Karl Franks   (kpf)

CS23710 Assignment

Design

For my implementation I decided to break the three features into their own separate files, eg feature_one.c
These files would then contain multiple functions to run those specific features (eg a function to read the data from the files).
In my final implementation I have only one separate file, feature_one, but it does feature multiple functions.
There are two functions to get the amount of data stored in the file, one for the observer file and one for the sighting file. This is because of the small difference that the observer file has a line for the date, then the main data. I understand I could perhaps parse the input and decide if it is an observer file or a sighting file, but my implementation also allows for files formatted in the same way that may not have the word "observer" or "sighting" in their file name.
Similarly, there are two separate functions for reading the data, due to the difference in input: the observer file lists three variables per line, with the sighting file listing four.
There is a final function for outputting the table of results, which loops through the observer and sighting structure arrays and matches up corresponding observer and sighting data. It then calculates the location of the Cetecean spotted, and if it is within the accepted sea area it is stored in an output struct. Finally, it prints the table of results displaying the location, type of Cetecean and username of the observer.

For storing the file input, I opted for an array of chars large enough it would hopefully not be exceed (256 characters), since I tried using the "char *" method but had problems with passing pointers and opted for a simpler approach to save time.
Similarly, my data is stored in arrays of structures, not a variable data structure such as a linked list due to starting the assignment too late and having not completed the linked list worksheet so I did not feel confident enough to use linked lists.

I have included the call "sleep(3)" (and included the necessary header file to run it), since I had issues with sometimes outputting my data and saw other people discussing similar issues on the Aber Comp Sci Q&A Facebook group with that as a simple solution.
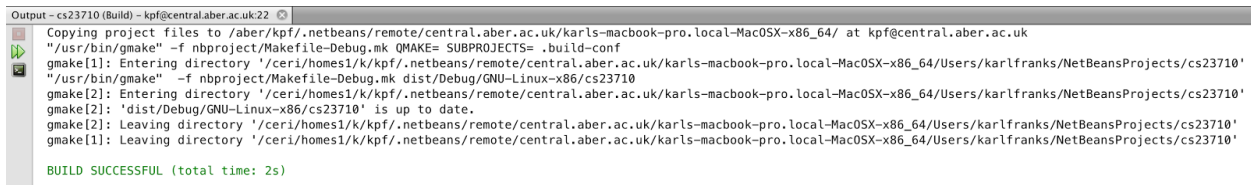
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Bibliography

I have adapted one small piece of code from code I found on StackOverflow (source:
http://stackoverflow.com/questions/1910724/c-retrieving-total-line-numbers-in-a-file)
It is the code that calculates the amount of pieces of data stored, however their function
overestimates by one so I removed their second if statement. Also, in the function to count the
number of observers, I decrement the count at the end so as not to count the date/time as an
observer.
It is also surrounded with the comments "//Adapted Code" and "//End Adapted Code" so as to
signify what I have adapted.

Run

When compiling, it compiles successfully as shown:

```
Output - cs23710 (Build) - kpf@central.aber.ac.uk:22  ⊗
    Copying project files to /aber/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/ at kpf@central.aber.ac.uk
    "/usr/bin/gmake" -f nbproject/Makefile-Debug.mk QMAKE= SUBPROJECTS= .build-conf
    gmake[1]: Entering directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'
    "/usr/bin/gmake"  -f nbproject/Makefile-Debug.mk dist/Debug/GNU-Linux-x86/cs23710
    gmake[2]: Entering directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'
    gmake[2]: 'dist/Debug/GNU-Linux-x86/cs23710' is up to date.
    gmake[2]: Leaving directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'
    gmake[1]: Leaving directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'

    BUILD SUCCESSFUL (total time: 2s)
```

The actual text output:

"Copying project files to /aber/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/ at kpf@central.aber.ac.uk

"/usr/bin/gmake" -f nbproject/Makefile-Debug.mk QMAKE= SUBPROJECTS= .build-conf

gmake[1]: Entering directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'

"/usr/bin/gmake" -f nbproject/Makefile-Debug.mk dist/Debug/GNU-Linux-x86/cs23710

gmake[2]: Entering directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'

gmake[2]: 'dist/Debug/GNU-Linux-x86/cs23710' is up to date.

gmake[2]: Leaving directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'
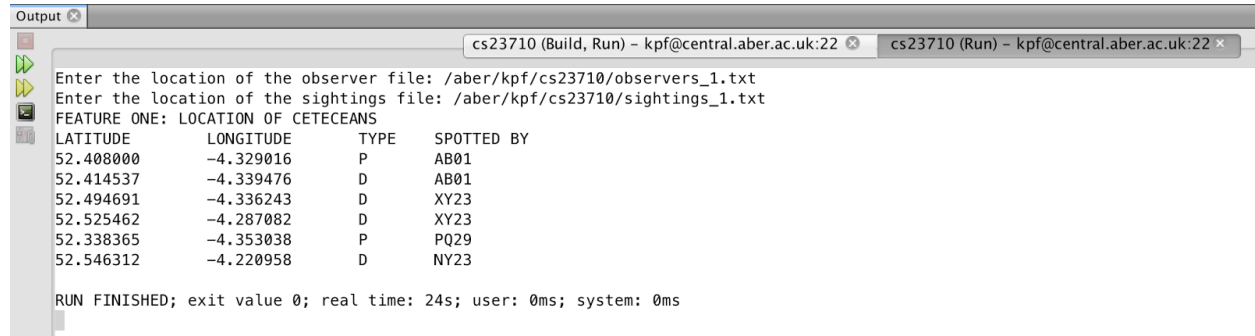
gmake[1]: Leaving directory '/ceri/homes1/k/kpf/.netbeans/remote/central.aber.ac.uk/karls-macbook-pro.local-MacOSX-x86_64/Users/karlfranks/NetBeansProjects/cs23710'

BUILD SUCCESSFUL (total time: 2s)"

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I have had issues with running certain data files though, namely the even ones. My code runs perfectly fine on the odd numbered data files provided, but does not on the even numbered however I can't see any reason in my code why this would be the case.
For example, when running the first data set:

```
Output ⊗
                                    cs23710 (Build, Run) – kpf@central.aber.ac.uk:22 ⊗    cs23710 (Run) – kpf@central.aber.ac.uk:22 ×
Enter the location of the observer file: /aber/kpf/cs23710/observers_1.txt
Enter the location of the sightings file: /aber/kpf/cs23710/sightings_1.txt
FEATURE ONE: LOCATION OF CETECEANS
LATITUDE        LONGITUDE       TYPE    SPOTTED BY
52.408000       -4.329016       P       AB01
52.414537       -4.339476       D       AB01
52.494691       -4.336243       D       XY23
52.525462       -4.287082       D       XY23
52.338365       -4.353038       P       PQ29
52.546312       -4.220958       D       NY23

RUN FINISHED; exit value 0; real time: 24s; user: 0ms; system: 0ms
```

However when running the second:

```
Output ⊗
                                    cs23710 (Build, Run) – kpf@central.aber.ac.uk:22 ⊗    cs23710 (Run) – kpf@central.aber.ac.uk:22 ×
Enter the location of the observer file: /aber/kpf/cs23710/observers_2.txt
Enter the location of the sightings file: /aber/kpf/cs23710/sightings_2.txt
FEATURE ONE: LOCATION OF CETECEANS
LATITUDE        LONGITUDE       TYPE    SPOTTED BY
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000

RUN FINISHED; exit value 0; real time: 24s; user: 0ms; system: 0ms
```

Output

Data Set 1:

```
Output ⊗

                                        cs23710 (Build, Run) – kpf@central.aber.ac

  Enter the location of the observer file: /aber/kpf/cs23710/observers_1.txt
  Enter the location of the sightings file: /aber/kpf/cs23710/sightings_1.txt
  FEATURE ONE: LOCATION OF CETECEANS
  LATITUDE        LONGITUDE       TYPE      SPOTTED BY
  52.408000       -4.329016       P         AB01
  52.414537       -4.339476       D         AB01
  52.494691       -4.336243       D         XY23
  52.525462       -4.287082       D         XY23
  52.338365       -4.353038       P         PQ29
  52.546312       -4.220958       D         NY23

  RUN FINISHED; exit value 0; real time: 24s; user: 0ms; system: 0ms
```

Data Set 2:

```
Output ⊗

                                        cs23710 (Build, Run) – kpf@central.aber.a

  Enter the location of the observer file: /aber/kpf/cs23710/observers_2.txt
  Enter the location of the sightings file: /aber/kpf/cs23710/sightings_2.txt
  FEATURE ONE: LOCATION OF CETECEANS
  LATITUDE        LONGITUDE       TYPE      SPOTTED BY
  0.000000        0.000000
  0.000000        0.000000
  0.000000        0.000000
  0.000000        0.000000
  0.000000        0.000000
  0.000000        0.000000
  0.000000        0.000000
  0.000000        0.000000

  RUN FINISHED; exit value 0; real time: 24s; user: 0ms; system: 0ms
```

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Data Set 3:

```
Enter the location of the observer file: /aber/kpf/cs23710/observers_3.txt
Enter the location of the sightings file: /aber/kpf/cs23710/sightings_3.txt
FEATURE ONE: LOCATION OF CETECEANS
LATITUDE        LONGITUDE       TYPE    SPOTTED BY
52.506694       -4.763639       D       CB00
52.531476       -4.779905       D       CB01
52.468876       -4.812255       D       CB02
52.450303       -4.769175       D       CB03
52.464575       -4.725755       D       CB04
52.528502       -4.818241       D       CB05
52.498586       -4.760735       D       CB06
52.484622       -4.745346       D       CB07
52.478888       -4.749171       D       CB08
52.511441       -4.684252       D       CB09
52.492779       -4.699054       D       CB10
52.509985       -4.772265       D       CB11
52.497365       -4.762054       D       CB12
52.541142       -4.762905       D       CB13
52.496602       -4.755620       D       CB14
52.521928       -4.735142       D       CB15
52.480922       -4.828742       D       CB16
52.492405       -4.775675       D       CB17
52.484885       -4.711594       P       CB18
52.514674       -4.813614       P       CB19
52.513000       -4.738626       P       CB20
52.517738       -4.735372       D       CB21
52.520176       -4.712684       D       CB22
52.490614       -4.783392       P       CB23
52.496588       -4.760522       P       CB24
52.471319       -4.742334       D       CB25
52.518053       -4.749945       D       CB26
52.487075       -4.765720       D       CB27
52.515124       -4.798355       D       CB28
52.498359       -4.762158       D       CB29
52.470376       -4.736791       D       CB30
52.496569       -4.759486       D       CB31
52.477550       -4.763048       D       CB32
52.514227       -4.714628       P       CB33
52.492918       -4.763936       P       CB34
52.535313       -4.741766       P       CB35
52.498885       -4.739829       P       CB36
52.476728       -4.784936       D       CB37
52.450908       -4.769724       P       CB38
52.495291       -4.761616       P       CB39
```

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Data Set 4:

```
Enter the location of the observer file: /aber/kpf/cs23710/observers_4.txt
Enter the location of the sightings file: /aber/kpf/cs23710/sightings_4.txt
FEATURE ONE: LOCATION OF CETECEANS
LATITUDE        LONGITUDE        TYPE     SPOTTED BY
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000
0.000000        0.000000

RUN FINISHED; exit value 0; real time: 29s; user: 0ms; system: 0ms
```

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Data Set 5:

```
Enter the location of the observer file: /aber/kpf/cs23710/observers_5.txt
Enter the location of the sightings file: /aber/kpf/cs23710/sightings_5.txt
FEATURE ONE: LOCATION OF CETECEANS
LATITUDE          LONGITUDE          TYPE      SPOTTED BY
52.380808         -4.195592          P         CB00
52.404692         -4.178301          P         CB01
52.394617         -4.155552          P         CB02
52.413729         -4.161501          P         CB03
52.384324         -4.225457          P         CB04
52.416136         -4.167768          P         CB05
52.431934         -4.125508          P         CB06
52.395589         -4.211974          P         CB07
52.415998         -4.160688          P         CB08
52.422708         -4.147117          P         CB09
52.441616         -4.195339          P         CB10
52.421438         -4.163640          P         CB11
52.419295         -4.181656          P         CB12
52.417694         -4.181886          P         CB13
52.440449         -4.158164          P         CB14
52.459783         -4.138636          P         CB15
52.427063         -4.203718          P         CB16
52.399319         -4.103278          P         CB17
52.411494         -4.169405          P         CB18
52.407573         -4.175898          P         CB19
52.430678         -4.184228          D         CB20
52.401318         -4.141506          D         CB21
52.426873         -4.179069          D         CB22
52.451655         -4.195306          D         CB23
52.412665         -4.167789          D         CB24
52.398244         -4.215045          D         CB25
52.384754         -4.141254          D         CB26
52.424893         -4.180362          D         CB27
52.438586         -4.193747          D         CB28
52.406416         -4.215083          D         CB29
52.404801         -4.160809          D         CB30
52.402886         -4.161217          D         CB31
52.451581         -4.164066          D         CB32
52.381294         -4.213680          D         CB33
52.416770         -4.177290          D         CB34
52.428202         -4.192576          D         CB35
52.412470         -4.218213          D         CB36
52.411638         -4.179406          D         CB37
52.433551         -4.167555          D         CB38

RUN FINISHED; exit value 0; real time: 38s; user: 0ms; system: 0ms
```

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Data Set 6:

```
Enter the location of the observer file: /aber/kpf/cs23710/observers_6.txt
Enter the location of the sightings file: /aber/kpf/cs23710/sightings_6.txt
FEATURE ONE: LOCATION OF CETECEANS
LATITUDE          LONGITUDE          TYPE      SPOTTED BY

RUN FINISHED; exit value 0; real time: 31s; user: 0ms; system: 0ms
```