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04/04/2024

CS3331- Advanced Object-Oriented Programming-Term Spring 2024

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Project Part 1

1. Program Explanation:

The task is to develop a management system for auto dealerships. Users of the system can purchase vehicles, view tickets, filter cars, view cars, log in, and sign out. It also has administrative features for logging actions and updating vehicle information. The user and vehicle data kept in CSV files must be read and updated by the system.

I first determined the primary functionalities needed by analyzing the requirements in order to approach this problem. To see how the actors—users and administrators—interacted with the system, I next constructed a UML Use Case Diagram (Level I).

I was able to comprehend the system's general flow thanks to this.

To organize the code, I created a UML Class Diagram next. I made classes using the main method for users, admins, automobiles (including special kinds like sedans and SUVs), logs, and cars. Every class included fields and methods that were suitable for handling the necessary capabilities.

I made use of the CSV parsing libraries that come with Java to handle reading and storing data from CSV files. In order to read and update the CSV files in response to the user's activities (such as buying a car or revising their budget), I built methods in the User and Car classes.

I divided the issue into more manageable subissues, like these:

- putting in place login and user authentication.
- putting in place the browsing, filtering, and buying capabilities for cars.
- putting in place user activity logging.
- updating data in CSV files about the user and the vehicle.

2. What did I learn?

I gained knowledge on how to use Java programming and UML diagrams to build and implement an automobile dealership management system. Additionally, I gained knowledge of setting up user identification, managing user interactions via a menu-driven interface, and reading and updating data from CSV files.

Several things could be done to make your solution better:

- Handling errors: To address situations like incorrect user input, file not found issues, etc., include more reliable error handling.
- Code modularity: To make your code easier to read and maintain, divide it up into smaller, more manageable functions and classes.
- Improve the user interface to make it more intuitive and user-friendly.
- Use data validation to make sure that only legitimate inputs are accepted.

Taking a lb-based approach to the problem is an additional solution. Using HTML, CSS, JavaScript, and a backend framework like Spring Boot or Node.js, you may develop a lb application. This method would make the system more scalable and accessible by enabling users to access it using a lb browser.

3. Solution Design

I created and put into use a Java auto dealership management system for this program. Users of the system can purchase automobiles, explore and filter cars, view tickets, and sign out. It also has administrative features for logging actions and updating vehicle information. The software reads and updates data from CSV files that contain user and vehicle information.

I started by analyzing the requirements and determining the primary functionalities required in order to solve this problem. I then created Use Case and Class diagrams using UML to show the organization and dynamics of the system. I used Java to develop the system, concentrating on writing modular and reusable code, based on the diagrams.

I used CSV files to store user and vehicle data for data storage. I read and updated these files using the CSV parsing libraries that come with Java. I also managed and stored items in memory, like user and vehicle instances, using collections like ArrayLists. These data structures were selected due to their ease of use and effectiveness in handling the necessary data.

Our presumptions consist of:

- The user and vehicle data are contained in Ill-formatted, error-free CSV files.
- Every person has a distinct username.
- A single instance of the program can only have one user logged in at once by the system.
- The user CSV file stores the budget for buying an automobile as a double value.

4. Testing

I combined white-box and black-box testing methods to test the program. Testing a program's functionality without being aware of its internal workings is known as "black-box" testing. This involved testing the login, car-browsing, car-filtering, car-purchasing, ticket-viewing, and sign-out features.

White-box testing entailed analyzing the logic and internal workings of the program to make sure it operated as intended. This involved testing the logging and reading of CSV files in addition to their updating.

Although I think I tested the solution thoroughly, testing procedures can always be improved. In order to enhance testing, I may have:

- To cover a wider range of scenarios, including edge cases and invalid inputs, the number of test cases was increased.
- To guarantee consistency and effectiveness in testing, automated testing was conducted utilizing tools such as JUnit.

- conducted stress testing to evaluate the program's performance with big datasets or under high load.
- strengthened error handling and validation procedures to detect and manage unforeseen inputs or circumstances.

Among the test cases I employed are:

- entering a working username and password to log in.
- using an incorrect password or username to log in.
- looking through every car and making sure the right information is shown.
- separating cars into different categories (used/new) and making sure the right vehicles are shown.
- buying a car and making sure the amount of cars is reduced and the user's budget is updated.
- trying to buy an automobile on a shoestring.
- checking sure the right ticket information is displayed by looking at the tickets.
- logging off and making sure the person has left their account.

While I didn't intentionally break the software to make it better, I did take into account edge cases and invalid inputs during testing to make sure the program handled them III.

5. Test Results

User verification (sign in)

- *Test:* To confirm login functionality, enter both valid and incorrect credentials.
- *Anticipated outcome:* If the credentials are legitimate, the login will be successful; if not, it will fail.
- *Console Output:* Show a message indicating if the login attempt succeeded or failed.

The screenshot shows an IDE with two panels. The left panel displays the test results for 'UserTest [Runner: JUnit 5] (0.041 s)'. It lists six tests, all of which passed (indicated by green checkmarks):

- testPurchaseCarFailureID (0.014 s)
- testPurchaseCarSuccessful (0.019 s)
- testPurchaseCarFailureFunds (0.002 s)
- testLoginFailure (0.002 s)
- testLoginSuccessful (0.002 s)
- testLogout (0.002 s)

The right panel shows the console output for the failed login test. It displays the following sequence of events:

```
<terminated> UserTest [JUnit] C:\Program Files\Java\jdk-19\bin\javaw.exe (Ap
Invalid CarID
Car Purchased! Congratulations testUser!!
Insufficient Funds

Input username please.

Input password please.
Login Attempt Failed

Input username please.

Input password please.
Login Successful!

Bye, testUser
```

Driving and Reviewing

- *Test:* Show every car and sort by new or used.
- *Anticipated Outcome:* A list of vehicles sorted by filter displayed.
- *Console Output:* Show a list of vehicles together with their attributes.

NEW CARS

```
Console X Problems Debug Shell Git Staging Coverage
RunShips [Java Application] [pid: 2020]
Login Successful!

Welcome, yoda.

1. Display all cars
2. Filter Cars (used/new)
3. Purchase a car
4. View Tickets
5. Sign out
6. Go back

1. New
2. Used
3. Go back

Car ID: 1, Car Type: Hatchback, Model: Honda Fit, Condition: New, Color: Yellow, Capacity: 5, Mileage: 3055, Fuel Type: Hybrid, Transmission: Automatic, VIN: VM6L2L6S23396C40, Price: 23471.55, Cars Avail
Car ID: 2, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: Silver, Capacity: 5, Mileage: 3067, Fuel Type: Diesel, Transmission: Automatic, VIN: 61379WYNBA005V3, Price: 20688.35, Cars Avail
Car ID: 3, Car Type: SUV, Model: Toyota RAV4, Condition: New, Color: Green, Capacity: 5, Mileage: 2950, Fuel Type: Gasoline, Transmission: Automatic, VIN: POC3M4C2XKBL0C, Price: 33045.65, Cars Avail
Car ID: 4, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Blue, Capacity: 5, Mileage: 3837, Fuel Type: Hybrid, Transmission: Manual, VIN: 1S7MD4M484848484, Price: 27905.20, Cars Avail
Car ID: 5, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: Red, Capacity: 5, Mileage: 1549, Fuel Type: Electric, Transmission: Manual, VIN: 809F6C957FKFJW2, Price: 49839.1, Cars Avail
Car ID: 6, Car Type: SUV, Model: Ford Explorer, Condition: New, Color: White, Capacity: 7, Mileage: 523, Fuel Type: Hybrid, Transmission: Manual, VIN: GKE42ED303JAD037, Price: 30414.56, Cars Avail
Car ID: 7, Car Type: Pickup, Model: Ford F-150, Condition: New, Color: Black, Capacity: 5, Mileage: 339, Fuel Type: Gasoline, Transmission: Automatic, VIN: 90W04035848W2220, Price: 21657.59, Cars Avail
Car ID: 8, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Black, Capacity: 5, Mileage: 1518, Fuel Type: Diesel, Transmission: Manual, VIN: 5ZUJ1NFP6AKHJ1E19, Price: 38236.01, Cars Avail
Car ID: 9, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Green, Capacity: 5, Mileage: 2714, Fuel Type: Hybrid, Transmission: Automatic, VIN: 9440480L1H848083, Price: 43403.39, Cars Avail
Car ID: 10, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: White, Capacity: 5, Mileage: 4083, Fuel Type: Hybrid, Transmission: Manual, VIN: 820056631LH18204, Price: 32241.67, Cars Avail
Car ID: 11, Car Type: Pickup, Model: Toyota Tacoma, Condition: New, Color: Red, Capacity: 5, Mileage: 2771, Fuel Type: Gasoline, Transmission: Manual, VIN: KFFB84M48023NA559, Price: 37757.99, Cars Avail
Car ID: 12, Car Type: SUV, Model: Chevrolet Tahoe, Condition: New, Color: Red, Capacity: 8, Mileage: 2338, Fuel Type: Hybrid, Transmission: Automatic, VIN: MAC9VCTU2D0V0X088, Price: 35678.92, Cars Avail
Car ID: 13, Car Type: SUV, Model: Chevrolet Tahoe, Condition: New, Color: White, Capacity: 8, Mileage: 4083, Fuel Type: Hybrid, Transmission: Manual, VIN: 820056631LH18204, Price: 32241.67, Cars Avail
Car ID: 14, Car Type: SUV, Model: Honda CR-V, Condition: New, Color: Black, Capacity: 5, Mileage: 2138, Fuel Type: Gasoline, Transmission: Manual, VIN: HP888L05L873N015, Price: 30232.68, Cars Avail
Car ID: 15, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Yellow, Capacity: 5, Mileage: 2277, Fuel Type: Gasoline, Transmission: Automatic, VIN: 3C14F040M0P1V0W04, Price: 41081.58, Cars Avail
Car ID: 16, Car Type: Sedan, Model: Ford Fusion, Condition: New, Color: Yellow, Capacity: 5, Mileage: 612, Fuel Type: Hybrid, Transmission: Manual, VIN: N842X7M40W94547, Price: 23331.19, Cars Avail
Car ID: 17, Car Type: Sedan, Model: Ford Fusion, Condition: New, Color: Blue, Capacity: 5, Mileage: 2857, Fuel Type: Hybrid, Transmission: Automatic, VIN: LS20Q42T2F1836C0, Price: 36419.35, Cars Avail
Car ID: 18, Car Type: Sedan, Model: Toyota RAV4, Condition: New, Color: Silver, Capacity: 5, Mileage: 3061, Fuel Type: Gasoline, Transmission: Automatic, VIN: C42080809773PAK, Price: 41678.4, Cars Avail
Car ID: 19, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Red, Capacity: 5, Mileage: 2192, Fuel Type: Electric, Transmission: Manual, VIN: XFFB70P0P1W1928, Price: 33372.42, Cars Avail
Car ID: 20, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Blue, Capacity: 5, Mileage: 1004, Fuel Type: Gasoline, Transmission: Manual, VIN: TMMWCC27C7H037, Price: 30416.16, Cars Avail
Car ID: 21, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 22, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: Green, Capacity: 5, Mileage: 128, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 23, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Silver, Capacity: 5, Mileage: 3, Fuel Type: Electric, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 24, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 25, Car Type: Hatchback, Model: Ford Fiesta, Condition: New, Color: Black, Capacity: 5, Mileage: 3087, Fuel Type: Diesel, Transmission: Manual, VIN: EFQ401538P8N638, Price: 21014.94, Cars Avail
Car ID: 26, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Red, Capacity: 5, Mileage: 4790, Fuel Type: Gasoline, Transmission: Manual, VIN: X0E1H0P70ZL0E0, Price: 19602.76, Cars Avail
Car ID: 27, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: Green, Capacity: 5, Mileage: 128, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 28, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: White, Capacity: 5, Mileage: 4199, Fuel Type: Hybrid, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 29, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Silver, Capacity: 5, Mileage: 3, Fuel Type: Electric, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 30, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 31, Car Type: Hatchback, Model: Ford Fiesta, Condition: New, Color: Red, Capacity: 5, Mileage: 2171, Fuel Type: Hybrid, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 32, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: Silver, Capacity: 5, Mileage: 3067, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 33, Car Type: Sedan, Model: Ford Fusion, Condition: New, Color: Blue, Capacity: 5, Mileage: 2857, Fuel Type: Hybrid, Transmission: Automatic, VIN: LS20Q42T2F1836C0, Price: 36419.35, Cars Avail
Car ID: 34, Car Type: Sedan, Model: Toyota RAV4, Condition: New, Color: Silver, Capacity: 5, Mileage: 3061, Fuel Type: Gasoline, Transmission: Automatic, VIN: C42080809773PAK, Price: 41678.4, Cars Avail
Car ID: 35, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Red, Capacity: 5, Mileage: 2192, Fuel Type: Electric, Transmission: Manual, VIN: XFFB70P0P1W1928, Price: 33372.42, Cars Avail
Car ID: 36, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Blue, Capacity: 5, Mileage: 1004, Fuel Type: Gasoline, Transmission: Manual, VIN: TMMWCC27C7H037, Price: 30416.16, Cars Avail
Car ID: 37, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 38, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: Green, Capacity: 5, Mileage: 128, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 39, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Silver, Capacity: 5, Mileage: 3, Fuel Type: Electric, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 40, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 41, Car Type: Hatchback, Model: Ford Fiesta, Condition: New, Color: Black, Capacity: 5, Mileage: 3087, Fuel Type: Diesel, Transmission: Manual, VIN: EFQ401538P8N638, Price: 21014.94, Cars Avail
Car ID: 42, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Red, Capacity: 5, Mileage: 4790, Fuel Type: Gasoline, Transmission: Manual, VIN: X0E1H0P70ZL0E0, Price: 19602.76, Cars Avail
Car ID: 43, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: Green, Capacity: 5, Mileage: 128, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 44, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: White, Capacity: 5, Mileage: 4199, Fuel Type: Hybrid, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 45, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Silver, Capacity: 5, Mileage: 3, Fuel Type: Electric, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 46, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 47, Car Type: Hatchback, Model: Ford Fiesta, Condition: New, Color: Red, Capacity: 5, Mileage: 2171, Fuel Type: Hybrid, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 48, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: Silver, Capacity: 5, Mileage: 3067, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 49, Car Type: Sedan, Model: Ford Fusion, Condition: New, Color: Blue, Capacity: 5, Mileage: 2857, Fuel Type: Hybrid, Transmission: Automatic, VIN: LS20Q42T2F1836C0, Price: 36419.35, Cars Avail
Car ID: 50, Car Type: Sedan, Model: Toyota RAV4, Condition: New, Color: Silver, Capacity: 5, Mileage: 3061, Fuel Type: Gasoline, Transmission: Automatic, VIN: C42080809773PAK, Price: 41678.4, Cars Avail
Car ID: 51, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Red, Capacity: 5, Mileage: 2192, Fuel Type: Electric, Transmission: Manual, VIN: XFFB70P0P1W1928, Price: 33372.42, Cars Avail
Car ID: 52, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Blue, Capacity: 5, Mileage: 1004, Fuel Type: Gasoline, Transmission: Manual, VIN: TMMWCC27C7H037, Price: 30416.16, Cars Avail
Car ID: 53, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 54, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: Green, Capacity: 5, Mileage: 128, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 55, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Silver, Capacity: 5, Mileage: 3, Fuel Type: Electric, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 56, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: SH8300L1L13771D, Price: 40272.72, Cars Avail
Car ID: 57, Car Type: Hatchback, Model: Ford Fiesta, Condition: New, Color: Black, Capacity: 5, Mileage: 3087, Fuel Type: Diesel, Transmission: Manual, VIN: EFQ401538P8N638, Price: 21014.94, Cars Avail
Car ID: 58, Car Type: Pickup, Model: Chevrolet Silverado, Condition: New, Color: Red, Capacity: 5, Mileage: 4790, Fuel Type: Gasoline, Transmission: Manual, VIN: X0E1H0P70ZL0E0, Price: 19602.76, Cars Avail
Car ID: 59, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: Green, Capacity: 5, Mileage: 128, Fuel Type: Diesel, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 60, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: White, Capacity: 5, Mileage: 4199, Fuel Type: Hybrid, Transmission: Manual, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
```

USED CARS

```
Console X Problems Debug Shell Git Staging Coverage
RunShips [Java Application] [pid: 2020]

Car ID: 99, Car Type: SUV, Model: Chevrolet Tahoe, Condition: New, Color: Yellow, Capacity: 8, Mileage: 4049, Fuel Type: Hybrid, Transmission: Automatic, VIN: 0P3TC9B1T8M027851, Price: 33289.25, Cars Avail
Car ID: 100, Car Type: Hatchback, Model: Toyota Prius, Condition: New, Color: Black, Capacity: 5, Mileage: 3065, Fuel Type: Gasoline, Transmission: Manual, VIN: 78A87184H980R0M4, Price: 24443.93, Cars Avail

1. Display all cars
2. Filter Cars (used/new)
3. Purchase a car
4. View Tickets
5. Sign out
6. Go back

1. New
2. Used
3. Go back

Car ID: 8, Car Type: Sedan, Model: Honda Accord, Condition: Used, Color: Silver, Capacity: 5, Mileage: 180339, Fuel Type: Electric, Transmission: Automatic, VIN: LFPQH0B11YV0P1E, Price: 47923.73, Cars Avail
Car ID: 9, Car Type: SUV, Model: Toyota RAV4, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 77009, Fuel Type: Hybrid, Transmission: Automatic, VIN: 8308K0L150V7E13, Price: 27048.68, Cars Avail
Car ID: 13, Car Type: Pickup, Model: Chevrolet Silverado, Condition: Used, Color: Blue, Capacity: 5, Mileage: 128830, Fuel Type: Hybrid, Transmission: Automatic, VIN: CA13K16L8H05K0K5E, Price: 33287.49, Cars Avail
Car ID: 19, Car Type: Hatchback, Model: Ford Fiesta, Condition: Used, Color: Red, Capacity: 5, Mileage: 2171, Fuel Type: Hybrid, Transmission: Automatic, VIN: 8202X7V0U0J0M0M0M, Price: 41626.99, Cars Avail
Car ID: 20, Car Type: SUV, Model: Honda CR-V, Condition: Used, Color: Silver, Capacity: 5, Mileage: 4889, Fuel Type: Hybrid, Transmission: Automatic, VIN: 81819721P1M0P7Y02, Price: 20196.96, Cars Avail
Car ID: 22, Car Type: Sedan, Model: Toyota Camry, Condition: Used, Color: Silver, Capacity: 5, Mileage: 41396, Fuel Type: Diesel, Transmission: Manual, VIN: ID04C00A0Q0008573, Price: 39618.11, Cars Avail
Car ID: 24, Car Type: Sedan, Model: Ford Fusion, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 116812, Fuel Type: Gasoline, Transmission: Automatic, VIN: 81P7446K0K000000, Price: 11830.37, Cars Avail
Car ID: 25, Car Type: Pickup, Model: Ford F-150, Condition: Used, Color: Silver, Capacity: 5, Mileage: 82664, Fuel Type: Diesel, Transmission: Manual, VIN: 80V059040M000000, Price: 22272.46, Cars Avail
Car ID: 27, Car Type: Sedan, Model: Ford Fusion, Condition: Used, Color: Silver, Capacity: 5, Mileage: 11147, Fuel Type: Hybrid, Transmission: Manual, VIN: PK02M0A1H0000000, Price: 21834.58, Cars Avail
Car ID: 28, Car Type: SUV, Model: Honda CR-V, Condition: Used, Color: Black, Capacity: 5, Mileage: 8621, Fuel Type: Gasoline, Transmission: Automatic, VIN: 72625P0L00000000, Price: 20900.65, Cars Avail
Car ID: 32, Car Type: SUV, Model: Chevrolet Tahoe, Condition: Used, Color: Silver, Capacity: 8, Mileage: 51092, Fuel Type: Diesel, Transmission: Automatic, VIN: 1P0P25H0R0A00000, Price: 46986.52, Cars Avail
Car ID: 36, Car Type: SUV, Model: Honda CR-V, Condition: Used, Color: Silver, Capacity: 5, Mileage: 8889, Fuel Type: Diesel, Transmission: Automatic, VIN: 80405P0P00000000, Price: 4938.97, Cars Avail
Car ID: 39, Car Type: Pickup, Model: Toyota Tacoma, Condition: Used, Color: White, Capacity: 5, Mileage: 75075, Fuel Type: Hybrid, Transmission: Manual, VIN: 2P9P00879V000000, Price: 46139.53, Cars Avail
Car ID: 40, Car Type: Sedan, Model: Honda Accord, Condition: Used, Color: Red, Capacity: 5, Mileage: 144427, Fuel Type: Electric, Transmission: Manual, VIN: QTV1E05LPP000000, Price: 30149.35, Cars Avail
Car ID: 44, Car Type: SUV, Model: Ford Explorer, Condition: Used, Color: Yellow, Capacity: 7, Mileage: 48827, Fuel Type: Gasoline, Transmission: Manual, VIN: 80P01P0000000000, Price: 36580.13, Cars Avail
Car ID: 45, Car Type: Sedan, Model: Toyota Camry, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 141066, Fuel Type: Hybrid, Transmission: Automatic, VIN: T2AEV0000P1E1E, Price: 40220.72, Cars Avail
Car ID: 46, Car Type: Hatchback, Model: Toyota Prius, Condition: Used, Color: White, Capacity: 5, Mileage: 80848, Fuel Type: Electric, Transmission: Automatic, VIN: 1S7P0C0000000000, Price: 16798.43, Cars Avail
Car ID: 47, Car Type: Pickup, Model: Ford F-150, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 118084, Fuel Type: Gasoline, Transmission: Manual, VIN: 17X42Q0000000000, Price: 32247.35, Cars Avail
Car ID: 52, Car Type: Pickup, Model: Ram 1500, Condition: Used, Color: Silver, Capacity: 5, Mileage: 136490, Fuel Type: Hybrid, Transmission: Manual, VIN: 2544QV0000000000, Price: 16156.63, Cars Avail
Car ID: 54, Car Type: Hatchback, Model: Toyota Prius, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 141832, Fuel Type: Diesel, Transmission: Automatic, VIN: P0P0C00000000000, Price: 17733.48, Cars Avail
Car ID: 55, Car Type: Sedan, Model: Ford Fusion, Condition: Used, Color: Green, Capacity: 5, Mileage: 8914, Fuel Type: Hybrid, Transmission: Manual, VIN: H0P0C00000000000, Price: 4848.81, Cars Avail
Car ID: 58, Car Type: Hatchback, Model: Volkswagen Golf, Condition: Used, Color: White, Capacity: 5, Mileage: 61304, Fuel Type: Gasoline, Transmission: Automatic, VIN: 6TAC76500T28K613, Price: 27960.65, Cars Avail
Car ID: 59, Car Type: SUV, Model: Chevrolet Tahoe, Condition: Used, Color: Yellow, Capacity: 8, Mileage: 14864, Fuel Type: Diesel, Transmission: Manual, VIN: 80P01P0000000000, Price: 17203.4, Cars Avail
Car ID: 64, Car Type: Hatchback, Model: Volkswagen Golf, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 44387, Fuel Type: Diesel, Transmission: Manual, VIN: 8A8383928X000000, Price: 27940.4, Cars Avail
Car ID: 65, Car Type: Hatchback, Model: Honda Fit, Condition: Used, Color: Green, Capacity: 5, Mileage: 59184, Fuel Type: Electric, Transmission: Automatic, VIN: 1T0P0A0L1V000000, Price: 38139.48, Cars Avail
Car ID: 66, Car Type: Pickup, Model: Ram 1500, Condition: Used, Color: Red, Capacity: 5, Mileage: 130465, Fuel Type: Electric, Transmission: Manual, VIN: 80P0C00000000000, Price: 18288.16, Cars Avail
Car ID: 68, Car Type: Sedan, Model: Nissan Altima, Condition: Used, Color: Black, Capacity: 5, Mileage: 101568, Fuel Type: Gasoline, Transmission: Automatic, VIN: 80P0C00000000000, Price: 31993.85, Cars Avail
Car ID: 70, Car Type: Hatchback, Model: Volkswagen Golf, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 89919, Fuel Type: Hybrid, Transmission: Manual, VIN: 1P0D0C0000000000, Price: 29184.89, Cars Avail
Car ID: 71, Car Type: Pickup, Model: Ford F-150, Condition: Used, Color: Silver, Capacity: 5, Mileage: 54260, Fuel Type: Hybrid, Transmission: Manual, VIN: 820056631LH18204, Price: 6306.97, Cars Avail
Car ID: 73, Car Type: SUV, Model: Ford Explorer, Condition: Used, Color: Blue, Capacity: 7, Mileage: 103467, Fuel Type: Electric, Transmission: Manual, VIN: F80T2G002328K6F0, Price: 47342.94, Cars Avail
Car ID: 74, Car Type: Sedan, Model: Nissan Altima, Condition: Used, Color: Green, Capacity: 5, Mileage: 11696, Fuel Type: Diesel, Transmission: Automatic, VIN: 820056631LH18204, Price: 26324.83, Cars Avail
Car ID: 75, Car Type: Sedan, Model: Honda Accord, Condition: Used, Color: Blue, Capacity: 5, Mileage: 149919, Fuel Type: Hybrid, Transmission: Automatic, VIN: C34H8M07082W0000, Price: 40806.15, Cars Avail
Car ID: 76, Car Type: Hatchback, Model: Honda Fit, Condition: Used, Color: White, Capacity: 5, Mileage: 116862, Fuel Type: Hybrid, Transmission: Manual, VIN: 3YVJ000000000000, Price: 41423.52, Cars Avail
Car ID: 77, Car Type: Pickup, Model: Ram 1500, Condition: Used, Color: Blue, Capacity: 5, Mileage: 8621, Fuel Type: Gasoline, Transmission: Automatic, VIN: 80P0C00000000000, Price: 16057.47, Cars Avail
Car ID: 79, Car Type: Pickup, Model: Chevrolet Silverado, Condition: Used, Color: Green, Capacity: 5, Mileage: 117641, Fuel Type: Diesel, Transmission: Automatic, VIN: N50A000000000000, Price: 38781.99, Cars Avail
Car ID: 80, Car Type: Sedan, Model: Honda Accord, Condition: Used, Color: Black, Capacity: 5, Mileage: 143329, Fuel Type: Hybrid, Transmission: Manual, VIN: H0P0C00000000000, Price: 44807.17, Cars Avail
Car ID: 81, Car Type: Pickup, Model: Toyota Tacoma, Condition: Used, Color: Black, Capacity: 5, Mileage: 127799, Fuel Type: Electric, Transmission: Manual, VIN: A0C1E00000000000, Price: 39218.13, Cars Avail
Car ID: 82, Car Type: Hatchback, Model: Toyota Prius, Condition: Used, Color: Red, Capacity: 5, Mileage: 57548, Fuel Type: Gasoline, Transmission: Manual, VIN: 1XK08U0723X0083, Price: 21748.4, Cars Avail
```

ALL CARS

```
RunShop [Java Application] (Jd2: 27620)
Type username please.
yoda

Input password please.
kvyCode*
Login Successful

Welcome, yoda.

1. Display all cars
2. Filter Cars (used/new)
3. Purchase a car
4. View Tickets
5. Sign out
1
Car ID: 1, Car Type: Hatchback, Model: Honda Fit, Condition: New, Color: Yellow, Capacity: 5, Mileage: 3055, Fuel Type: Hybrid, Transmission: Automatic, VIN: YVAGL2L65239GCA0, Price: 25471.55, Cars Available
Car ID: 2, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: Silver, Capacity: 5, Mileage: 3067, Fuel Type: Diesel, Transmission: Automatic, VIN: 81178WY684H0R0X3, Price: 26088.35, Cars Available
Car ID: 3, Car Type: SUV, Model: Toyota RAV4, Condition: New, Color: Green, Capacity: 5, Mileage: 2983, Fuel Type: Gasoline, Transmission: Automatic, VIN: FVCR3H4M2CKXCLCC0, Price: 33050.65, Cars Available
Car ID: 4, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Blue, Capacity: 5, Mileage: 3037, Fuel Type: Hybrid, Transmission: Manual, VIN: R3134D434M4950004, Price: 27905.20, Cars Available
Car ID: 5, Car Type: Sedan, Model: Toyota Camry, Condition: New, Color: Red, Capacity: 5, Mileage: 1549, Fuel Type: Electric, Transmission: Manual, VIN: 80WPE6C57F674W42, Price: 48059.1, Cars Available
Car ID: 6, Car Type: SUV, Model: Ford Explorer, Condition: New, Color: White, Capacity: 7, Mileage: 523, Fuel Type: Hybrid, Transmission: Manual, VIN: 0PWEZDP033A0X037, Price: 20414.56, Cars Available
Car ID: 7, Car Type: Pickup, Model: Ford F-150, Condition: New, Color: Black, Capacity: 5, Mileage: 339, Fuel Type: Gasoline, Transmission: Automatic, VIN: 90M4026SR6V4W220, Price: 21687.59, Cars Available
Car ID: 8, Car Type: Sedan, Model: Honda Accord, Condition: Used, Color: Silver, Capacity: 5, Mileage: 182639, Fuel Type: Electric, Transmission: Automatic, VIN: LFQFQ8B31VYP16, Price: 47923.73, Cars Available
Car ID: 9, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Black, Capacity: 5, Mileage: 1518, Fuel Type: Diesel, Transmission: Manual, VIN: 92U2D9YP4M4H1E19, Price: 38296.01, Cars Available
Car ID: 10, Car Type: SUV, Model: Toyota RAV4, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 77089, Fuel Type: Diesel, Transmission: Automatic, VIN: 8106KCB1354P743, Price: 27806.68, Cars Available
Car ID: 11, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Green, Capacity: 5, Mileage: 3718, Fuel Type: Hybrid, Transmission: Automatic, VIN: 5V4P8G0N380H0803, Price: 43483.38, Cars Available
Car ID: 12, Car Type: Pickup, Model: Toyota Tacoma, Condition: New, Color: Red, Capacity: 5, Mileage: 2771, Fuel Type: Gasoline, Transmission: Manual, VIN: 4PFA6M4H4023H0359, Price: 37757.99, Cars Available
Car ID: 13, Car Type: Pickup, Model: Chevrolet Silverado, Condition: Used, Color: Blue, Capacity: 5, Mileage: 128836, Fuel Type: Hybrid, Transmission: Automatic, VIN: G413H6L40V050006, Price: 33307.49, Cars Available
Car ID: 14, Car Type: SUV, Model: Honda CR-V, Condition: New, Color: White, Capacity: 5, Mileage: 2128, Fuel Type: Hybrid, Transmission: Manual, VIN: M06NCTUD020V08080, Price: 15678.92, Cars Available
Car ID: 15, Car Type: SUV, Model: Chevrolet Tahoe, Condition: New, Color: White, Capacity: 8, Mileage: 4063, Fuel Type: Hybrid, Transmission: Manual, VIN: 600U5G61LH1L3N20, Price: 32241.67, Cars Available
Car ID: 16, Car Type: SUV, Model: Honda CR-V, Condition: New, Color: Black, Capacity: 5, Mileage: 2138, Fuel Type: Gasoline, Transmission: Manual, VIN: M06BBL6L67J0D15, Price: 3822.68, Cars Available
Car ID: 17, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Yellow, Capacity: 5, Mileage: 3277, Fuel Type: Gasoline, Transmission: Automatic, VIN: 3C1AFV0M3P1V0606X, Price: 41881.58, Cars Available
Car ID: 18, Car Type: Sedan, Model: Ford Fusion, Condition: New, Color: Red, Capacity: 5, Mileage: 615, Fuel Type: Hybrid, Transmission: Manual, VIN: H0C4V7M06G0W65V, Price: 23333.15, Cars Available
Car ID: 19, Car Type: Hatchback, Model: Ford Fiesta, Condition: Used, Color: Red, Capacity: 5, Mileage: 21871, Fuel Type: Hybrid, Transmission: Automatic, VIN: N1220M0C02N1722K, Price: 29330.83, Cars Available
Car ID: 20, Car Type: SUV, Model: Honda CR-V, Condition: Used, Color: Silver, Capacity: 5, Mileage: 44889, Fuel Type: Hybrid, Transmission: Automatic, VIN: H03P721P10P797D, Price: 29199.99, Cars Available
Car ID: 21, Car Type: Sedan, Model: Ford Fusion, Condition: New, Color: Blue, Capacity: 5, Mileage: 2087, Fuel Type: Hybrid, Transmission: Automatic, VIN: L3204L12161816C0, Price: 36410.38, Cars Available
Car ID: 22, Car Type: Sedan, Model: Toyota Camry, Condition: Used, Color: Silver, Capacity: 5, Mileage: 41396, Fuel Type: Diesel, Transmission: Manual, VIN: 1D0N00400H0Q0805V, Price: 39618.11, Cars Available
Car ID: 23, Car Type: SUV, Model: Toyota RAV4, Condition: New, Color: Silver, Capacity: 5, Mileage: 3041, Fuel Type: Gasoline, Transmission: Automatic, VIN: C410060630P73P04V, Price: 41478.4, Cars Available
Car ID: 24, Car Type: Sedan, Model: Ford Fusion, Condition: Used, Color: Yellow, Capacity: 5, Mileage: 116812, Fuel Type: Gasoline, Transmission: Automatic, VIN: 1U07446V6A0LQ0581, Price: 18330.37, Cars Available
Car ID: 25, Car Type: Pickup, Model: Ford F-150, Condition: Used, Color: Silver, Capacity: 5, Mileage: 92664, Fuel Type: Diesel, Transmission: Automatic, VIN: 80V05X0Q0H2CH04, Price: 22272.46, Cars Available
Car ID: 26, Car Type: Hatchback, Model: Toyota Prius, Condition: New, Color: Blue, Capacity: 5, Mileage: 1888, Fuel Type: Gasoline, Transmission: Manual, VIN: T0N06ACV2C0H0F1, Price: 30416.16, Cars Available
Car ID: 27, Car Type: Sedan, Model: Ford Fusion, Condition: Used, Color: Silver, Capacity: 5, Mileage: 13147, Fuel Type: Hybrid, Transmission: Manual, VIN: P0620M4130H05C2N, Price: 21834.58, Cars Available
Car ID: 28, Car Type: Hatchback, Model: Volkswagen Golf, Condition: New, Color: White, Capacity: 5, Mileage: 4199, Fuel Type: Hybrid, Transmission: Manual, VIN: 90M4026SR6V4W220, Price: 41488.99, Cars Available
Car ID: 29, Car Type: SUV, Model: Chevrolet Tahoe, Condition: New, Color: Red, Capacity: 8, Mileage: 788, Fuel Type: Gasoline, Transmission: Automatic, VIN: H03P721P10P797D, Price: 24564.37, Cars Available
Car ID: 30, Car Type: SUV, Model: Honda CR-V, Condition: Used, Color: Black, Capacity: 5, Mileage: 16621, Fuel Type: Gasoline, Transmission: Automatic, VIN: 75057P0L2X1H0V094, Price: 20900.65, Cars Available
Car ID: 31, Car Type: Sedan, Model: Nissan Altima, Condition: New, Color: Silver, Capacity: 5, Mileage: 5, Fuel Type: Electric, Transmission: Manual, VIN: 8002XV00060000, Price: 41626.99, Cars Available
Car ID: 32, Car Type: SUV, Model: Chevrolet Tahoe, Condition: Used, Color: Silver, Capacity: 8, Mileage: 51892, Fuel Type: Diesel, Transmission: Automatic, VIN: 1YCPZ50F0T40U3M, Price: 46986.52, Cars Available
Car ID: 33, Car Type: Sedan, Model: Honda Accord, Condition: New, Color: Yellow, Capacity: 5, Mileage: 4459, Fuel Type: Diesel, Transmission: Manual, VIN: 5MR3080211717T1P, Price: 45272.72, Cars Available
Car ID: 34, Car Type: Hatchback, Model: Honda Fit, Condition: New, Color: Yellow, Capacity: 5, Mileage: 332, Fuel Type: Electric, Transmission: Manual, VIN: E70B071L1R0K305, Price: 32281.86, Cars Available
Car ID: 35, Car Type: Hatchback, Model: Ford Fiesta, Condition: New, Color: Black, Capacity: 5, Mileage: 3807, Fuel Type: Diesel, Transmission: Manual, VIN: EFQ4M16S38P8N558, Price: 21814.94, Cars Available
```

Buying a Car

- **Test:** Try buying a car both with and without enough money.
- **Anticipated outcome:** If funds are available, the transaction will be successful; if not, it will fail.
- **Console Output:** An error message indicating insufficient budget and a confirmation message upon successful purchase. (You might want to add somewhere that the test for purchasing is only successful if the users moneyAvailable is adjusted to an appropriate predetermined value, the size of the users tickets array list is increased by 1 and the users carsPurchased variable is increased by 1.)

```
Car ID: 96, Car Type: Pickup, Model: Toyota Tacoma, Condition: Used, Color: Red, Capacity: 5, Mileage: 36178, Fuel Type: Diesel, Transmission: Automatic, VIN: K01Z1B0F0H8TAD5G, Price: 33307.49

1. Display all cars
2. Filter Cars (used/new)
3. Purchase a car
4. View Tickets
5. Sign out
1
Enter car ID to purchase.
96
Car Purchased! Congratulations tonystark!!

1. Display all cars
2. Filter Cars (used/new)
3. Purchase a car
4. View Tickets
5. Sign out
4
Displaying all user tickets for: tonystark
Ticket 1:
Car Type: SUV, Model: Chevrolet Tahoe, color: Yellow

1. Display all cars
2. Filter Cars (used/new)
3. Purchase a car
4. View Tickets
5. Sign out
5
Bye, tonystark

Welcome to Mine Cars

1. User Login
2. Admin Login
3. Exit(or type EXIT)
3
Exiting Program.
```

Modify the user's CSV

- *Test:* Add the updated budget to the user's CSV file.
- *Anticipated Outcome:* A CSV file with the updated budget should be the expected outcome.
- *Text Document Result:* The modified user's CSV file contents.

BEFORE

C:\Users\rober\OneDrive\Desktop\BeforePurchase.csv

	A	B	C	D	E	F	G	H
4	3	Yoda	Yagins	43301.00	0	False	yoda	KVYCOGc
5	4	Yoda	Smith	41552.72	0	False	yoda	KVYCOGc
6	5	Captain	America	31633.09	0	True	captainamerica	2Lob0Zfa
7	6	Sherlock	Holmes	22545.97	0	True	sherlockholmes	#A2UjgVh
8	7	Neo	Miller	48819.72	0	True	neo	L8GKCj\$A
9	8	Captain	Jack Sparrow	25338.27	0	False	captainjacksparrow	3*Gts&4X
10	9	Atticus	Finch	43657.68	0	False	atticusfinch	3@H\$PHp
11	10	James	T. Kirk	17855.2	0	False	jamest.kirk	YQoQ3LH
12	11	Wolverine	Wilson	45137.8	0	False	wolverine	SuclRbjh
13	12	Gandalf	Williams	35888.84	0	False	gandalf	Qa8bl@jK
14	13	John	Wick	35258.16	0	True	johnwick	WUa9@Nl
15	14	Tony	Stark	22035.25	0	True	tonystark	bmQ@0Cr
16	15	Rocky	Balboa	17044.39	0	False	rockybalboa	Sma0y*cv
17	16	Luke	Skywalker	24267.18	0	False	lukeskywalker	Fl&*ml*Y
18	17	Morpheus	Wilson	24224.76	0	True	morpheus	1IZgnN1(
19	18	Tony	Montana	41234.53	0	True	tonymontana	ut@zVg\$!
20	19	Batman	Miller	43288.0	0	False	batman	P8A)art(
21	20	Norman	Bates	33671.7	0	False	normanbates	SgSj29cv
22	21	E.T.	Moore	27324.29	0	True	e.t.	cstk@z16
23	22	Jackie	Chan	26291.92	0	False	jackiechan	yCTnezqK
24	23	Travis	Bickle	36835.98	0	False	travisbickle	eT47a5mC
25	24	Han	Solo	46816.13	0	True	hansolo	6EJQon4R
26	25	James	Bond	25557.28	0	False	jamesbond	1kfbNp2W
27	26	Hanibal	Lecter	27073.63	0	False	haniballecter	EG1Wink4

AFTER

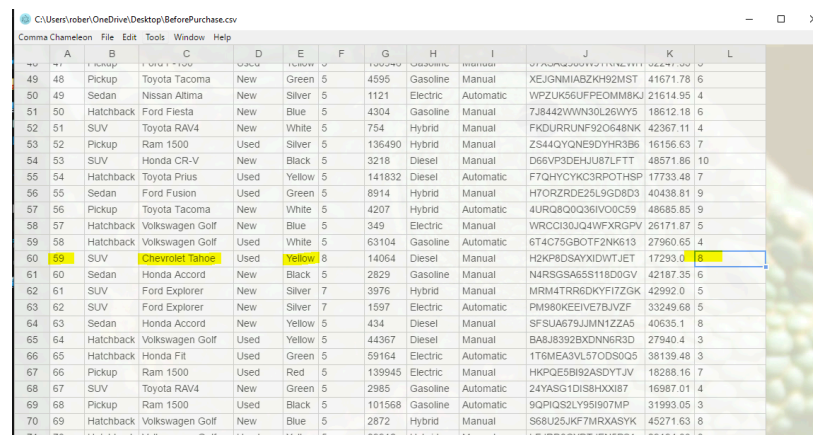
C:\Users\rober\OneDrive\Desktop\AfterPurchaseCar.csv

	A	B	C	D	E	F	G	H
4	3	Yoda	Yagins	43301.00	0	False	yoda	KVYCOGc
5	4	Yoda	Smith	18081.17	1	False	yoda	KVYCOGc
6	5	Captain	America	31633.09	0	True	captainamerica	2Lob0Zfa
7	6	Sherlock	Holmes	22545.97	0	True	sherlockholmes	#A2UjgVh
8	7	Neo	Miller	48819.72	0	True	neo	L8GKCj\$A
9	8	Captain	Jack Sparrow	25338.27	0	False	captainjacksparrow	3*Gts&4X
10	9	Atticus	Finch	43657.68	0	False	atticusfinch	3@H\$PHp
11	10	James	T. Kirk	17855.2	0	False	jamest.kirk	YQoQ3LH
12	11	Wolverine	Wilson	45137.8	0	False	wolverine	SuclRbjh
13	12	Gandalf	Williams	35888.84	0	False	gandalf	Qa8bl@jK
14	13	John	Wick	35258.16	0	True	johnwick	WUa9@Nl
15	14	Tony	Stark	4742.25	1	True	tonystark	bmQ@0Cr
16	15	Rocky	Balboa	17044.39	0	False	rockybalboa	Sma0y*cv
17	16	Luke	Skywalker	24267.18	0	False	lukeskywalker	Fl&*ml*Y
18	17	Morpheus	Wilson	24224.76	0	True	morpheus	1IZgnN1(
19	18	Tony	Montana	41234.53	0	True	tonymontana	ut@zVg\$!
20	19	Batman	Miller	43288.0	0	False	batman	P8A)art(
21	20	Norman	Bates	33671.7	0	False	normanbates	SgSj29cv
22	21	E.T.	Moore	27324.29	0	True	e.t.	cstk@z16
23	22	Jackie	Chan	26291.92	0	False	jackiechan	yCTnezqK
24	23	Travis	Bickle	36835.98	0	False	travisbickle	eT47a5mC
25	24	Han	Solo	46816.13	0	True	hansolo	6EJQon4R
26	25	James	Bond	25557.28	0	False	jamesbond	1kfbNp2W
27	26	Hanibal	Lecter	27073.63	0	False	haniballecter	EG1Wink4

Update the CSV for the car.

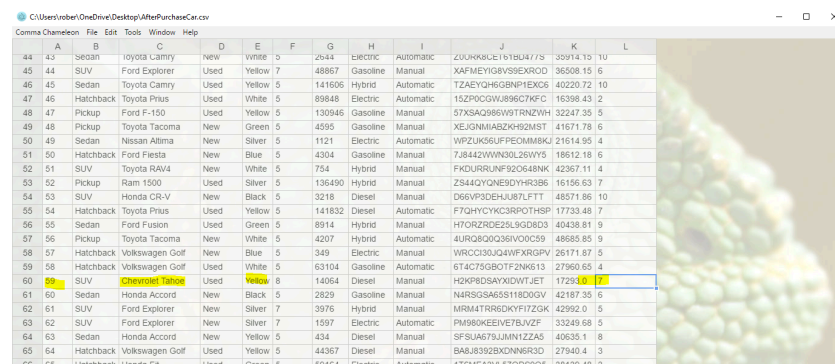
- Test: Add the updated number of automobiles available to the car's CSV file.
- Anticipated Outcome: The new quantity ought to be reflected in the CSV file, as anticipated.
- Text Document Result: Contents of the CSV file containing the modified automobile.

BEFORE



	A	B	C	D	E	F	G	H	I	J	K	L
49	48	Pickup	Toyota Tacoma	New	Green	5	4595	Gasoline	Manual	XEJGNMABZKH92MST	41671.78	6
50	49	Sedan	Nissan Altima	New	Silver	5	1121	Electric	Automatic	WPZUK56UFPEOMMBKJ	21614.95	4
51	50	Hatchback	Ford Fiesta	New	Blue	5	4304	Gasoline	Manual	7J8442WWN30L26WY5	18612.18	6
52	51	SUV	Toyota RAV4	New	White	5	754	Hybrid	Manual	FKDURRUNF920648NK	42367.11	4
53	52	Pickup	Ram 1500	Used	Silver	5	136490	Hybrid	Manual	ZS44QYQNE9YHR3B6	16156.63	7
54	53	SUV	Honda CR-V	New	Black	5	3218	Diesel	Manual	D66VP3DEHU87LFTT	48571.86	10
55	54	Hatchback	Toyota Prius	Used	Yellow	5	141832	Diesel	Automatic	F7QHYYKCYK3RPOTHSP	17733.48	7
56	55	Sedan	Ford Fusion	Used	Green	5	8914	Hybrid	Manual	H70RZDE25L9GD8D3	40438.81	9
57	56	Pickup	Toyota Tacoma	New	White	5	4207	Hybrid	Automatic	4URQ80Q36V00C59	48685.85	9
58	57	Hatchback	Volkswagen Golf	New	Blue	5	349	Electric	Manual	WRCC130JQ4WFXRGPV	26171.87	5
59	58	Hatchback	Volkswagen Golf	Used	White	5	63104	Gasoline	Automatic	6T4C75GBOTF2NK613	27960.65	4
60	59	SUV	Chevrolet Tahoe	Used	Yellow	8	14064	Diesel	Manual	H2KP8DSAYXIDWTJET	17293.0	18
61	60	Sedan	Honda Accord	New	Black	5	2829	Gasoline	Manual	N4RSGSA6S118D0GV	42187.35	6
62	61	SUV	Ford Explorer	New	Silver	7	3976	Hybrid	Manual	MRM4TRR6DKYFI7ZGK	42992.0	5
63	62	SUV	Ford Explorer	New	Silver	7	1597	Electric	Automatic	PM980KEEIVE7BJVZF	33249.68	5
64	63	Sedan	Honda Accord	New	Yellow	5	434	Diesel	Manual	SFSUA679JUMN1ZZA5	40635.1	8
65	64	Hatchback	Volkswagen Golf	Used	Yellow	5	44367	Diesel	Manual	BASJ8392BXDN6R3D	27940.4	3
66	65	Hatchback	Honda Fit	Used	Green	5	59164	Electric	Automatic	1TGME35LV5ODS0Q5	38139.48	3
67	66	Pickup	Ram 1500	Used	Red	5	139945	Electric	Manual	HKPQESB192ASDYJV	18288.16	7
68	67	SUV	Toyota RAV4	New	Green	5	2985	Gasoline	Automatic	24YASG1DIS8HX087	16987.01	4
69	68	Pickup	Ram 1500	Used	Black	5	101568	Gasoline	Automatic	9QPIQSL2Y91907MP	31993.05	3
70	69	Hatchback	Volkswagen Golf	New	Blue	5	2872	Hybrid	Manual	S68U25JKF7MRXASYK	45271.63	8
71	70	Hatchback	Volkswagen Golf	Used	Yellow	5	88842	Hybrid	Manual	1E1D93VYVF1EM8D4	19464.05	9

AFTER



	A	B	C	D	E	F	G	H	I	J	K	L
44	43	Sedan	Toyota Camry	New	White	5	2644	Electric	Automatic	Z0URK8CE16T8U47/7S	39914.15	10
45	44	SUV	Ford Explorer	Used	Yellow	7	48867	Gasoline	Manual	XAFMEY1G8Y9SEXROD	36508.15	6
46	45	Sedan	Toyota Camry	Used	Yellow	5	141606	Hybrid	Automatic	1ZAEYGH68NP1EXC5	40220.72	10
47	46	Hatchback	Toyota Prius	Used	White	5	89648	Electric	Automatic	15ZPCCDWJ896C7WFC	16368.43	2
48	47	Pickup	Ford F-150	Used	Yellow	5	130945	Gasoline	Manual	57XSAQ986V9TRNZWH	32247.35	5
49	48	Pickup	Toyota Tacoma	New	Green	5	4595	Gasoline	Manual	XEJGNMABZKH92MST	41671.78	6
50	49	Sedan	Nissan Altima	New	Silver	5	1121	Electric	Automatic	WPZUK56UFPEOMMBKJ	21614.95	4
51	50	Hatchback	Ford Fiesta	New	Blue	5	4304	Gasoline	Manual	7J8442WWN30L26WY5	18612.18	6
52	51	SUV	Toyota RAV4	New	White	5	754	Hybrid	Manual	FKDURRUNF920648NK	42367.11	4
53	52	Pickup	Ram 1500	Used	Silver	5	136490	Hybrid	Manual	ZS44QYQNE9YHR3B6	16156.63	7
54	53	SUV	Honda CR-V	New	Black	5	3218	Diesel	Manual	D66VP3DEHU87LFTT	48571.86	10
55	54	Hatchback	Toyota Prius	Used	Yellow	5	141832	Diesel	Automatic	F7QHYYKCYK3RPOTHSP	17733.48	7
56	55	Sedan	Ford Fusion	Used	Green	5	8914	Hybrid	Manual	H70RZDE25L9GD8D3	40438.81	9
57	56	Pickup	Toyota Tacoma	New	White	5	4207	Hybrid	Automatic	4URQ80Q36V00C59	48685.85	9
58	57	Hatchback	Volkswagen Golf	New	Blue	5	349	Electric	Manual	WRCC130JQ4WFXRGPV	26171.87	5
59	58	Hatchback	Volkswagen Golf	Used	White	5	63104	Gasoline	Automatic	6T4C75GBOTF2NK613	27960.65	4
60	59	SUV	Chevrolet Tahoe	Used	Yellow	8	14064	Diesel	Manual	H2KP8DSAYXIDWTJET	17293.0	18
61	60	Sedan	Honda Accord	New	Black	5	2829	Gasoline	Manual	N4RSGSA6S118D0GV	42187.35	6
62	61	SUV	Ford Explorer	New	Silver	7	3976	Hybrid	Manual	MRM4TRR6DKYFI7ZGK	42992.0	5
63	62	SUV	Ford Explorer	New	Silver	7	1597	Electric	Automatic	PM980KEEIVE7BJVZF	33249.68	5
64	63	Sedan	Honda Accord	New	Yellow	5	434	Diesel	Manual	SFSUA679JUMN1ZZA5	40635.1	8
65	64	Hatchback	Volkswagen Golf	Used	Yellow	5	44367	Diesel	Manual	BASJ8392BXDN6R3D	27940.4	3
66	65	Hatchback	Honda Fit	Used	Green	5	59164	Electric	Automatic	1TGME35LV5ODS0Q5	38139.48	3

Recording Activities

- Test: Run through a series of actions and see whether any logs are generated.
- Anticipated Outcome: Records have to include details regarding the actions executed.
- Text Document Outcome: The log file's contents.

```
Log
File Edit View

New Session Logged
Thu Apr 04 20:57:22 MDT 2024 - Car data read by system
Thu Apr 04 20:57:22 MDT 2024 - System generated Car Sheet successfully File Name: car_data_snapshots_20-57-22_04_04_24.csv
Thu Apr 04 20:57:22 MDT 2024 - User data read by system
Thu Apr 04 20:57:22 MDT 2024 - System generated User Sheet successfully. File Name: user_data_snapshot_20-57-22_04_04_24.csv
Thu Apr 04 20:57:22 MDT 2024 - System loaded user tickets successfully
Thu Apr 04 20:57:27 MDT 2024 - tonystark Logged In
Thu Apr 04 20:57:31 MDT 2024 - tonystark Attempted to purchase car with ID: 99 - INSUFFICIENT FUNDS
Thu Apr 04 20:57:32 MDT 2024 - tonystark displayed tickets. User has no tickets.
Thu Apr 04 20:57:38 MDT 2024 - tonystark Attempted to purchase car with ID: 72 - INSUFFICIENT FUNDS
Thu Apr 04 20:57:42 MDT 2024 - tonystark Attempted to purchase car with ID: 25 - INSUFFICIENT FUNDS
Thu Apr 04 20:57:44 MDT 2024 - tonystark Attempted to purchase car with ID: 1 - INSUFFICIENT FUNDS
Thu Apr 04 20:57:46 MDT 2024 - tonystark Attempted to purchase car with ID: 65 - INSUFFICIENT FUNDS
Thu Apr 04 20:57:59 MDT 2024 - tonystark filtered cars by Used
Thu Apr 04 20:58:18 MDT 2024 - System generated ticket for car: 59
Thu Apr 04 20:58:18 MDT 2024 - System appended tickets.csv successfully
Thu Apr 04 20:58:18 MDT 2024 - tonystark Purchased car with id: 59
Thu Apr 04 20:58:22 MDT 2024 - tonystark displayed tickets. User has 1 tickets.
Thu Apr 04 20:58:31 MDT 2024 - tonystark logged out
Thu Apr 04 20:58:32 MDT 2024 - System generated User Sheet successfully. File Name: user_data.csv
Thu Apr 04 20:58:32 MDT 2024 - System generated Car Sheet successfully File Name: car_data.csv
```

Exit Program

- *Test:* Close the application and check the modified CSV files.
- *Anticipated Outcome:* Any modifications performed during the session expected to be reflected in the CSV files.
- *Text Document Result:* After the software is closed, the data of the updated CSV files for the user and the car.

USER

C:\Users\rober\OneDrive\Desktop\AfterPurchaseCar.csv

	A	B	C	D	E	F	G	H
4	3	Yoda	Smith	18081.17	1	False	yoda	KVYCOGc*
5	4	Yoda	Smith	18081.17	1	False	yoda	KVYCOGc*
6	5	Captain	America	31633.09	0	True	captainamerica	2Lob0Zfa
7	6	Sherlock	Holmes	22545.97	0	True	sherlockholmes	#A2UjgVh
8	7	Neo	Miller	48819.72	0	True	neo	L8GKCj\$A
9	8	Captain	Jack Sparrow	25338.27	0	False	captainjacksparrow	3*Gts&4X
10	9	Atticus	Finch	43657.68	0	False	atticusfinch	3@H\$PHp
11	10	James	T. Kirk	17855.2	0	False	jamest.kirk	YQoQ3LH
12	11	Wolverine	Wilson	45137.8	0	False	wolverine	SucLrbjh
13	12	Gandalf	Williams	35888.84	0	False	gandalf	Qa8bl@jK
14	13	John	Wick	35258.16	0	True	johnwick	WUa9@Nl
15	14	Tony	Stark	4742.25	1	True	tonystark	bmQ@0Cr
16	15	Rocky	Balboa	17044.39	0	False	rockybalboa	Sma0y*cV
17	16	Luke	Skywalker	24267.18	0	False	lukeskywalker	FI&^ml*Y
18	17	Morpheus	Wilson	24224.76	0	True	morpheus	1IZgnN1(
19	18	Tony	Montana	41234.63	0	True	tonymontana	ut@zVg\$!
20	19	Batman	Miller	43288.0	0	False	batman	P8A)art(
21	20	Norman	Bates	33671.7	0	False	normanbates	SgSj29cv
22	21	E.T.	Moore	27324.29	0	True	e.t.	cstk@zI6
23	22	Jackie	Chan	26291.92	0	False	jackiechan	yCTnezqK
24	23	Travis	Bickle	36835.98	0	False	travisbickle	eT47a5mC
25	24	Han	Solo	46816.13	0	True	hansolo	6EJQon4R

CAR

C:\Users\roben\OneDrive\Desktop\AfterPurchaseCar.csv													Comma Chameleon		File	Edit	Tools	Window	Help
A	B	C	D	E	F	G	H	I	J	K	L								
44	43	Sedan	toyota Camry	New	White	5	2944	Electric	Automatic	ZUKXK8J2E1616U4173	35914.15	10							
45	44	SUV	Ford Explorer	Used	Yellow	7	4867	Gasoline	Manual	XAFMEYIC8VSG5XRD0	35508.15	6							
46	45	Sedan	Toyota Camry	Used	Yellow	5	141605	Hybrid	Automatic	T2AEYOH6GBNP1EXG5	40220.72	10							
47	46	Hatchback	Toyota Prius	Used	White	5	89848	Electric	Automatic	15ZP0C0GWJ896C7KFC	16398.43	2							
48	47	Pickup	Ford F-150	Used	Yellow	5	130945	Gasoline	Manual	57XSAQ986V9TRNZYH	32247.35	5							
49	48	Pickup	Toyota Tacoma	New	Green	5	4595	Gasoline	Manual	XEJGNMIAZKH92MST	41671.78	6							
50	49	Sedan	Nissan Altima	New	Silver	5	1121	Electric	Automatic	WPZUK56UPPEOMMBKJ	21614.95	4							
51	50	Hatchback	Ford Fiesta	New	Blue	5	4304	Gasoline	Manual	7J8442WNN30L26WY5	19612.18	6							
52	51	SUV	Toyota RAV4	New	White	5	754	Hybrid	Manual	PJOURRURJF92064BNK	42367.11	4							
53	52	Pickup	Ram 1500	Used	Silver	5	136490	Hybrid	Manual	ZS4QYQNE9YH9R086	16156.63	7							
54	53	SUV	Honda CR-V	New	Black	5	3218	Diesel	Manual	D66VP3DEHJLJLFTT	48571.96	10							
55	54	Hatchback	Toyota Prius	Used	Yellow	5	141832	Diesel	Automatic	F7QHYYCYK3RPOTHSP	17733.48	7							
56	55	Sedan	Ford Fusion	Used	Green	5	8914	Hybrid	Manual	HT0RZKDE25L9GD8D3	40438.81	9							
57	56	Pickup	Toyota Tacoma	New	White	5	4207	Hybrid	Automatic	4URQ80Q36VVOOC59	48685.85	9							
58	57	Hatchback	Volkswagen Golf	New	Blue	5	349	Electric	Manual	WRC0130JQ4WFXRGPV	26171.87	5							
59	58	Hatchback	Volkswagen Golf	Used	White	5	63104	Gasoline	Automatic	6T4C75GB0TF2NK513	27960.65	4							
60	59	SUV	Chrysler Pacifica	Used	Yellow	8	14064	Diesel	Manual	H2K9B34YKDWJ2ET	1725.89	10							
61	60	Sedan	Honda Accord	New	Black	5	2829	Gasoline	Manual	N4RSG3A65S118C0GV	42187.35	5							
62	61	SUV	Ford Explorer	New	Silver	7	3976	Hybrid	Manual	MRM4TRR6KXVF1ZGK	42992.0	5							
63	62	SUV	Ford Explorer	New	Silver	7	1597	Electric	Automatic	PM980KEIIE7BUZVF	33249.68	5							
64	63	Sedan	Honda Accord	New	Yellow	5	434	Diesel	Manual	SFSUA679JUMN1ZZA5	40635.1	8							
65	64	Hatchback	Volkswagen Golf	Used	Yellow	5	44367	Diesel	Manual	BAJ8J392BXDNMR3D	27940.4	3							
66	65	Hatchback	Honda Fit	Used	Green	5	59164	Electric	Automatic	1T6MEAYVL67YD50Q5	38139.48	3							

6. Code Review

Quality of Code

- *Verify Consistency:* Make sure the codebase's names, layout, and programming style are all the same.
- *Verify the readability:* the code by making sure it is clear and, if needed, well-commented.

Operational

- *Examine Requirements:* Verify that the code satisfies the functional specifications and requirements as outlined in the use case and class diagrams.
- *Test Cases:* Ensure that the test cases pass and cover all areas of the code.

Achievement

- *Optimization:* Look for any places where the code could be made more efficient or for any performance bottlenecks.
- *Resource Usage:* Verify that resources like CPU and memory are being used effectively.

Safety

- *Verify:* that every user input is validated to stop security flaws
- *Authentication and Authorization:* Check to make sure the procedures for authorization and authentication are set up properly.

Error Reduction

- *Verify Exception Handling:* Make that exceptions are managed properly and politely.
- *Logging:* Ensure that errors and important events are recorded in logs.

Record-keeping

- *Look for Comments:* Make sure the code has clear documentation that explains any complicated logic or features.

Testing

- *Test Coverage:* Verify that there is enough test coverage to cover every important section of the code.
- *Testing for Regression:* Ensure that modifications don't cause new issues or errors.

Maintainability and Flexibility

- *Verify:* that the code is simple and follows accepted practices for maintainability and durability.
- *Code Duplication:* Look for instances of duplicate code and, if needed, rework it.