

Project: MP1
Course: ITM-411
Author: Brian T. Bailey

Project Description:

The object of this project was to create an object model and do some minor data analysis on a set of records of Intraplate Earthquakes provided by the USGS at their website listed below. The data included events from the year 495 to 2003.

For this project we needed to produce an object model with an abstract superclass called EarthquakeRecord and subclasses that extend that superclass for each continent called ContinentEarthquakeRecord. Also using an interface we needed to implement 4 methods in the superclass for finding the oldest, newest, minimum and maximum earthquakes per continent.

The output for the application needs to display a few pieces of data to both the screen and a data file. The data that needs to be output is all the earthquake records in string form, the oldest and newest earthquake per continent, the minimum and maximum earthquakes per continent and a table of tectonic-association by continent.

http://earthquake.usgs.gov/research/data/scr_catalog.php

Installation, Compile and Run-Time Requirements:

This project was written in Java using JDK 1.6. The IDE used to write and compile the application was NetBeans 7.1 on the Macintosh platform. The computer used was an Intel core i7 MacBook Pro running OS X Lion.

The application folder can be copied to a folder on the system and opened in NetBeans. The project can then be build and run using the play button in netbeans. The application can also be run from the standard terminal. To do this the data directory needs to be copied to the dist directory. The application jar file can then be run with the command "java -jar mp1.jar" from within the dist directory.

Insights and Expected Results:

Overall I found this project to be fairly straight forward. The biggest problem was the data file itself. When first looking at the data file I noticed some records were split between two lines making it difficult to just read in one line per record. This problem with the data file was the only thing that really held me up for a while.

First I tried to find a way to read the data by just changing the delimiter character used. That was causing an issue because there were fields with spaces that also had newline characters erroneously in them. Another problem in the data file was some records did not have a field 35 or 36.

My next thought was to read until I saw the date column because it was the only column with 7 or 8 digits in it. I setup a regular expression, "[0-9]{7,8}", to search for that pattern. I planned on starting a

new record when I found that pattern. If I found that pattern before I filled all 36 fields I would fill the others with a default value. When I tested this I found the next issue. There is a date in another field, number 33. I had to make sure I wasn't starting records on that date.

That brought me on to my next idea. I would test for a date and if I found one I would test again and see if the next field had the characters hist or instr in them with a regular expression, "(?:.*hist.*)"|"(?:.*instr.*)"". This appeared to be working at first. I was still having problems with the erroneous newline characters in with the fields with spaces. I tried not splitting on spaces or newlines. That caused a problem at the end of the line. I needed only the newlines in fields with spaces to go away. I decided to look at the data more closely in my text editor with invisible characters on.

What I found in the data was interesting. The only places there were the erroneous newline characters in the data they were immediately preceded by a space character. Also when looking at the newline characters at the end of the lines they were never preceded by a space. I did a quick find and replace in my text editor to remove the space newlines with just spaces and found that it fixed the data file and all the fields lined up correctly. I didn't want to edit the data file outside the application but now I knew what the problem was.

Since I would have to loop through and remove the newlines with my previous approach anyway, came up with the algorithm to fix the data file before I start parsing it. The algorithm entailed reading the file one line at a time and appending it to a StringBuilder object. I would also have to append a newline to the StringBuilder object since the act of reading the line removed it. After I had the entire file in the StringBuilder exactly like it was I converted it to a String. I then used the String.replaceAll() method and replaced all the space newlines with spaces and put the resulting String in a new variable. Now I could read one line at a time and get only one record. I read those lines into an ArrayList as a list of Strings. That ArrayList would be used for further parsing and processing.

Other than the data there was really only one thing I needed to figure out. That was how I could sort the data arrays. I found calling the Arrays.sort() method would sort based on the natural order of the objects. This was defined by the compareTo() method. I found I needed to implement the Comparable interface in my EarthquakeRecord object and override a compareTo() method. I implemented this method to compare the date field and return the proper value for the method. Now I could sort my arrays.

The final step was to implement all the methods to display the proper data to the screen and file. I went through and built methods to do all the output for me and called them from within the main method. I did this to make the code more readable and minimize the size of the main method.

Overall I found the project to be rather easy once I got past the data issues. It probably took me a little longer to get all the formatting of the output right because I was being rather picky on how it was looking. But all in all I think it turned out good.

Screenshots Demonstrating Application:

Screenshots of the application running appear on the following pages.

Screenshot of the application starting and displaying the table of tectonic associations by continent and a table of the minimum and maximum earthquakes per continent.

NetBeans IDE 7.1

Output - mp1 (run) x Tasks

run:
 Project: MP1
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Tectonic Associations by Continent

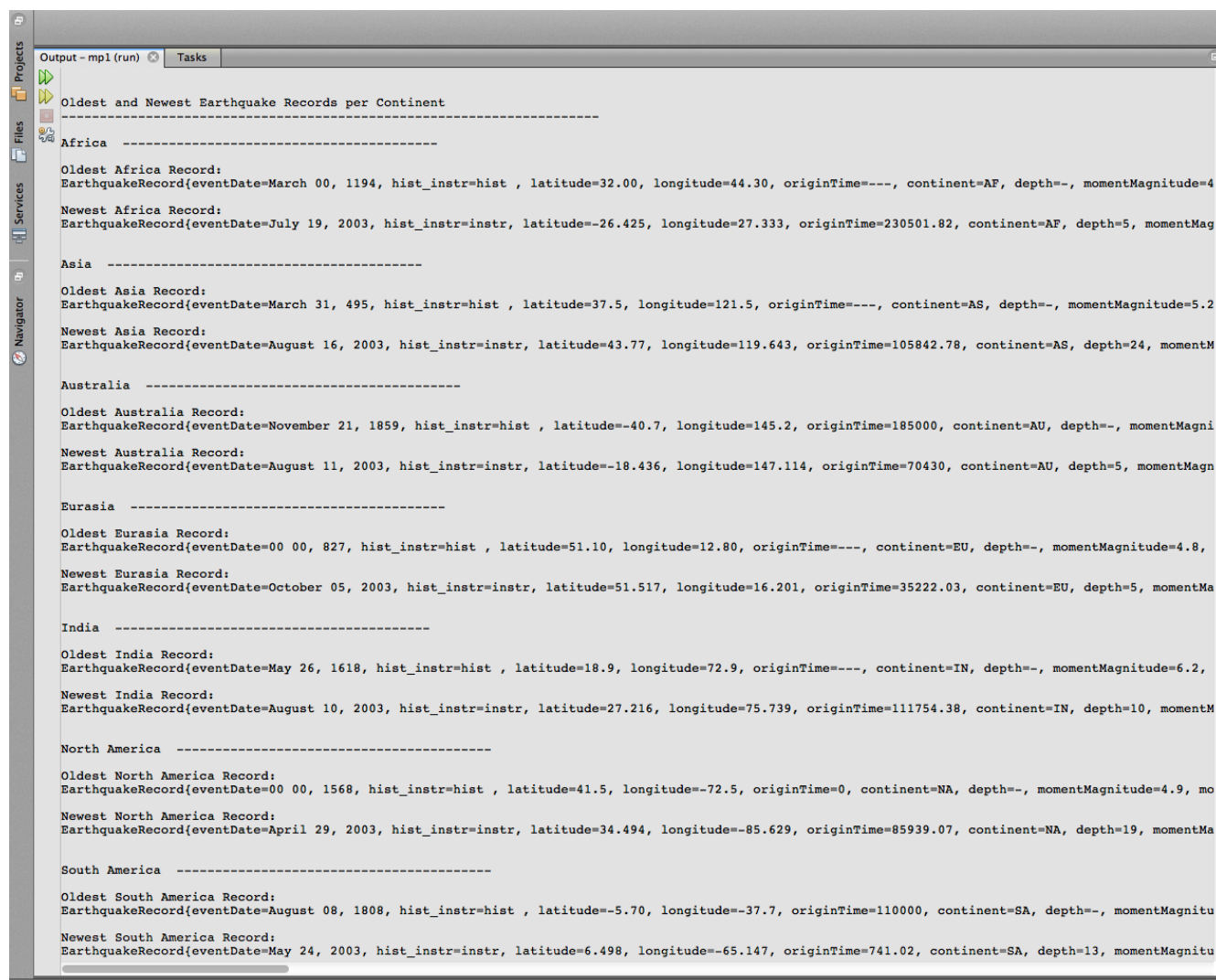
	Rifts	RCM*	Non-Rifted Crust	Possible Rifts	Europe	Possible RCM*
Africa	21	67	84	21	0	6
Asia	89	15	56	24	0	2
Australia	29	65	119	6	0	5
Eurasia	61	39	45	22	31	5
India	75	28	36	8	0	1
North America	51	86	75	6	0	2
South America	2	9	26	1	0	3

* Rifted Continental Margins (Passive Margins)

Minimum and Maximum Number of Earthquakes by Continent

	Minimum	Maximum
Africa	1	287
Asia	1	190
Australia	1	224
Eurasia	1	224
India	1	163
North America	1	244
South America	1	41
Total		1373

Screenshot of the application displaying the oldest and newest earthquake records grouped by the continent where they happened.



The screenshot shows an IDE window with a sidebar on the left containing icons for Projects, Files, Services, and Navigator. The main area displays the output of a program titled "Output - mpl (run)". The output text is as follows:

```
Oldest and Newest Earthquake Records per Continent
-----
Africa -----
Oldest Africa Record:
EarthquakeRecord{eventDate=March 00, 1194, hist_instr=hist , latitude=32.00, longitude=44.30, originTime=---, continent=AF, depth=--, momentMagnitude=4
Newest Africa Record:
EarthquakeRecord{eventDate=July 19, 2003, hist_instr=instr, latitude=-26.425, longitude=27.333, originTime=230501.82, continent=AF, depth=5, momentMag

Asia -----
Oldest Asia Record:
EarthquakeRecord{eventDate=March 31, 495, hist_instr=hist , latitude=37.5, longitude=121.5, originTime=---, continent=AS, depth=--, momentMagnitude=5.2
Newest Asia Record:
EarthquakeRecord{eventDate=August 16, 2003, hist_instr=instr, latitude=43.77, longitude=119.643, originTime=105842.78, continent=AS, depth=24, momentM

Australia -----
Oldest Australia Record:
EarthquakeRecord{eventDate=November 21, 1859, hist_instr=hist , latitude=-40.7, longitude=145.2, originTime=185000, continent=AU, depth=--, momentMagni
Newest Australia Record:
EarthquakeRecord{eventDate=August 11, 2003, hist_instr=instr, latitude=-18.436, longitude=147.114, originTime=70430, continent=AU, depth=5, momentMagn

Eurasia -----
Oldest Eurasia Record:
EarthquakeRecord{eventDate=00 00, 827, hist_instr=hist , latitude=51.10, longitude=12.80, originTime=---, continent=EU, depth=--, momentMagnitude=4.8,
Newest Eurasia Record:
EarthquakeRecord{eventDate=October 05, 2003, hist_instr=instr, latitude=51.517, longitude=16.201, originTime=35222.03, continent=EU, depth=5, momentMa

India -----
Oldest India Record:
EarthquakeRecord{eventDate=May 26, 1618, hist_instr=hist , latitude=18.9, longitude=72.9, originTime=---, continent=IN, depth=--, momentMagnitude=6.2,
Newest India Record:
EarthquakeRecord{eventDate=August 10, 2003, hist_instr=instr, latitude=27.216, longitude=75.739, originTime=111754.38, continent=IN, depth=10, momentM

North America -----
Oldest North America Record:
EarthquakeRecord{eventDate=00 00, 1568, hist_instr=hist , latitude=41.5, longitude=-72.5, originTime=0, continent=NA, depth=--, momentMagnitude=4.9, mo
Newest North America Record:
EarthquakeRecord{eventDate=April 29, 2003, hist_instr=instr, latitude=34.494, longitude=-85.629, originTime=85939.07, continent=NA, depth=19, momentMa

South America -----
Oldest South America Record:
EarthquakeRecord{eventDate=August 08, 1808, hist_instr=hist , latitude=-5.70, longitude=-37.7, originTime=110000, continent=SA, depth=--, momentMagnitu
Newest South America Record:
EarthquakeRecord{eventDate=May 24, 2003, hist_instr=instr, latitude=6.498, longitude=-65.147, originTime=741.02, continent=SA, depth=13, momentMagnitu
```

This screenshot shows the application starting to display all the earthquake records. They are output grouped by continent.

```
Output - mpl (run) Tasks
Newest South America Record:
EarthquakeRecord{eventDate=May 24, 2003, hist_instr=instr, latitude=6.498, longitude=-65.147, originTime=741.02, continent=SA, depth=13, momentMagnitu

-----
All Earthquake Records per Continent
-----
Africa
-----
EarthquakeRecord{eventDate=March 00, 1194, hist_instr=hist, latitude=32.00, longitude=44.30, originTime=---, continent=AF, depth=-, momentMagnitude=4
EarthquakeRecord{eventDate=00 00, 1615, hist_instr=hist, latitude=5.1, longitude=1.3, originTime=---, continent=AF, depth=-, momentMagnitude=5.5, mo
EarthquakeRecord{eventDate=February 18, 1618, hist_instr=hist, latitude=16.7, longitude=-3.2, originTime=120000, continent=AF, depth=-, momentMagnitu
EarthquakeRecord{eventDate=December 18, 1636, hist_instr=hist, latitude=5.1, longitude=-2.2, originTime=---, continent=AF, depth=-, momentMagnitude=6
EarthquakeRecord{eventDate=00 00, 1788, hist_instr=hist, latitude=7.6, longitude=1.7, originTime=---, continent=AF, depth=-, momentMagnitude=5.7, mom
EarthquakeRecord{eventDate=May 20, 1795, hist_instr=hist, latitude=9.3, longitude=-13.4, originTime=220000, continent=AF, depth=-, momentMagnitude=4.
EarthquakeRecord{eventDate=December 04, 1809, hist_instr=hist, latitude=-34.0, longitude=18.4, originTime=200800, continent=AF, depth=-, momentMagnit
EarthquakeRecord{eventDate=June 02, 1811, hist_instr=hist, latitude=-34.0, longitude=18.4, originTime=90000, continent=AF, depth=-, momentMagnitude=4
EarthquakeRecord{eventDate=January 00, 1818, hist_instr=hist, latitude=12.1, longitude=-12.4, originTime=---, continent=AF, depth=-, momentMagnitude=
EarthquakeRecord{eventDate=00 00, 1820, hist_instr=hist, latitude=-4.5, longitude=11.6, originTime=---, continent=AF, depth=-, momentMagnitude=6.4, m
EarthquakeRecord{eventDate=July 10, 1862, hist_instr=hist, latitude=7.0, longitude=0.4, originTime=81500, continent=AF, depth=-, momentMagnitude=6.8,
EarthquakeRecord{eventDate=April 14, 1872, hist_instr=hist, latitude=5.5, longitude=-0.4, originTime=230000, continent=AF, depth=-, momentMagnitude=5
EarthquakeRecord{eventDate=February 11, 1879, hist_instr=hist, latitude=6.5, longitude=-3.3, originTime=60000, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=August 00, 1883, hist_instr=hist, latitude=30.0, longitude=9.5, originTime=0, continent=AF, depth=-, momentMagnitude=4.9,
EarthquakeRecord{eventDate=00 00, 1889, hist_instr=hist, latitude=6.8, longitude=-6.7, originTime=---, continent=AF, depth=-, momentMagnitude=5.1, mo
EarthquakeRecord{eventDate=June 04, 1903, hist_instr=hist, latitude=0.0, longitude=26, originTime=145800, continent=AF, depth=-, momentMagnitude=6.3,
EarthquakeRecord{eventDate=November 20, 1906, hist_instr=hist, latitude=6.5, longitude=0.3, originTime=210000, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=February 02, 1907, hist_instr=instr, latitude=33.0, longitude=18.4, originTime=90454, continent=AF, depth=-, momentMagnitud
EarthquakeRecord{eventDate=00 00, 1908, hist_instr=hist, latitude=7.7, longitude=-7.8, originTime=---, continent=AF, depth=-, momentMagnitude=5.8, mo
EarthquakeRecord{eventDate=April 02, 1908, hist_instr=hist/instr, latitude=3.0, longitude=25.5, originTime=55300, continent=AF, depth=-, momentMagnitud
EarthquakeRecord{eventDate=August 05, 1909, hist_instr=hist, latitude=-22.2, longitude=29, originTime=83700, continent=AF, depth=-, momentMagnitude=5
EarthquakeRecord{eventDate=May 30, 1910, hist_instr=instr, latitude=10.0, longitude=27.0, originTime=123000, continent=AF, depth=-, momentMagnitude=5.
EarthquakeRecord{eventDate=October 21, 1910, hist_instr=hist, latitude=-30.5, longitude=24.7, originTime=184200, continent=AF, depth=-, momentMagnitu
EarthquakeRecord{eventDate=March 26, 1911, hist_instr=instr, latitude=3.1, longitude=11.0, originTime=132000, continent=AF, depth=-, momentMagnitude=5
EarthquakeRecord{eventDate=February 20, 1912, hist_instr=instr, latitude=-29.45, longitude=25.06, originTime=130300, continent=AF, depth=-, momentMagn
EarthquakeRecord{eventDate=October 09, 1913, hist_instr=hist, latitude=3.8, longitude=12.3, originTime=160000, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=May 18, 1914, hist_instr=hist/instr, latitude=31.35, longitude=15.25, originTime=104656, continent=AF, depth=-, momentMagnit
EarthquakeRecord{eventDate=May 24, 1914, hist_instr=instr, latitude=-10.0, longitude=15.0, originTime=155604, continent=AF, depth=-, momentMagnitude=6
EarthquakeRecord{eventDate=January 21, 1917, hist_instr=hist/instr, latitude=-3.0, longitude=10.0, originTime=232720, continent=AF, depth=-, momentMag
EarthquakeRecord{eventDate=October 31, 1919, hist_instr=instr, latitude=-27, longitude=31.5, originTime=153635, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=September 16, 1921, hist_instr=hist, latitude=3.8, longitude=16.3, originTime=190000, continent=AF, depth=-, momentMagnitu
EarthquakeRecord{eventDate=April 05, 1928, hist_instr=hist, latitude=9.8, longitude=-13.3, originTime=80200, continent=AF, depth=-, momentMagnitude=4
EarthquakeRecord{eventDate=July 26, 1929, hist_instr=instr, latitude=-2.5, longitude=24.5, originTime=171850, continent=AF, depth=-, momentMagnitude=5
EarthquakeRecord{eventDate=April 03, 1930, hist_instr=instr, latitude=32.5, longitude=43.7, originTime=120840, continent=AF, depth=33, momentMagnitude
EarthquakeRecord{eventDate=May 01, 1931, hist_instr=hist/instr, latitude=3.0, longitude=27.0, originTime=94525, continent=AF, depth=33, momentMagnitud
EarthquakeRecord{eventDate=December 31, 1932, hist_instr=instr, latitude=-28.5, longitude=32.75, originTime=63053, continent=AF, depth=-, momentMagnit
EarthquakeRecord{eventDate=April 19, 1935, hist_instr=instr, latitude=31.243, longitude=15.3, originTime=152323.62, continent=AF, depth=15, momentMagn
EarthquakeRecord{eventDate=April 19, 1935, hist_instr=instr, latitude=31.20, longitude=15.00, originTime=161841, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=April 19, 1935, hist_instr=instr, latitude=30.8, longitude=15.5, originTime=175747, continent=AF, depth=-, momentMagnitude=
EarthquakeRecord{eventDate=April 19, 1935, hist_instr=instr, latitude=31.60, longitude=15.43, originTime=203139, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=April 20, 1935, hist_instr=instr, latitude=31.60, longitude=15.64, originTime=51056, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=January 12, 1936, hist_instr=hist, latitude=-27.0, longitude=31.0, originTime=51624, continent=AF, depth=10, momentMagnitu
EarthquakeRecord{eventDate=January 16, 1936, hist_instr=hist/instr, latitude=-29.8, longitude=25.3, originTime=93800, continent=AF, depth=30, momentMa
EarthquakeRecord{eventDate=June 13, 1936, hist_instr=instr, latitude=32.75, longitude=22.50, originTime=3237, continent=AF, depth=-, momentMagnitude=5
EarthquakeRecord{eventDate=July 21, 1938, hist_instr=instr, latitude=-3.1, longitude=41.1, originTime=91036, continent=AF, depth=-, momentMagnitude=6.
EarthquakeRecord{eventDate=January 20, 1939, hist_instr=instr, latitude=31.03, longitude=15.84, originTime=12421, continent=AF, depth=-, momentMagnitu
EarthquakeRecord{eventDate=January 20, 1939, hist_instr=instr, latitude=31.10, longitude=15.94, originTime=142230, continent=AF, depth=-, momentMagnit
EarthquakeRecord{eventDate=January 23, 1939, hist_instr=instr, latitude=31.69, longitude=16.06, originTime=22251, continent=AF, depth=-, momentMagnitu
EarthquakeRecord{eventDate=February 02, 1939, hist_instr=instr, latitude=31.80, longitude=16.80, originTime=22350, continent=AF, depth=-, momentMagnit
EarthquakeRecord{eventDate=June 22, 1939, hist_instr=instr, latitude=5.18, longitude=-0.13, originTime=191931, continent=AF, depth=13, momentMagnitude
EarthquakeRecord{eventDate=August 18, 1939, hist_instr=instr, latitude=6.2, longitude=-0.3, originTime=45114, continent=AF, depth=-, momentMagnitude=5
EarthquakeRecord{eventDate=November 10, 1940, hist_instr=hist, latitude=-24.0, longitude=30.2, originTime=210000, continent=AF, depth=-, momentMagnitude
EarthquakeRecord{eventDate=March 04, 1941, hist_instr=instr, latitude=30.75, longitude=15.75, originTime=234510, continent=AF, depth=-, momentMagnitud
EarthquakeRecord{eventDate=November 01, 1942, hist_instr=hist/instr, latitude=-31.1, longitude=30.5, originTime=45000, continent=AF, depth=-, momentMa
```

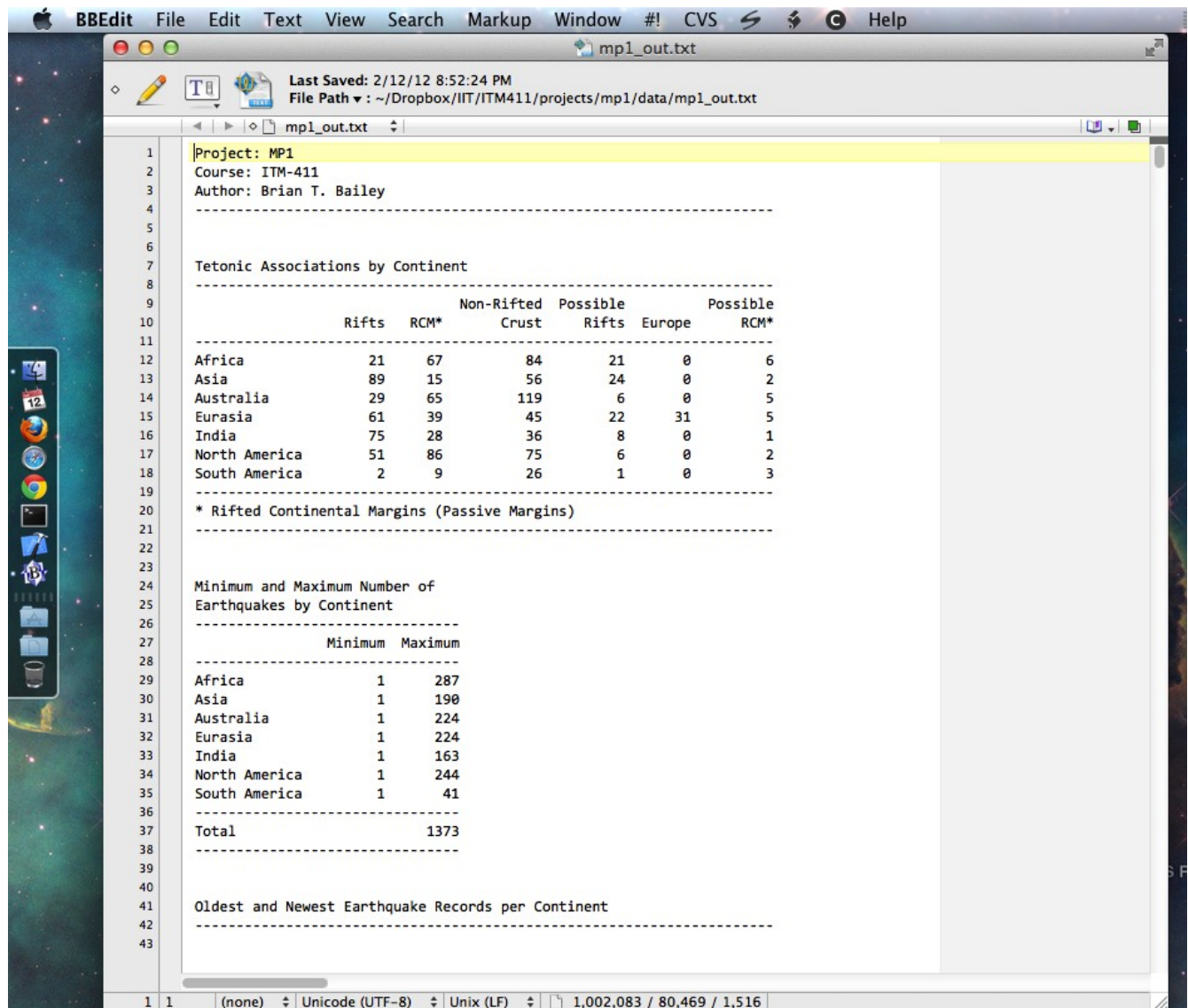

This screenshot shows the end of the list of all records and the indication that the build was successful and the application finished running.

```
Output - mpl (run) Tasks
EarthquakeRecord{eventDate=September 05, 2001, hist_instr=instr, latitude=75.1661, longitude=-106.1823, originTime=23334.3, continent=NA, depth=33, mo
EarthquakeRecord{eventDate=September 05, 2001, hist_instr=instr, latitude=77.984, longitude=-114.673, originTime=23349.8, continent=NA, depth=10, mome
EarthquakeRecord{eventDate=September 05, 2001, hist_instr=instr, latitude=37.109, longitude=-104.528, originTime=105207.5, continent=NA, depth=5, mome
EarthquakeRecord{eventDate=September 11, 2001, hist_instr=instr, latitude=18.5, longitude=-92.2, originTime=91321.4, continent=NA, depth=10, momentMag
EarthquakeRecord{eventDate=September 15, 2001, hist_instr=instr, latitude=19.7238, longitude=-91.9038, originTime=80237.9, continent=NA, depth=33, mom
EarthquakeRecord{eventDate=September 18, 2001, hist_instr=instr, latitude=43.853, longitude=-105.232, originTime=200104.2, continent=NA, depth=0, mome
EarthquakeRecord{eventDate=September 30, 2001, hist_instr=instr, latitude=43.79, longitude=-105.286, originTime=180138.7, continent=NA, depth=0, momen
EarthquakeRecord{eventDate=October 01, 2001, hist_instr=instr, latitude=68.8555, longitude=-127.6986, originTime=82332.1, continent=NA, depth=10, mome
EarthquakeRecord{eventDate=October 09, 2001, hist_instr=instr, latitude=21.7104, longitude=-92.8017, originTime=184842.4, continent=NA, depth=33, mome
EarthquakeRecord{eventDate=November 07, 2001, hist_instr=instr, latitude=43.775, longitude=-105.215, originTime=200020.8, continent=NA, depth=0, momen
EarthquakeRecord{eventDate=November 17, 2001, hist_instr=instr, latitude=43.809, longitude=-105.22, originTime=190253.1, continent=NA, depth=0, moment
EarthquakeRecord{eventDate=January 07, 2002, hist_instr=instr, latitude=69.11, longitude=-95.87, originTime=104108, continent=NA, depth=18, momentMagn
EarthquakeRecord{eventDate=April 20, 2002, hist_instr=instr, latitude=44.513, longitude=-73.699, originTime=105047.5, continent=NA, depth=11, momentMa
EarthquakeRecord{eventDate=June 18, 2002, hist_instr=instr, latitude=38.069, longitude=-87.68, originTime=173713, continent=NA, depth=5, momentMagnitu
EarthquakeRecord{eventDate=April 29, 2003, hist_instr=instr, latitude=34.494, longitude=-85.629, originTime=85939.07, continent=NA, depth=19, momentMa

South America -----
EarthquakeRecord{eventDate=August 08, 1808, hist_instr=hist, latitude=-5.70, longitude=-37.7, originTime=110000, continent=SA, depth=-, momentMagnitu
EarthquakeRecord{eventDate=00 00, 1824, hist_instr=hist, latitude=-8, longitude=-39, originTime=---, continent=SA, depth=-, momentMagnitude=5.4, mome
EarthquakeRecord{eventDate=July 18, 1905, hist_instr=hist, latitude=-10.2, longitude=-40.4, originTime=223000, continent=SA, depth=-, momentMagnitude
EarthquakeRecord{eventDate=June 01, 1919, hist_instr=hist, latitude=-18.00, longitude=-56.00, originTime=213000, continent=SA, depth=-, momentMagnitu
EarthquakeRecord{eventDate=January 27, 1922, hist_instr=hist, latitude=-22.17, longitude=-47.04, originTime=65000, continent=SA, depth=-, momentMagni
EarthquakeRecord{eventDate=June 28, 1939, hist_instr=instr, latitude=-29.00, longitude=-49.00, originTime=113227, continent=SA, depth=-, momentMagnitu
EarthquakeRecord{eventDate=January 21, 1948, hist_instr=hist/instr, latitude=-31.11, longitude=-57.27, originTime=164756.9, continent=SA, depth=84, mo
EarthquakeRecord{eventDate=September 17, 1949, hist_instr=hist, latitude=3.83, longitude=-51.84, originTime=---, continent=SA, depth=-, momentMagnitude
EarthquakeRecord{eventDate=January 31, 1955, hist_instr=instr, latitude=-12.42, longitude=-57.3, originTime=50307, continent=SA, depth=33, momentMagni
EarthquakeRecord{eventDate=April 16, 1957, hist_instr=instr, latitude=-9.5, longitude=-67.0, originTime=191712, continent=SA, depth=-, momentMagnitude
EarthquakeRecord{eventDate=June 14, 1963, hist_instr=instr, latitude=-2.3, longitude=-61.01, originTime=542, continent=SA, depth=45, momentMagnitu
EarthquakeRecord{eventDate=February 13, 1964, hist_instr=instr, latitude=-18.06, longitude=-56.69, originTime=112146, continent=SA, depth=5, momentMag
EarthquakeRecord{eventDate=June 19, 1964, hist_instr=instr, latitude=2.55, longitude=-59.3, originTime=35622.4, continent=SA, depth=75, momentMagnitude
EarthquakeRecord{eventDate=August 15, 1965, hist_instr=instr, latitude=2.71, longitude=-60.24, originTime=193657, continent=SA, depth=42, momentMagnit
EarthquakeRecord{eventDate=October 24, 1972, hist_instr=instr, latitude=-21.8, longitude=-40.5, originTime=153635.9, continent=SA, depth=10, momentMag
EarthquakeRecord{eventDate=September 27, 1974, hist_instr=instr, latitude=2.646, longitude=-71.355, originTime=40859.9, continent=SA, depth=20.6, mome
EarthquakeRecord{eventDate=August 02, 1977, hist_instr=instr, latitude=-0.1, longitude=-50.0, originTime=174552, continent=SA, depth=33, momentMagnitu
EarthquakeRecord{eventDate=March 06, 1980, hist_instr=instr, latitude=-6.17, longitude=-71.16, originTime=94618, continent=SA, depth=18, momentMagnitu
EarthquakeRecord{eventDate=November 12, 1980, hist_instr=instr, latitude=-8.04, longitude=-50.14, originTime=212305, continent=SA, depth=33, momentMag
EarthquakeRecord{eventDate=November 20, 1980, hist_instr=instr, latitude=-4.30, longitude=-38.40, originTime=32942, continent=SA, depth=5, momentMagni
EarthquakeRecord{eventDate=April 08, 1982, hist_instr=instr, latitude=-24.8, longitude=-58.1, originTime=55852, continent=SA, depth=12, momentMagnitude
EarthquakeRecord{eventDate=February 08, 1983, hist_instr=instr, latitude=-26.26, longitude=-59.89, originTime=183815.2, continent=SA, depth=33, moment
EarthquakeRecord{eventDate=August 05, 1983, hist_instr=instr, latitude=-3.59, longitude=-62.17, originTime=62142, continent=SA, depth=23, momentMagnit
EarthquakeRecord{eventDate=December 25, 1983, hist_instr=instr, latitude=-5.09, longitude=-73.42, originTime=53240.2, continent=SA, depth=37, momentMa
EarthquakeRecord{eventDate=April 12, 1985, hist_instr=instr, latitude=-23.94, longitude=-60.55, originTime=143457, continent=SA, depth=21, momentMagni
EarthquakeRecord{eventDate=November 30, 1986, hist_instr=instr, latitude=-5.5, longitude=-35.75, originTime=51948.29, continent=SA, depth=5, momentMag
EarthquakeRecord{eventDate=June 26, 1988, hist_instr=instr, latitude=-36.27, longitude=-52.73, originTime=32426, continent=SA, depth=31, momentMagnitu
EarthquakeRecord{eventDate=March 10, 1989, hist_instr=instr, latitude=-5.81, longitude=-35.56, originTime=41122.4, continent=SA, depth=10, momentMagni
EarthquakeRecord{eventDate=March 26, 1989, hist_instr=instr, latitude=-5.05, longitude=-37.6, originTime=132536, continent=SA, depth=10, momentMagnitu
EarthquakeRecord{eventDate=February 12, 1990, hist_instr=instr, latitude=-31.22, longitude=-48.9, originTime=235638, continent=SA, depth=5, momentMagn
EarthquakeRecord{eventDate=April 19, 1991, hist_instr=instr, latitude=-4.006, longitude=-39.7315, originTime=101247.1, continent=SA, depth=10.7, momen
EarthquakeRecord{eventDate=April 28, 1995, hist_instr=instr, latitude=-6.2142, longitude=-73.2034, originTime=222953, continent=SA, depth=33, momentMa
EarthquakeRecord{eventDate=October 30, 1995, hist_instr=instr, latitude=-49.6603, longitude=-42.775, originTime=651.7, continent=SA, depth=33, momentM
EarthquakeRecord{eventDate=September 08, 1996, hist_instr=instr, latitude=-4.4521, longitude=-76.7274, originTime=60934.5, continent=SA, depth=35, mom
EarthquakeRecord{eventDate=September 11, 1997, hist_instr=instr, latitude=-3.6376, longitude=-76.9265, originTime=24435.4, continent=SA, depth=29, mom
EarthquakeRecord{eventDate=March 03, 1998, hist_instr=instr, latitude=-3.7548, longitude=-77.322, originTime=172328.1, continent=SA, depth=9.2, moment
EarthquakeRecord{eventDate=March 10, 1998, hist_instr=instr, latitude=-11.745, longitude=-56.9634, originTime=233243.6, continent=SA, depth=10, moment
EarthquakeRecord{eventDate=June 27, 2001, hist_instr=instr, latitude=-12.1, longitude=-63.7, originTime=2148.2, continent=SA, depth=10, momentMagnitude
EarthquakeRecord{eventDate=July 25, 2001, hist_instr=instr, latitude=-12.663, longitude=-59.8357, originTime=221348.6, continent=SA, depth=10, momentM
EarthquakeRecord{eventDate=July 31, 2001, hist_instr=instr, latitude=-9.2026, longitude=-70.0348, originTime=152810.8, continent=SA, depth=10, momentM
EarthquakeRecord{eventDate=May 24, 2003, hist_instr=instr, latitude=6.498, longitude=-65.147, originTime=741.02, continent=SA, depth=13, momentMagnitu

BUILD SUCCESSFUL (total time: 5 seconds)
```

This final screenshot shows the mp1_out.txt file produced by this application opened in a text editor.



```
1 |Project: MP1
2 |Course: ITM-411
3 |Author: Brian T. Bailey
4 |-----
5 |
6 |
7 |Tectonic Associations by Continent
8 |-----
9 |
10 |          Rifts   RCM*   Non-Rifted   Possible   Possible
11 |                   Crust   Rifts   Europe   RCM*
12 |-----
13 |Africa           21    67         84        21         0         6
14 |Asia             89    15         56        24         0         2
15 |Australia        29    65        119         6         0         5
16 |Eurasia          61    39         45        22        31         5
17 |India            75    28         36         8         0         1
18 |North America    51    86         75         6         0         2
19 |South America     2     9         26         1         0         3
20 |-----
21 |* Rifted Continental Margins (Passive Margins)
22 |-----
23 |
24 |Minimum and Maximum Number of
25 |Earthquakes by Continent
26 |-----
27 |          Minimum   Maximum
28 |-----
29 |Africa              1    287
30 |Asia                1    190
31 |Australia           1    224
32 |Eurasia             1    224
33 |India               1    163
34 |North America       1    244
35 |South America       1     41
36 |-----
37 |Total              1373
38 |-----
39 |
40 |
41 |Oldest and Newest Earthquake Records per Continent
42 |-----
43 |
```

1 1 | (none) | Unicode (UTF-8) | Unix (LF) | 1,002,083 / 80,469 / 1,516