

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

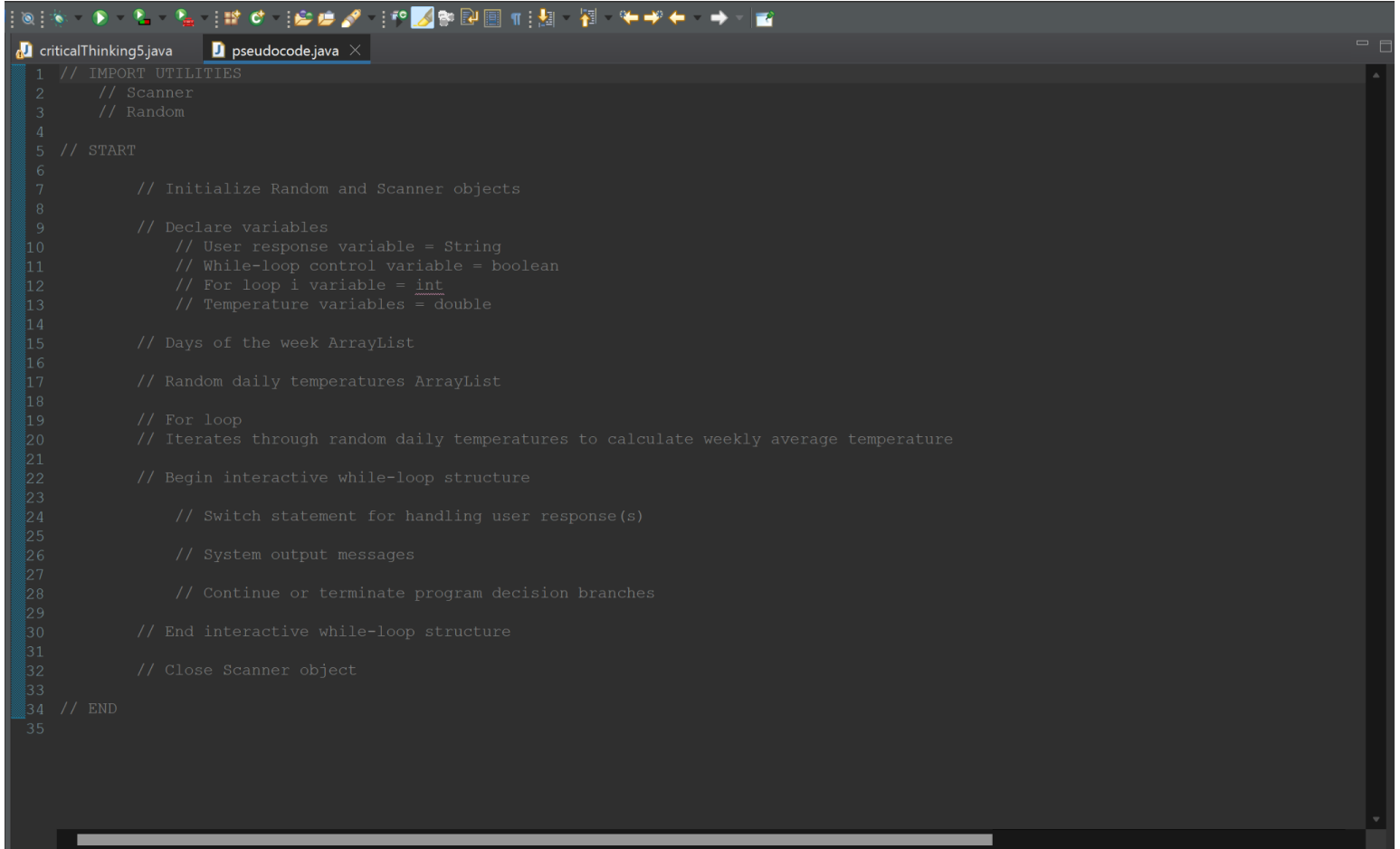
    // End interactive while-loop structure

    // Close Scanner object

// END
```

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Pseudocode Screenshot:

A screenshot of a Java IDE window with two tabs: 'criticalThinking5.java' and 'pseudocode.java'. The 'pseudocode.java' tab is active, displaying a series of 35 lines of pseudocode. The code is written in a dark-themed editor with a light blue line number margin on the left. The pseudocode outlines a program structure including imports, variable declarations, array initializations, loops, and a switch statement for user response handling.

```
1 // IMPORT UTILITIES
2 // Scanner
3 // Random
4
5 // START
6
7 // Initialize Random and Scanner objects
8
9 // Declare variables
10 // User response variable = String
11 // While-loop control variable = boolean
12 // For loop i variable = int
13 // Temperature variables = double
14
15 // Days of the week ArrayList
16
17 // Random daily temperatures ArrayList
18
19 // For loop
20 // Iterates through random daily temperatures to calculate weekly average temperature
21
22 // Begin interactive while-loop structure
23
24 // Switch statement for handling user response(s)
25
26 // System output messages
27
28 // Continue or terminate program decision branches
29
30 // End interactive while-loop structure
31
32 // Close Scanner object
33
34 // END
35
```

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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);
```

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```
// 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();
    }
}
```

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```
        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:

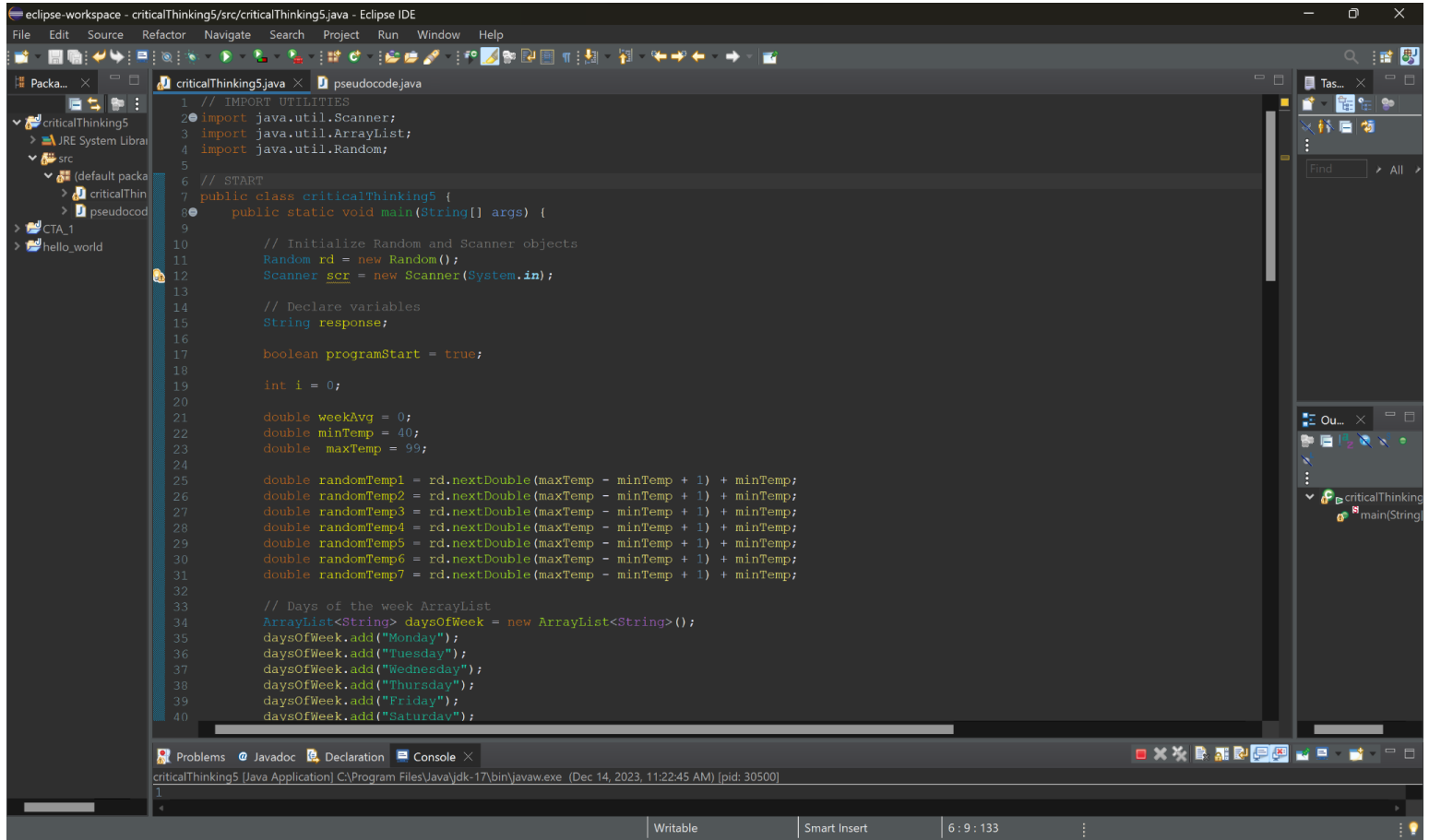
This program utilizes Java's Random class. Here it is used to create random floating point numbers for each day's temperature. Each time the program is run, new floating point numbers are created and stored within the appropriate variables.

Reference used for the implementation of the Random class:

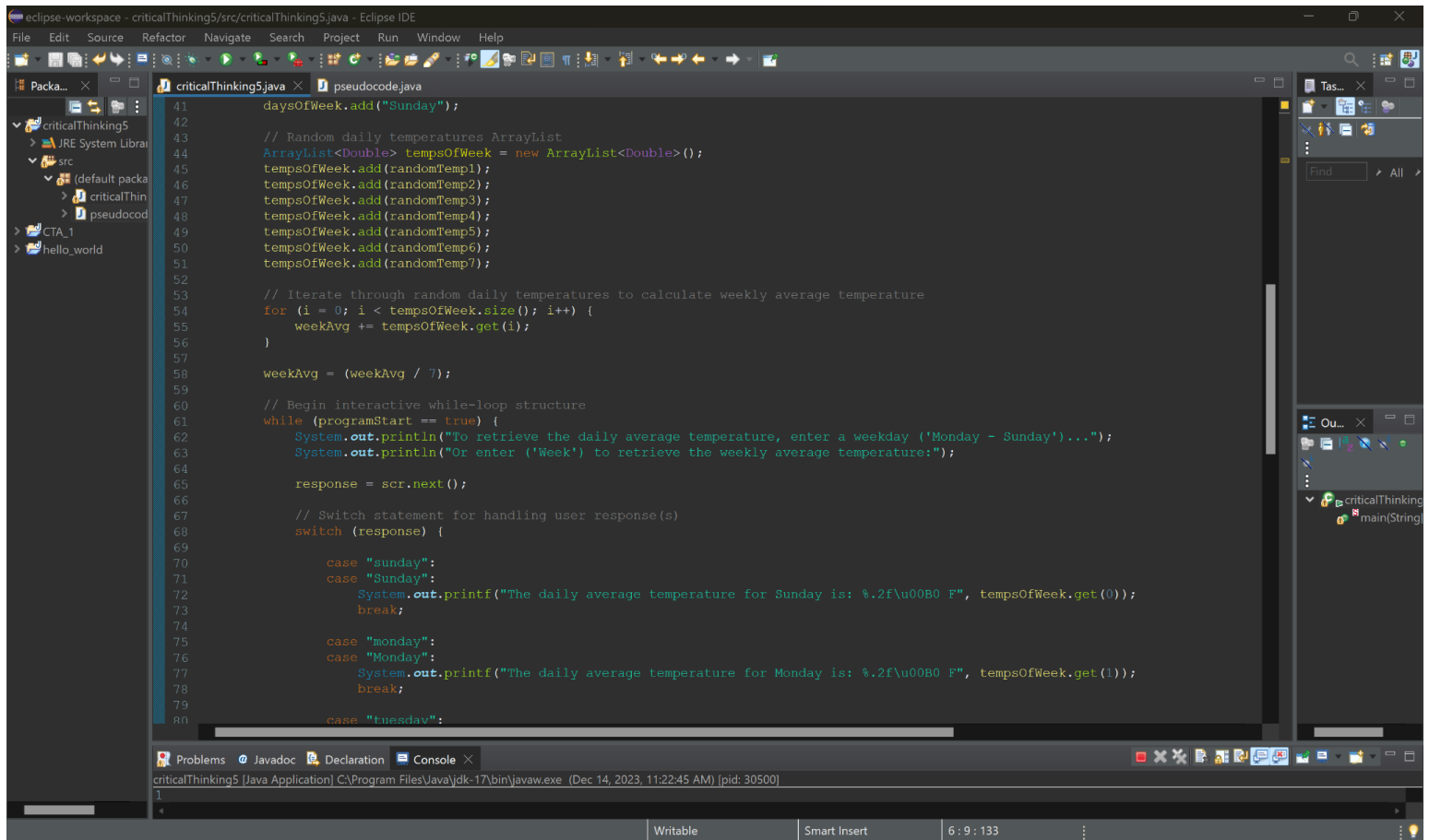
GeeksforGeeks. (n.d.). Generating Random Numbers in Java. GeeksforGeeks.
<https://www.geeksforgeeks.org/generating-random-numbers-in-java/>

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Source code Screenshots:



```
1 // IMPORT UTILITIES
2 import java.util.Scanner;
3 import java.util.ArrayList;
4 import java.util.Random;
5
6 // START
7 public class criticalThinking5 {
8     public static void main(String[] args) {
9
10         // Initialize Random and Scanner objects
11         Random rd = new Random();
12         Scanner scr = new Scanner(System.in);
13
14         // Declare variables
15         String response;
16
17         boolean programStart = true;
18
19         int i = 0;
20
21         double weekAvg = 0;
22         double minTemp = 40;
23         double maxTemp = 99;
24
25         double randomTemp1 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
26         double randomTemp2 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
27         double randomTemp3 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
28         double randomTemp4 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
29         double randomTemp5 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
30         double randomTemp6 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
31         double randomTemp7 = rd.nextDouble(maxTemp - minTemp + 1) + minTemp;
32
33         // Days of the week ArrayList
34         ArrayList<String> daysOfWeek = new ArrayList<String>();
35         daysOfWeek.add("Monday");
36         daysOfWeek.add("Tuesday");
37         daysOfWeek.add("Wednesday");
38         daysOfWeek.add("Thursday");
39         daysOfWeek.add("Friday");
40         daysOfWeek.add("Saturday");
```



```
41 daysOfWeek.add("Sunday");
42
43 // Random daily temperatures ArrayList
44 ArrayList<Double> tempsOfWeek = new ArrayList<Double>();
45 tempsOfWeek.add(randomTemp1);
46 tempsOfWeek.add(randomTemp2);
47 tempsOfWeek.add(randomTemp3);
48 tempsOfWeek.add(randomTemp4);
49 tempsOfWeek.add(randomTemp5);
50 tempsOfWeek.add(randomTemp6);
51 tempsOfWeek.add(randomTemp7);
52
53 // Iterate through random daily temperatures to calculate weekly average temperature
54 for (i = 0; i < tempsOfWeek.size(); i++) {
55     weekAvg += tempsOfWeek.get(i);
56 }
57
58 weekAvg = (weekAvg / 7);
59
60 // Begin interactive while-loop structure
61 while (programStart == true) {
62     System.out.println("To retrieve the daily average temperature, enter a weekday ('Monday - Sunday')...");
63     System.out.println("Or enter ('Week') to retrieve the weekly average temperature:");
64
65     response = scr.next();
66
67     // Switch statement for handling user response(s)
68     switch (response) {
69
70         case "sunday":
71         case "Sunday":
72             System.out.printf("The daily average temperature for Sunday is: %.2f\u00B0 F", tempsOfWeek.get(0));
73             break;
74
75         case "monday":
76         case "Monday":
77             System.out.printf("The daily average temperature for Monday is: %.2f\u00B0 F", tempsOfWeek.get(1));
78             break;
79
80         case "tuesday":
```

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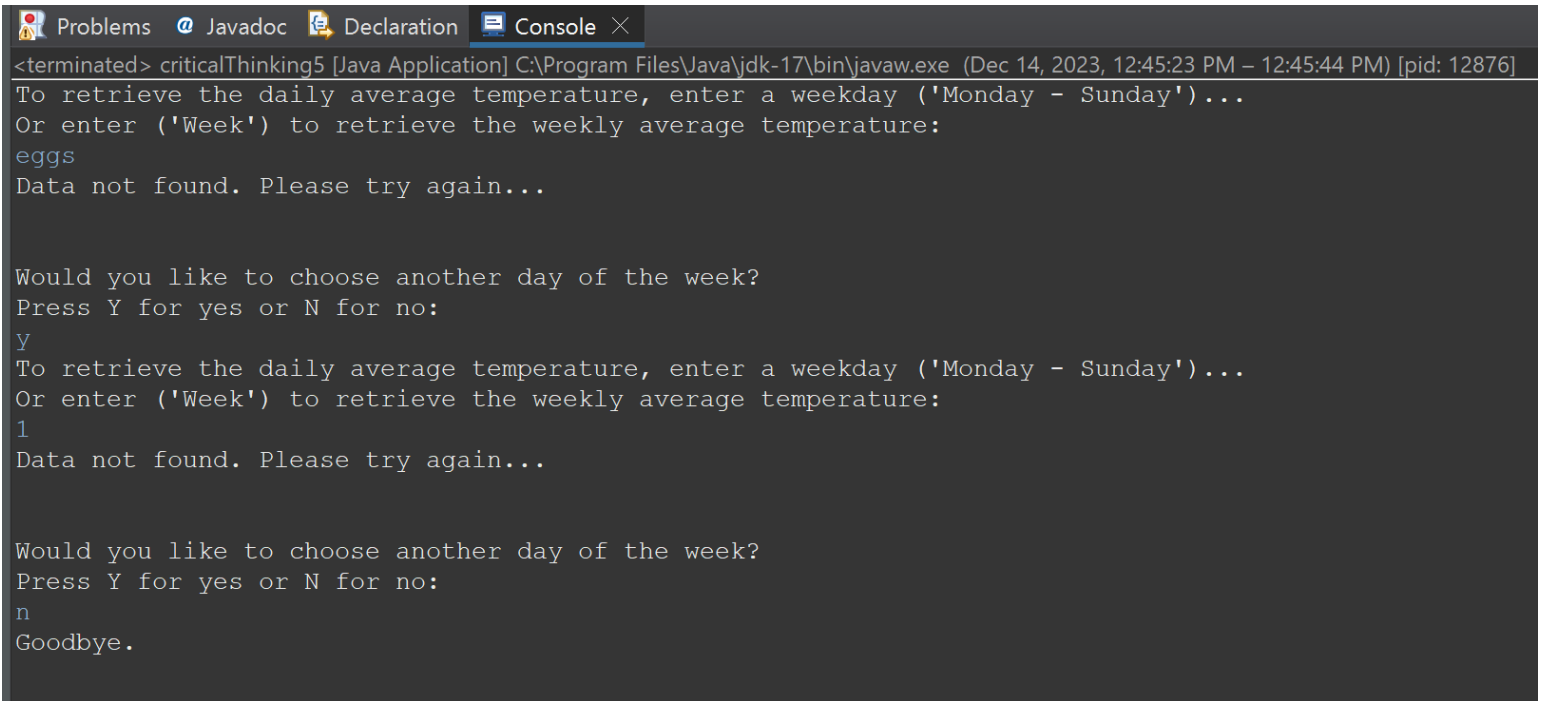
```
criticalThinking5.java x pseudocode.java
80     case "tuesday":
81     case "Tuesday":
82         System.out.printf("The daily average temperature for Tuesday is: %.2f\u00B0 F", tempsOfWeek.get(2));
83         break;
84
85     case "wednesday":
86     case "Wednesday":
87         System.out.printf("The daily average temperature for Wednesday is: %.2f\u00B0 F", tempsOfWeek.get(3));
88         break;
89
90     case "thursday":
91     case "Thursday":
92         System.out.printf("The daily average temperature for Thursday is: %.2f\u00B0 F", tempsOfWeek.get(4));
93         break;
94
95     case "friday":
96     case "Friday":
97         System.out.printf("The daily average temperature for Friday is: %.2f\u00B0 F", tempsOfWeek.get(5));
98         break;
99
100    case "saturday":
101    case "Saturday":
102        System.out.printf("The daily average temperature for Saturday is: %.2f\u00B0 F", tempsOfWeek.get(6));
103        break;
104
105    case "week":
106    case "Week":
107        System.out.println("The daily average temperatures for each day this week are as follows: ");
108        System.out.println();
109        System.out.printf("\tSunday: %.2f\u00B0 F\n", tempsOfWeek.get(0));
110        System.out.printf("\tMonday: %.2f\u00B0 F\n", tempsOfWeek.get(1));
111        System.out.printf("\tTuesday: %.2f\u00B0 F\n", tempsOfWeek.get(2));
112        System.out.printf("\tWednesday: %.2f\u00B0 F\n", tempsOfWeek.get(3));
113        System.out.printf("\tThursday: %.2f\u00B0 F\n", tempsOfWeek.get(4));
114        System.out.printf("\tFriday: %.2f\u00B0 F\n", tempsOfWeek.get(5));
115        System.out.printf("\tSaturday: %.2f\u00B0 F\n", tempsOfWeek.get(6));
116        System.out.println();
117        System.out.printf("The weekly average temperature is: %.2f\u00B0 F", weekAvg);
118        break;
119
120
121
122
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130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148 // END
149 }
```

```
criticalThinking5.java x pseudocode.java
110        System.out.printf("\tMonday: %.2f\u00B0 F\n", tempsOfWeek.get(1));
111        System.out.printf("\tTuesday: %.2f\u00B0 F\n", tempsOfWeek.get(2));
112        System.out.printf("\tWednesday: %.2f\u00B0 F\n", tempsOfWeek.get(3));
113        System.out.printf("\tThursday: %.2f\u00B0 F\n", tempsOfWeek.get(4));
114        System.out.printf("\tFriday: %.2f\u00B0 F\n", tempsOfWeek.get(5));
115        System.out.printf("\tSaturday: %.2f\u00B0 F\n", tempsOfWeek.get(6));
116        System.out.println();
117        System.out.printf("The weekly average temperature is: %.2f\u00B0 F", weekAvg);
118        break;
119
120    default:
121        System.out.println("Data not found. Please try again..");
122        break;
123    }
124
125    // System output messages
126    System.out.println();
127    System.out.println();
128    System.out.println("Would you like to choose another day of the week?");
129    System.out.println("Press Y for yes or N for no:");
130
131    // Continue or terminate program decision branches
132    response = scr.next();
133
134    if (response.equals("Y") || response.equals("y")) {
135        programStart = true;
136    } else {
137        programStart = false;
138        System.out.println("Goodbye.");
139    }
140
141    // End interactive while-loop structure
142    }
143
144    // Close Scanner object
145    scr.close();
146    }
147
148 // END
149 }
```

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Screenshots of the application executing

- User input error handling

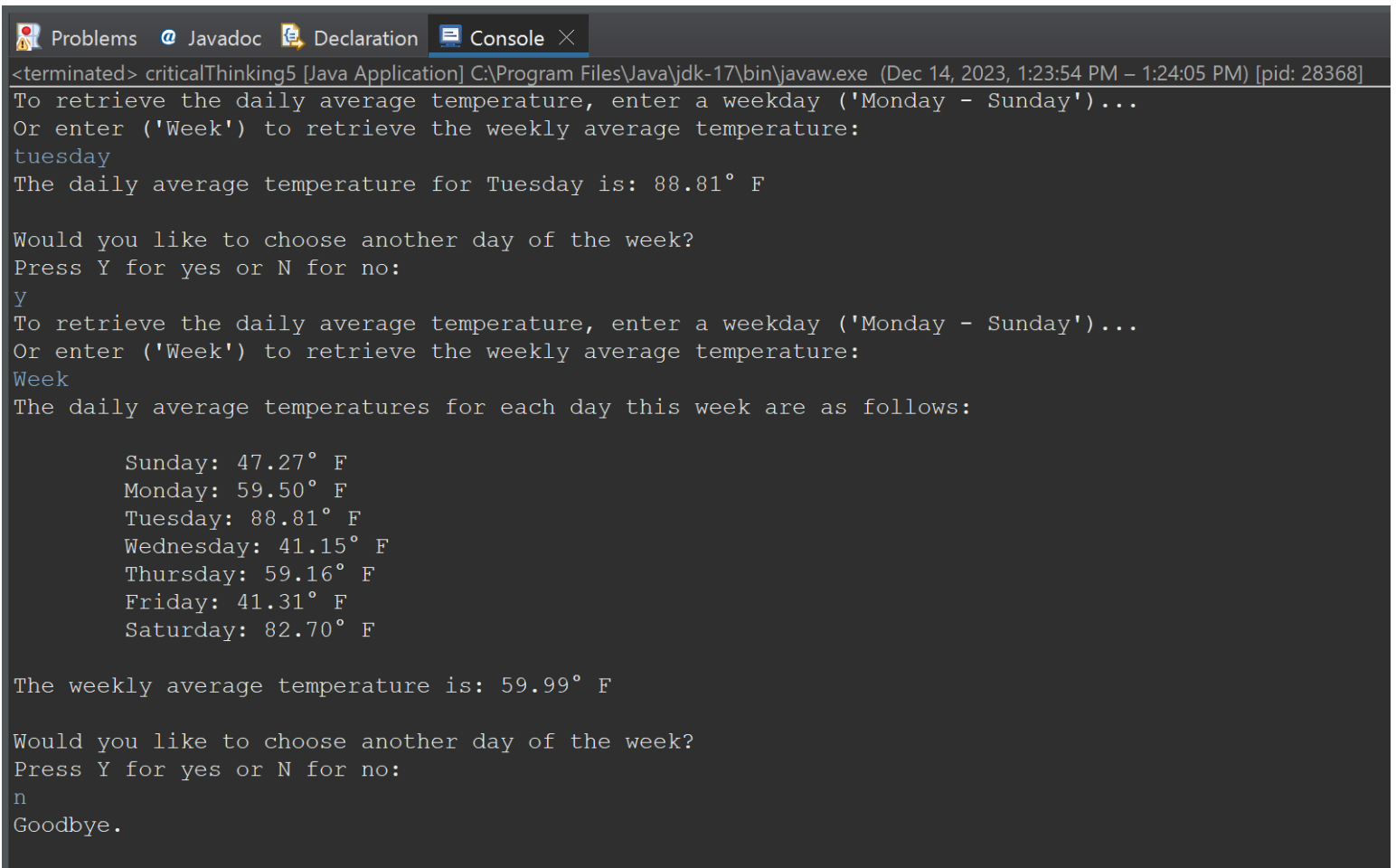


```
<terminated> criticalThinking5 [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (Dec 14, 2023, 12:45:23 PM – 12:45:44 PM) [pid: 12876]
To retrieve the daily average temperature, enter a weekday ('Monday - Sunday')...
Or enter ('Week') to retrieve the weekly average temperature:
eggs
Data not found. Please try again...

Would you like to choose another day of the week?
Press Y for yes or N for no:
Y
To retrieve the daily average temperature, enter a weekday ('Monday - Sunday')...
Or enter ('Week') to retrieve the weekly average temperature:
1
Data not found. Please try again...

Would you like to choose another day of the week?
Press Y for yes or N for no:
n
Goodbye.
```

- Code execution & results



```
<terminated> criticalThinking5 [Java Application] C:\Program Files\Java\jdk-17\bin\javaw.exe (Dec 14, 2023, 1:23:54 PM – 1:24:05 PM) [pid: 28368]
To retrieve the daily average temperature, enter a weekday ('Monday - Sunday')...
Or enter ('Week') to retrieve the weekly average temperature:
tuesday
The daily average temperature for Tuesday is: 88.81° F

Would you like to choose another day of the week?
Press Y for yes or N for no:
Y
To retrieve the daily average temperature, enter a weekday ('Monday - Sunday')...
Or enter ('Week') to retrieve the weekly average temperature:
Week
The daily average temperatures for each day this week are as follows:

    Sunday: 47.27° F
    Monday: 59.50° F
    Tuesday: 88.81° F
    Wednesday: 41.15° F
    Thursday: 59.16° F
    Friday: 41.31° F
    Saturday: 82.70° F

The weekly average temperature is: 59.99° F

Would you like to choose another day of the week?
Press Y for yes or N for no:
n
Goodbye.
```


Module 5: Critical Thinking

Screenshot of Git Repository

The screenshot shows a GitHub repository page for 'Programming-I---Module-5'. The repository is public and has 1 branch (main) and 0 tags. The commit history shows a recent update to README.md by user 'jgamblejoj' 2 minutes ago, with 2 commits. The README file is highlighted, and its content is displayed below. The README title is 'Programming-I---Module-5' and the content describes a Java programming assignment.

Programming-I---Module-5 Public

main 1 Branch 0 Tags

Go to file Add file Code

jgamblejoj Update README.md eb7de1b · 2 minutes ago 2 Commits

README.md Update README.md 2 minutes ago

README

Programming-I---Module-5

CSU Global, Programming I

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.

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