PROJECT: FINCH CONTROL S5 (PERSISTENCE)

OVERVIEW

Students will implement the use of a data file to store information for the Finch Control application. Possible applications of a data file are indicated below.

- Store and retrieve a console theme, background and foreground colors.
- Store and retrieve login information including a user name and password.
- Store and retrieve sensor data in an array in the Data Recorder module.
- Store and retrieve Finch robot commands in a list in the User Programming module.

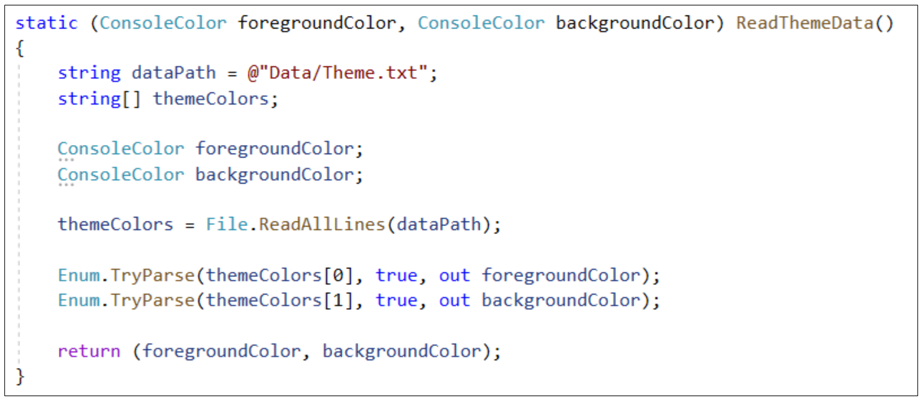
INSTRUCTIONS

1. Extend the application framework with persistence using only **ONE** of the following three methods.
   Note: The methods described in the instructions are simplified examples. Students are free to implement these features using any set of methods of their own design.
   a. **Implement User Theme**
      i. **Challenge Levels**
         1. Read and set the theme from a data file.
         2. Read the current theme from and write a new theme to a data file.
         3. Implement the a Try/Catch block for all of the file I/O operations and generate error messages for the user.
      ii. **File**: *Theme.txt*
         1. Create a **Data** folder to hold the text file.
            a. Store background and foreground colors on two lines.

```
Red
White
```

iii. **Method**: *static (ConsoleColor foregroundColor, ConsoleColor backgroundColor) ReadThemeData()*

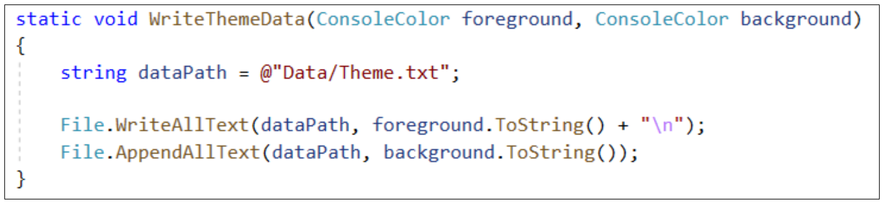
1. Note that the method returns a tuple with two ***ConsoleColor*** items. The method can also just return the array from the **File.ReadAllLines** method.
2. Declare a variable **dataPath** and store the path to the ***theme.txt*** file.
3. Declare an array of string to hold the foreground and background colors read from the data file.
4. Read the data file using the **File.ReadAllLines** method and store them in the array.
5. Parse the two values in the array into the **foregroundColor** and **backgroundColor** elements in the tuple.
6. Return the tuple.



```
static (ConsoleColor foregroundColor, ConsoleColor backgroundColor) ReadThemeData()
{
    string dataPath = @"Data/Theme.txt";
    string[] themeColors;

    ConsoleColor foregroundColor;
    ConsoleColor backgroundColor;

    themeColors = File.ReadAllLines(dataPath);

    Enum.TryParse(themeColors[0], true, out foregroundColor);
    Enum.TryParse(themeColors[1], true, out backgroundColor);

    return (foregroundColor, backgroundColor);
}
```

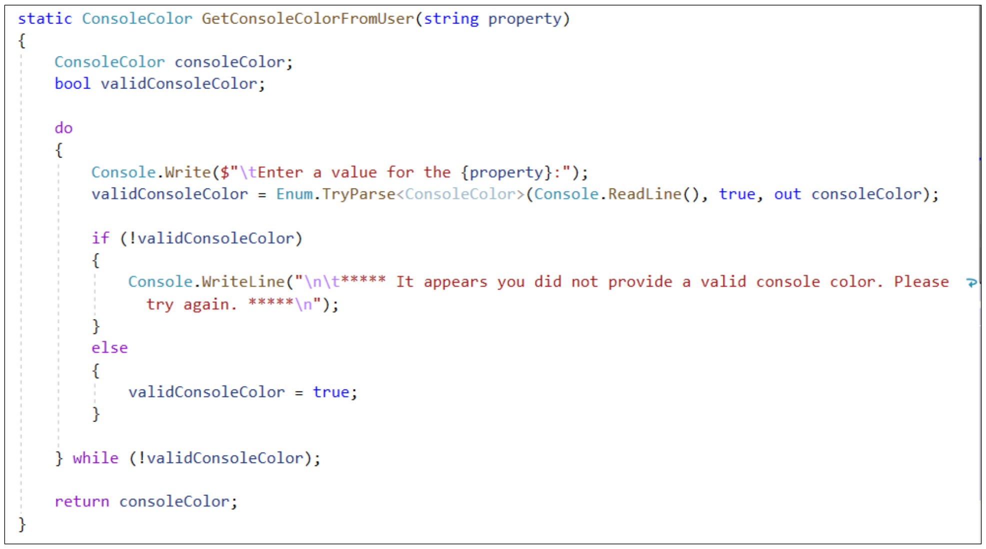
iv. **Method**: *void WriteThemeData(ConsoleColor background, ConsoleColor foreground)*

1. Declare a variable **dataPath** and store the path to the ***theme.txt*** file.
2. Write the two console colors to the data file as strings using the **WriteAllText** and **AppendAllText** methods.



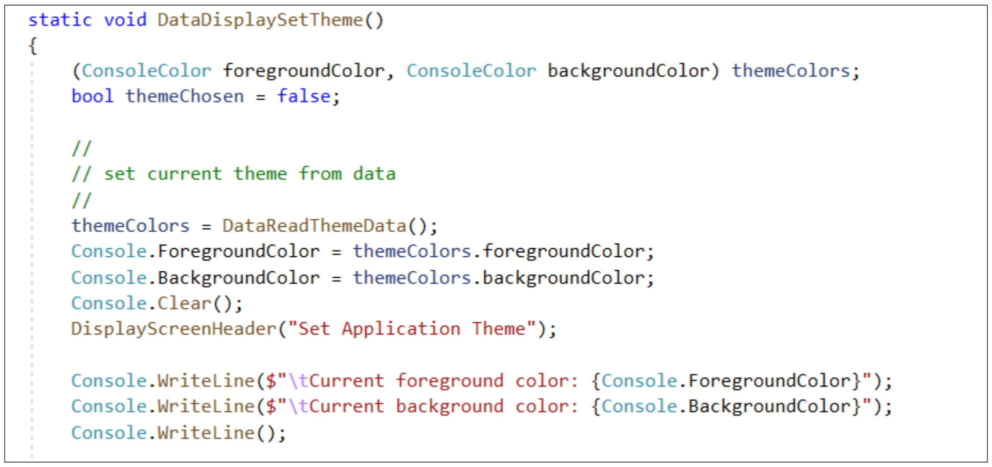
```
static void WriteThemeData(ConsoleColor foreground, ConsoleColor background)
{
    string dataPath = @"Data/Theme.txt";

    File.WriteAllText(dataPath, foreground.ToString() + "\n");
    File.AppendAllText(dataPath, background.ToString());
}
```

v. **Method**: *static ConsoleColor GetConsoleColorFromUser(string property)*
   1. Declare variables.
   2. Create a **do/while** loop to validate the user's input as a ConsoleColor enum.
   3. Return the value.



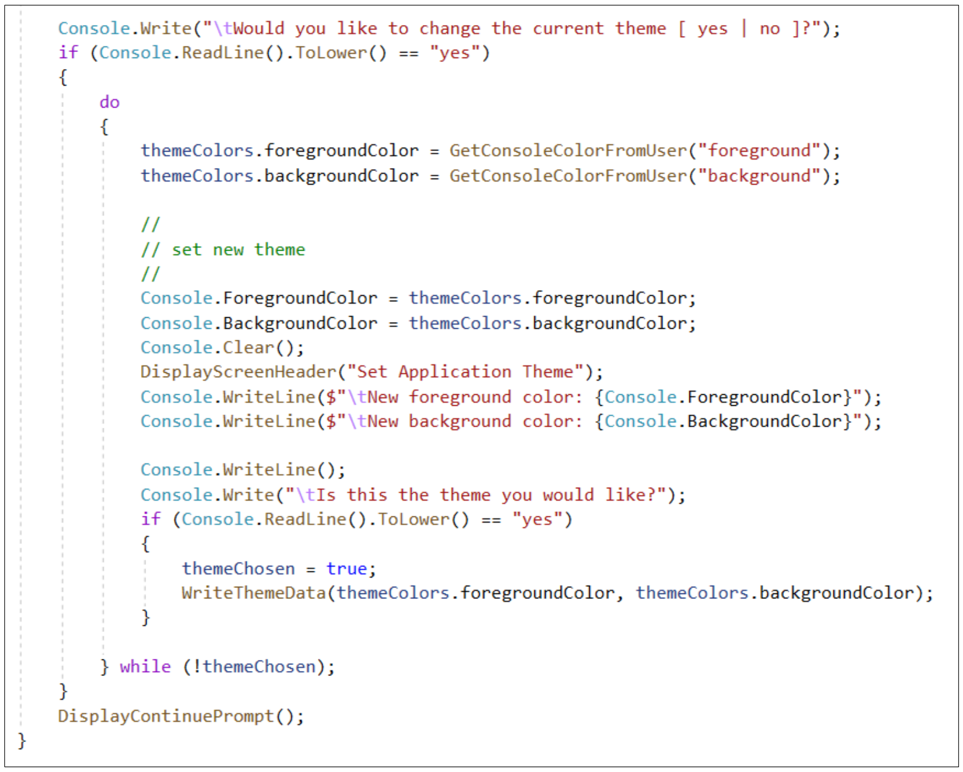
```
static ConsoleColor GetConsoleColorFromUser(string property)
{
    ConsoleColor consoleColor;
    bool validConsoleColor;

    do
    {
        Console.Write($"\tEnter a value for the {property}:");
        validConsoleColor = Enum.TryParse<ConsoleColor>(Console.ReadLine(), true, out consoleColor);

        if (!validConsoleColor)
        {
            Console.WriteLine("\n\t***** It appears you did not provide a valid console color. Please
              try again. *****\n");
        }
        else
        {
            validConsoleColor = true;
        }

    } while (!validConsoleColor);

    return consoleColor;
}
```

vi. **Method**: void *DisplaySetTheme()*
   1. Read, set, and display the current theme colors.



```
static void DataDisplaySetTheme()
{
    (ConsoleColor foregroundColor, ConsoleColor backgroundColor) themeColors;
    bool themeChosen = false;

    //
    // set current theme from data
    //
    themeColors = DataReadThemeData();
    Console.ForegroundColor = themeColors.foregroundColor;
    Console.BackgroundColor = themeColors.backgroundColor;
    Console.Clear();
    DisplayScreenHeader("Set Application Theme");

    Console.WriteLine($"\tCurrent foreground color: {Console.ForegroundColor}");
    Console.WriteLine($"\tCurrent background color: {Console.BackgroundColor}");
    Console.WriteLine();
```

2. Query the user to change the current theme.
3. Create a **do/while** loop.
   a. Call the **GetConsoleColorFromUser** method for both the foreground and background colors.
   b. Set the new theme, display the colors, and prompt the user to either keep the theme or enter a new one.



```
    Console.Write("\tWould you like to change the current theme [ yes | no ]?");
    if (Console.ReadLine().ToLower() == "yes")
    {
        do
        {
            themeColors.foregroundColor = GetConsoleColorFromUser("foreground");
            themeColors.backgroundColor = GetConsoleColorFromUser("background");

            //
            // set new theme
            //
            Console.ForegroundColor = themeColors.foregroundColor;
            Console.BackgroundColor = themeColors.backgroundColor;
            Console.Clear();
            DisplayScreenHeader("Set Application Theme");
            Console.WriteLine($"\tNew foreground color: {Console.ForegroundColor}");
            Console.WriteLine($"\tNew background color: {Console.BackgroundColor}");

            Console.WriteLine();
            Console.Write("\tIs this the theme you would like?");
            if (Console.ReadLine().ToLower() == "yes")
            {
                themeChosen = true;
                WriteThemeData(themeColors.foregroundColor, themeColors.backgroundColor);
            }

        } while (!themeChosen);
    }
    DisplayContinuePrompt();
}
```

vii. **Method**: Main
   1. Call DataDisplaySetTheme.

viii. **Method**: *void DisplayMainMenu()*
   1. Add a **Change Theme** option to the menu can call *DisplayMainMenu*.

b. **Implement a login and registration functionality.**
   i. **Challenge Levels**
      1. Level 1: Store one username
         A single user name is stored, retrieved and authenticated with the user input.
      2. Level 2: Store one username and password
         A single user name and password is stored, retrieved and authenticated with the user input.
      3. Level 3: Store multiple usernames
         Multiple user names are stored, retrieved and used to authenticate the user input.
      4. Level 4: Store multiple usernames and passwords
         Multiple user names and passwords are stored, retrieved and used to authenticate the user input.
   ii. Developer considerations and extensions:
      1. Level 2 and 4: Username and Password – use a tuple to return both values
      2. Login – handling incorrect usernames and/or passwords
      3. Register – validating username and/or passwords
      4. Register – handling usernames currently in the data set

c. **Implement data saving and recovery in the Data Recorder module.**
   i. **Challenge Levels**
      Add "**Read from Data File**" and "**Write to Data File**" to the **Data Recorder Menu** and create the appropriate methods.
      1. Level 1: Store and retrieve temperature **or** light values.
      2. Level 2: Store and retrieve temperature **and** light values.
      3. Level 3: Store and retrieve temperature **or** light values with time stamp.
      4. Level 4: Store and retrieve temperature **and** light values with time stamp.
   ii. Developer considerations and extensions:
      1. Use separate data files for temperature and light values.
      2. Use tuples and lists and arrays of tuples to hold sensor value and time stamp.

d. **Implement data saving and recovery in the User Programming module.**
   i. **Challenge Levels**
      Add "**Load User Program**" and "**Write User Program**" to the **User Programming Menu** and create the appropriate methods
      1. Level 1: Store and retrieve one user program.
      2. Level 2: Store and retrieve multiple user programs.
      3. Level 3: Store and retrieve one user program with extended commands, command and execution time for that commend.
      4. Level 4: Store and retrieve multiple user programs with extended commands.

2. Test the application thoroughly.

SUBMIT THE ASSIGNMENT

1. Complete the **Skills Checklist.**
    a. [Face-Face only] Demonstrate the application to the instructor.
    b. [Online only] Upload the checklist in Moodle.
2. Push the VS solution to GitHub.
3. Submit to Moodle.
    a. Click the ***Project: Finch Control S5 (Persistence)*** assignment link.
    b. [Online only] Submit the completed **Skills Checklist**.
    c. [Online only] Submit a link to the streaming video walk-through.
    d. Submit the link to the GitHub repository with the solution.
    e. Click **Save Changes**.
5. After receiving a grade, refer to Moodle to review the graded rubric and additional comments.

PROJECT: FINCH CONTROL S5 (PERSISTENCE) - SKILLS CHECKLIST

Author ______________________________ **Reviewer(s)** ______________________________

[In-class Students Only]
Code Share – Discuss the following during the Peer Review.

- Describe the flow of the application, walking through the application's major components.
- State one coding issue you encountered and how you resolved it.
- Highlight one unique block of code (method or function) that you developed and are particularly proud of. Share how the code block functions.
- State something that you learned during the development of this application that will be useful as you develop future applications.

[All Students]
Check all demonstrated skills and submit.

Skills	
Read a single line of text from a text file.	
Write a single line of text to a text file.	
Read more than one line of text from a text file.	
Write more than one line of text to a text file.	
Read into an array or list from a text file.	
Write an array or list to a text file.	
Read a line of text with multiple values separated by a comma from a text file.	
Write a line of text with multiple values separated by a comma to a text file.	
Use multiple data files in an application.	