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

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Problem Solution Approach – Q1

First to be able to create a linked list i have created a private inner class inside LinkedArrayList class. According to this homework a node should have kept an array which has constant capacity so i have created a new class which manipulate this array with some basic methods. When the array of a node has been fiiled I have created a new node for new datas. if the user tries to insert an element in a node which is full then the new node will be created between this node and next node. I have kept the tail of list due to make add easier from end of the list. The LinkedArrayList extends from AbstractList and implements List interface so I had had to implement some methodes which cames from super class and the interface. After overriding some important methods there is more methods that user can use through super class. I have create a new inner iterator class also which implemets ListIterator interface.

This iterator class has kept two reference and three index fields. One reference keeps a node to determine where this iterator is. The other reference keeps where the last returned item from. One of the indexes is keeps the total index and the other two index keeps the index of element just for one node.

Problem Solution Approach – Q2

I have kept the datas as List. This list keeps the all characters of SimpleTextEditor. To determine whether List is LinkedList or ArrayList I have used two different constructors. One of them has taken name of the file as string and has taken boolean expression to determine the list is LinkedList. The other has taken just the name of the file as string and list is determined as ArrayList.

Theoretical Analysis - Q2

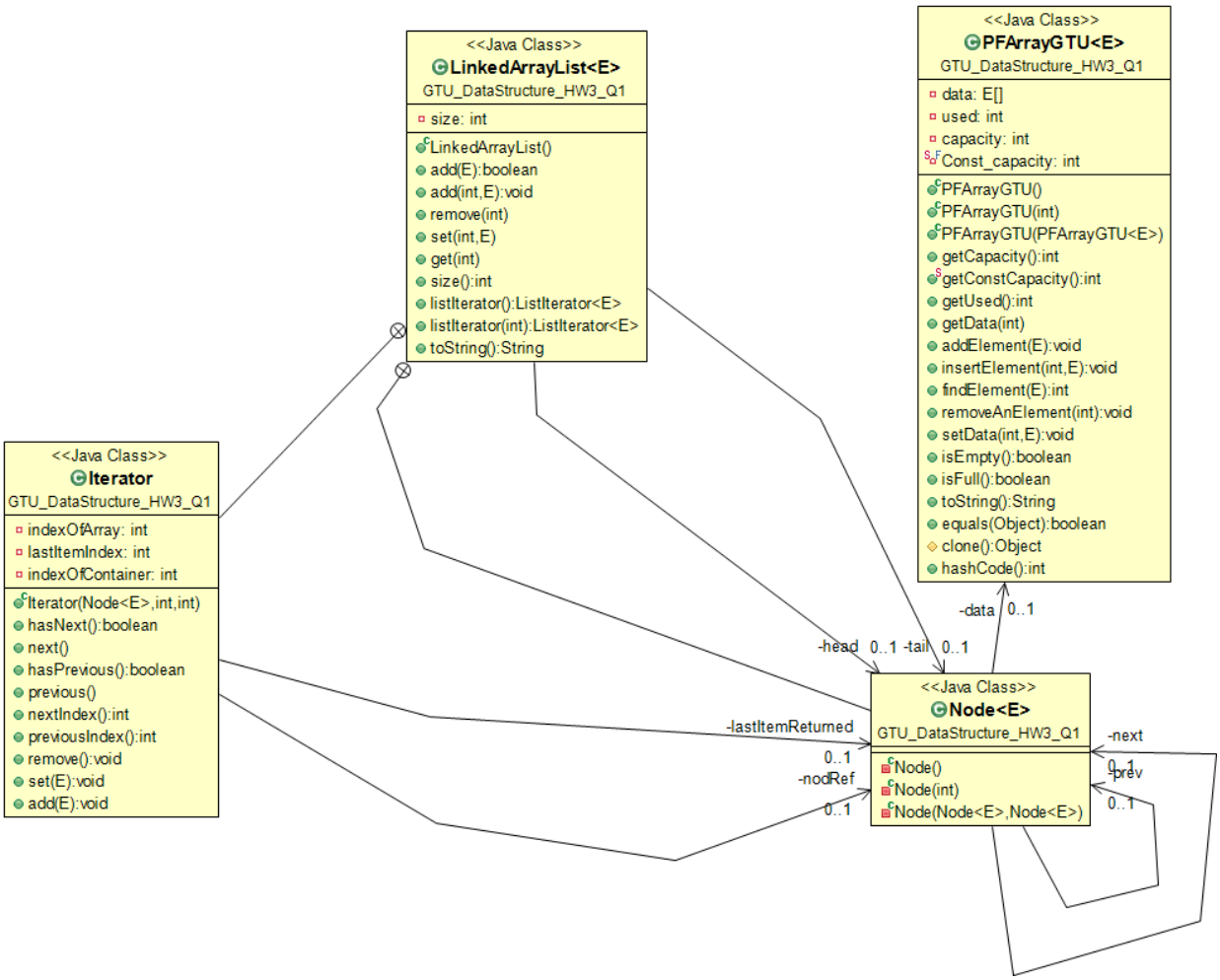
Method	ArrayList	LinkedList
read()	Read method uses add(char) method N times. The add(char) method works with O(N) complexity because of resizing. Totally read method works with $O(N^2)$ complexity.	The add(char) method works with O(1) complexity so read method works with O(N) complexity.
readWithIter()	The ListIterator.add(char) works with O(N) complexity. So this readWithIter() method works with $O(N^2)$ complexity.	The ListIterator.add(char) works with O(1) complexity, so this readWithIter() method works with O(N) complexity.
add(int,String)	The add(int,String) method uses add(int,char) method which has O(N) complexity from ArrayList. So Total complexity is O(NM). M is because of length of string and N is because of index.	The add(int,String) method uses add(int,char) method which has O(N) complexity from LinkedList. So Total complexity is O(NM). M is because of length of string and N is because of index.
addWithIter(int,String)	listIterator(int) Has O(1) complexity . ListIterator.add(char) has O(N) complexity. Because of resizing may be occur.	listIterator(int) Has O(N) complexity . ListIterator.add(char) has O(1) And there is a loop

	And there is a loop which has $O(N^2)$ complexity. totally the complexity is $O(N^2)$	which has O(N) complexity. totally the complexity is O(N)
find(String)	Complexity is O(NM). N is size of the all text. M is the length of the String which is searched.	Complexity is O(NM). N is size of the all text. M is the length of the String which is searched.
findWithIter(String)	The complexity of listIterator() is O(1) Total complexity is O(NM). N is size of the all text. M is the length of the String which is searched.	The complexity of listIterator() is O(1) Total complexity is O(NM). N is size of the all text. M is the length of the String which is searched.
replace(char,char)	Complexity of get(int) is O(1) Complexity of set(int,char) is O(1) Total complexity is O(N) because of for loop.	Complexity of get(int) is O(N) Complexity of set(int,char) is O(N) Total complexity is $O(N^2)$ because of for loop.
replaceWithIter(char,char)	O(N)	O(N)

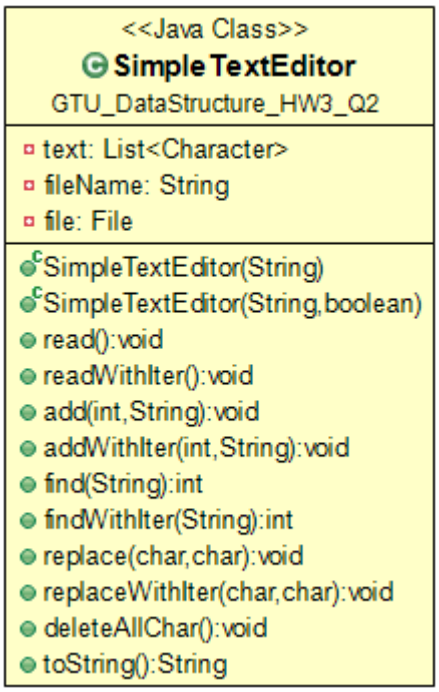
Experimental Performance - Q2

```
By using ArrayList
Without iterator:   add         read            find            replace
40 character    :   57ms        2197700ns       180000ns        1870400ns
200 character   :   215ms       2398500ns       568100ns        1437000ns
600 character   :   688ms       2408400ns       881400ns        2948100ns


With iterator   :   add         read            find            replace
40 character    :   42ms        1497500ns       172700ns        1171700ns
200 character   :   190ms       1309700ns       1526900ns       1121000ns
600 character   :   509ms       1590400ns       1954700ns       1473000ns


By using LinkedList
Without iterator:   add         read            find            replace
40 character    :   42ms        1174200ns       338600ns        1527000ns
200 character   :   200ms       2063500ns       1526400ns       2071300ns
600 character   :   607ms       1519400ns       3018900ns       1882500ns


With iterator   :   add         read            find            replace
40 character    :   32ms        1099200ns       287900ns        979300ns
200 character   :   164ms       1409800ns       1674400ns       1624000ns
600 character   :   637ms       1805100ns       1946300ns       1647500ns
```

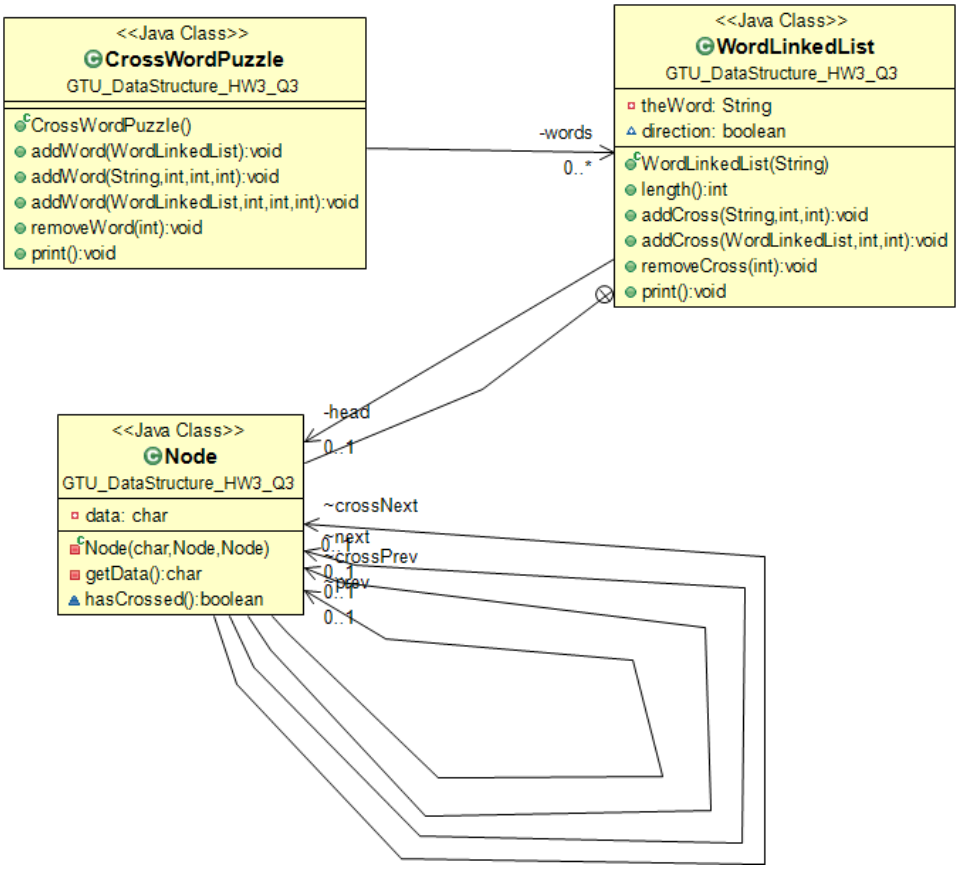
Class Diagram-Q1



Class Diagram-Q2



Class Diagram-Q3



Test Cases Q1

Test ID	Scenerio	Test Data	Expected Result	Actual Result	Pass /Fail
1	Create two different LinkedArrayList,one of them keeps charackers and the others keeps Strings.in first initialization ,try to print them.	names, alphabet	Prints empty sets	As expected	Pass
2	Add a lot of elements to LinkedArrayList (names, alphabet).print and see the elements which is added. Add(element);	elemenet = All letters in english for alpbhabeth object. Element = some arbitrary strings for names object.	Prints all elements which is added.	As expected	Pass
3	Add a few more element to both object names and alphabet. Then print and see whether they are added in correct index. Add(index,element)	Index = All indexes was arbitrary and less than size.	Prints the all elements in correct index.	As expected	Pass
4	Remove some element from both objects names and alphabet.then print to see whether they are removed correctly. Remove(index)	Index = All indexes was arbitrary and less than size.	Prints the all elements in correct index.	As expected	Pass
5	All characters in the alphabet object are setted to ‘u’ Set(index,character)	Index = All indexes respectively. Character=’u’	All elements in alphabet turns to ‘u’	As expected	Pass
6	Print all elements of alphabet by using get method. Get(index)	Index = All indexes respectively.	Prints the all ellements in alphabet object.	As expected	Pass
7	Take an iterator from alphabet object then go up to end by using next and hasNext methodes.	Iterator of alphabet object.	All elements in the alphabet object are removed.when we try to print the alphabet	As expected	Pass

	after the all next methods call the remove method of the iterator.		object we will see a empty set.		
8	Take an iterator from names object and print the all data inside the names objejct by using hasNext and next methodes.	Iterator of names object.	All elements are gonna be printed in names object.	As expected	Pass
9	Print the all data of the names object by using hasPrevious and previous methodes.	Iterator of name object.	All elements are gonna be printed in reverse order.	As expected	Pass
10	Go up to end with iterator of names object by using next and hasNext. After the all call of the next method call the set method and set the all data to “setted”.	Iterator of name object.	All elements of name object turns to “setted”.	As expected	Pass
11	Take an iterator from alphabet object from beginning. Fill this object with letters by using iterator and add method of iterator.	Iterator of alphabet object.	When we print this alphabet object we will see all letters respectively.	As expected	Pass
12	Take an new iterator from alphabet by using index.and print all data in reverse order.	Inedx = size of the alphabet object.	All datas in alphabet object will be printed in reverse order.	As expected	Pass
13	Take a new iterator form names with index. Go back up to first element by using previous and hasPrevious methodes.after all previous method call the remove method.	Index = size of the names object.	All elements of the name object will be removed and when we try to print names object we will see a empty set.	As expected	Pass
14	Try to remove with empty LinkedArrayList	Index = 1;	ArrayIndexOutOfBoundsException	As expected	pass
15	Try to remove an element whith index.	Index = greater than size.	ArrayIndexOutOfBoundsException	As expected	Pass

16	Try to call remove method of iterator without call the next or previous method.	Iterator of the names object.	IllegalStateException	As expected	Pass
17	Try to call set method of the iterator without calling the next or previous method.	Iterator of the names object.	IllegalStateException	As expected	Pass
18	Add(index,element)	Index = -1	ArrayIndexOutOfBoundsException	As expected	Pass

Test Cases Q2

Test ID	Scenerio	Test Data	Expected Result	Actual Result	Pass/Fail
1	Create a new simpleTextEditor and fill this text editor with random characters by using add(index,element) method.	Index = from zero to 40 or 200 or 600.	File is created and all data added to file.	As expected	Pass
2	Read the file and print it on terminal	editor	All data which is in the file will be printed on terminal.	As expected	Pass
3	Test the find method Find(toSearch)	ToSearch = the last word in the file.	First index of the word will be printed.	As expected.	Pass
4	Turn the all space characters of the file to '.' by using replace method.	Letter = ' ' NewLetter = '.'	All spaces turnes to '.'	As expected	pass

Running Command and Results Q1

```
"C:\Program Files\Java\jdk-13.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2019.3.3\lib\idea_rt.jar=57603:C:\Program Files\JetBrains\IntelliJ IDEA 2019.3.3\bin" -Dfile.en
First initialization :
list of names : {}
list of alphabet : {}


After add some element to list :
list of alphabet : { { A, B, C, D, E } <--> { F, G, H, I, J } <--> { K, L, M, N, O } <--> { P, Q, R, S, T } <--> { U, V, W, X, Y } <--> { Z } }
list of names : { { Ali, Bahar, 17, 1044, 066 } <--> { GTU, Gebze, Denizli, Acipayam, Pamukkale } <--> { Horoz } }


After add some element to list with index :
list of alphabet : { { i, A, B, C, i } <--> { D } <--> { E } <--> { F, G, i, H, I } <--> { i } <--> { J } <--> { K, L, M, N, O } <--> { P, Q, R, S, T } <--> { U, V, W, X, Y } <--> { i, Z } }
list of names : { { first, Ali, Bahar, 17, inserted } <--> { 1044 } <--> { 066 } <--> { GTU, inserted, inserted, Gebze, Denizli } <--> { Acipayam } <--> { Pamukkale } <--> { Horoz, last } }


After remove some element from list :
list of alphabet : { { A, B, C } <--> { D } <--> { E } <--> { F, G, H, I } <--> { J } <--> { K, L, M, N, O } <--> { P, Q, R, S, T } <--> { U, V, W, X, Y } <--> { Z } }
list of names : { { Ali, Bahar, 17 } <--> { 1044 } <--> { 066 } <--> { GTU, Gebze, Denizli } <--> { Acipayam } <--> { Pamukkale } <--> { Horoz } }


All character in alphabet list have setted to 'u'
All character in alphabet list have printed by using get() method
u u u u u u u u u u u u u u u u u u u u u u u u u u


All elements of alphabet list has been removed by using iterator methods(remove,next,hasNext)
list of alphabet : {}


list of names : Ali Bahar 17 1044 066 GTU Gebze Denizli Acipayam Pamukkale Horoz
All elements of names list has been printed by using iterator methods(hasNext,next)
```

```
list of names : Horoz Pamukkale Acipayam Denizli Gebze GTU 066 1044 17 Bahar Ali
All elements of names list has been printed by using iterator methods(hasPrevious,previous)


All elements of names list setted to "setted"
list of names : { { setted, setted, setted } <--> { setted } <--> { setted } <--> { setted, setted, setted } <--> { setted } <--> { setted } <--> { setted } }


Alphabet filled with characters by using iterator add method.
list of alphabet : { { a, b, c, d, e } <--> { f, g, h, i, j } <--> { k, l, m, n, o } <--> { p, q, r, s, t } <--> { u, v, w, x, y } <--> { z } }


z y x w v u t s r q p o n m l k j i h g f e d c b a
All element of alphabet is removed by using iterator remove method
list of alphabet : {}


setted setted setted setted setted setted setted setted setted setted setted
All element of names is removed by using iterator remove method
list of names : {}
```

```
java.lang.ArrayIndexOutOfBoundsException: size : 0   index : 1
    at GTU_DataStructure_HW3_Q1.LinkedArrayList.remove(LinkedArrayList.java:87)
    at TestQ1.main(TestQ1.java:58)
java.lang.ArrayIndexOutOfBoundsException: size : 4   index : 15
    at GTU_DataStructure_HW3_Q1.LinkedArrayList.remove(LinkedArrayList.java:87)
    at TestQ1.main(TestQ1.java:64)
java.lang.IllegalStateException
    at GTU_DataStructure_HW3_Q1.LinkedArrayList$Iterator.remove(LinkedArrayList.java:448)
    at TestQ1.main(TestQ1.java:71)
java.lang.IllegalStateException
    at GTU_DataStructure_HW3_Q1.LinkedArrayList$Iterator.set(LinkedArrayList.java:495)
    at TestQ1.main(TestQ1.java:78)
java.lang.ArrayIndexOutOfBoundsException: Index -1 out of bounds for length 5
    at GTU_DataStructure_HW3_Q1.PFArrayGTU.insertElement(PFArrayGTU.java:109)
    at GTU_DataStructure_HW3_Q1.LinkedArrayList$Iterator.add(LinkedArrayList.java:547)
    at GTU_DataStructure_HW3_Q1.LinkedArrayList.add(LinkedArrayList.java:76)
    at TestQ1.main(TestQ1.java:84)
All exceptions have been handled (They wew just test)

Process finished with exit code 0
```

Running Command and Results Q2

"C:\Program Files\Java\jdk-13.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2019.3.3\lib\idea_rt.jar=57649:C:\Program Files\JetBrains\IntelliJ IDEA 2019.3.3\bin" -Dfile.encoding=UTF-8 -classpath C:\Users\Ali\IdeaProjects\DataStructureHW-3\out\production\DataStructureHW-3 TestQ2

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 40 character add method without iterator :48ms

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 40 character read method without iterator :1735800ns

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 40 character find method without iterator :191400ns

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 40 character replace method without iterator :1670000ns

Before replace:

tdngyuhzbumobqjcuhwsjasvkkcru

toFind

add method worked

read method worked

the string(toFind) found at 40th

replace method turned all ' ' to '.'

after replace :

.....tdngyuhzbumobqjcuhwsjasvkkcru

toFind

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 200 character add method without iterator :264ms

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 200 character read method without iterator :2636000ns

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 200 character find method without iterator :596600ns

Nis 02, 2020 4:06:16 ÖÖ TestQ2 test

INFO: 200 character replace method without iterator :1872800ns

Before replace:

uacvqkwoieyvfxxrwlkhivtayfrjz

mztxnadxlvrcubkzeulzckzrobdmo

yiwsdbrhbyhgcaotozlzktthvzkvg

fyzivstywivrylbzfsklxjmfwvvgg

dpjgghapuoqjbczmwivnspkgjvsch

toFind

add method worked

read method worked

the string(toFind) found at 200th

replace method turned all ' ' to '.'

after replace :

.....uacvqkwoieyvfxxrwlkhivtayfrjz

.....mztxnadxlvrcubkzeulzckzrobdmo

.....yiwsdbrhbyhgcaotozlzktthvzkvg

.....fyzivstywivrylbzfsklxjmfwvvgg

.....dpjgghapuoqjbczmwivnspkgjvsch

toFind

Nis 02, 2020 4:06:17 ÖÖ TestQ2 test

INFO: 600 character add method without iterator :695ms

Nis 02, 2020 4:06:17 ÖÖ TestQ2 test

INFO: 600 character read method without iterator :4224300ns

Nis 02, 2020 4:06:17 ÖÖ TestQ2 test

INFO: 600 character find method without iterator :1044100ns

Nis 02, 2020 4:06:17 ÖÖ TestQ2 test

INFO: 600 character replace method without iterator :2833300ns

Before replace:

hpbcjpxfoaosgipifxbysonrzibul

cvjhkbuheogtnawfltrmsrvrcmpwz

assgzjyjxcognudmrytelokvivlhd

dywpawdmwbtmircudnezrgdjcalcr

wubmcrsjjngwbwunpxicoxocyiaea

afjdxcujgirlgqclerhcwvjkplzmq

lovijwkeqqkdxoedpnyjqovvwxubi

mrxgfizlhbxebnonwuzwfpbjqbbkl

uxlzuslquxjoaorfscpzhwznmzwok

jfknttkwizqejsrvuwxypxulgymip

dvqoeouxzehqrndlhowpldodihmpt

afaeydrpvbtrgdzzegvrbvegohiss

ierwyfqhxegflndmupjcmnrbyqmxu

uxmzevtxnetaczlezquwbirkhsipg

izfeezxfcunfvxeqstiwgmzfxerum

toFind

add method worked

read method worked

the string(toFind) found at 600th

replace method turned all ' ' to '.'

after replace :

.....hpbcjpxfoaosgipifxbysonrzibul

.....cvjhkbuheogtnawfltrmsrvrcmpwz

.....assgzjyjxcognudmrytelokvivlhd

.....dywpawdmwbtmircudnezrgdjcalcr

.....wubmcrsjjngwbwunpxicoxocyiaea

.....afjdxcujgirlgqclerhcwvjkplzmq

.....lovijwkeqqkdxoedpnyjqovvwxubi

.....mrxgfizlhbxebnonwuzwfpbjqbbkl

.....uxlzuslquxjoaorfscpzhwznmzwok

.....jfknttkwizqejsrvuwxypxulgymip

.....dvqoeouxzehqrndlhowpldodihmpt

.....afaeydrpvbtrgdzzegvrbvegohiss

.....ierwyfqhxegflndmupjcmnrbyqmxu

.....uxmzevtxnetaczlezquwbirkhsipg

.....izfeezxfcunfvxeqstiwgmzfxerum

toFind

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 40 character add method with iterator:33ms

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 40 character read method with iterator:1346600ns

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 40 character find method with iterator:174000ns

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 40 character replace method with iterator:1106000ns

Before replace:

aiywihggndtikwqivddgjtvyxjxth

toFind

add method worked

read method worked

the string(toFind) found at 40th

replace method turned all ' ' to '.'

after replace :

.....aiywihggndtikwqivddgjtvyxjxth

toFind

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 200 character add method with iterator:165ms

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 200 character read method with iterator:1334000ns

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 200 character find method with iterator:664000ns

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 200 character replace method with iterator:1061100ns

Before replace:

zaloinvuxdmbcgoahakhgacmvmhzh

bnqbabhfbvvjpnjbgntpfdmopymwt

fdeqqkmjgmxlrhieakvbwighdvyor

evamhwoxggtagndxkffwoptfnsyci

goiydentttzjqalymrdzurepafkxi

toFind

add method worked

read method worked

the string(toFind) found at 200th

replace method turned all ' ' to '.'

after replace :

.....zaloinvuxdmbcgoahakhgacmvmhzh

.....bnqbabhfbvvjpnjbgntpfdmopymwt

.....fdeqqkmjgmxlrhieakvbwighdvyor

.....evamhwoxggtagndxkffwoptfnsyci

.....goiydentttzjqalymrdzurepafkxi

toFind

Nis 02, 2020 4:06:17 ÖÖ TestQ2 testWithIter

INFO: 600 character add method with iterator:508ms

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 600 character read method with iterator:4386700ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 600 character find method with iterator:1484900ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 600 character replace method with iterator:1318000ns

Before replace:

wxulrulfqpgxrefzkwwboimgwuqom

iatwtfhgrftpmpihqhbeykventlus

pxroxasqbptjnkpqiiabuenhhaqub

athdpaozsmjfebodibozxzqoxpual

iwinjvpbgkshmzdtrtrvbujoclziy

uoxyjsmusmgwnoygkemgciaqptowj

xdffhdblawxumotfehyxuxqhihlix

saqzcbegdfozkeqrueczyevmduvxk

qautxycjydhyysxruikhronqjzfng

yoaeajjwkgjflcwgsgrspytxwetbm

lunzgdqqmmiittgyhcdmfnuqrfhwc

udaolpjhbaftjudcbysqjcmceomtm

koqrqalyhlvnirpamosshujlfoisy

qyoysxgonzivghteefpdkprsutfiq

irqumotspvymgatkmnaypihavtbdf

toFind

add method worked

read method worked

the string(toFind) found at 600th

replace method turned all ' ' to '.'

after replace :

.....wxulrulfqpgxrefzkwwboimgwuqom

.....iatwtfhgrftpmpihqhbeykventlus

.....pxroxasqbptjnkpqiiabuenhhaqub

.....athdpaozsmjfebodibozxzqoxpual

.....iwinjvpbgkshmzdtrtrvbujoclziy

.....uoxyjsmusmgwnoygkemgciaqptowj

.....xdffhdblawxumotfehyxuxqhihlix

.....saqzcbegdfozkeqrueczyevmduvxk

.....qautxycjydhyysxruikhronqjzfng

.....yoaeajjwkgjflcwgsgrspytxwetbm

.....lunzgdqqmmiittgyhcdmfnuqrfhwc

.....udaolpjhbaftjudcbysqjcmceomtm

.....koqrqalyhlvnirpamosshujlfoisy

.....qyoysxgonzivghteefpdkprsutfiq

.....irqumotspvymgatkmnaypihavtbdf

toFind

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 40 character add method without iterator :39ms

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 40 character read method without iterator :1431100ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 40 character find method without iterator :368600ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 40 character replace method without iterator :1105900ns

Before replace:

idarjatlcprofbfugqbrvwwmnghth

toFind

add method worked

read method worked

the string(toFind) found at 40th

replace method turned all ' ' to '.'

after replace :

.....idarjatlcprofbfugqbrvwwmnghth

toFind

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 200 character add method without iterator :180ms

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 200 character read method without iterator :1653300ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 200 character find method without iterator :3095500ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 200 character replace method without iterator :2214400ns

Before replace:

ijpjewznhhofickocpdieggfhfbgd

ypyhqeadplvmhsplyobbygtwvcvgw

whtfdsboctixryszkkixecxyiuyeg

odaritcakbcjlohmqfarxocyelrll

llpywzccmzqwpkfarzfvcdzrawyuf

toFind

add method worked

read method worked

the string(toFind) found at 200th

replace method turned all ' ' to '.'

after replace :

.....ijpjewznhhofickocpdieggfhfbgd

.....ypyhqeadplvmhsplyobbygtwvcvgw

.....whtfdsboctixryszkkixecxyiuyeg

.....odaritcakbcjlohmqfarxocyelrll

.....llpywzccmzqwpkfarzfvcdzrawyuf

toFind

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 600 character add method without iterator :601ms

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 600 character read method without iterator :1570700ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 600 character find method without iterator :5080000ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 test

INFO: 600 character replace method without iterator :2324200ns

Before replace:

tyhmssdmlzxctmtiomgaelcjxbppl

sdkjytzxltgnomouboeuzyykimsjn

ghjwydfvvpenshohlvgzxcunfffml

yjqxewndwinxsthtidsxzdxlnseeo

qymtleorcugqncjigaudbclqheuue

bjmodcfbsjnxrfmxhtsdfrlxtlleb

vlvewenktyawtydzlwdqluowilcnd

cmwwkvgoifakroinssbldmwvwtixi

rypbdoexqgmqgwviooxdehxihonro

hcnpigermvlmioncbrdqspjxqmmzh

fnllfkzolscruqyoofjrpdjjjxfxo

xrmmgiaafexcltaqsuxxitdarblyh

jbzuofwaxdvjblxxydruyxbhrszyd

kbalhfippryielljxtpujwnxmdaex

szoaguasibakorthmgcazvhgfisig

toFind

add method worked

read method worked

the string(toFind) found at 600th

replace method turned all ' ' to '.'

after replace :

.....tyhmssdmlzxctmtiomgaelcjxbppl

.....sdkjytzxltgnomouboeuzyykimsjn

.....ghjwydfvvpenshohlvgzxcunfffml

.....yjqxewndwinxsthtidsxzdxlnseeo

.....qymtleorcugqncjigaudbclqheuue

.....bjmodcfbsjnxrfmxhtsdfrlxtlleb

.....vlvewenktyawtydzlwdqluowilcnd

.....cmwwkvgoifakroinssbldmwvwtixi

.....rypbdoexqgmqgwviooxdehxihonro

.....hcnpigermvlmioncbrdqspjxqmmzh

.....fnllfkzolscruqyoofjrpdjjjxfxo

.....xrmmgiaafexcltaqsuxxitdarblyh

.....jbzuofwaxdvjblxxydruyxbhrszyd

.....kbalhfippryielljxtpujwnxmdaex

.....szoaguasibakorthmgcazvhgfisig

toFind

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 40 character add method with iterator:37ms

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 40 character read method with iterator:1199000ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 40 character find method with iterator:196600ns

Nis 02, 2020 4:06:18 ÖÖ TestQ2 testWithIter

INFO: 40 character replace method with iterator:1091700ns

Before replace:

vegyshlhwqjqpfdqrtfqbjfomupur

toFind

add method worked

read method worked

the string(toFind) found at 40th

replace method turned all ' ' to '.'

after replace :

.....vegyshlhwqjqpfdqrtfqbjfomupur

toFind

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 200 character add method with iterator:234ms

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 200 character read method with iterator:1554800ns

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 200 character find method with iterator:2546400ns

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 200 character replace method with iterator:2440600ns

Before replace:

sklmsvrzbsbjplrqlnxxruwnuqand

azsgsgnkkyfqogypkqeutevincjyp

yqizkdpamycbmbgexgpojzjpkxhzs

nsybzlgfwkmuknjpvfguaqciosyec

vgikqvlnibqzvamovgspwzubfgbev

toFind

add method worked

read method worked

the string(toFind) found at 200th

replace method turned all ' ' to '.'

after replace :

.....sklmsvrzbsbjplrqlnxxruwnuqand

.....azsgsgnkkyfqogypkqeutevincjyp

.....yqizkdpamycbmbgexgpojzjpkxhzs

.....nsybzlgfwkmuknjpvfguaqciosyec

.....vgikqvlnibqzvamovgspwzubfgbev

toFind

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 600 character add method with iterator:713ms

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 600 character read method with iterator:1618600ns

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 600 character find method with iterator:1500300ns

Nis 02, 2020 4:06:19 ÖÖ TestQ2 testWithIter

INFO: 600 character replace method with iterator:1619300ns

Before replace:

irlevipamnyozixmxqohedkeypbwy

begozoheekmkhvugczgagpvnqvsdm

qpsdpglstpnzqgwjhsoerscdqurat

fgfbdyqwfagrngpgnredpmoylkgem

djjawztevwvvtaowcfzbamvizjhdn

wpeymvjqhkhpowohscufmymbwtysj

unbawlovdcuynzvgzwibkeugetyco

jlrjphzicnqduerwqjahyldtzatzg

rrlsjspfllxbesgryuupmwkfbydwe

gpbccotuvyatvnhxjppewgdpcalcb

phnfkiddvtdqxotkjpmjofaaksdjt

asuelewsigldfxogjvdmnqedhwzql

jvsyluwvotodymfrmbpxtbaclwfjf

ornqiylftttagcbowcntxxjhyqzwd

zqcjernepuyuuqjfsfopuhwognnzd

toFind

add method worked

read method worked

the string(toFind) found at 600th

replace method turned all ' ' to '.'

after replace :

.....irlevipamnyozixmxqohedkeypbwy

.....begozoheekmkhvugczgagpvnqvsdm

.....qpsdpglstpnzqgwjhsoerscdqurat

.....fgfbdyqwfagrngpgnredpmoylkgem

.....djjawztevwvvtaowcfzbamvizjhdn

.....wpeymvjqhkhpowohscufmymbwtysj

.....unbawlovdcuynzvgzwibkeugetyco

.....jlrjphzicnqduerwqjahyldtzatzg

.....rrlsjspfllxbesgryuupmwkfbydwe

.....gpbccotuvyatvnhxjppewgdpcalcb

.....phnfkiddvtdqxotkjpmjofaaksdjt

.....asuelewsigldfxogjvdmnqedhwzql

.....jvsyluwvotodymfrmbpxtbaclwfjf

.....ornqiylftttagcbowcntxxjhyqzwd

.....zqcjernepuyuuqjfsfopuhwognnzd

toFind

By using ArrayList

Without iterator:	add	read	find	replace
40 character :	48ms	1735800ns	191400ns	1670000ns
200 character :	264ms	2636000ns	596600ns	1872800ns
600 character :	695ms	4224300ns	1044100ns	2833300ns

With iterator :	add	read	find	replace
40 character :	33ms	1346600ns	174000ns	1106000ns
200 character :	165ms	1334000ns	664000ns	1061100ns
600 character :	508ms	4386700ns	1484900ns	1318000ns

By using LinkedList

Without iterator:	add	read	find	replace
40 character :	39ms	1431100ns	368600ns	1105900ns
200 character :	180ms	1653300ns	3095500ns	2214400ns

600 character : 601ms 1570700ns 5080000ns 2324200ns

With iterator : add read find replace

40 character : 37ms 1199000ns 196600ns 1091700ns

200 character : 234ms 1554800ns 2546400ns 2440600ns

600 character : 713ms 1618600ns 1500300ns 1619300ns

Each method of the SimpleTextEditor class has been tested.

Readable log file of the test has been created .

Process finished with exit code 0