Assignment 1 – Oisin Mc Laughlin 22441106

Problem Statement with Analysis and Design Notes

This assignment asks me to write a program for reading in the letters of the alphabet and allow the user to either type the letters one by one in either a forwards or backwards direction.

The first thing that I'll need to do is create my variables. I'm going to create an array of characters to hold each letter of the alphabet, a char that will take the input, two booleans; one to check if the user has inputted a direction for the alphabet and another which will either be false meaning forward or true meaning backwards. I will also need an increment value as well as two long's to hold the start and end times so I can work out the total time taken. I've also researched a way to scan in the user's input using the java.util.Scanner library, I'll create a scanner object as well, I found out how to do this on javapoint.

I will prompt the user to either enter 'f' for forward or 'b' for backwards and then begin a while loop that will keep running as long as the boolean to check if the user inputted a correct value is false. In this while loop I will have conditional statements to check if their input, if their input is 'f', direction boolean will be set to false and the boolean to check if the user has entered a correct input is set to true which will stop the while loop, there will also be an else if statement that does the same thing except that it will set the direction boolean to true meaning backwards. The input scanner will also only scan in the first value that the user inputs using charAt(0).

If the direction is false meaning forwards, i will remain at 0, a timer will start and then a while loop will loop through the letters array, at each letter it will prompt a user for an input, tell them what letter to write, if they write the correct letter, increment i, after looping through the letters array, end timer. Else statement can assume its going backwards so it will do the same thing but i will be 1 less than the array length, it will loop until i >= 0 and it will decrement i if the user enters the correct letter.

At the end of the code the total is calculated by end time – start time and the result is printed.

Code

```
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        char[] letters = {'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'};
        //Scanner object
        Scanner c = new Scanner(System.in);
        char input;
        boolean checkIn = false;
        boolean direction = false;
        long start;
        long end;
        int i;
```

```
        System.out.println("Type the alphabet in order (hit enter between
letters)\nForwards or Backwards (f/b)?: ");

        //This while loop asks for which direction the user wants to type
the alphabet
        while(!checkIn) {
            //Scanning in first character entered
            input = c.next().charAt(0);
            //Changing character to lowercase
            input = Character.toLowerCase(input);

            //If input is f
            if (input == 'f') {
                //Direction = false (false = forwards)
                direction = false;
                System.out.println("Forwards Selected");
                //To end while loop
                checkIn = true;
            }
            else if (input == 'b') {
                //Direction = true (true = backwards)
                direction = true;
                System.out.println("Backwards Selected");
                checkIn = true;
            }
            else {
                System.out.println("Invalid. You must enter either 'f' or
'b' to start.");
                checkIn = false;
                //Run
            }
        }

        //Forwards
        i = 0;
        if (direction == false) {
            //Start timer
            start = System.currentTimeMillis();
            //Loop through forwards
            while (i < letters.length) {
                System.out.println("\nType the letter " + letters[i] +
":");
                //Scan first letter
                input = c.next().charAt(0);
                //Lowercase
                input = Character.toLowerCase(input);

                //If user input is correct, increment i
                if (input == letters[i]) {
                    i++;
                }
                else {
                    System.out.print(input + " is incorrect");
                }
            }
            //End timer
            end = System.currentTimeMillis();
        }
        else {
            //Set i to the length of array - 1
```

```
            i = (letters.length - 1);

            start = System.currentTimeMillis();
            while (i >= 0) {
                System.out.println("\nType the letter " + letters[i] +
":");
                input = c.next().charAt(0);
                input = Character.toLowerCase(input);

                //If user input is correct, decrement i
                if (input == letters[i]) {
                    i--;
                }
                else {
                    System.out.print(input + " is incorrect");
                }
            }
            end = System.currentTimeMillis();
        }

        //Working out total time taken
        double total = ((end - start) / 1000);
        System.out.println("Total time taken: " + total + " seconds.");
    }
}
```

Testing

```
Type the alphabet in order (hit enter between letters)
Forwards or Backwards (f/b)?:
g
Invalid. You must enter either 'f' or 'b' to start.
l
Invalid. You must enter either 'f' or 'b' to start.
f
Forwards Selected

Type the letter a:
a

Type the letter b:
b

Type the letter c:
c

Type the letter d:
d

Type the letter e:
```

All results are as expected.

Expected Result	Actual Result
Prompts user to go forwards or backwards, asks again if ‘f’ or ‘b’ isn’t entered.	Prompts user to go forwards or backwards, asks again if ‘f’ or ‘b’ isn’t entered.