COP-2800: Java Programming

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D8 Software Documentation: P3 DMV Vehicle License Plate Software

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AI Content Statement:

Some AI was used in this project for understanding how to use the Random utility in Java and verifying custom plate input. The rest of the code was created using information from the textbook and modeled after previous programs I have completed in this course (P2).

Requirements:

Write a Java program that supports the Department of Motor Vehicles. Your program will offer a menu to the user with four options: Random plate, custom plate, plate renewal, exit. New plates cost $45.00, Custom plates cost the new plate price plus $1.25 for each letter and $1.00 for each number (dashes are free). Plate renewals are 50% of the price of a new plate. Custom renewals are 50% of a basic new plate plus $1 per character.

The program will:

- Display a menu with options for random plates, custom plates, and plate renewal.
- Generate a random plate with a mix of letters and numbers, following a predefined format.
- Allow custom plates, ensuring input validation (only A-Z, 0-9, and dashes) with additional fees based on plate characters.
- Provide plate renewal services, calculating standard and custom renewal costs.
- Ensure proper input handling to prevent invalid selections.
- Exit the program when the user selects the exit option.

Installation and Run Instructions:

I used the IDE, Visual Studio Code, to write this program and ensured JDK was installed on my system. This program runs by opening the P3DMVSystem.java file in an IDE and executing the code.

Alternatively, this program can run via the terminal using the following commands:

Compile the source file: javac P3DMVSystem.java

Run the compiled program: java P3DMVSystem.java

Design Notes:

This program simulates a DMV system that allows users to generate random license plates, create custom plates, and renew existing plates. The project demonstrates an understanding of String manipulation, Math calculations, loops, if statements, and switch statements.

Key elements of the design include:

- Scanner Class: Used to capture user input for various prompts.
- Random Class: Used to generate random license plates.
- If statements and Switch cases: Manages user choices and input validation
- Strings: Formats license plates and calculates costs

Test Plan:

Before testing, I reviewed my code for syntax errors and logical consistency.

I didn't have any errors, but one change I can make is that when a user enters incorrect input, the program restarts at the main menu. I could update the program to just display the original choice and prompt the user to try again without restarting the whole process.

I decided to run the following tests to verify functionality of the program:

Test #1 – Generate Random Plate

Input:

- User selects option 1 (Random plate)

Expected Output:

- A random 6-charcter plate in the format XXX-XXX
- Total cost: $45.00

Actual Output: success

```
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
1
 Your new plate is: CCJ-E65
 Total: $45.00
```

Test #2 – Valid Custom Plate

Input:

- User enters a custom plate containing 2-8 characters, A-Z, 0-9, or dashes: ZEE-444

Expected Output:

- The user's custom plate
- The Total: $52.75

Actual Output: success

```
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
2
 Enter your custom plate. Must contain 2-8 characters, A-Z, 0-9, or dashes (extra f
ees apply): ZEE-444
 Your custom plate is: ZEE-444
Total: $51.75
```

Test #3 – Invalid Custom Plate

Input:

- User enters a custom plate that does not contain 2-8 characters, A-Z, 0-9, or dashes: A@Z!E

Expected Output:

- Invalid plate format. Please only enter 2-8 characters, A-Z, 0-9, and dashes.
- The program restarts

Actual Output: success

```
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
2
 Enter your custom plate. Must contain 2–8 characters, A–Z, 0–9, or dashes (extra f
ees apply): A@Z!E
Invalid plate format. Please only enter 2–8 characters, A–Z, 0–9, and dashes.
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
```

Test #4 – Standard Plate Renewal

Input:

- User enters selects 3 (Plate renewal) -> (1 (Standard Renewal)

Expected Output:

- A random 6-charcter renewal plate in the format XXX-XXX
- Total Renewal Cost: $22.50

Actual Output: success

```
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
3
 Choose renewal type:
 1. Standard Renewal
 2. Custom Renewal (extra fees apply)
1
Your renewal plate is: GWL-2JF
Renewal cost: $22.50
```

Test #5 – Custom Plate Renewal

Input:

- User enters selects 3 (Plate renewal) -> 2 (Custom Renewal)

Expected Output:

- User enters a custom plate containing 2-8 characters, A-Z, 0-9, or dashes: ZEE-444
- Total Renewal Cost: $29.50

Actual Output: success

```
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
3
 Choose renewal type:
 1. Standard Renewal
 2. Custom Renewal (extra fees apply)
2
 Enter your custom plate. Must contain 2-8 characters, A-Z, 0-9, or dashes (extra f
ees apply): ZEE-444
 Your Renewal plate is: ZEE-444
 Total Renewal Cost: $29.5
```

Test #6 – Exit Program

Input:

- User enters selects 4 (Exit)

Expected Output:

- The message "Goodbye!" prints to the screen

Actual Output: success

```
 Welcome to the DMV. Please choose a service listed below:
 1. Random plate
 2. Custom plate
 3. Plate Renewal
 4. Exit
4
Goodbye!
```

Conclusion

The program runs and exits as expected and passes all test cases.
Error handling ensures only valid plates are accepted.
The pricing structure dynamically adjusts based on user input.