

SE 317, Lab 5

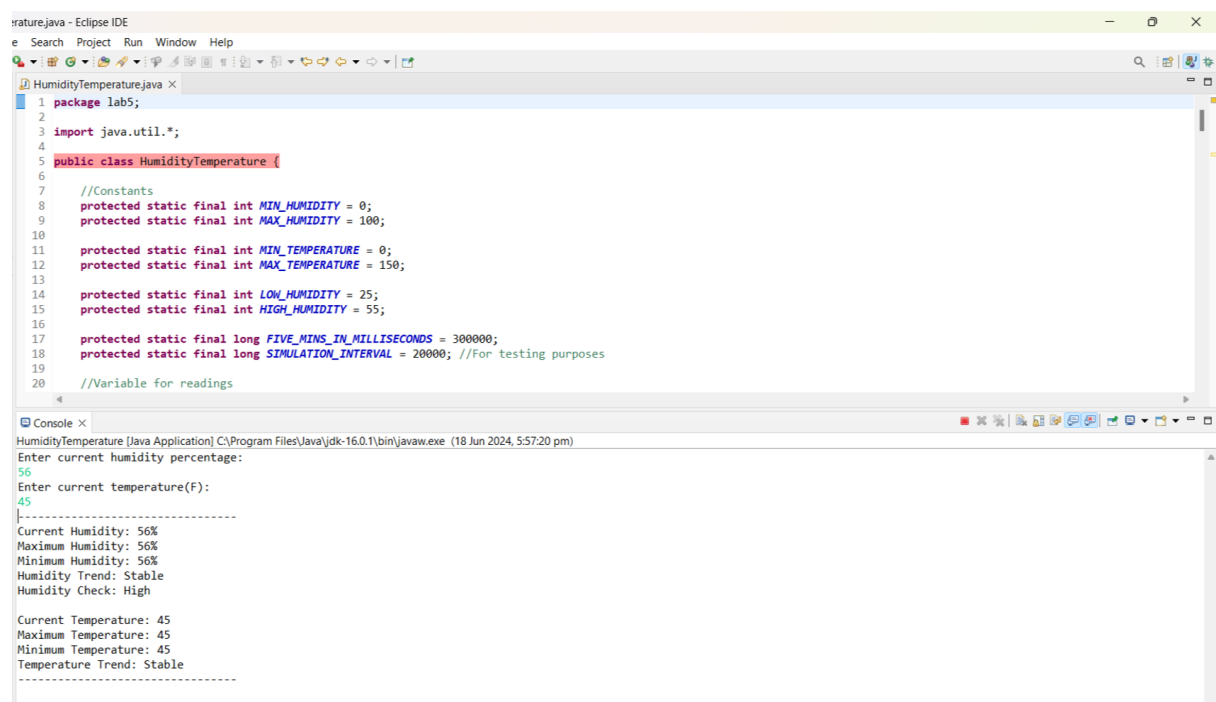
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Part 1: Screenshot of three different input pairs (Input in a sequence)

- Related code file: HumidityTemperature.java

1. Humidity: 56, Temperature: 45



The screenshot displays the Eclipse IDE with the file `HumidityTemperature.java` open. The code defines a class `HumidityTemperature` with various constants for humidity and temperature ranges and simulation intervals. Below the code editor, the console window shows the execution output for the input pair (56, 45).

```
HumidityTemperature.java - Eclipse IDE
e Search Project Run Window Help
HumidityTemperature.java
1 package lab5;
2
3 import java.util.*;
4
5 public class HumidityTemperature {
6
7     //Constants
8     protected static final int MIN_HUMIDITY = 0;
9     protected static final int MAX_HUMIDITY = 100;
10
11     protected static final int MIN_TEMPERATURE = 0;
12     protected static final int MAX_TEMPERATURE = 150;
13
14     protected static final int LOW_HUMIDITY = 25;
15     protected static final int HIGH_HUMIDITY = 55;
16
17     protected static final long FIVE_MINS_IN_MILLISECONDS = 300000;
18     protected static final long SIMULATION_INTERVAL = 20000; //For testing purposes
19
20     //Variable for readings
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22 }
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```

The screenshot shows the Eclipse IDE with a Java project. The editor displays the `HumidityTemperature.java` file, which is part of the `lab5` package. The code defines a `HumidityTemperature` class with various constants for humidity and temperature ranges, and simulation intervals. The console output shows the program's execution, where the user enters a humidity of 78 and a temperature of 23. The program then displays the current and maximum/minimum values for both humidity and temperature, along with their trends and checks.

```
1 package lab5;
2
3 import java.util.*;
4
5 public class HumidityTemperature {
6
7     //Constants
8     protected static final int MIN_HUMIDITY = 0;
9     protected static final int MAX_HUMIDITY = 100;
10
11     protected static final int MIN_TEMPERATURE = 0;
12     protected static final int MAX_TEMPERATURE = 150;
13
14     protected static final int LOW_HUMIDITY = 25;
15     protected static final int HIGH_HUMIDITY = 55;
16
17     protected static final long FIVE_MINS_IN_MILLISECONDS = 300000;
18     protected static final long SIMULATION_INTERVAL = 20000; //For testing purposes
19
20     //Variable for readings
21
22 }
```

Console Output:

```
HumidityTemperature [Java Application] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (18 Jun 2024, 5:57:20 pm)
Enter current humidity percentage:
78
Enter current temperature(F):
23
-----
Current Humidity: 78%
Maximum Humidity: 78%
Minimum Humidity: 56%
Humidity Trend: Increasing
Humidity Check: High

Current Temperature: 23
Maximum Temperature: 45
Minimum Temperature: 23
Temperature Trend: Decreasing
-----
```

3. Humidity: 23, Temperature: 45

This screenshot shows the same Eclipse IDE environment as the first, but with different input values. The user enters a humidity of 23 and a temperature of 45. The program's output reflects these changes, showing that the humidity is now low and decreasing, while the temperature is at its maximum and increasing.

```
1 package lab5;
2
3 import java.util.*;
4
5 public class HumidityTemperature {
6
7     //Constants
8     protected static final int MIN_HUMIDITY = 0;
9     protected static final int MAX_HUMIDITY = 100;
10
11     protected static final int MIN_TEMPERATURE = 0;
12     protected static final int MAX_TEMPERATURE = 150;
13
14     protected static final int LOW_HUMIDITY = 25;
15     protected static final int HIGH_HUMIDITY = 55;
16
17     protected static final long FIVE_MINS_IN_MILLISECONDS = 300000;
18     protected static final long SIMULATION_INTERVAL = 20000; //For testing purposes
19
20     //Variable for readings
21
22 }
```

Console Output:

```
HumidityTemperature [Java Application] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (18 Jun 2024, 5:57:20 pm)
Enter current humidity percentage:
23
Enter current temperature(F):
45
-----
Current Humidity: 23%
Maximum Humidity: 78%
Minimum Humidity: 23%
Humidity Trend: Decreasing
Humidity Check: Low

Current Temperature: 45
Maximum Temperature: 45
Minimum Temperature: 23
Temperature Trend: Increasing
-----
```

Part 2: Question a)

- Related code file: HumidityTest.java & TemperatureTest.java

Test Criterion

1. Current relative humidity
2. Validation of humidity values (boundary testing)
3. Maximum relative humidity
4. Minimum relative humidity
5. Humidity trend (Increasing, Decreasing, Stable)
6. Humidity status (High, OK, Low)
7. Current temperature
8. Validation of temperature values (boundary testing)
9. Maximum temperature
10. Minimum temperature
11. Temperature trend (Increasing, Decreasing, Stable)

Complete TR (Test Requirement) Set

Test Criterion	Test Requirement Set
1. Current relative humidity	<ul style="list-style-type: none"> • Ensure that the current humidity value is stored and retrieved correctly.
2. Validation of humidity values (boundary testing)	<ul style="list-style-type: none"> • Humidity above the valid upper boundary • Humidity below the valid lower boundary • Humidity at the valid upper boundary • Humidity at the valid lower boundary
3. Maximum relative humidity	<ul style="list-style-type: none"> • Update the maximum humidity if the current humidity exceeds the previous maximum. • Maintain the maximum humidity if the current humidity is less than or equal to the previous maximum.
4. Minimum relative humidity	<ul style="list-style-type: none"> • Update the minimum humidity if the current humidity is less than the previous minimum. • Maintain the minimum humidity if the current

	humidity is greater than or equal to the previous minimum.
5. Humidity trend (Increasing, Decreasing, Stable)	<ul style="list-style-type: none"> • Identify an increasing trend if the current humidity is greater than the previous humidity. • Identify a decreasing trend if the current humidity is less than the previous humidity. • Identify a stable trend if the current humidity equals the previous humidity.
6. Humidity status (High, OK, Low)	<ul style="list-style-type: none"> • Classify humidity as "High" if it exceeds the high threshold. • Classify humidity as "Low" if it is below the low threshold. • Classify humidity as "OK" if it is within the acceptable range.
7. Current temperature	<ul style="list-style-type: none"> • Ensure that the current temperature value is stored and retrieved correctly.
8. Validation of temperature values (boundary testing)	<ul style="list-style-type: none"> • Temperature above the valid upper boundary • Temperature below the valid lower boundary • Temperature at the valid upper boundary • Temperature at the valid lower boundary
9. Maximum temperature	<ul style="list-style-type: none"> • Update the maximum temperature if the current temperature exceeds the previous maximum. • Maintain the maximum temperature if the current temperature is less than or equal to the previous maximum.
10. Minimum temperature	<ul style="list-style-type: none"> • Update the minimum temperature if the current temperature is less than the previous minimum. • Maintain the minimum temperature if the current temperature is greater than or equal to the previous minimum.
11. Temperature trend (Increasing, Decreasing, Stable)	<ul style="list-style-type: none"> • Identify an increasing trend if the current temperature is greater than the previous temperature. • Identify a decreasing trend if the current temperature is less than the previous temperature. • Identify a stable trend if the current temperature equals the previous temperature.

Complete Test Set

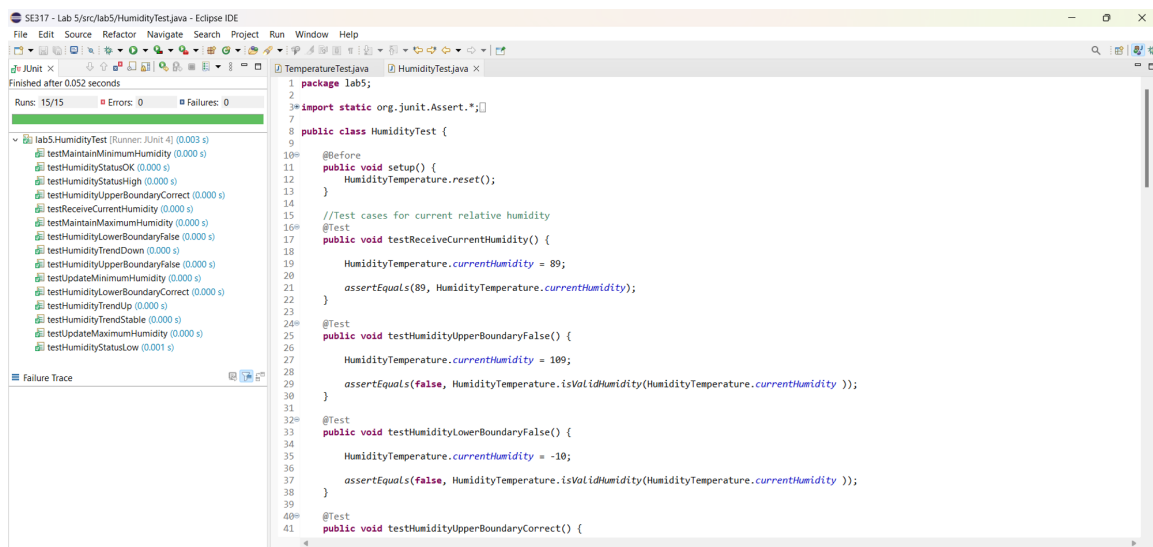
Test Criterion	Test Set
1. Current relative humidity	<code>testReceiveCurrentHumidity</code>
2. Validation of humidity values (boundary testing)	<ul style="list-style-type: none"> • <code>testHumidityUpperBoundaryFalse</code> • <code>testHumidityLowerBoundaryFalse</code> • <code>testHumidityUpperBoundaryCorrect</code> • <code>testHumidityLowerBoundaryCorrect</code>
3. Maximum relative humidity	<ul style="list-style-type: none"> • <code>testUpdateMaximumHumidity</code> • <code>testMaintainMaximumHumidity</code>
4. Minimum relative humidity	<ul style="list-style-type: none"> • <code>testUpdateMinimumHumidity</code> • <code>testMaintainMinimumHumidity</code>
5. Humidity trend (Increasing, Decreasing, Stable)	<ul style="list-style-type: none"> • <code>testHumidityTrendUp</code> • <code>testHumidityTrendDown</code> • <code>testHumidityTrendStable</code>
6. Humidity status (High, OK, Low)	<ul style="list-style-type: none"> • <code>testHumidityStatusHigh</code> • <code>testHumidityStatusLow</code> • <code>testHumidityStatusOK</code>
7. Current temperature	<code>testReceiveCurrentTemperature</code>
8. Validation of temperature values (boundary testing)	<ul style="list-style-type: none"> • <code>testTemperatureUpperBoundaryFalse</code> • <code>testTemperatureLowerBoundaryFalse</code> • <code>testTemperatureUpperBoundaryCorrect</code> • <code>testTemperatureLowerBoundaryCorrect</code>
9. Maximum temperature	<ul style="list-style-type: none"> • <code>testUpdateMaximumTemperature</code> • <code>testMaintainMaximumTemperature</code>
10. Minimum temperature	<ul style="list-style-type: none"> • <code>testUpdateMinimumTemperature</code> • <code>testMaintainMinimumTemperature</code>

11. Temperature trend (Increasing, Decreasing, Stable)

- `testTemperatureTrendUp`
- `testTemperatureTrendDown`
- `testTemperatureTrendStable`

Screenshots of Test Cases

Proof that ALL 15 test cases related to Humidity Passes



1. `testReceiveCurrentHumidity`

```
@Test
public void testReceiveCurrentHumidity() {

    HumidityTemperature.currentHumidity = 89;

    assertEquals(89, HumidityTemperature.currentHumidity);
}
```

2. `testHumidityUpperBoundaryFalse`

```

@Test
public void testHumidityUpperBoundaryFalse() {
    HumidityTemperature.currentHumidity = 109;

    assertEquals(false, HumidityTemperature.isValidHumidity(HumidityTemperature.currentHumidity ));
}

```

3. testHumidityLowerBoundaryFalse

```

@Test
public void testHumidityLowerBoundaryFalse() {
    HumidityTemperature.currentHumidity = -10;

    assertEquals(false, HumidityTemperature.isValidHumidity(HumidityTemperature.currentHumidity ));
}

```

4. testHumidityUpperBoundaryCorrect

```

@Test
public void testHumidityUpperBoundaryCorrect() {
    HumidityTemperature.currentHumidity = 100;

    assertEquals(true, HumidityTemperature.isValidHumidity(HumidityTemperature.currentHumidity ));
}

```

5. testHumidityLowerBoundaryCorrect

```

@Test
public void testHumidityLowerBoundaryCorrect() {
    HumidityTemperature.currentHumidity = 0;

    assertEquals(true, HumidityTemperature.isValidHumidity(HumidityTemperature.currentHumidity ));
}

```

6. testUpdateMaximumHumidity

```

@Test
public void testUpdateMaximumHumidity() {

    HumidityTemperature.maxHumidity = 67;
    HumidityTemperature.currentHumidity = 89;

    HumidityTemperature.findMaxMinHumidity();

    assertEquals(89, HumidityTemperature.maxHumidity);
}

```

7. testMaintainMaximumHumidity

```

@Test
public void testMaintainMaximumHumidity() {

    HumidityTemperature.maxHumidity = 78;
    HumidityTemperature.prevHumidity = 67;
    HumidityTemperature.currentHumidity = 56;

    HumidityTemperature.findMaxMinHumidity();

    assertEquals(78, HumidityTemperature.maxHumidity);
}

```

8. testUpdateMinimumHumidity

```

@Test
public void testUpdateMinimumHumidity() {

    HumidityTemperature.minHumidity = 67;
    HumidityTemperature.currentHumidity = 59;

    HumidityTemperature.findMaxMinHumidity();

    assertEquals(59, HumidityTemperature.minHumidity);
}

```

9. testMaintainMinimumHumidity


```

@Test
public void testMaintainMinimumHumidity() {

    HumidityTemperature.minHumidity = 78;
    HumidityTemperature.prevHumidity = 97;
    HumidityTemperature.currentHumidity = 86;

    HumidityTemperature.findMaxMinHumidity();

    assertEquals(78, HumidityTemperature.minHumidity);
}

```

10. testHumidityTrendUp

```

@Test
public void testHumidityTrendUp() {

    HumidityTemperature.prevHumidity = 25;
    HumidityTemperature.currentHumidity = 30;

    HumidityTemperature.findHumidityTrend();

    assertEquals("Increasing", HumidityTemperature.humidityTrend);
}

```

11. testHumidityTrendDown

```

@Test
public void testHumidityTrendDown() {

    HumidityTemperature.prevHumidity = 25;
    HumidityTemperature.currentHumidity = 22;

    HumidityTemperature.findHumidityTrend();

    assertEquals("Decreasing", HumidityTemperature.humidityTrend);
}

```

12. testHumidityTrendStable

```

@Test
public void testHumidityTrendStable() {

    HumidityTemperature.prevHumidity = 25;
    HumidityTemperature.currentHumidity = 25;

    HumidityTemperature.findHumidityTrend();

    assertEquals("Stable", HumidityTemperature.humidityTrend);

}

```

13. testHumidityStatusHigh

```

//----- HumidityStatusHigh -----
@Test
public void testHumidityStatusHigh() {

    HumidityTemperature.currentHumidity = 60;
    HumidityTemperature.humidity_Status(HumidityTemperature.currentHumidity);

    assertEquals("High", HumidityTemperature.humidityStatus);

}

```

14. testHumidityStatusLow

```

@Test
public void testHumidityStatusLow() {

    HumidityTemperature.currentHumidity = 24;
    HumidityTemperature.humidity_Status(HumidityTemperature.currentHumidity);

    assertEquals("Low", HumidityTemperature.humidityStatus);

}

```

15. testHumidityStatusOK

```

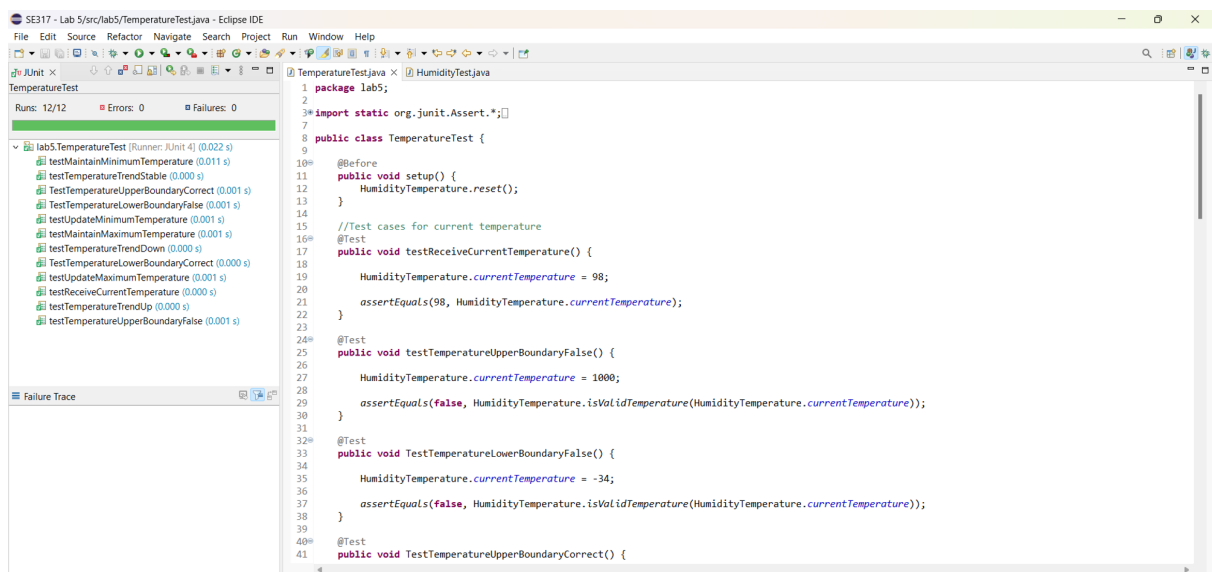
@Test
public void testHumidityStatusOK() {

    HumidityTemperature.currentHumidity = 34;
    HumidityTemperature.humidity_Status(HumidityTemperature.currentHumidity);

    assertEquals("OK", HumidityTemperature.humidityStatus);
}

```

Proof that ALL 12 test cases related to Temperature Passes



16. testReceiveCurrentTemperature

```

@Test
public void testReceiveCurrentTemperature() {

    HumidityTemperature.currentTemperature = 98;

    assertEquals(98, HumidityTemperature.currentTemperature);
}

```

17. testTemperatureUpperBoundaryFalse

```

@Test
public void testTemperatureUpperBoundaryFalse() {
    HumidityTemperature.currentTemperature = 1000;
    assertEquals(false, HumidityTemperature.isValidTemperature(HumidityTemperature.currentTemperature));
}

```

18. testTemperatureLowerBoundaryFalse

```

@Test
public void TestTemperatureLowerBoundaryFalse() {
    HumidityTemperature.currentTemperature = -34;
    assertEquals(false, HumidityTemperature.isValidTemperature(HumidityTemperature.currentTemperature));
}

```

19. testTemperatureUpperBoundaryCorrect

```

@Test
public void TestTemperatureUpperBoundaryCorrect() {
    HumidityTemperature.currentTemperature = 150;
    assertEquals(true, HumidityTemperature.isValidTemperature(HumidityTemperature.currentTemperature));
}

```

20. testTemperatureLowerBoundaryCorrect

```

@Test
public void TestTemperatureLowerBoundaryCorrect() {
    HumidityTemperature.currentTemperature = 0;
    assertEquals(true, HumidityTemperature.isValidTemperature(HumidityTemperature.currentTemperature));
}

```

21. testUpdateMaximumTemperature

```

@Test
public void testUpdateMaximumTemperature() {

    HumidityTemperature.maxTemperature = 67;
    HumidityTemperature.currentTemperature = 98;

    HumidityTemperature.findMaxMinTemp();

    assertEquals(98, HumidityTemperature.maxTemperature);

}

```

22. `testMaintainMaximumTemperature`

```

@Test
public void testMaintainMaximumTemperature() {

    HumidityTemperature.maxTemperature = 107;
    HumidityTemperature.prevTemperature = 56;
    HumidityTemperature.currentTemperature = 98;

    HumidityTemperature.findMaxMinTemp();

    assertEquals(107, HumidityTemperature.maxTemperature);

}

```

23. `testUpdateMinimumTemperature`

```

@Test
public void testUpdateMinimumTemperature() {

    HumidityTemperature.minTemperature = 67;
    HumidityTemperature.currentTemperature = 56;

    HumidityTemperature.findMaxMinTemp();

    assertEquals(56, HumidityTemperature.minTemperature);

}

```

24. `testMaintainMinimumTemperature`

```

@Test
public void testMaintainMinimumTemperature() {

    HumidityTemperature.minTemperature = 98;
    HumidityTemperature.prevTemperature = 115;
    HumidityTemperature.currentTemperature = 107;

    HumidityTemperature.findMaxMinTemp();

    assertEquals(98, HumidityTemperature.minTemperature);

}

```

25. testTemperatureTrendUp

```

// Test cases for temperature trend
@Test
public void testTemperatureTrendUp() {

    HumidityTemperature.prevTemperature = 45;
    HumidityTemperature.currentTemperature = 50;

    HumidityTemperature.findTempTrend();

    assertEquals("Increasing", HumidityTemperature.temperatureTrend);

}

```

26. testTemperatureTrendDown

```

@Test
public void testTemperatureTrendDown() {

    HumidityTemperature.prevTemperature = 45;
    HumidityTemperature.currentTemperature = 40;

    HumidityTemperature.findTempTrend();

    assertEquals("Decreasing", HumidityTemperature.temperatureTrend);

}

```

27. testTemperatureTrendStable

```

@Test
public void testTemperatureTrendStable() {

    HumidityTemperature.prevTemperature = 45;
    HumidityTemperature.currentTemperature = 45;

    HumidityTemperature.findTempTrend();

    assertEquals("Stable", HumidityTemperature.temperatureTrend);
}

```

Summary Part 2 Question a

- Total number of test criteria: 11
- Total number of test cases: 27
- Test Set Size: 27

Part 2 Question b)

- Related code file: HumidityTemperatureStyle1.java & HumidityTemperatureStyle2.java

i. Use the following temperature sequence after a reset:

66, 68, 69, 67, 63, 59, 53

(Use any arbitrary value for the corresponding humidity readings)

- **Style 1**

The screenshot shows the Eclipse IDE with the file `HumidityTemperatureTestStyle1.java` open. The code defines a test class with a `testStyle1TemperatureFocus()` method. The console output shows the results of the test run, including humidity and temperature readings and trends.

```

14
15 @Test
16 public void testStyle1TemperatureFocus() {
17
18     int[][] temperatureHumidityPairs = { {66, 67},
19                                           {68, 69},
20                                           {69, 70},
21                                           {67, 68},
22                                           {63, 64},
23                                           {59, 60},
24                                           {53, 54} };
25
26     for(int[] pair:temperatureHumidityPairs) {
27
28         HumidityTemperature.roundCount++;
29
30         HumidityTemperature.currentTemperature = pair[0];
31         HumidityTemperature.currentHumidity = pair[1];
32
33         HumidityTemperature.findTempTrend();
34         HumidityTemperature.findHumidityTrend();
35     }
36 }

```

```

<terminated> HumidityTemperatureTestStyle1 [JUnit] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (19 Jun 2024, 12:18:23 am - 12:18:24 am)
-----
Current Humidity: 54%
Maximum Humidity: 70%
Minimum Humidity: 54%
Humidity Trend: Decreasing
Humidity Check: OK

Current Temperature: 53
Maximum Temperature: 69
Minimum Temperature: 53
Temperature Trend: Decreasing
-----

```

• Style 2

The screenshot shows the Eclipse IDE with the file `HumidityTemperatureTestStyle2.java` open. The code defines a test class with a `testStyle2TemperatureFocus()` method. The console output shows the results of the test run, including humidity and temperature readings and trends.

```

10 import org.junit.runners.Parameterized;
11 import org.junit.runners.Parameterized.Parameters;
12
13 @RunWith(Parameterized.class)
14 public class HumidityTemperatureTestStyle2 {
15
16     private int temperature;
17     private int humidity;
18
19     private static int pair;
20
21     //Constructor to receive parameters
22     public HumidityTemperatureTestStyle2(int temperature, int humidity) {
23
24         this.temperature = temperature;
25         this.humidity = humidity;
26     }
27
28     @Before
29     public void setup() {
30
31         pair = 0;
32         HumidityTemperature.reset();
33     }
34 }

```

```

<terminated> HumidityTemperatureTestStyle2 [JUnit] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (19 Jun 2024, 5:06:24 pm - 5:06:25 pm)
Output Pair 1
-----
Current Humidity: 67%
Maximum Humidity: 67%
Minimum Humidity: 67%
Humidity Trend: Stable
Humidity Check: High

Current Temperature: 66
Maximum Temperature: 66
Minimum Temperature: 66
Temperature Trend: Stable
-----

```

ii.

Use the following relative humidity sequence (in %) after a reset:

53, 51, 48, 49, 54, 56, 56

(Use any arbitrary value for the corresponding temperature readings)

- **Style 1**

SE317 - Lab 5/src/lab5/HumidityTemperatureTestStyle1.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

JUnit x Project Explorer

Finished after 0.038 seconds

Runs: 2/2 Errors: 0 Failures: 0

lab5.HumidityTemperatureTestStyle1 [Runner: JUnit 4] (0.0)

testStyle1HumidityFocus (0.000 s)

testStyle1TemperatureFocus (0.000 s)

```

60
61 @Test
62 public void testStyle1HumidityFocus() {
63     int[][] humidityTemperaturePairs = { { 53, 67},
64                                           { 51, 63},
65                                           { 48, 54},
66                                           { 49, 45},
67                                           { 54, 86},
68                                           { 56, 76},
69                                           { 56, 65}};
70
71     for(int[] pair: humidityTemperaturePairs) {
72
73         HumidityTemperature.roundCount++;
74
75         HumidityTemperature.currentHumidity = pair[0];
76         HumidityTemperature.currentTemperature = pair[1];
77
78         HumidityTemperature.findTempTrend();
79         HumidityTemperature.findHumidityTrend();
80
81         HumidityTemperature.findMaxMinTemp();
82     }

```

Failure Trace

Console x

<terminated> HumidityTemperatureTestStyle1 [JUnit] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (19 Jun 2024, 12:12:45 am - 12:12:45 am)

```

-----
Current Humidity: 56%
Maximum Humidity: 56%
Minimum Humidity: 48%
Humidity Trend: Stable
Humidity Check: High

Current Temperature: 65
Maximum Temperature: 86
Minimum Temperature: 45
Temperature Trend: Decreasing
-----

```

- **Style 2**

SE317 - Lab 5/src/lab5/HumidityTemperatureTestStyle2.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

JUnit x Project Explorer

Finished after 0.087 seconds

Runs: 14/14 Errors: 0 Failures: 0

lab5.HumidityTemperatureTestStyle2 [Runner: JUnit 4] (0.027)

[0] (0.010 s)

[1] (0.001 s)

[2] (0.000 s)

[3] (0.000 s)

[4] (0.001 s)

[5] (0.001 s)

[6] (0.001 s)

[7] (0.001 s)

[8] (0.002 s)

[9] (0.001 s)

[10] (0.001 s)

[11] (0.000 s)

[12] (0.000 s)

[13] (0.000 s)

```

50
51 @Test
52 public void testTemperatureAndHumidity() {
53     HumidityTemperature.roundCount++;
54
55     HumidityTemperature.currentTemperature = temperature;
56     HumidityTemperature.currentHumidity = humidity;
57
58     HumidityTemperature.findTempTrend();
59     HumidityTemperature.findHumidityTrend();
60     HumidityTemperature.findMaxMinTemp();
61     HumidityTemperature.findMaxMinHumidity();
62     HumidityTemperature.humidity_Status(HumidityTemperature.currentHumidity);
63
64     HumidityTemperature.prevTemperature = HumidityTemperature.currentTemperature;
65     HumidityTemperature.prevHumidity = HumidityTemperature.currentHumidity;
66
67     HumidityTemperature.displayHumidityInformation();
68     HumidityTemperature.displayTemperatureInformation();
69
70     assertEquals(temperature, HumidityTemperature.currentTemperature);
71     assertEquals(humidity, HumidityTemperature.currentHumidity);
72
73 }

```

Failure Trace

Console x

<terminated> HumidityTemperatureTestStyle2 [JUnit] C:\Program Files\Java\jdk-16.0.1\bin\javaw.exe (19 Jun 2024, 5:08:40 pm - 5:08:41 pm)

```

-----
Current Temperature: 53
Maximum Temperature: 53
Minimum Temperature: 53
Temperature Trend: Stable

-----
Current Humidity: 63%
Maximum Humidity: 63%
Minimum Humidity: 63%
Humidity Trend: Stable
Humidity Check: High

Current Temperature: 51

```

Part 2 Question c)

- Related code file: HumidityTemperatureRefactored.java

Questions (iv)

iv) Answer the following question:

a. What is the difference between testing the 7 inputs in a sequence and testing them individually. How are the two test cases designed? (use narrative description, no test code needed.)

Answer:

When seven inputs are tested consecutively, all of the inputs are processed collectively, and the system's overall response is assessed. Its goal is to evaluate how well the system performs while data flows continuously throughout time.

Every pair of inputs is tested independently, treating them as distinct test cases. To confirm the system's response to certain events without the effect of other inputs, each pair is entered and analyzed separately.

b. As the same person who developed, refactored, and tested the code, does your refactored code make it easier or harder to test the system, explain with examples.

Answer: The refactored code makes testing easier as it improves modularity, reduce code duplication, enhance readability and maintain a consistency. By combining similar logic into single methods and focusing each method on a specific responsibility, the code becomes clearer and more maintainable. This allows me to reduces the likelihood of error and simplifies the process of writing and maintaining tests. For example, consolidating the logic for finding trends and max/min values into single methods means that updates need to be made in only one place, making the code more reliable and easier to test.

c. Does your refactored code parameterize your tests ? Explain.

Answer: Yes, the refactored code does parameterize the tests, especially with the approach used of Style 2. Parameterization is achieved using the `'RunWith(Parameterized.class)'` annotation. This annotation allows the same test to run multiple times with a different sets of input data which allows the reduction of code duplication and enhancement of test coverages.

For example, the

`HumidityTemperatureTestStyle2` class uses parameterized tests to validate multiple temperature and humidity pairs efficiently within a single test method.

d. If you received the refactored code (written by another developer) to just test it, would it be easier or harder than case iv) above?

Answer: It would probably be easier than case iv) above only if the refactored code is well-structured, readable and follows the best practices.

e. Would you prefer to test the original code or the refactored code, if both were written by another developer?

Answer: I would prefer to test the refactored code. The reason is because refactored code usually benefits from improvements in structure, clarity and possibly performance optimizations. The improvements can make it easier to understand the code's logic, locate potential issues and validates its functionality against the intended requirements.
