

 spec.md

Introduction to Programming

Assignment: Task 2

The Problem

A science project is seeking to determine the average flight speeds of British and European swallows. To this end, tracking equipment has been set up, to track birds in both the UK and in Europe. The equipment sends its measurements over the Internet as a simple data stream.

The project now needs to use the data to determine various interesting statistics about swallow speed.

Unfortunately, post-Brexit the European equipment measures speed in kilometres per hour while the British equipment uses miles per hour.

Data from the European equipment looks like this:

```
E23.56
```

The *E* denotes that this is a European reading (so in KPH), and the following numbers are the measured speed.

The data from the British equipment is identical except that the first letter is a *U*:

```
U15.8
```

A program is required that will process a stream of this data, and then display the number of readings processed, along with the maximum, minimum, and average (mean) speeds. The final output is required in both KPH and MPH (see the examples below).

Write a program that reads any number of data items from standard input (i.e. the keyboard), and then displays the statistics needed. The output ends when the user just presses Enter at the input prompt.

Since the data stream is generated by software that has been rigorously tested, it is safe to assume that the data is always in one of the two expected formats.

Note: 1 MPH is roughly 1.61 KPH. Google a more exact factor to avoid rounding errors in your results.

Examples

The following illustrate what should happen when the program executes in a variety of scenarios.

Here, there is no data, so the program just exits gracefully.

```
Swallow Speed Analysis: Version 1.0
```

```
Enter the Next Reading:
```

```
No readings entered. Nothing to do.
```

Now there is one reading, in MPH, which is reported as the max, min, and mean. (We should also check that 20 MPH is indeed just over 32 KPH.)

```
Swallow Speed Analysis: Version 1.0
```

```
Enter the Next Reading: U20
```

```
Reading saved.
```

```
Enter the Next Reading:
```

```
Results Summary
```

1 Reading Analysed.

Max Speed: 20.0 MPH, 32.2 KPH.

Min Speed: 20.0 MPH, 32.2 KPH.

Avg Speed: 20.0 MPH, 32.2 KPH.

Now, if the data is 20 MPH and the equivalent in KPH, we should see the same results:

Swallow Speed Analysis: Version 1.0

Enter the Next Reading: U20

Reading saved.

Enter the Next Reading: E32.2

Reading saved.

Enter the Next Reading:

Results Summary

2 Readings Analysed.

Max Speed: 20.0 MPH, 32.2 KPH.

Min Speed: 20.0 MPH, 32.2 KPH.

Avg Speed: 20.0 MPH, 32.2 KPH.

Note: If you try similar experiments, you may see rounding errors (so one of the above values might be slightly different). This can probably be fixed by using a more accurate conversion factor, but there is no need to worry about small differences.

Finally, a stream of five values produces expected output:

Swallow Speed Analysis: Version 1.0

Enter the Next Reading: U20

Reading saved.

Enter the Next Reading: U25

Reading saved.

Enter the Next Reading: E30

Reading saved.

Enter the Next Reading: E32.5

Reading saved.

Enter the Next Reading: U28.3

Reading saved.

Enter the Next Reading:

Results Summary

5 Readings Analysed.

Max Speed: 28.3 MPH, 45.5 KPH.

Min Speed: 18.6 MPH, 30.0 KPH.

Avg Speed: 22.4 MPH, 36.1 KPH.