CPSC 1060/1061: Introduction to Programming in Java

Lab 04 – If-Else, Branching, Enumerations

Introduction

This lab builds upon lab 3, using **`if-else`** and other branching statements to classify short messages (like tweets) based on keywords in the message. This is a task that might reasonably be done in real-world situations. E.g., certain tweets might contain information (e.g., a request for help, a fire sighted) that must be acted on quickly, and computer programs could be used to identify these based upon the text in the message.

In this lab, you will create a Java enumeration called **`MessageCategory`** that lists several message categories (**`NEED, OFFER, ALERT, INFO, UNKNOWN`**). Your program will parse the text of a user specified message, identify the category of the message, and assign this value to a variable (**`category`**) declared to be of type **`MessageCategory`** (only values from the enumeration can be assigned to the variable)**.** You will also identify the latitude and longitude specified in the message and determine whether these are within ranges defined elsewhere in the program.

Lab Objectives

By the end of the lab, you should:

- be able to create if-else statements, including multi-branch statements;
- define and use enumerations.
- declare and use Boolean variables.
- compare values of primitive data types using comparison operators and Boolean expressions;
- compare Strings and other objects for equality.

Prerequisites

The lab deals with material about Strings, decision statements, and enumerations. You should have read the textbook about these concepts before beginning the lab.

What to Submit

The source file **`ClassifyMessage.java`** should be submitted to our course webpage for grading.

Exercise – Using Enumerations and If-Else statements

Since the primary purpose of this lab is not String manipulation, we will use a simpler message format than that found in lab 3. You will still use the **`Scanner`** and **`String`** classes, however.

You may assume that the messages processed by the program all have the following format:

category latitude longitude payload

where *category* is a single keyword indicating the message category (its type in Lab 3), *latitude* and *longitude* are both floating point numbers, and *payload* is a string of text (potentially containing arbitrary characters) constituting the primary body of the message. For instance, the message

```
offer 40.022 -105.226 free essential supplies 4 evacs pets, 2323 55th st, boulder
```

conforms to the above format. Additional sample messages are provided at the end of this document. You should use them to test your code.

Instructions

1. Create a new class called **`ClassifyMessage`** (stored in a file called **`ClassifyMessage.java`**).
2. At the top of the source file, include a comment stating your name, the date, the program purpose, and containing a statement of academic honesty.
3. Also include an import statement for the **`Scanner`** class at the top of the source file.
4. Below the class header (which begins with the text **`public class ClassifyMessage{`** …), declare the enumeration **`MessageCategory`** by adding the following line:

   ```
   enum MessageCategory {NEED, OFFER, ALERT, INFO, UNKNOWN}
   ```

   Observe that the elements of the enumeration are enclosed in braces, and an ending semicolon is not necessary. The elements are all capitalized, too, which is a custom of Java programmers.

   Later, you will declare a variable of type **`MessageCategory`**. It can only be assigned values from the above list.
5. At the beginning of the **`main`** method's body, you should declare and initialize an instance of the **`Scanner`** class. Call it **`keyboard`**, and have it read from **`System.in.`**
6. You should also declare the following variables:

   ```
   o catString:      String          // The raw text of the message's category
   o payload:        String          // The primary content of the message
   o latitude:       double          // The latitude indicated in the message
   o longitude:      double          // The longitude indicated in the message
   o isInRange:      boolean         // A "flag" indicating whether the latitude and
                                     // longitude values are within bounds
   o category:       MessageCategory // The message's category
   ```

7. Additionally, you should declare the following **`double`** variables and initialize them to the shown values. These define geographic boundaries that the program uses. Some messages will originate from within those bounds, other messages will not.

   - **`south`** **`double`** 39.882343 *// southernmost latitude*
   - **`north`** **`double`** 40.231315 *// northernmost latitude*
   - **`west`** **`double`** -105.743511 *// westernmost longitude*
   - **`east`** **`double`** -104.907864 *// easternmost longitude*

8. After the variables have been declared, write a statement to prompt the user with the following message:

   `Please enter a formatted message:`

9. Use the **`keyboard`** object's **`next()`**, **`nextDouble(),`** and **`nextLine()`** methods to read in values for **`catString`**, **`latitude`**, **`longitude`**, and **`payload`**. You may assume that the message is entered as a single line of text and formatted as described earlier.

10. For **`payload`** (and **`catString`**, if needed) you should trim (using the **`trim()`** method of the **`String`** class) any leading and trailing white spaces from the text.

11. Use a multi-branch if-else statement to match the value stored in **`catString`** to one of the elements of the enumeration **`MessageCategory`**. The conditions should be the following:

    - If the value of **`catString`** is one of **`"fire"`** or **`"smoke",`** then **`category`** should be assigned the value **`MessageCategory.ALERT`**.
    - Otherwise, if the value of **`catString`** is **`"need"`**, then **`category`** should be assigned the value **`MessageCategory.NEED`**.
    - Otherwise, if the value of **`catString`** is **`"offer"`**, then **`category`** should be assigned the value **`MessageCategory.OFFER`**.
    - Otherwise, if the value of **`catString`** is one of **`"structure", "road", "photo",`** or **`"evac",`** then **`category`** should be assigned the value **`MessageCategory.INFO`**.
    - Otherwise, **`category`** should be assigned the value **`MessageCategory.UNKNOWN`**.

When comparing the strings, you should use the **`equalsIgnoreCase`** method.

12. Use another if-else statement to determine whether the latitude and longitude specified in the message are within the geographic boundaries indicated by **`north`**, **`south`**, **`east`**, and **`west`**. Variable **`isInRange`** should be assigned the value **`true`** if and only if ***both*** of the below conditions are met. Otherwise, **`isInRange`** should be assigned the value **`false`**.

    I. If **`latitude ≥ south`** and **`latitude ≤ north`**.

    II. If **`longitude ≥ west`** and **`longitude ≤ east`**.

Submission and Grading

After you have completed and thoroughly tested **`ClassifyMessage.java`**, submit it to our course webpage in order to receive credit for the lab (if you have any questions about how to submit this assignment, then ask your lab instructor for help at least 24 hours before this assignment is due). Always double check that your submission was successful on our course website.

The lab will be graded according to the following guidelines.

- A score between 0 and 100 will be assigned.
- If the source file(s) are not submitted before the specified deadline, if they do not compile, or if the submitting student has an unexcused absence for a single lab period devoted to the assignment, then a grade of 0 will be assigned. (Note: students who show up to their first lab period and ***personally*** show their lab TA that they finished and submitted the week's lab assignment may be excused from their second lab period for that week.)
- If the required comment for all labs describing the program and the academic honesty statement is not included at the top of the file, then 10 points will be deducted. Note: this required comment can be found in Lab 02.
- If a (single) source file name is incorrect, then 10 points will be deducted.
- The program will be evaluated using the inputs below and additional inputs. For each test case, the output must be correct in order to receive credit for that test case.

Sample Input (a text file with these inputs is also posted with this lab)

```
1.  smoke 40.499812 -105.012075 its raining ash
2.  offer 40.022 -105.226 free essential supplies 4 evacs pets, 2323 55th st, boulder
3.  structure 40.029854 -105.391055 damaged:  224 left fork road (shed) (house okay)
4.  wind 40.3523 -105.2045 just switched, and now the smoke is thick around our house
5.  fire 40.0515 -105.332 firefighter sees a glow: sw from west coach rd toward sunshine canyon
6.  structure 40.050904 -105.373941 damaged: unknown number, by 204 gold run road
7.  evac 40.383 -105.113  overflow shltr 4 evacuees at walt clark middle school, loveland
8.  nofire 40.367 -105.292 activity: west of the pinewood res dam
9.  photo 40.052304 -105.319374 local: wild horse
10. info 40.499812 -105.012075 its raining ash: windsor, co
11. need  40.011471 -105.28638 volunteers sun 8a-10p donation ctr 2 help w/donations for victims & firefighters: 3111 28th st
12. need  40.031131 -105.259259 people to help sort donations  Sept 12 8am-9pm 3111 28th st
13. open 40.072208 -105.354437 evacuees can return to homes: lee hill
```

14. open 40.076431 -105.309757 lee hill dr.

Sample Input and Output

These are sample runs of the program. Input is indicated in red. Your output should be consistent with what is shown here.

```
Please enter a formatted message:
smoke 40.499812 -105.012075 its raining ash
Category:    ALERT
Raw Cat:     smoke
Message:     its raining ash
Latitude:    40.499812
Longitude:   -105.012075
In Range:    false
```

```
Please enter a formatted message:
offer 40.022 -105.226 free essential supplies 4 evacs pets, 2323 55th st, boulder
Category:    OFFER
Raw Cat:     offer
Message:     free essential supplies 4 evacs pets, 2323 55th st, boulder
Latitude:    40.022
Longitude:   -105.226
In Range:    true
```

```
Please enter a formatted message:
structure 40.029854 -105.391055 damaged:  224 left fork road (shed) (house okay)
Category:    INFO
Raw Cat:     structure
Message:     damaged:  224 left fork road (shed) (house okay)
Latitude:    40.029854
Longitude:   -105.391055
In Range:    true
```

```
Please enter a formatted message:
wind 40.3523 -105.2045 just switched, and now the smoke is thick around our house
Category:    UNKNOWN
Raw Cat:     wind
Message:     just switched, and now the smoke is thick around our house
Latitude:    40.3523
Longitude:   -105.2045
In Range:    false
```

```
Please enter a formatted message:
fire 40.0515 -105.332 firefighter sees a glow: sw from west coach rd toward sunshine
canyon
Category:    ALERT
Raw Cat:     fire
Message:     firefighter sees a glow: sw from west coach rd toward sunshine canyon
```

```
Latitude:    40.0515
Longitude:   -105.332
In Range:    true
```

```
Please enter a formatted message:
structure 40.050904 -105.373941 damaged: unknown number, by 204 gold run road
Category:    INFO
Raw Cat:     structure
Message:     damaged: unknown number, by 204 gold run road
Latitude:    40.050904
Longitude:   -105.373941
In Range:    true
```

```
Please enter a formatted message:
evac 40.383 -105.113  overflow shltr 4 evacuees at walt clark middle school, loveland
Category:    INFO
Raw Cat:     evac
Message:     overflow shltr 4 evacuees at walt clark middle school, loveland
Latitude:    40.383
Longitude:   -105.113
In Range:    false
```

```
Please enter a formatted message:
nofire 40.367 -105.292 activity: west of the pinewood res dam
Category:    UNKNOWN
Raw Cat:     nofire
Message:     activity: west of the pinewood res dam
Latitude:    40.367
Longitude:   -105.292
In Range:    false
```

```
Please enter a formatted message:
photo 40.052304 -105.319374 local: wild horse
Category:    INFO
Raw Cat:     photo
Message:     local: wild horse
Latitude:    40.052304
Longitude:   -105.319374
In Range:    true
```

```
Please enter a formatted message:
info 40.499812 -105.012075 its raining ash: windsor, co
Category:    UNKNOWN
Raw Cat:     info
Message:     its raining ash: windsor, co
Latitude:    40.499812
Longitude:   -105.012075
In Range:    false
```

```
Please enter a formatted message:
need  40.011471 -105.28638 volunteers sun 8a-10p donation ctr 2 help w/donations for
victims & firefighters: 3111 28th st
Category:    NEED
Raw Cat:     need
Message:     volunteers sun 8a-10p donation ctr 2 help w/donations for victims &
firefighters: 3111 28th st
Latitude:    40.011471
Longitude:   -105.28638
In Range:    true
```

```
Please enter a formatted message:
need  40.031131 -105.259259 people to help sort donations  Sept 12 8am-9pm 3111 28th st
Category:    NEED
Raw Cat:     need
Message:     people to help sort donations  Sept 12 8am-9pm 3111 28th st
Latitude:    40.031131
Longitude:   -105.259259
In Range:    true
```

```
Please enter a formatted message:
open 40.072208 -105.354437 evacuees can return to homes: lee hill
Category:    UNKNOWN
Raw Cat:     open
Message:     evacuees can return to homes: lee hill
Latitude:    40.072208
Longitude:   -105.354437
In Range:    true
```

```
Please enter a formatted message:
open 40.076431 -105.309757 lee hill dr.
Category:    UNKNOWN
Raw Cat:     open
Message:     lee hill dr.
Latitude:    40.076431
Longitude:   -105.309757
In Range:    true
```