5.3.39 Timings. Write a program that times the four methods for the task of searching for the substring
“it is a far far better thing that i do than i have ever done”
in the text of Tale of Two Cities (tale.txt). Discuss the extent to which your results validate the hypotheses about performance that are stated in the text.

Intro:
This question asks us to search for a substring in a file titled Tale of Two Cities using all the four algorithms of substring searching. I.e; brute force, KMP, Boyer Moore and Rabin Karp methods. And also asked to compare the performances of all the four methods.

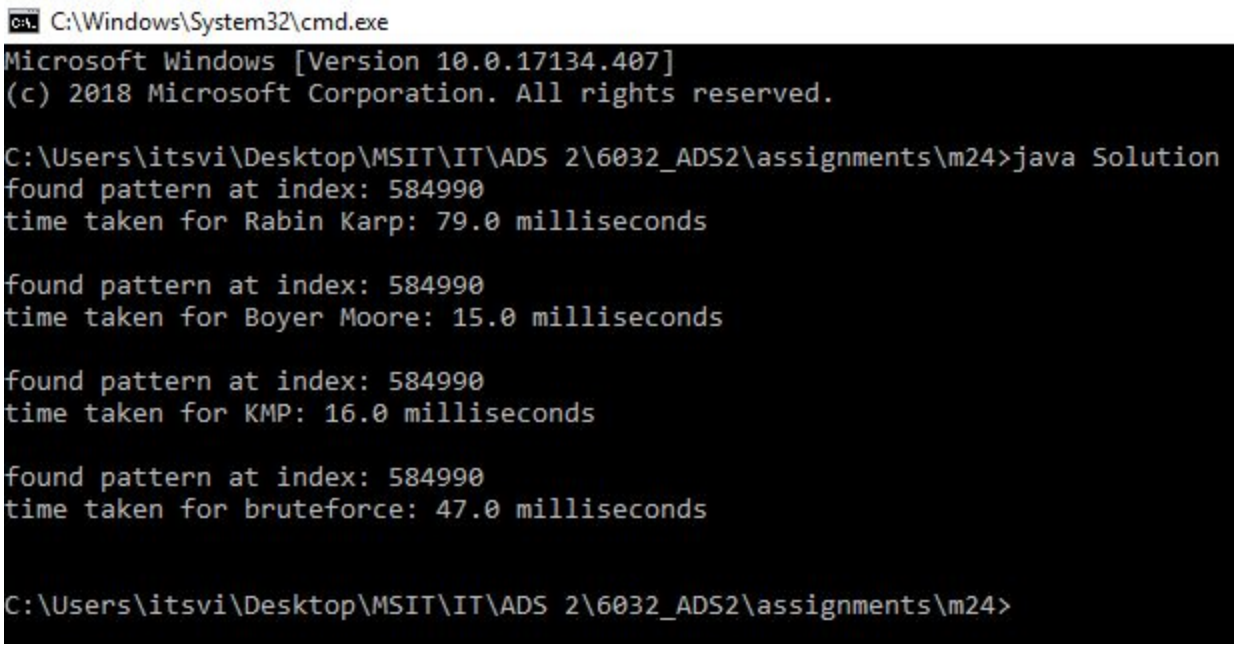
Expectation:

As per the performances taught by Bob sedwick, the Brute Force method will take MN complexity
KMP method will take 2M complexity
Boye Moore will take 3M complexity
and Rabin Karp will take 7M complexity.

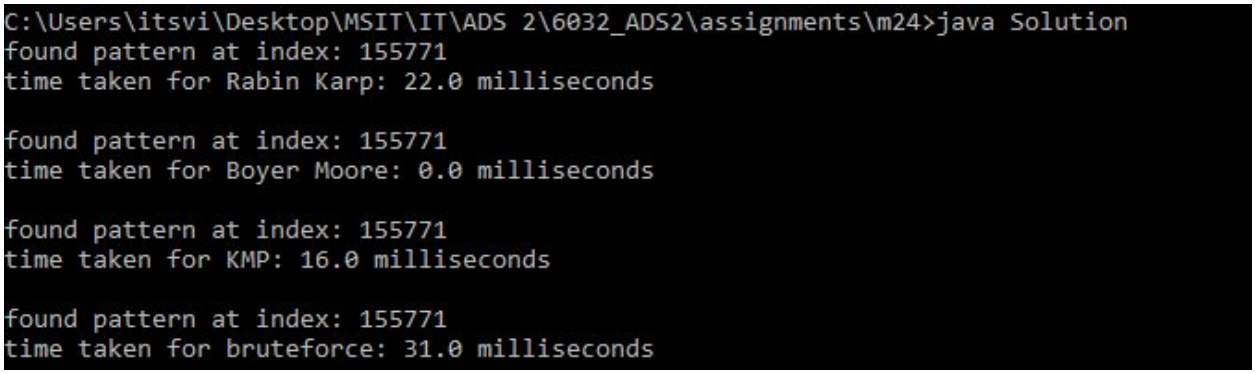
By the above data, by using KMP method for searching a substring in a text file will take lesser time compared to other searching methods

Observation:
Git Link:
https://github.com/tezasrivishnu/6032_ADS2/blob/master/assignments/m24/Solution.java

The string pattern we are searching in the text file is almost at the last.
KMP method took 16.0 ms
Boyer Moore method took 15.0 ms
Rabin Karp method took 79.0ms
Brute Force method took 47.0ms to search the given substring in the text file.



If the pattern we are searching is inthe middle of the file,
KMP method took 16.0ms
Boyer Moore method took 0.0ms(might be in nanoseconds)
Rabin Karp method took 22.0ms
Brute Force method took 31ms to search the given substring in the text file.



Conclusion:

In the above experiment, I have tested all the four methods of substring search algorithms. I got the fastest subsearch string by using Boye Moore method in lesser time compared to the other three substring search methods.