

GIT Department of Computer Engineering
CSE 222/505 - Spring 2020
Homework 3 Report

Melihcan Çilek
1801042092

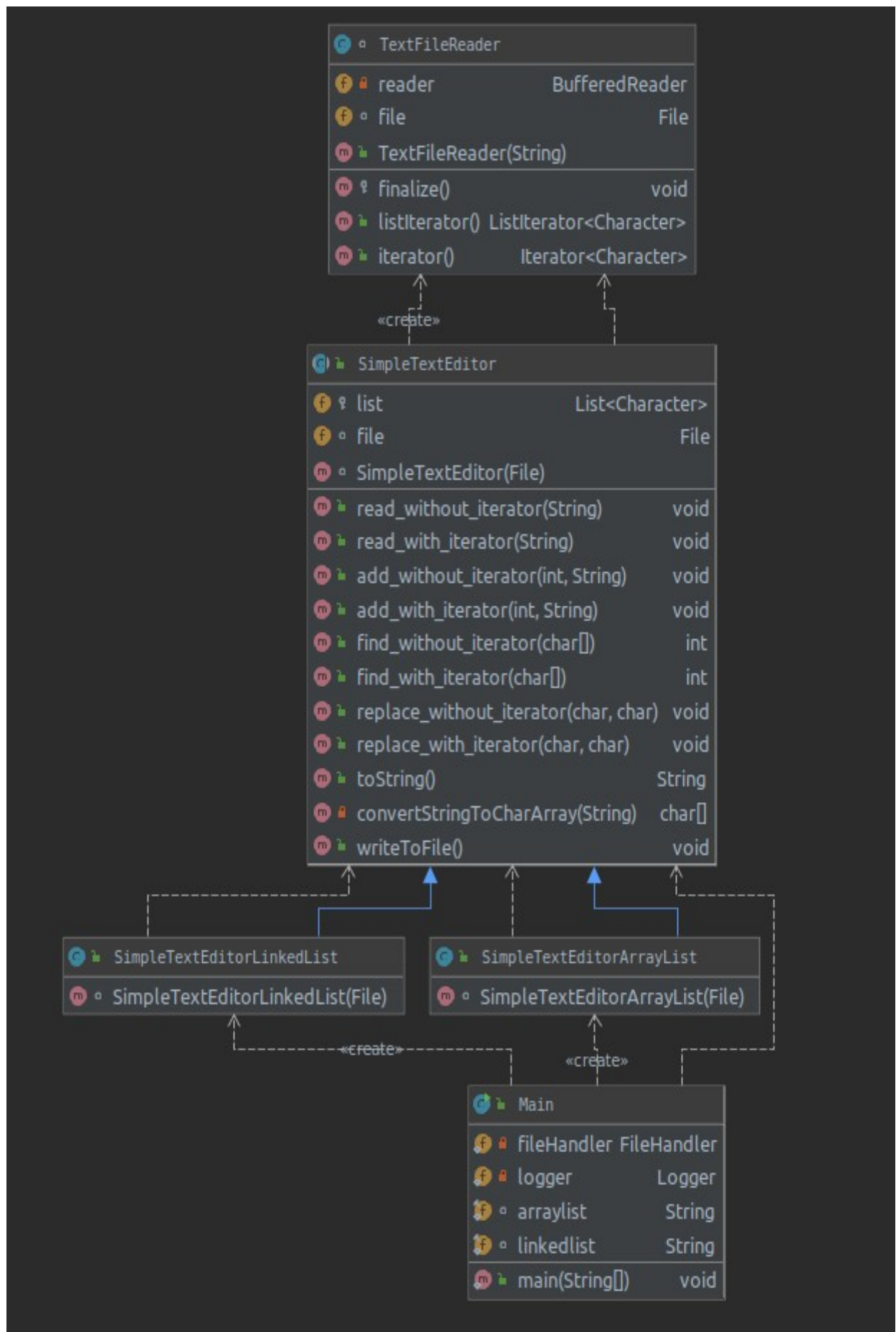
QUESTION 2

Problem solution approach:

In this problem, what wanted from us is that implementing simple text editor that has some edit functionality. First, we have to create custom created SimpleTextEditor class that has List<Character> generic interface field and file that is read from .txt file. Second, I have two extra class that are determine which abstract class will be used that are ArrayList or LinkedList abstract classes. Also one TextFileReader class for reading and iterating over text that is given as constructor.

Class Diagrams:

In this problem, we need to implement read, add, replace and find methods in our own custom style. Because of that our SimpleTextEditor class. For determining our abstract class, we used SimpleTextEditorArrayList and SimpleTextEditorLinkedList classes that are extends our SimpleTextEditor class because these three classes have same functionality with different class. Inside our SimpleTextEditor class, we have 8 different method such that with iterator and without iterator and after add and replace methods, we have writeToFile method for writing changes at list inside SimpleTextEditor class to text file that we get text from. Other than writeToFile method, inside class, I have convertStringToChar method for converting String object to char array.



Test Cases:

Tests:

```
startTime = System.nanoTime();
assert simpleTextEditorWithIterator != null;
simpleTextEditorWithIterator.readWithIterator(fileWithIterator.getPath());
stopTime = System.nanoTime();
double time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of read method with iterator is " + ((time) / 1_000_000_000) + " seconds.\n");

startTime = System.nanoTime();
simpleTextEditorWithoutIterator.readWithoutIterator(fileWithoutIterator.getPath());
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of read method without iterator is " + ((time) / 1_000_000_000) + " seconds.\n");
```

```
startTime = System.nanoTime();
simpleTextEditorWithIterator.addWithIterator(position: 65, nameWillBeAdded: " THIS STRING IS FROM ADD METHOD OF WIT ITERATOR BY USING " + value);
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of add method with iterator is " + ((time) / 1_000_000_000) + " seconds.\n");

startTime = System.nanoTime();
simpleTextEditorWithoutIterator.addWithoutIterator(position: 65, nameWillBeAdded: " THIS STRING IS FROM ADD METHOD OF NOT ITERATOR BY USING " + value);
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of add method without iterator is " + ((time) / 1_000_000_000) + " seconds.\n");
```

```
String value_string = "reprehenderit";
char[] values = value_string.toCharArray();

logger.info(msg: value_string + " is the string for find method.");

startTime = System.nanoTime();
logger.info(msg: "Starting index of character array " + Arrays.toString(values) + " is " + simpleTextEditorWithIterator.findWithIterator(values));
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of find method with iterator is " + ((time) / 1_000_000_000) + " seconds.\n");

startTime = System.nanoTime();
logger.info(msg: "Starting index of character array " + Arrays.toString(values) + " is " + simpleTextEditorWithoutIterator.findWithoutIterator(values));
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of find method without iterator is " + ((time) / 1_000_000_000) + " seconds.\n");
```

```
logger.info(msg: "Text before replacing is \n" + simpleTextEditorWithIterator);
startTime = System.nanoTime();
simpleTextEditorWithIterator.replaceWithIterator(before: 'a', after: '.');
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of replace method with iterator is " + ((time) / 1_000_000_000) + " seconds.\n");
logger.info(msg: "Text after replacing is \n" + simpleTextEditorWithIterator);

logger.info(msg: "Text before replacing is \n" + simpleTextEditorWithoutIterator);
startTime = System.nanoTime();
simpleTextEditorWithoutIterator.replaceWithoutIterator(before: 'a', after: '.');
stopTime = System.nanoTime();
time = (double)(stopTime - startTime);
logger.info(msg: "Execution time of replace method without iterator is " + ((time) / 1_000_000_000) + " seconds.\n");
logger.info(msg: "Text after replacing is \n" + simpleTextEditorWithoutIterator);
```

Running Commands And Results:

Arraylist

Test1: For 370 character

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
]
1-> ArrayList implementation test
2-> LinkedList implementation test
]
Nis 02, 2020 2:09:13 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:09:13 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:09:13 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:09:13 00 Main test2
INFO: Execution time of add method with iterator is 0.002295887 seconds.

Nis 02, 2020 2:09:13 00 Main test2
INFO: Execution time of add method without iterator is 3.70149E-4 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
]
1-> ArrayList implementation test
2-> LinkedList implementation test
]
Nis 02, 2020 2:17:31 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:17:31 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:17:31 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:17:31 00 Main test3
INFO: reprehenderit is the string for find method.
Nis 02, 2020 2:17:31 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 255
Nis 02, 2020 2:17:31 00 Main test3
INFO: Execution time of find method with iterator is 0.004199918 seconds.

Nis 02, 2020 2:17:31 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 255
Nis 02, 2020 2:17:31 00 Main test3
INFO: Execution time of find method without iterator is 9.82521E-4 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
]
1-> ArrayList implementation test
2-> LinkedList implementation test
]
Nis 02, 2020 2:05:36 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:05:36 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:05:36 ÖÖ Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:05:36 ÖÖ Main test1
INFO: Execution time of read method with iterator is 0.001246067 seconds.

Nis 02, 2020 2:05:36 ÖÖ Main test1
INFO: Execution time of read method without iterator is 4.8492E-4 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
]
1-> ArrayList implementation test
2-> LinkedList implementation test
]
Nis 02, 2020 2:21:26 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:21:26 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:21:26 ÖÖ Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:21:26 ÖÖ Main test4
INFO: Execution time of replace method with iterator is 4.83362E-4 seconds.

Nis 02, 2020 2:21:26 ÖÖ Main test4
INFO: Execution time of replace method without iterator is 3.30332E-4 seconds.
```

Test2: For 10.000 character

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:06:41 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:06:41 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:06:41 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:06:41 00 Main test1
INFO: Execution time of read method with iterator is 0.002530087 seconds.

Nis 02, 2020 2:06:41 00 Main test1
INFO: Execution time of read method without iterator is 0.006584697 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:11:47 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:11:47 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:11:47 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:11:47 00 Main test2
INFO: Execution time of add method with iterator is 0.00471083 seconds.

Nis 02, 2020 2:11:47 00 Main test2
INFO: Execution time of add method without iterator is 0.001611794 seconds.
```



```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:18:08 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:18:08 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:18:08 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:18:08 00 Main test3
INFO: reprehenderit is the string for find method.
Nis 02, 2020 2:18:08 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 3999
Nis 02, 2020 2:18:08 00 Main test3
INFO: Execution time of find method with iterator is 0.004935079 seconds.

Nis 02, 2020 2:18:08 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 3999
Nis 02, 2020 2:18:08 00 Main test3
INFO: Execution time of find method without iterator is 0.002587389 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:22:44 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:22:44 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:22:44 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:22:44 00 Main test4
INFO: Execution time of replace method with iterator is 0.004278901 seconds.

Nis 02, 2020 2:22:44 00 Main test4
INFO: Execution time of replace method without iterator is 0.002494084 seconds.
```


Test3: For 100.000 characters

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:07:20 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:07:20 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:07:20 ÖÖ Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:07:20 ÖÖ Main test1
INFO: Execution time of read method with iterator is 0.010594798 seconds.

Nis 02, 2020 2:07:20 ÖÖ Main test1
INFO: Execution time of read method without iterator is 0.018128659 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:12:46 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:12:46 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:12:46 ÖÖ Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:12:46 ÖÖ Main test2
INFO: Execution time of add method with iterator is 0.016493582 seconds.

Nis 02, 2020 2:12:46 ÖÖ Main test2
INFO: Execution time of add method without iterator is 0.013049195 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:18:49 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:18:49 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:18:49 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:18:49 00 Main test3
INFO: reprehenderit is the string for find method.
Nis 02, 2020 2:18:49 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 44155
Nis 02, 2020 2:18:49 00 Main test3
INFO: Execution time of find method with iterator is 0.008765971 seconds.

Nis 02, 2020 2:18:49 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 44155
Nis 02, 2020 2:18:49 00 Main test3
INFO: Execution time of find method without iterator is 0.011579931 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
1
Nis 02, 2020 2:23:52 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:23:52 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:23:52 00 Main main_menu
INFO: ARRAYLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:23:52 00 Main test4
INFO: Execution time of replace method with iterator is 0.017746122 seconds.

Nis 02, 2020 2:23:52 00 Main test4
INFO: Execution time of replace method without iterator is 0.01411022 seconds.
```

LinkedList

Test4: For 370 characters

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
1
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:06:10 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:06:10 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:06:10 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:06:10 00 Main test1
INFO: Execution time of read method with iterator is 0.001057786 seconds.

Nis 02, 2020 2:06:10 00 Main test1
INFO: Execution time of read method without iterator is 5.7218E-4 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
1
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:09:30 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:09:30 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:09:30 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:09:30 00 Main test2
INFO: Execution time of add method with iterator is 0.002615515 seconds.

Nis 02, 2020 2:09:30 00 Main test2
INFO: Execution time of add method without iterator is 5.89834E-4 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
1
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:17:53 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:17:53 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:17:53 ÖÖ Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:17:53 ÖÖ Main test3
INFO: reprehenderit is the string for find method.
Nis 02, 2020 2:17:53 ÖÖ Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 255
Nis 02, 2020 2:17:53 ÖÖ Main test3
INFO: Execution time of find method with iterator is 0.004033228 seconds.

Nis 02, 2020 2:17:53 ÖÖ Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 255
Nis 02, 2020 2:17:53 ÖÖ Main test3
INFO: Execution time of find method without iterator is 0.001117136 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
1
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:21:57 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:21:57 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:21:57 ÖÖ Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:21:57 ÖÖ Main test4
INFO: Execution time of replace method with iterator is 5.61336E-4 seconds.

Nis 02, 2020 2:21:57 ÖÖ Main test4
INFO: Execution time of replace method without iterator is 5.57477E-4 seconds.
```

Test5: For 10.000 characters

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:07:01 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:07:01 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:07:01 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:07:01 00 Main test1
INFO: Execution time of read method with iterator is 0.003287268 seconds.

Nis 02, 2020 2:07:01 00 Main test1
INFO: Execution time of read method without iterator is 0.007273353 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:12:12 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:12:12 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:12:12 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:12:12 00 Main test2
INFO: Execution time of add method with iterator is 0.004594301 seconds.

Nis 02, 2020 2:12:12 00 Main test2
INFO: Execution time of add method without iterator is 0.001846251 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:07:01 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:07:01 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:07:01 ÖÖ Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:07:01 ÖÖ Main test1
INFO: Execution time of read method with iterator is 0.003287268 seconds.

Nis 02, 2020 2:07:01 ÖÖ Main test1
INFO: Execution time of read method without iterator is 0.007273353 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
2
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:23:16 ÖÖ Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:23:16 ÖÖ Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:23:16 ÖÖ Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:23:16 ÖÖ Main test4
INFO: Execution time of replace method with iterator is 0.004622587 seconds.

Nis 02, 2020 2:23:16 ÖÖ Main test4
INFO: Execution time of replace method without iterator is 0.044386689 seconds.
```

Test6: For 100.000 characters

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:07:38 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:07:38 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:07:38 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:07:38 00 Main test1
INFO: Execution time of read method with iterator is 0.010469945 seconds.

Nis 02, 2020 2:07:38 00 Main test1
INFO: Execution time of read method without iterator is 0.014742695 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:13:38 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:13:38 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:13:38 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:13:38 00 Main test2
INFO: Execution time of add method with iterator is 0.02819194 seconds.

Nis 02, 2020 2:13:38 00 Main test2
INFO: Execution time of add method without iterator is 0.006450698 seconds.
```



```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:19:46 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:19:46 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:19:46 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:19:46 00 Main test3
INFO: reprehenderit is the string for find method.
Nis 02, 2020 2:19:47 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 44155
Nis 02, 2020 2:19:47 00 Main test3
INFO: Execution time of find method with iterator is 1.157914717 seconds.

Nis 02, 2020 2:19:47 00 Main test3
INFO: Starting index of character array [r, e, p, r, e, h, e, n, d, e, r, i, t] is 44155
Nis 02, 2020 2:19:47 00 Main test3
INFO: Execution time of find method without iterator is 0.023948485 seconds.
```

```
1-> 370 Characters
2-> 10.000 Characters
3-> 100.000 Characters
3
1-> ArrayList implementation test
2-> LinkedList implementation test
2
Nis 02, 2020 2:24:18 00 Main main_menu
INFO: Log message redirected to a file
Nis 02, 2020 2:24:18 00 Main main_menu
INFO: The name of the logger is Main
which is same as class name: Main
Nis 02, 2020 2:24:18 00 Main main_menu
INFO: LINKEDLIST IMPLEMENTATION TEST STARTING

Nis 02, 2020 2:24:18 00 Main test4
INFO: Execution time of replace method with iterator is 0.018394295 seconds.

Nis 02, 2020 2:24:22 00 Main test4
INFO: Execution time of replace method without iterator is 4.219138657 seconds.
```

Analysis of the performance of each method theoretically using the most appropriate asymptotic notation

1-)List is an ArrayList and iterator is used:

- read(): Everytime we iterate, we go for next character while we read all text so it takes $O(n)$ time complexity.
- add(): Add method with index ListIterator inside ArrayList is $O(n)$ that this method is $O(n)$.
- find(): Everytime we iterate one next index, we have to control if we get the char array so it must take $O(n^2)$ time.
- replace(): Everytime we iterate one index more, we control whether we find the before character so we change it. It takes $O(n)$ time.

2-)List is an ArrayList and iterator is not used:

- read(): Everytime we read next character character we save it to list so it takes $O(n)$ time complexity.
- add(): Add method with index inside ArrayList is $O(n)$ and we use for loop for iterate over String so it takes $O(n^2)$ time complexity.
- find(): The complexity of Java's implementation of indexOf is $O(m*n)$ where n and m are the length of the search string and pattern respectively.
- replace(): We we just iterate over list so time complexity is $O(n)$.

3-)List is a LinkedList and iterator is used:

- read(): Everytime we iterate, we go for next character and create new node while we read all text so it takes $O(n)$ time complexity.
- add(): Add method with index ListIterator inside LinkedList is $O(1)$ that this method is $O(1)$.
- find(): Everytime we iterate one next index, we have to control if we get the char array so it must take $O(n^2)$ time.
- replace(): Everytime we iterate one index more, we control whether we find the before character so we change it. It takes $O(n)$ time.

4-)List is an LinkedList and iterator is not used:

- read(): Everytime we read next character character we save it to list so it takes $O(n)$ time complexity.
- add(): Add method with index inside LinkedList is $O(1)$ and we use for loop for iterate over String so it takes $O(n)$ time complexity
- find(): The complexity of Java's implementation of indexOf is $O(m*n)$ where n and m are the length of the search string and pattern respectively.
- replace(): We we just iterate over list so time complexity is $O(n)$.

Comparison of the experimental performance of each operation when

Every step of time complexities of our methods that I show you above are working fine. add method at linkedlist is working really slow because everytime I try to go some position, I have to do iteration that much time and this is really expensive while number of characters increases. Other thing changing compare to my theoretic time complexity calculations is that, while number of characters increases, execution time of linkedlist is getting closer to arraylist.