Lab 1 - Tradeoff Analysis

Implementation

The goal is to implement file reader that allows finding given word in the file. I have coded three classes that implement `Searchable` interface:

- `LineByLineReader` - creates instance of buffered reader, reads file line-by-line, searching for given word, if word is found `true` is returned
- `WholeReader` - creates list of all lines at the time object initialization, then list is searched for given word, if word is found `true` is returned
- `CustomReader` - variation of `WholeReader` - also reads whole file at the time of object init, however binary search algorithm is used for searching given word

Performace measurements

Performance of above methods is measured by simply measuring average time needed to find a word in file. I have implementet testing environment - word is randomly choosen from file, then all of three readers tries to find same word. Elapsed time is measured for every search, then average is calculated.

Test's results for up to 100000 searches:

```
For 10 test cases...
  ...it takes 2.363636 on average for method 'wholeReader' to find a word...
  ...it takes 0.727273 on average for method 'lineByLineReader' to find a word...
  ...it takes 1.272727 on average for method 'customReader' to find a word...
For 100 test cases...
  ...it takes 0.693069 on average for method 'wholeReader' to find a word...
  ...it takes 0.376238 on average for method 'lineByLineReader' to find a word...
  ...it takes 0.643564 on average for method 'customReader' to find a word...
For 1000 test cases...
  ...it takes 0.536464 on average for method 'wholeReader' to find a word...
  ...it takes 0.249750 on average for method 'lineByLineReader' to find a word...
  ...it takes 0.521479 on average for method 'customReader' to find a word...
For 10000 test cases...
  ...it takes 0.454355 on average for method 'wholeReader' to find a word...
  ...it takes 0.208979 on average for method 'lineByLineReader' to find a word...
  ...it takes 0.434057 on average for method 'customReader' to find a word...
For 100000 test cases...
  ...it takes 0.471555 on average for method 'wholeReader' to find a word...
  ...it takes 0.223768 on average for method 'lineByLineReader' to find a word...
  ...it takes 0.448616 on average for method 'customReader' to find a word...
```

Conclusions

For all amounts of test cases it is faster to search for word line-by-line. Rereading whole file at initialization results in nearly two times larger execution time. This time can be slightly shorten by using more sophasticated search algorithm, however, in case of binary search we need to assume that words in file are sorted.