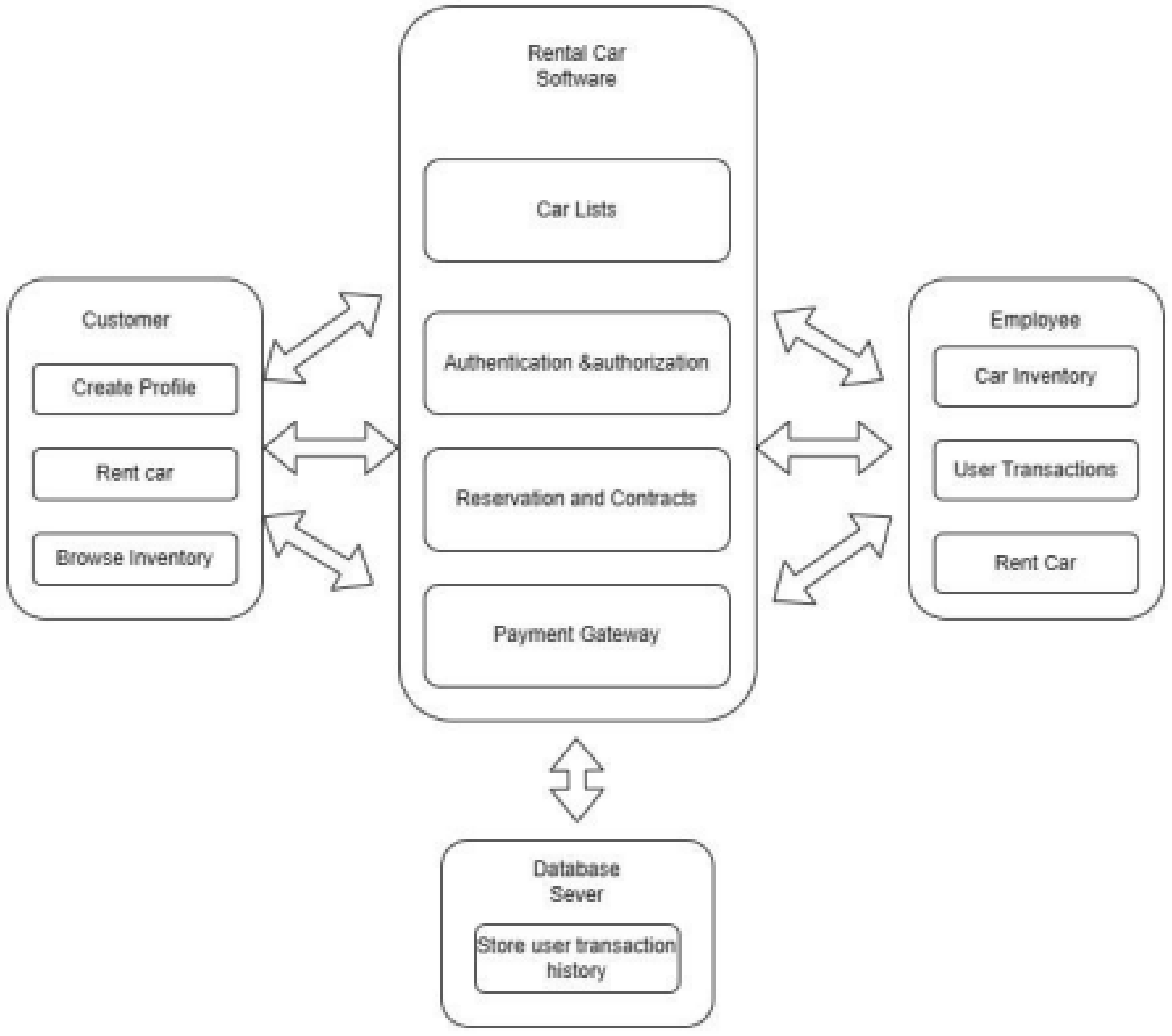
Brief System Overview:

The car rental system aims to make the business more efficient by digitalizing the current system. The company requesting this system uses paper and pen to track available cars, the car's condition, and guests that rent the cars. This procedure is extremely slow and can be made efficient with a system that is easy to understand. Customers are first required to create accounts with verified emails to start renting. Then, they add a payment method depending on if they rent on the website or in-person. Finally, they choose which car they want and the process is finished. Employees can view customer information and update the cars' info. This includes car availability, orders, conditions, and insurance. They are also able to scan required documents into the system.

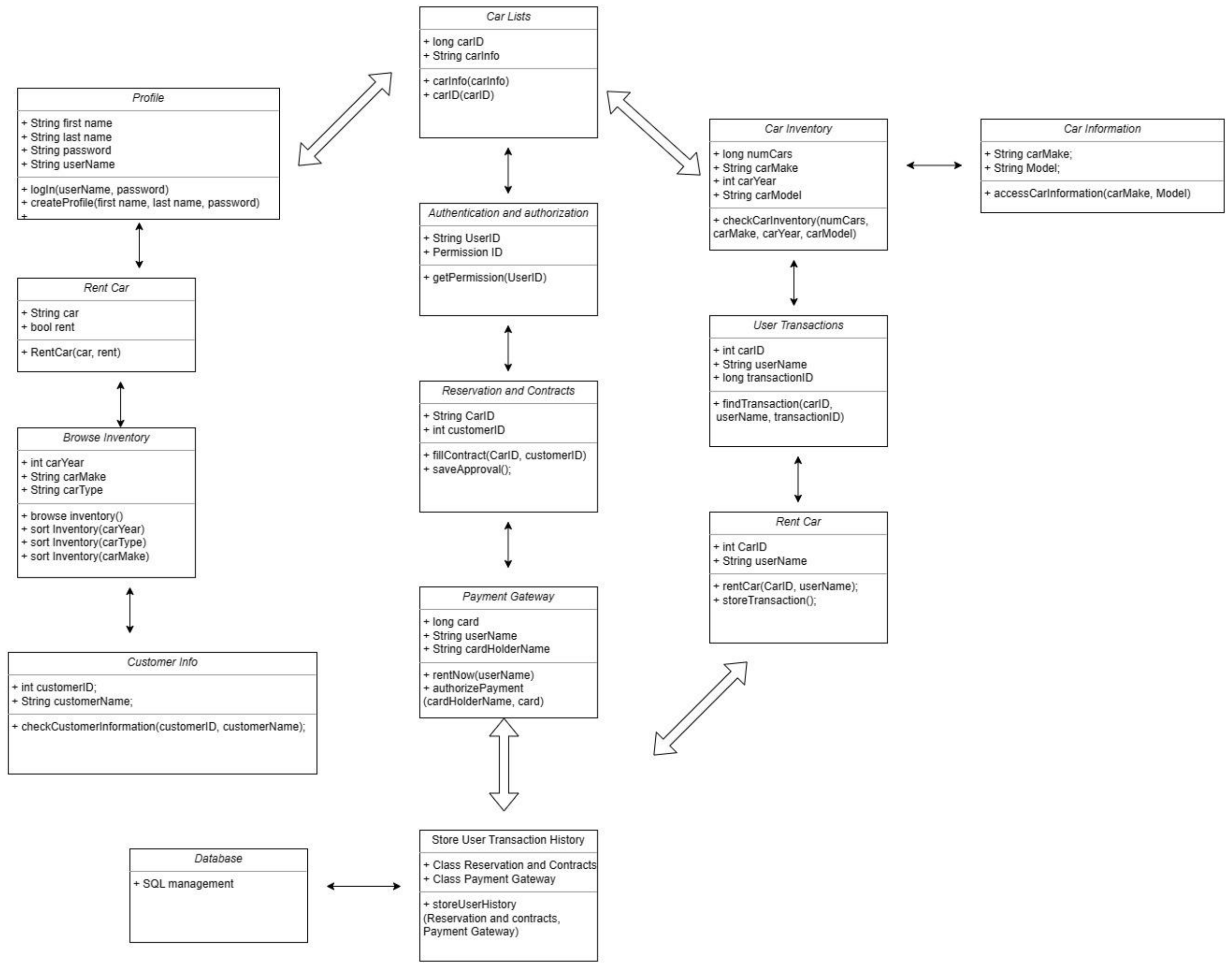
SWA diagram:



SWA Description:

Our diagram for the software architecture for the Rental Car Software is separated for different main users in the front end being customers (left), and employees on the right. Their general objectives and functions are connected to the central pillar which hosts essential back end functionality for the application to run. Everything either user would require, they can gather. The central hub being connected to the database server for data management and storage. Overall, the SWA was kept minimal with more UML diagrams and tests added below.

UML Class diagrams:



Class In-Depth Descriptions:

Class: Profile
Functions: login and create profile
Variables: 4 strings for first name, last name, password, and user name.
Description: Profile embodies all functions regarding profile creation or log in for the user to access the site on their own time and when needed.
Class: Rent Car
Functions: rent car
Variables: string car, boolean rent
Description: Basic function for user to choose if they want to rent a car.

Class: Browse Inventory
Functions: browse inventory, sort inventory (by year), sort inventory (by type), sort inventory (by make)
Variables: car year, car make, car type
Description: Class is meant to allow customer to browse the inventory however they would like by whatever parameters they prefer.

Class: Car Lists
Functions: car info, car ID
Variables: car info, and long carID
Description: based on the general variables regarding the car, the software will be able to save and list available cars for both user and employee.

Class: Authentication and authorization
Functions: fill contract, save approval
Variables: carID, customer id
Description: functions to fill the contract and save the approval. SaveApproval will generate new variables within function to return and save under transaction history.

Class: Reservation and Contracts
Functions: fill contract
Variables: car id, customer id
Description: class is meant to reserve and generate contracts for the customer and store them in the database.

Class: Payment Gateway
Functions: rent now, authorize payment
Variables: card, user name, card holder name
Description: payment gateway is meant to process payments when vehicles are rented.

Class: Store User Transaction History
Functions: store user history
Variables: classes for (reservation and contracts) and (payment gateways)
Description: Functions to store all the transactions regarding the rental of vehicles.
Class: Car Inventory
Functions: check car inventory
Variables: num cars, car make, car year, car model
Description: meant to show employee the car inventory available for customers to choose from.

Class: User Transactions
Functions: find transaction
Variables: carID, username, transaction id
Description: meant for employees to be able to find customer transactions if desired.

Class: Rent Car
Functions: rent car, store transaction
Variables: car id, user name
Description: Functions to allow employee access to rent cars for customer and streamline the process.

Development Plan:

We plan to have an SWA diagram, UML diagram, and an overview of the system by October 13, 2023. Hooman is responsible for creating the SWA diagram and description. It describes the architecture of the system and guides us during the building process. Victor will create the UML diagram that goes into further detail about the system. It covers the classes and objects that need to be coded to create the system.

Verification Test Plan:
For verification that our software will work as intended by the user and the company, the following tests will be implemented.

1 Test Set
This test set is going to cover the plans to verify the system's ability to create an account that can be repeatedly used for renting cars. This feature will be tested with the partition method because there are far too many inputs for brute force and random is not guaranteed to showcase inputs not in email format.

1.1 Unit
Input:
- Email: cs250@gmail.com
- Password: cs250

Method:
- Profile x = new Profile(cs250@gmail.com, cs250)

Output:
- New Profile Object
  - Email: cs250@gmail.com
  - Password: cs250
  - Payment: None

Input:
- Email: awesomesauce
- Password: cs250

Method:
- Profile x = new Profile(awesomesauce, cs250)

Output:
- No Profile Object is created
- Field warns user to enter in email format

1.2 Integration
The account creation feature is not inside of any other methods, but adding a payment method is required for renting online.

Input:

- Card Number: 0000 0000 0000 0000

Method:

- x.addPayment(0000000000000000)

Output:

- Profile x’s payment attribute is updated from None to 0000000000000000.

1.3 System

Having a profile is an important part of the system because every customer needs one to rent a car online and in-person. Transactions will interact with the accounts by acquiring the payment information. Car info can also be updated to show which profile is currently renting the car.

Input:

- Profile: x

Method:

- Transaction y = new Transaction(x)

Output:

- A new Transaction object that has account info

2 Test Set

In our car rental application, we want to ensure that employees can easily use the system for their regular tasks smoothly. Features such as checking the availability of the lot, customer information and car information, will help employees provide accurate information to customers and manage the inventory efficiently.

2.1 Inventory

This scenario is about requesting to check the car lot availability. It can be initiated by an employee selecting a specific date and possibly other filters like car type, location, or availability status.

Input:

- Date (the date for which the availability is to be checked)
- Car Type (optional filter for a specific car type, e.g., compact, SUV, luxury)
- Location (optional filter for a specific rental location)

Method:

Create a method called checkCarAvailability in your application. This method takes the input parameters mentioned above.

Output:

- A list of available cars that match the specified criteria.
- List of Car objects, where each Car object includes details like the car's make, model, year, rental price, and availability status.

2.2 Customer Info:

In this section, we want to make sure that the employees can easily access customer information for account management, inquiries, or assistance. This feature allows employees to retrieve and view customer details efficiently.

Input:

- The input for this scenario is a request to check customer information. It can be initiated by an employee searching for a specific customer's account. The input parameters may include:
- Customer ID (or other unique identifier)
- Customer Name (optional for searching by name)

Method:

We create a method called “checkCustomerInformation” in our application. This method takes the input parameters mentioned above.

Output:

The output is a Customer object that includes customer details such as name, contact information, rental history, and other relevant account information.

2.3 Car Information:

In this test case, we want to see if employees can access detailed information about the cars in our rental fleet. This feature will help employees provide accurate and informed answers to customer inquiries about the available cars.

Input:

The input for this scenario is a request to access car information. It can be initiated by an employee searching for a specific car's details, including its make, model, year, rental price, and availability status. The input parameters may include:

- Car Make (optional for searching by car make)
- Car Model (optional for searching by car model)

Method:

We will use a method called “accessCarInformation” in our application.

Output:

The output of the accessCarInformation method is a Car object that includes detailed information about the car, including its make, model, year, rental price, and availability status.

Data Management Plan:

Data management strategy we will be implementing for the Rental Car Software System will be with SQL. Diagram below shows how our SQL database management system modules will be related and connected between entities. Testing with the assigned data dictionary. (SWA updated with database management module). SWA main updated with database module.

Trade Off Discussion

We decided to use SQL to design the car rental database. The two objects that will have their own tables to track their attributes are customer accounts and cars. Every other table will just be categorizations of these two objects. For example, we can easily find available cars by having a table that adds cars that have the “available” value set to true and removes those set to false. Since the data can be easily organized into columns and rows SQL is a better choice than noSQL.

With our design, manipulating the database will be intuitive and easy to understand. noSQL offers many ways to display our data that we do not think are as good as tables and has flexible schemas that we do not need.

Data dictionary: Customer (information)

Name:	Jeff
Status:	Active
Transactions:	4

Data dictionary: Employee

Name:	Mary
ID:	005
Access:	Granted

Data Dictionary: Users

Name:	Barney
Age:	22
Driving Experience:	3

Data Dictionary: Car (Information)

Year:	2018
Brand:	Tesla
Model:	3
Mileage:	35,678

Data Dictionary: Rent Car

Available:	Yes
Contract:	Agreed
Insurance:	Yes

Data Dictionary: Confirmation

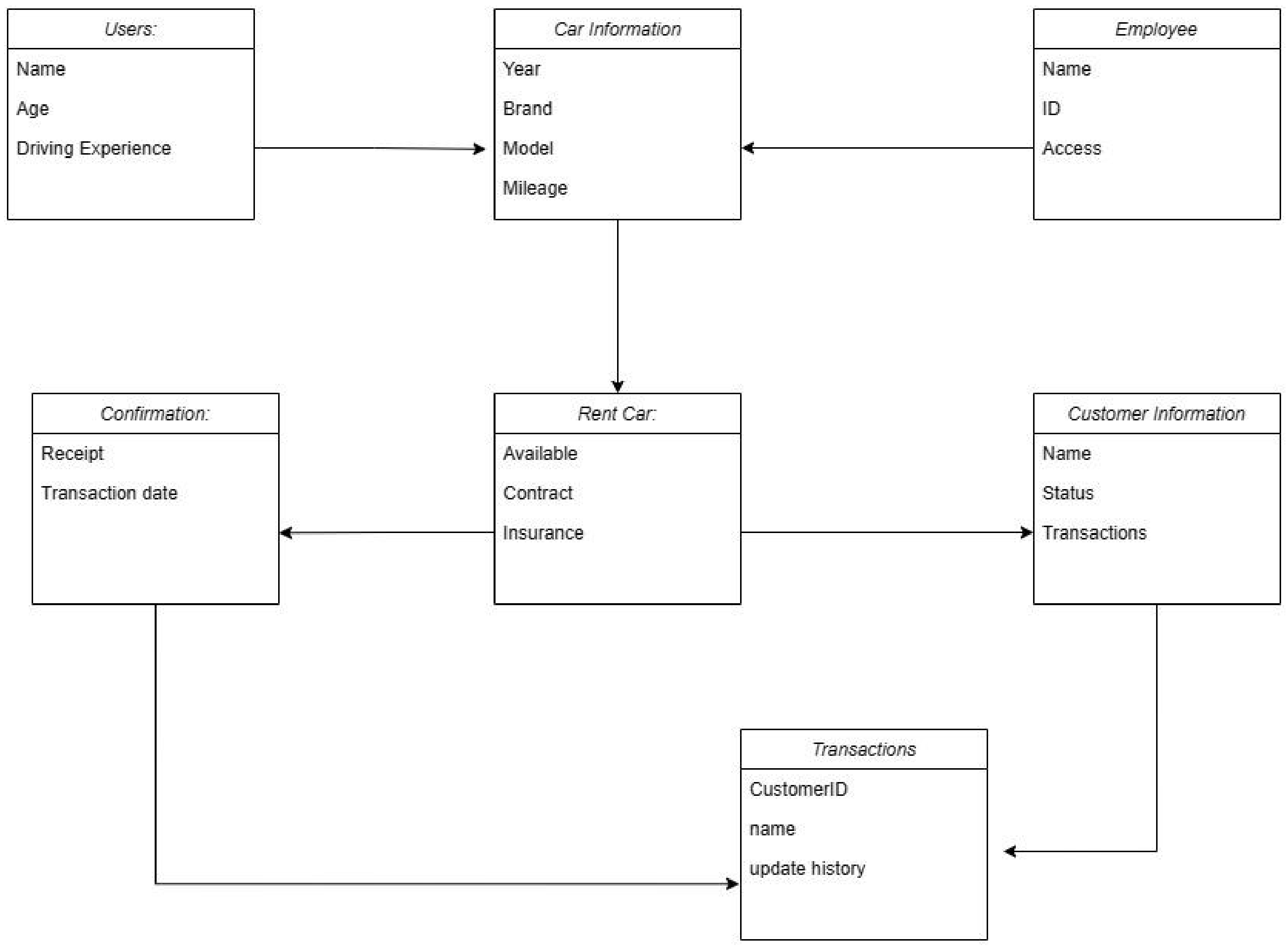
Receipt:	Create
Transaction date:	Record

Data Dictionary: Transactions

CustomerID:	109
Name:	Jeff
Update History:	Yes/No

Data Management Diagram:

Diagram for the tests to be implemented with via the data dictionaries


Users:
Name
Age
Driving Experience
Car Information
Year
Brand
Model
Mileage
Employee
Name
ID
Access
Confirmation:
Receipt
Transaction date
Rent Car:
Available
Contract
Insurance
Customer Information
Name
Status
Transactions
Transactions
CustomerID
name
update history