Module 5: Critical Thinking

Develop a Java program that will store data in the form of daily average temperatures for one week. Store the day and average temperature in two different arraylists. Your program should prompt the user for the day of the week (Monday through Sunday) and display both the day and temperature for each day. If "week" is entered, the output for your program should provide the temperature for each day and the weekly average. Use the looping and decision constructs in combination with the arrays to complete this assignment.

Pseudocode via Comments: The following section contains the pseudocode used to detail the steps of Module 5's Java application.

```
// IMPORT UTILITIES
      // Scanner
      // Random
// START

            // Initialize Random and Scanner objects


            // Declare variables

                  // User response variable = String
                  // While-loop control variable = boolean
                  // For loop i variable = int
                  // Temperature variables = double
            // Days of the week ArrayList


            // Random daily temperatures ArrayList


            // For loop
            // Iterates through random daily temperatures to calculate weekly average temperature



            // Begin interactive while-loop structure


                  // Switch statement for handling user response(s)



                  // System output messages


                  // Continue or terminate program decision branches



            // End interactive while-loop structure


            // Close Scanner object

// END
```

Module 5: Critical Thinking

Pseudocode Screenshot:

criticalThinking5.java | pseudocode.java

```
// IMPORT UTILITIES
    // Scanner
    // Random

// START

        // Initialize Random and Scanner objects

        // Declare variables
            // User response variable = String
            // While-loop control variable = boolean
            // For loop i variable = int
            // Temperature variables = double

        // Days of the week ArrayList

        // Random daily temperatures ArrayList

        // For loop
        // Iterates through random daily temperatures to calculate weekly average temperature

        // Begin interactive while-loop structure

            // Switch statement for handling user response(s)

            // System output messages

            // Continue or terminate program decision branches

        // End interactive while-loop structure

        // Close Scanner object

// END

```

Module 5: Critical Thinking

Source code: This section contains the source code for Module 5's Java application. Screenshots of the source code and the application being executed within the Eclipse IDE are also provided.

```
// IMPORT UTILITIES
import java.util.Scanner;

import java.util.ArrayList;
import java.util.Random;
// START
public class criticalThinking5 {

	public static void main(String[] args) {

		// Initialize Random and Scanner objects

		Random rd = new Random();
		Scanner scr = new Scanner(System.in);

		// Declare variables

		String response;

		boolean programStart = true;

		int i = 0;

		double weekAvg = 0;
		double minTemp = 40;
		double  maxTemp = 99;

		double randomTemp1 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
		double randomTemp2 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
		double randomTemp3 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
		double randomTemp4 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
		double randomTemp5 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
		double randomTemp6 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
		double randomTemp7 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;

		// Days of the week ArrayList

		ArrayList<String> daysOfWeek = new ArrayList<String>();
		daysOfWeek.add("Monday");
		daysOfWeek.add("Tuesday");
		daysOfWeek.add("Wednesday");
		daysOfWeek.add("Thursday");
		daysOfWeek.add("Friday");
		daysOfWeek.add("Saturday");
		daysOfWeek.add("Sunday");

		// Random daily temperatures ArrayList

		ArrayList<Double> tempsOfWeek = new ArrayList<Double>();
		tempsOfWeek.add(randomTemp1);
		tempsOfWeek.add(randomTemp2);
		tempsOfWeek.add(randomTemp3);
		tempsOfWeek.add(randomTemp4);
		tempsOfWeek.add(randomTemp5);
		tempsOfWeek.add(randomTemp6);
		tempsOfWeek.add(randomTemp7);

		// Iterate through random daily temperatures to calculate weekly average temperature


		for (i = 0; i < tempsOfWeek.size(); i++) {
			weekAvg += tempsOfWeek.get(i);
		}

		weekAvg = (weekAvg / 7);
```

Module 5: Critical Thinking

```
		// Begin interactive while-loop structure

		while (programStart == true) {
			System.out.println("To retrieve the daily average temperature, enter a weekday ('Monday - 
Sunday')...");
			System.out.println("Or enter ('Week') to retrieve the weekly average temperature:");

			response = scr.next();

			// Switch statement for handling user response(s)

			switch (response) {

				case "sunday":
				case "Sunday":
					System.out.printf("The daily average temperature for Sunday is: %.2f\u00B0 F", 
tempsOfWeek.get(0));
					break;

				case "monday":
				case "Monday":
					System.out.printf("The daily average temperature for Monday is: %.2f\u00B0 F", 
tempsOfWeek.get(1));
					break;

				case "tuesday":
				case "Tuesday":
					System.out.printf("The daily average temperature for Tuesday is: %.2f\u00B0 F", 
tempsOfWeek.get(2));
					break;

				case "wednesday":
				case "Wednesday":
					System.out.printf("The daily average temperature for Wednesday is: %.2f\u00B0 
F", tempsOfWeek.get(3));
					break;

				case "thursday":
				case "Thursday":
					System.out.printf("The daily average temperature for Thursday is: %.2f\u00B0 F", 
tempsOfWeek.get(4));
					break;

				case "friday":
				case "Friday":
					System.out.printf("The daily average temperature for Friday is: %.2f\u00B0 F", 
tempsOfWeek.get(5));
					break;

				case "saturday":
				case "Saturday":
					System.out.printf("The daily average temperature for Saturday is: %.2f\u00B0 F", 
tempsOfWeek.get(6));
					break;

				case "week":
				case "Week":
					System.out.println("The daily average temperatures for each day this week are as 
follows: ");
					System.out.println();
					System.out.printf("\tSunday: %.2f\u00B0 F%n", tempsOfWeek.get(0));
					System.out.printf("\tMonday: %.2f\u00B0 F%n", tempsOfWeek.get(1));
					System.out.printf("\tTuesday: %.2f\u00B0 F%n", tempsOfWeek.get(2));
					System.out.printf("\tWednesday: %.2f\u00B0 F%n", tempsOfWeek.get(3));
					System.out.printf("\tThursday: %.2f\u00B0 F%n", tempsOfWeek.get(4));
					System.out.printf("\tFriday: %.2f\u00B0 F%n", tempsOfWeek.get(5));
					System.out.printf("\tSaturday: %.2f\u00B0 F%n", tempsOfWeek.get(6));
					System.out.println();
```

Module 5: Critical Thinking

```
                                System.out.printf("The weekly average temperature is: %.2f\u00B0 F", weekAvg);
                                break;

                        default:
                                System.out.println("Data not found. Please try again...");
                                break;
                }

                // System output messages

                System.out.println();
                System.out.println();
                System.out.println("Would you like to choose another day of the week?");
                System.out.println("Press Y for yes or N for no:");

                // Continue or terminate program decision branches

                response = scr.next();

                if (response.equals("Y") || response.equals("y")) {
                        programStart = true;
                } else {
                        programStart = false;
                        System.out.println("Goodbye.");
                }

        // End interactive while-loop structure
        }


        // Close Scanner object
        scr.close();
    }

// END
}
```

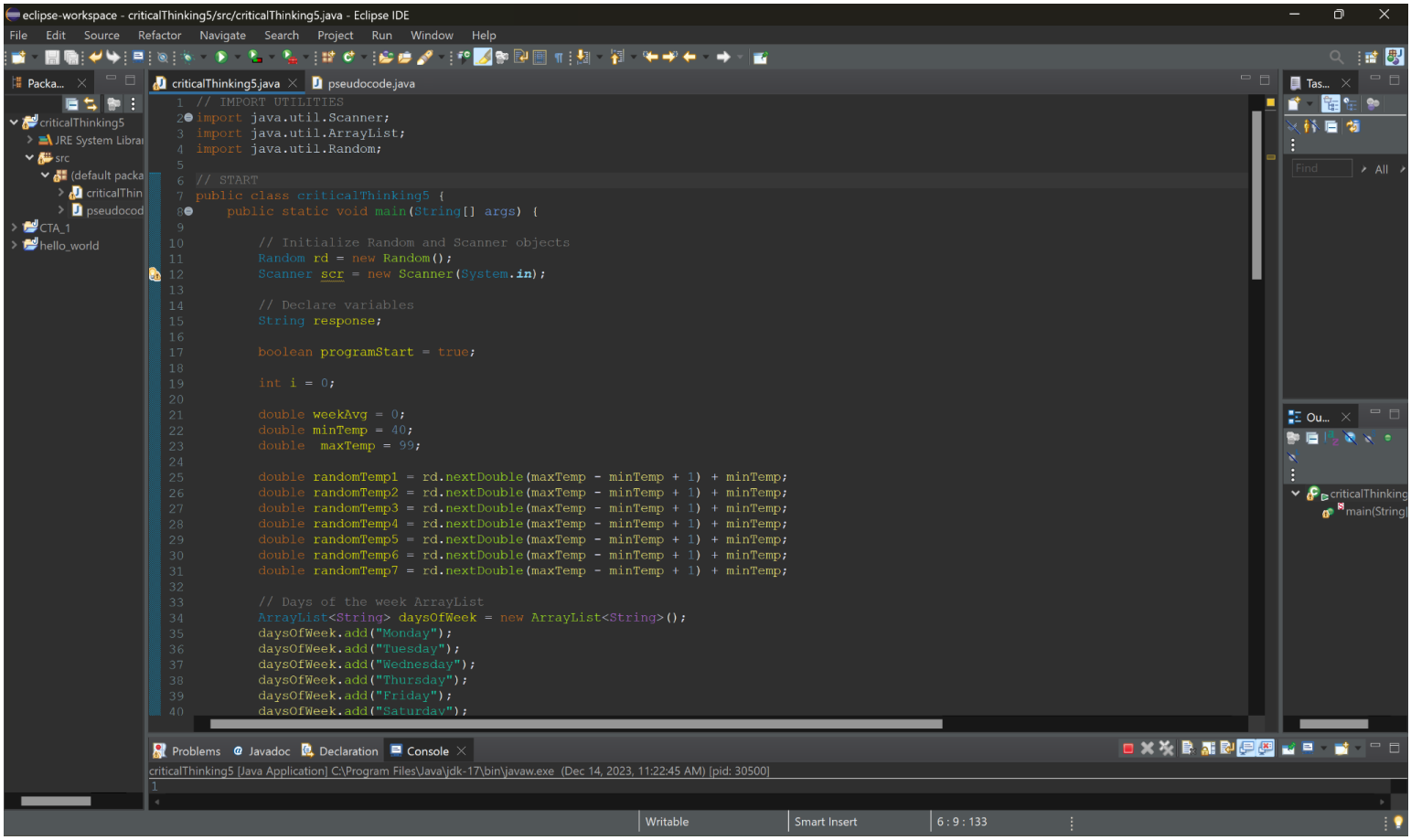
Note:
This program utilizes Java's Random class. Here it is used to create random floating point numbers for each day's temperature. Each time the program is run, new floating point numbers are created and stored within the appropriate variables.

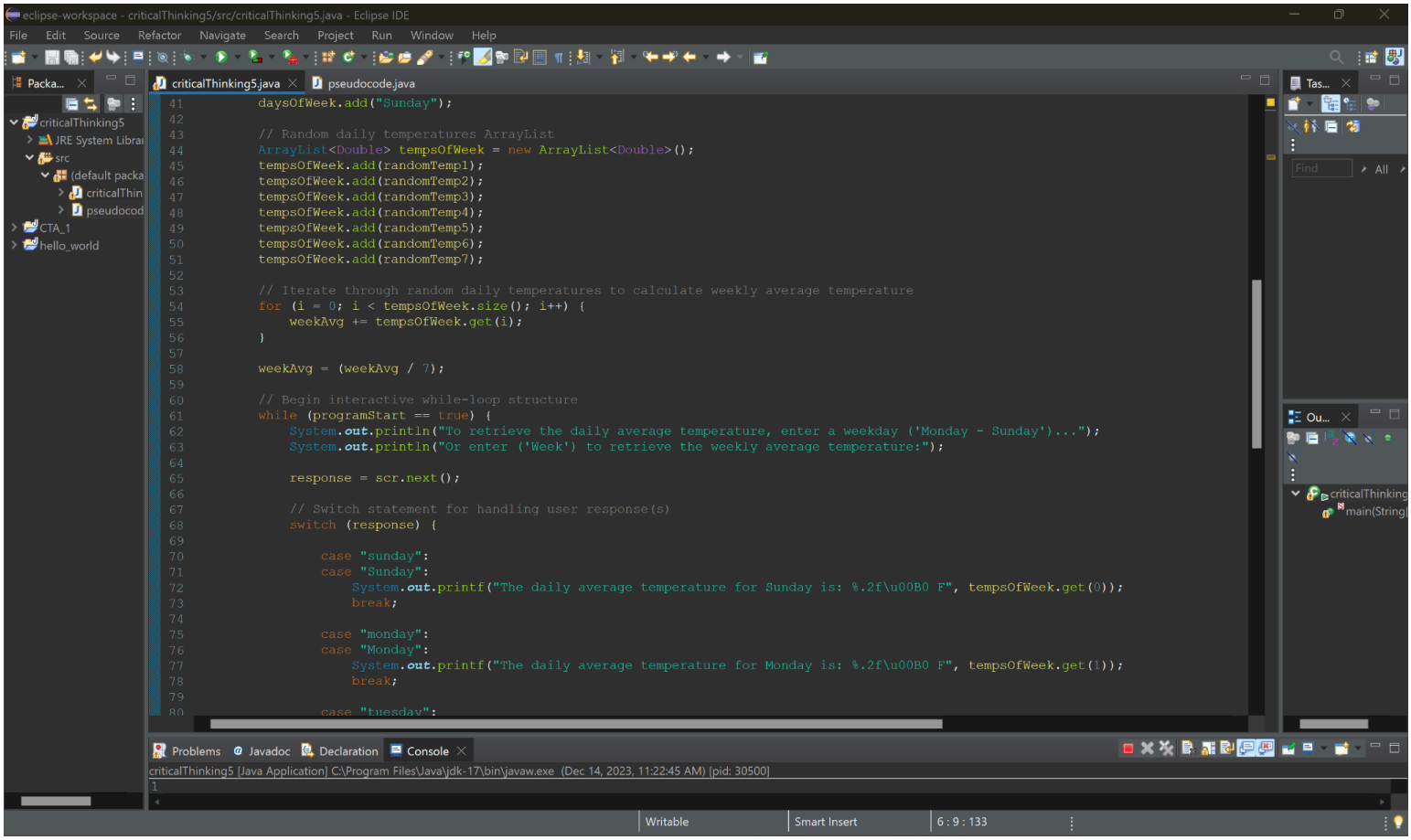
Reference used for the implementation of the Random class:

GeeksforGeeks. (n.d.). Generating Random Numbers in Java. GeeksforGeeks. https://www.geeksforgeeks.org/generating-random-numbers-in-java/

Module 5: Critical Thinking

Source code Screenshots:





Module 5: Critical Thinking

criticalThinking5.java | pseudocode.java

```
                case "tuesday":
                case "Tuesday":
                    System.out.printf("The daily average temperature for Tuesday is: %.2f\u00B0 F", tempsOfWeek.get(2));
                    break;

                case "wednesday":
                case "Wednesday":
                    System.out.printf("The daily average temperature for Wednesday is: %.2f\u00B0 F", tempsOfWeek.get(3));
                    break;

                case "thursday":
                case "Thursday":
                    System.out.printf("The daily average temperature for Thursday is: %.2f\u00B0 F", tempsOfWeek.get(4));
                    break;

                case "friday":
                case "Friday":
                    System.out.printf("The daily average temperature for Friday is: %.2f\u00B0 F", tempsOfWeek.get(5));
                    break;

                case "saturday":
                case "Saturday":
                    System.out.printf("The daily average temperature for Saturday is: %.2f\u00B0 F", tempsOfWeek.get(6));
                    break;

                case "week":
                case "Week":
                    System.out.println("The daily average temperatures for each day this week are as follows: ");
                    System.out.println();
                    System.out.printf("\tSunday: %.2f\u00B0 F%n", tempsOfWeek.get(0));
                    System.out.printf("\tMonday: %.2f\u00B0 F%n", tempsOfWeek.get(1));
                    System.out.printf("\tTuesday: %.2f\u00B0 F%n", tempsOfWeek.get(2));
                    System.out.printf("\tWednesday: %.2f\u00B0 F%n", tempsOfWeek.get(3));
                    System.out.printf("\tThursday: %.2f\u00B0 F%n", tempsOfWeek.get(4));
                    System.out.printf("\tFriday: %.2f\u00B0 F%n", tempsOfWeek.get(5));
                    System.out.printf("\tSaturday: %.2f\u00B0 F%n", tempsOfWeek.get(6));
                    System.out.println();
                    System.out.printf("The weekly average temperature is: %.2f\u00B0 F", weekAvg);
                    break;
```

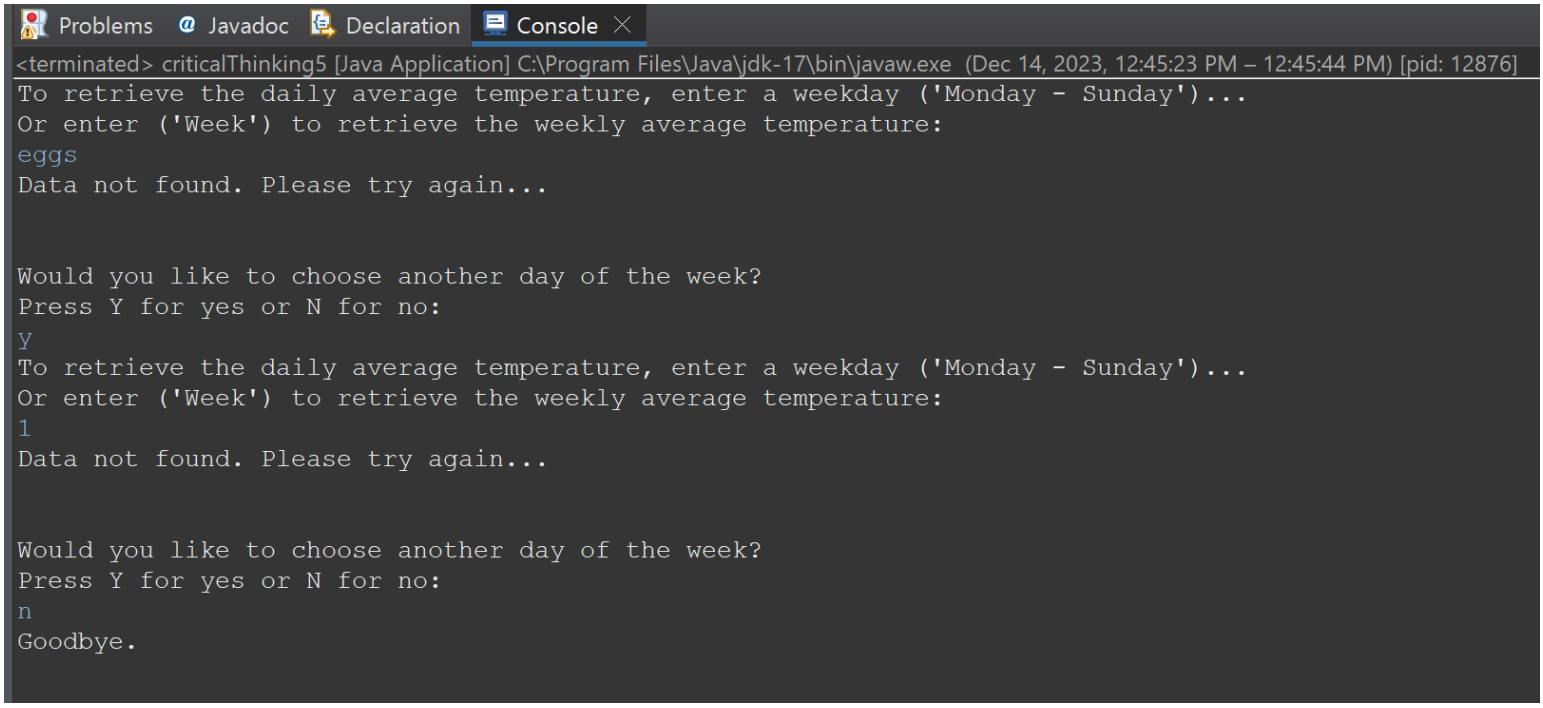
criticalThinking5.java | pseudocode.java

```
                    System.out.printf("\tMonday: %.2f\u00B0 F%n", tempsOfWeek.get(1));
                    System.out.printf("\tTuesday: %.2f\u00B0 F%n", tempsOfWeek.get(2));
                    System.out.printf("\tWednesday: %.2f\u00B0 F%n", tempsOfWeek.get(3));
                    System.out.printf("\tThursday: %.2f\u00B0 F%n", tempsOfWeek.get(4));
                    System.out.printf("\tFriday: %.2f\u00B0 F%n", tempsOfWeek.get(5));
                    System.out.printf("\tSaturday: %.2f\u00B0 F%n", tempsOfWeek.get(6));
                    System.out.println();
                    System.out.printf("The weekly average temperature is: %.2f\u00B0 F", weekAvg);
                    break;

                default:
                    System.out.println("Data not found. Please try again...");
                    break;
            }

            // System output messages
            System.out.println();
            System.out.println();
            System.out.println("Would you like to choose another day of the week?");
            System.out.println("Press Y for yes or N for no:");

            // Continue or terminate program decision branches
            response = scr.next();

            if (response.equals("Y") || response.equals("y")) {
                programStart = true;
            } else {
                programStart = false;
                System.out.println("Goodbye.");
            }

        // End interactive while-loop structure
        }

        // Close Scanner object
        scr.close();
    }

// END
}
```

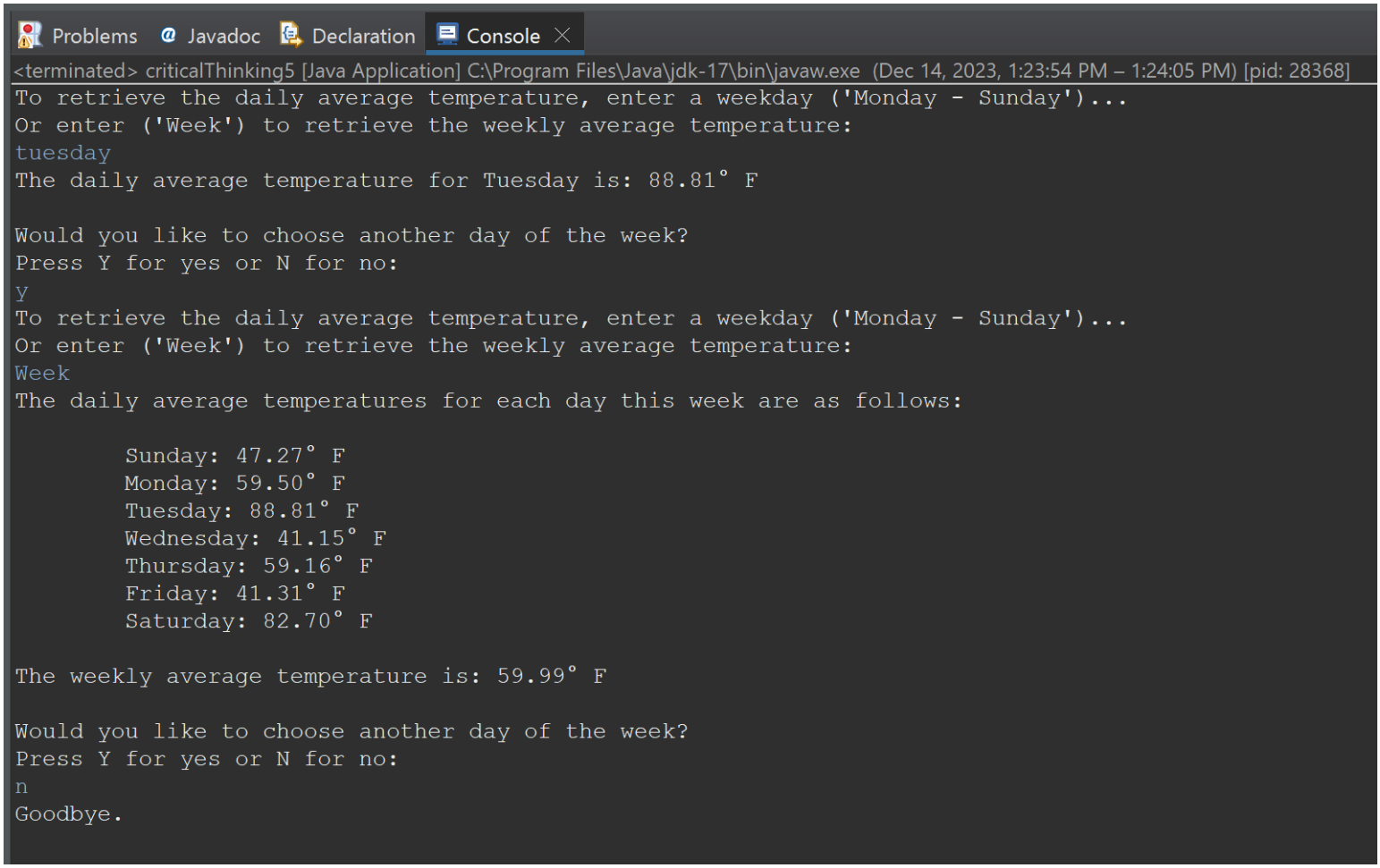
Module 5: Critical Thinking

Screenshots of the application executing

- *User input error handling*

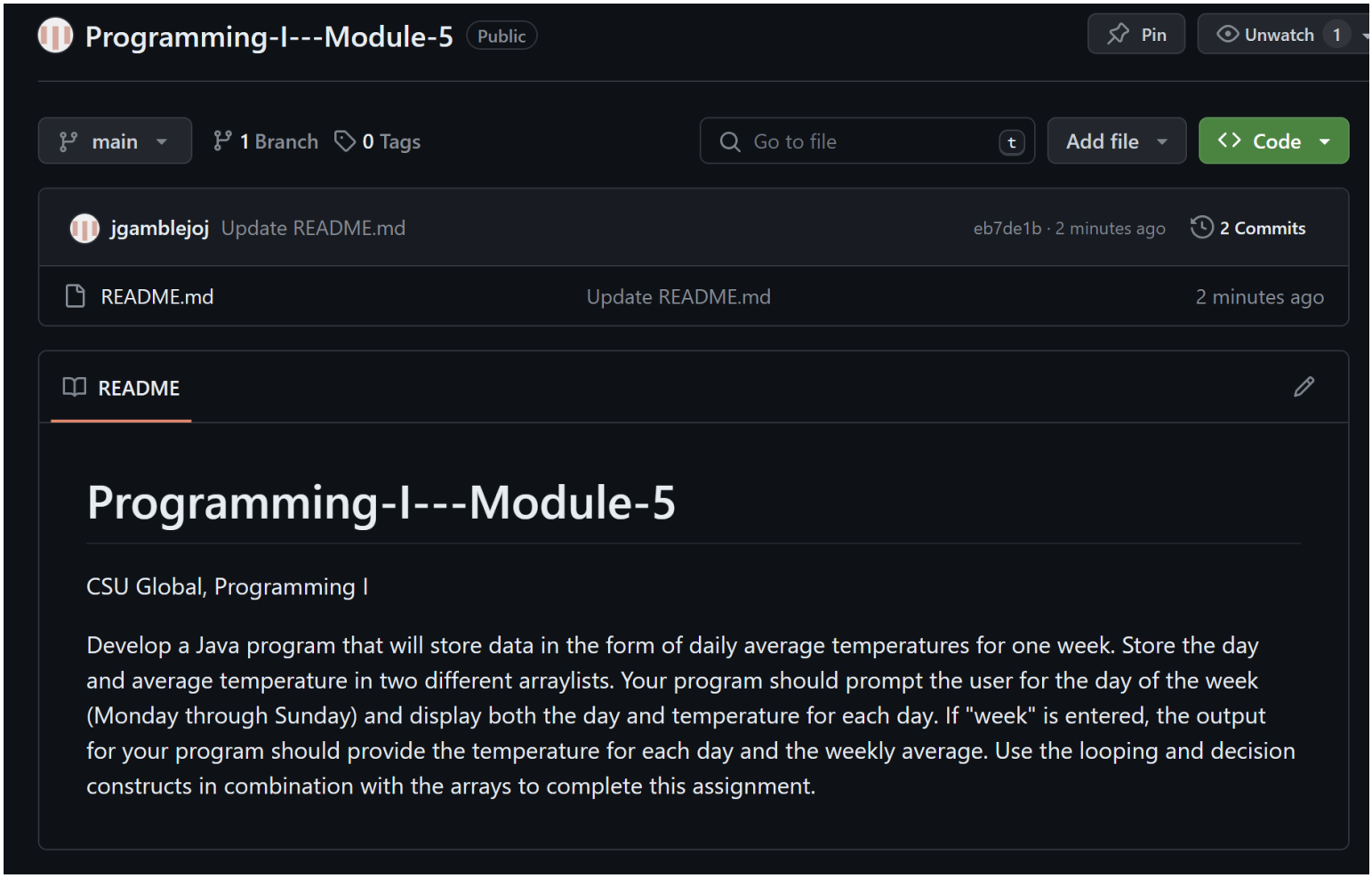


- *Code execution & results*



Module 5: Critical Thinking

Screenshot of Git Repository



Here is the link to the assignment's Git repository: https://github.com/jgamblejoj/Programming-I---Module-5