OOP Data Structures and Algorithms Assignment 1

Problem:
Create a java program that allows the user to do a speed typing test by typing out the alphabet forwards or backwards and measuring the time it takes them.

Design Notes:

Assignment One

- Create alphabet speed test (forwards and backwards)

-> figure out how to use scanner
-> record time taken
-> invalid /incorrect input
  - incorrect input for alphabet ignored
-> iterate through array both directions
-> test code multiple times

Scanner:
```
import    java.util. Scanner;
public  static  void  main(String [] args) {
Scanner  scan = new   Scanner (System.in);
```
->to create a scanner that interacts with user through console

index 0 of input
-> use scan.next()charAt (0) to pick out first character typed by user ?
- will still be correct if they type ab instead of a
- might do differently?

-> close sanner
```
        scan.close();
```

Timer:
System.nano Time() records time at one moment
endTime − StartTime = totalTime
- convert to seconds from nanosec -> ÷ 1,000,000,000

> •need to start measuring time from first letter
> of speed test and end after last letter
> is inputted

CODE:

```java
package assignment1;
import java.util.Scanner; //need to import the scanner class to use a scanner

public class Scan {

    static char alphabet[] = new char[] {'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'};
    static char letters;
    static char testType;
    static long startTime;
    static long endTime;
    static long totalTime;
    static double finalTime;
    //I used static variables as I only needed to use them in this class

    public static void main(String[] args) {

        Scanner scan = new Scanner(System.in); //creates scanner

        System.out.println("Speed test for the letters of the alphabet.
Would you like to go backwards or forwards? (b/f?)");
        testType = scan.next().charAt(0);
        //picks up on the first character that the user types. I decided to
allow the user to type
        //more, incorrect letters after the first one and still be correct
so this only takes the
        //character at index zero of input

        while(testType !='f' && testType!='b') {
            System.out.println("Invalid entry. Enter f or b to begin.");
            testType=scan.next().charAt(0);
            //this while loop runs until the user inputs an f or a b, ie
chooses forwards or backwards
        }

        if(testType=='f') {
            System.out.println("Forwards it is! You may begin with the
letter a");
            letters=scan.next().charAt(0);
            startTime = System.nanoTime();
```

```java
				//startTime saves the time at which the user inputs the first
letter, a

			for(int i=0; i<25; i++) {

				while(letters!=alphabet[i]) {
					letters=scan.next().charAt(0);
				}

				if(letters==alphabet[i]) {
					System.out.printf("Correct!\nType the letter
%c:\n", alphabet[i+1]);
				}
				letters=scan.next().charAt(0);
				}
				//the while and if loops here check the users input to see if
they are getting
				//the letters correct. It doesn't check the last letter as I
found it was easier
				//to do this separately. If the input is incorrect it is
ignored until a correct
				//answer is inputted

				while(letters!='z') {
					letters=scan.next().charAt(0);
				}

				if(letters=='z') {
				endTime = System.nanoTime(); //the time at the end of the test
				totalTime = endTime - startTime; //the time taken to complete
the test in nanoseconds
				finalTime = (double) totalTime/1000000000; //the time taken
converted to seconds in double form
				System.out.println("Congratulations! You completed the speed
test in " +finalTime+ " seconds.");
				}
				//the while and if loops here check that the final input of z
is correct.
				//if not the test continues until it is, if it is correct the
test ends
				//and the time taken to do the test is displayed in the
console

		}

			else if(testType=='b') {
				System.out.println("Backwards it is! You may begin with
the letter z");

				letters=scan.next().charAt(0);
				startTime = System.nanoTime();
				//same format as the code for forwards

				for(int i=alphabet.length-1; i>0; i--) {
					//iterates backwards through array alphabet

					while(letters!=alphabet[i]) {
						letters=scan.next().charAt(0);
					}
```

```java
                            if(letters==alphabet[i]) {
                                    System.out.printf("Correct!\nType the
letter %c:\n", alphabet[i-1]);
                            }
                            letters=scan.next().charAt(0);
                            }

                    while(letters!='a') {
                            letters=scan.next().charAt(0);
                    }

                    if(letters=='a') {
                    endTime = System.nanoTime();
                    totalTime = endTime - startTime;
                    finalTime = (double) totalTime/1000000000;
                    System.out.println("Congratulations! You completed the
speed test in " +finalTime+ " seconds.");
                    }
                    }
            scan.close();
            //scanner is closed to avoid memory leak
      }
      }
```

Testing:

```
Speed test for the letters of the alphabet. Would you like to go backwards or forwards? (b/f?)
x
Invalid entry. Enter f or b to begin.
w
Invalid entry. Enter f or b to begin.
f
Forwards it is! You may begin with the letter a

```

```
Speed test for the letters of the alphabet. Would you like to go backwards or forwards? (b/f?)
f
Forwards it is! You may begin with the letter a
a
Correct!
Type the letter b:
b
Correct!
Type the letter c:
c
Correct!
Type the letter d:
d
Correct!
Type the letter e:
e
Correct!
Type the letter f:
f
Correct!
Type the letter g:
g
Correct!
Type the letter h:
h
Correct!
Type the letter i:
i
Correct!
Type the letter j:
j
Correct!
Type the letter k:
k
Correct!
```

```
l
Correct!
Type the letter m:
m
Correct!
Type the letter n:
n
Correct!
Type the letter o:
o
Correct!
Type the letter p:
p
Correct!
Type the letter q:
q
Correct!
Type the letter r:
r
Correct!
Type the letter s:
s
Correct!
Type the letter t:
t
Correct!
Type the letter u:
u
Correct!
Type the letter v:
v
Correct!
Type the letter w:
w
Correct!
```

```
Correct!
Type the letter p:
p
Correct!
Type the letter q:
q
Correct!
Type the letter r:
r
Correct!
Type the letter s:
s
Correct!
Type the letter t:
t
Correct!
Type the letter u:
u
Correct!
Type the letter v:
v
Correct!
Type the letter w:
w
Correct!
Type the letter x:
x
Correct!
Type the letter y:
y
Correct!
Type the letter z:
z
Congratulations! You completed the speed test in 10.1372263 seconds.
```

```
Speed test for the letters of the alphabet. Would you like to go backwards or forwards? (b/f?)
f
Forwards it is! You may begin with the letter a
a
Correct!
Type the letter b:
f
d
e
g
b
Correct!
Type the letter c:
c
Correct!
Type the letter d:
c
d
Correct!
Type the letter e:
e
Correct!
Type the letter f:
f
Correct!
Type the letter g:
```

```
<terminated> Scan [Java Application] C:\Users\Maria\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_15.0.2.v20210201-0955\jre\bin\javaw.exe  (24 Feb 2021, 14:48:25 – 14:48:46)
Type the letter q:
q
Correct!
Type the letter r:
r
Correct!
Type the letter s:
s
Correct!
Type the letter t:
t
Correct!
Type the letter u:
u
Correct!
Type the letter v:
v
Correct!
Type the letter w:
w
Correct!
Type the letter x:
x
Correct!
Type the letter y:
y
Correct!
Type the letter z:
y
t
r
g
z
Congratulations! You completed the speed test in 16.1264454 seconds.
```

```
Speed test for the letters of the alphabet. Would you like to go backwards or forwards? (b/f?)
b
Backwards it is! You may begin with the letter z
z
Correct!
Type the letter y:
x
y
Correct!
Type the letter x:
x
Correct!
Type the letter w:
w
Correct!
Type the letter v:
v
Correct!
Type the letter u:
u
Correct!
Type the letter t:
t
Correct!
Type the letter s:
s
Correct!
Type the letter r:
r
Correct!
Type the letter q:
q
Correct!
Type the letter p:
p
Correct!
```

```
<terminated> Scan [Java Application] C:\Users\Maria\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_15.0.2.v20210201-0955\jre\bin\javaw.exe  (24 Feb 2021, 14:50:12 – 14:50:53)
p
Correct!
Type the letter o:
o
Correct!
Type the letter n:
n
Correct!
Type the letter m:
m
Correct!
Type the letter l:
l
Correct!
Type the letter k:
k
Correct!
Type the letter j:
j
Correct!
Type the letter i:
i
Correct!
Type the letter h:
h
Correct!
Type the letter g:
g
Correct!
Type the letter f:
f
Correct!
Type the letter e:
d
e
Correct!
```

```
Type the letter k:
k
Correct!
Type the letter j:
j
Correct!
Type the letter i:
i
Correct!
Type the letter h:
h
Correct!
Type the letter g:
g
Correct!
Type the letter f:
f
Correct!
Type the letter e:
d
e
Correct!
Type the letter d:
d
Correct!
Type the letter c:
c
Correct!
Type the letter b:
b
Correct!
Type the letter a:
q
a
Congratulations! You completed the speed test in 34.5496459 seconds.
```