Practice Assignment

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Question 1

Given an input string and a dictionary of words, find out if the input string can be segmented into a space-separated sequence of dictionary words. See following examples for more details.

This is a famous Google interview question, also being asked by many other companies now a days.

Consider the following dictionary

{ i, like, sam, sung, samsung, mobile, ice,

cream, icecream, man, go, mango}

Input: ilike

Output: Yes

The string can be segmented as "i like".

Input: ilikesamsung

Output: Yes

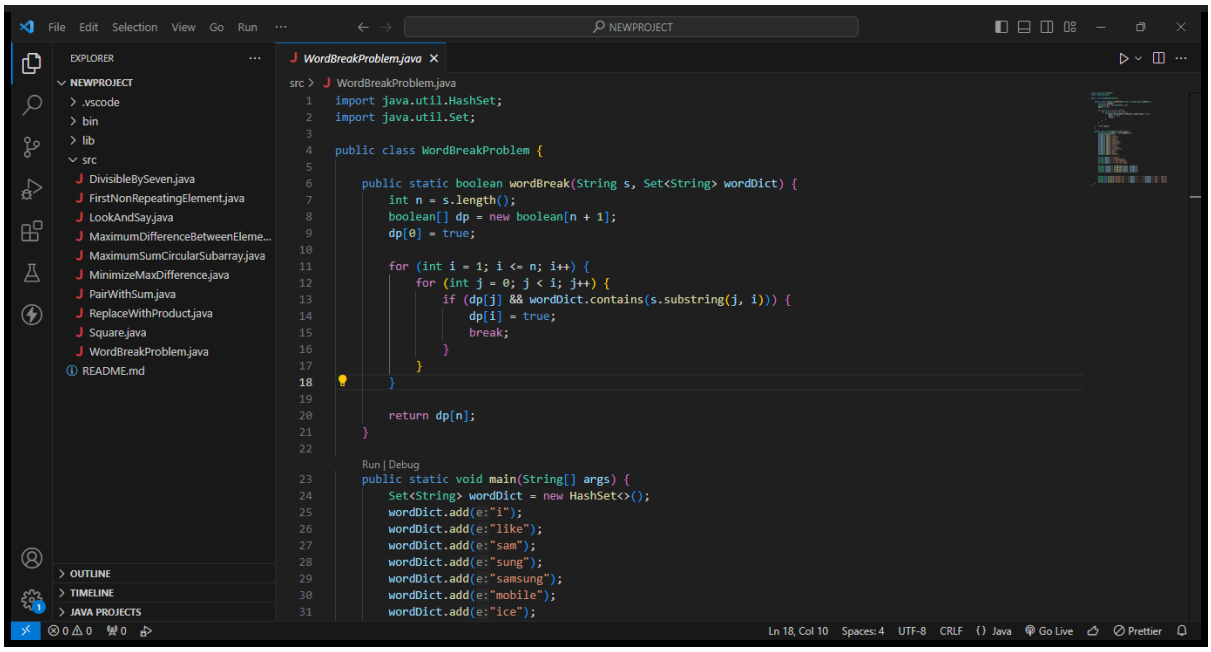
The string can be segmented as "i like samsung" or "i like sam sung".

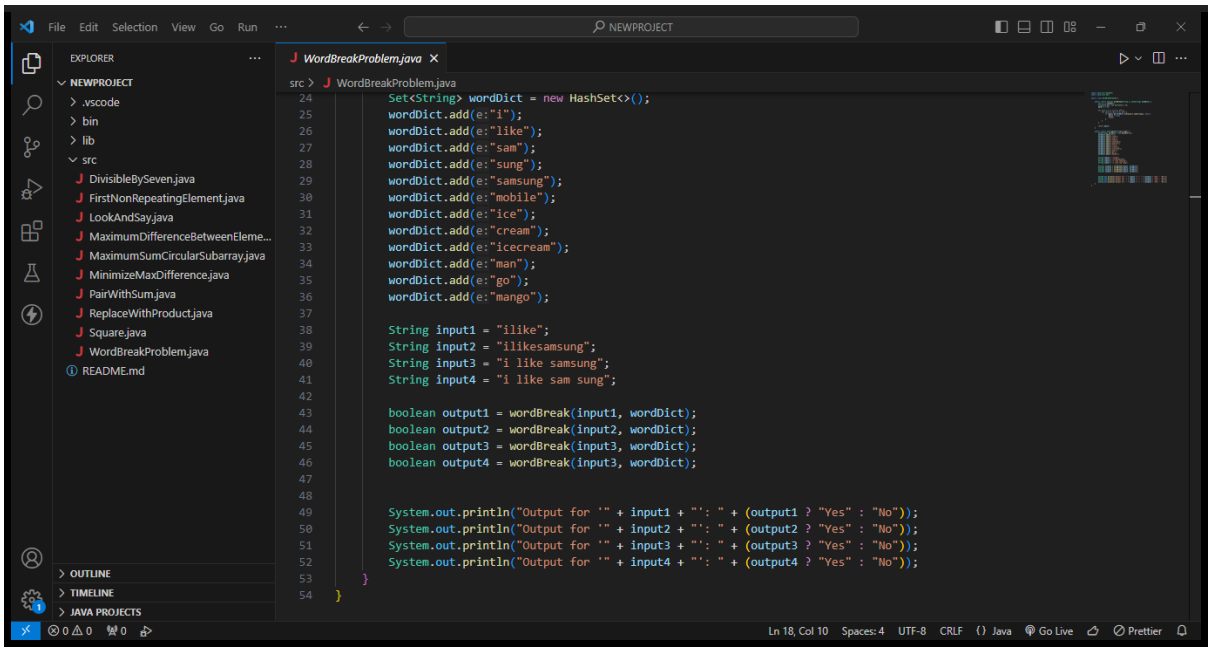
JAVA CODE:-

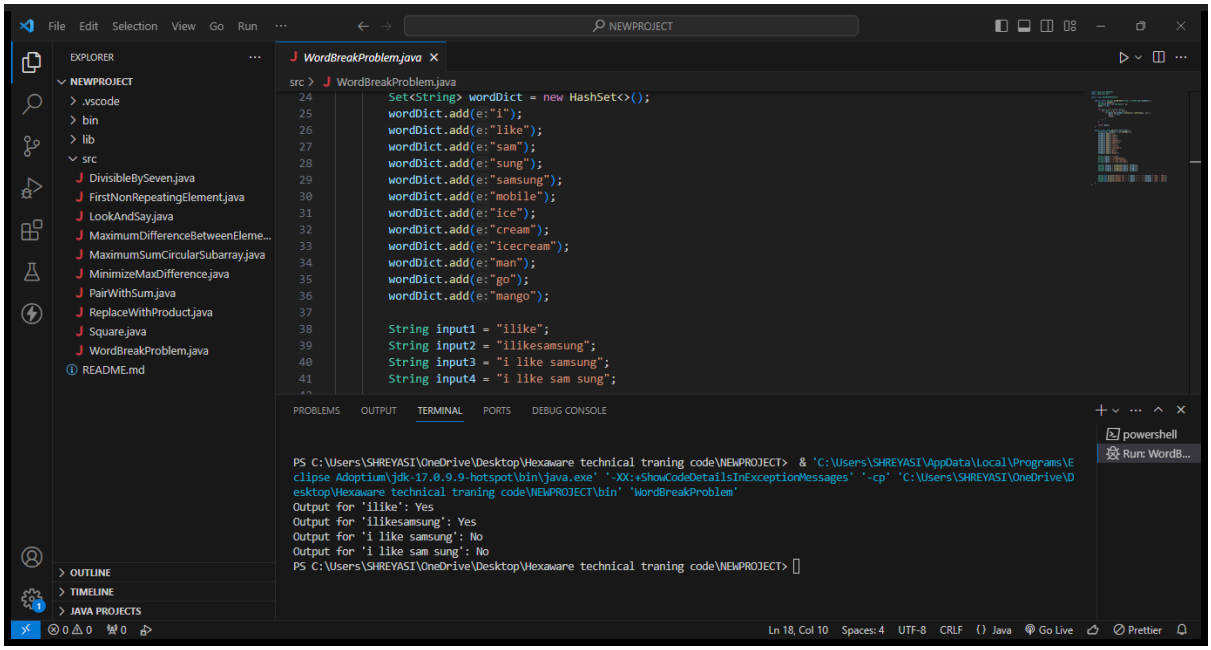
```
import java.util.HashSet;

import java.util.Set;


public class WordBreakProblem {


    public static boolean wordBreak(String s, Set<String> wordDict) {

        int n = s.length();

        boolean[] dp = new boolean[n + 1];

        dp[0] = true;


        for (int i = 1; i <= n; i++) {

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

                if (dp[j] && wordDict.contains(s.substring(j, i))) {

                    dp[i] = true;

                    break;

                }

            }

        }


        return dp[n];

    }


    public static void main(String[] args) {
```

```
Set<String> wordDict = new HashSet<>();
wordDict.add("i");
wordDict.add("like");
wordDict.add("sam");
wordDict.add("sung");
wordDict.add("samsung");
wordDict.add("mobile");
wordDict.add("ice");
wordDict.add("cream");
wordDict.add("icecream");
wordDict.add("man");
wordDict.add("go");
wordDict.add("mango");

String input1 = "ilike";
String input2 = "ilikesamsung";
String input3 = "i like samsung";
String input4 = "i like sam sung";

boolean output1 = wordBreak(input1, wordDict);
boolean output2 = wordBreak(input2, wordDict);
boolean output3 = wordBreak(input3, wordDict);
boolean output4 = wordBreak(input3, wordDict);


System.out.println("Output for '" + input1 + "': " + (output1 ? "Yes" : "No"));
System.out.println("Output for '" + input2 + "': " + (output2 ? "Yes" : "No"));
```

```
        System.out.println("Output for '" + input3 + "': " + (output3 ? "Yes" : "No"));

        System.out.println("Output for '" + input4 + "': " + (output4 ? "Yes" : "No"));

    }

}
```







Ques-2

A number can always be represented as a sum of squares of other numbers. Note that 1 is a square and we can always break a number as (1*1 + 1*1 + 1*1 + ...). Given a number n, find the minimum number of squares that sum to X.

Examples :

Input: n = 100

Output: 1

Explanation:

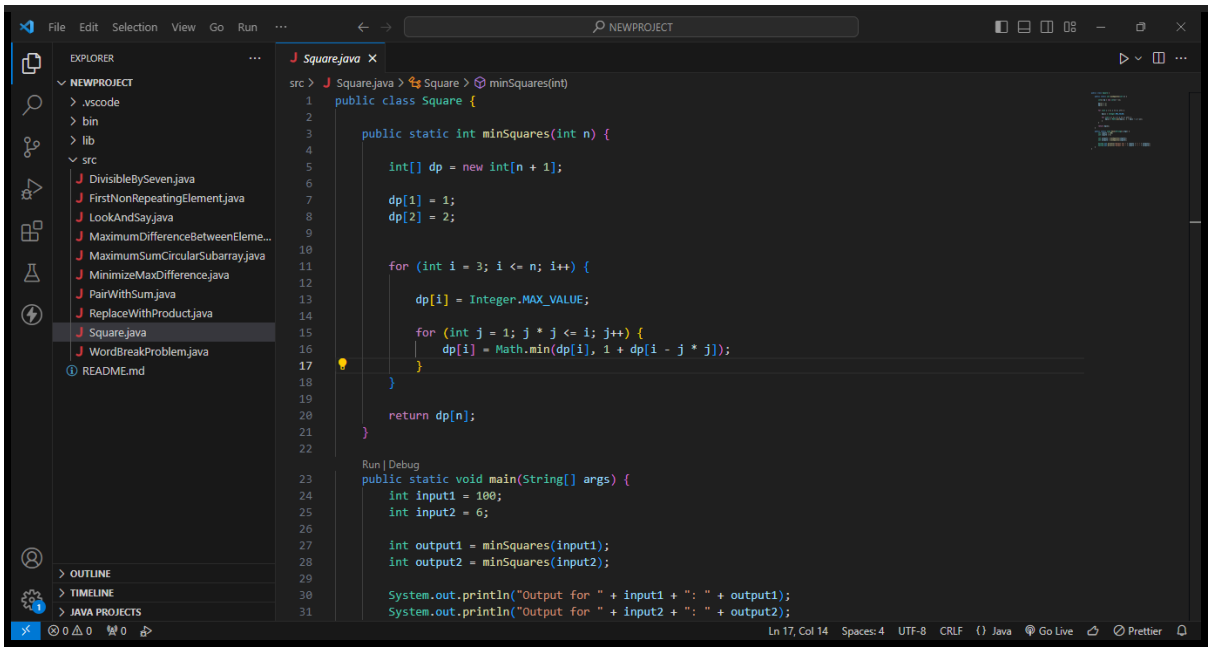
100 can be written as 102. Note that 100 can also be written as 52 + 52 + 52 + 52, but this representation requires 4 squares.

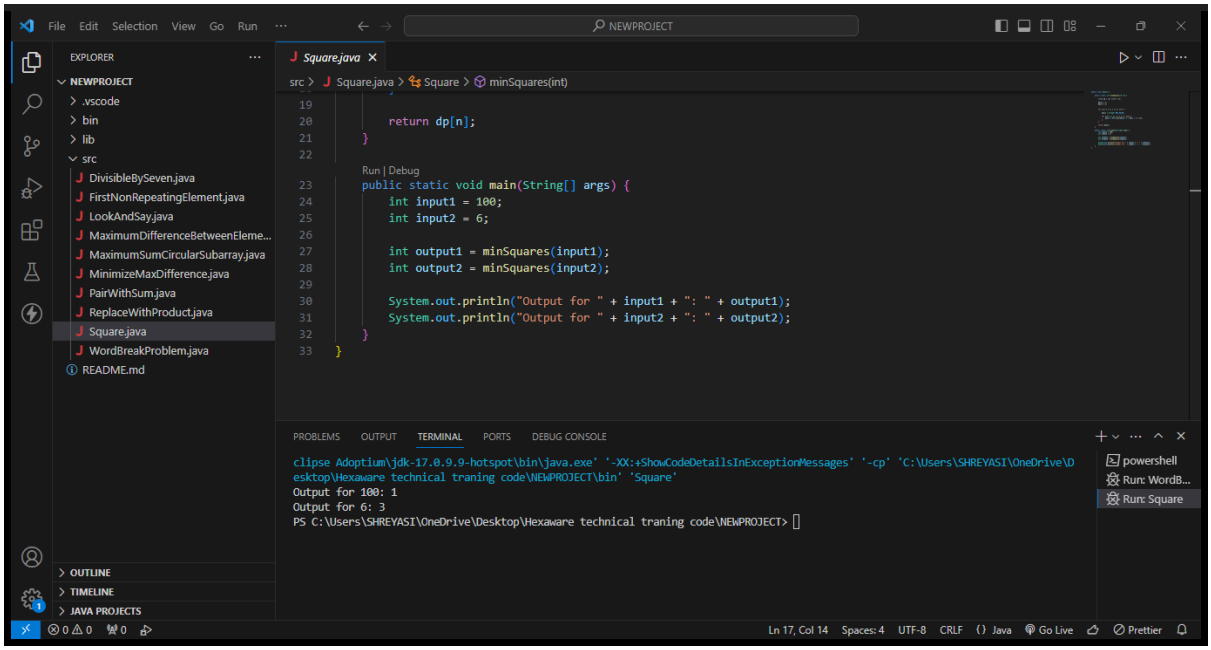
Input: n = 6

Output: 3

```
public class Square {

    public static int minSquares(int n) {

        int[] dp = new int[n + 1];

        dp[1] = 1;
        dp[2] = 2;

        for (int i = 3; i <= n; i++) {

            dp[i] = Integer.MAX_VALUE;

            for (int j = 1; j * j <= i; j++) {
                dp[i] = Math.min(dp[i], 1 + dp[i - j * j]);
            }
```

```
        }

        return dp[n];
    }

    public static void main(String[] args) {
        int input1 = 100;
        int input2 = 6;

        int output1 = minSquares(input1);
        int output2 = minSquares(input2);

        System.out.println("Output for " + input1 + ": " + output1);
        System.out.println("Output for " + input2 + ": " + output2);
    }
}
```





Ques-3

Given a number N, the task is to check if it is divisible by 7 or not.

Note: You are not allowed to use the modulo operator, floating point arithmetic is also not allowed.

Naive approach: A simple method is repeated subtraction. Following is another interesting method.

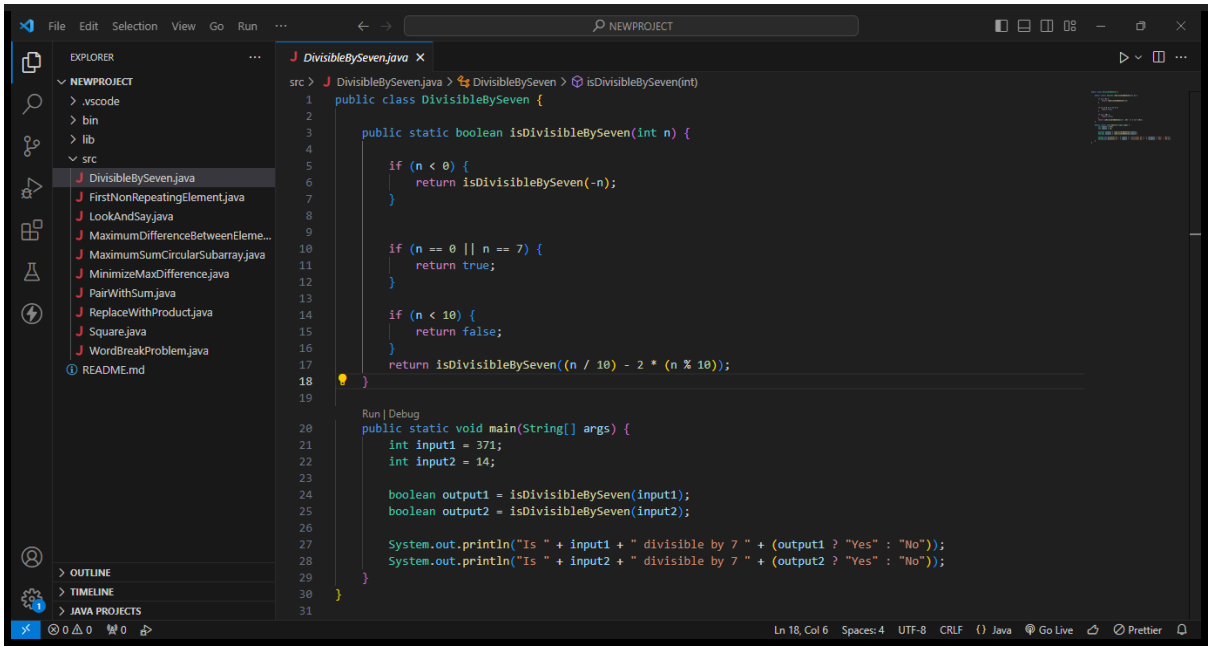
Divisibility by 7 can be checked by a recursive method. A number of the form 10a + b is divisible by 7 if and only if a – 2b is divisible by 7. In other words, subtract twice the last digit from the

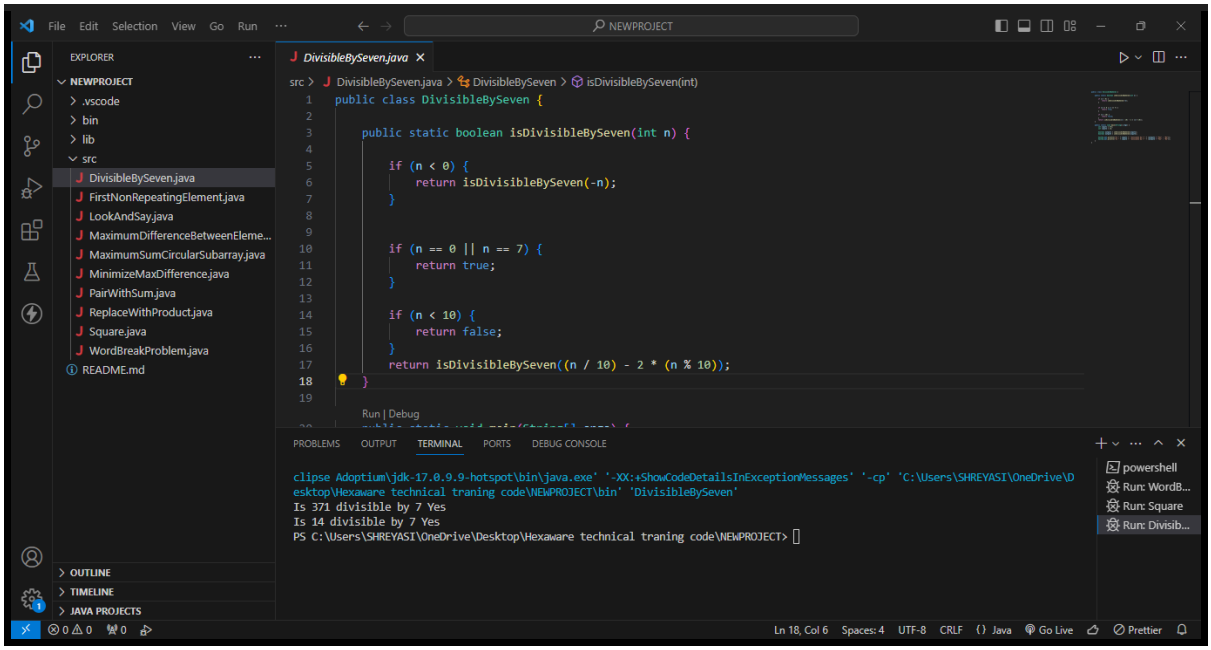
number formed by the remaining digits. Continue to do this until a small number.

Example: the number 371: 37 – (2×1) = 37 – 2 = 35; 3 – (2 × 5) = 3 – 10 = -7; thus, since -7 is divisible by 7, 371 is divisible by 7.

```
public class DivisibleBySeven {

  public static boolean isDivisibleBySeven(int n) {

    if (n < 0) {
      return isDivisibleBySeven(-n);
    }

    if (n == 0 || n == 7) {
      return true;
    }

    if (n < 10) {
      return false;
    }
    return isDivisibleBySeven((n / 10) - 2 * (n % 10));
  }
```

```
    public static void main(String[] args) {
        int input1 = 371;
        int input2 = 14;

        boolean output1 = isDivisibleBySeven(input1);
        boolean output2 = isDivisibleBySeven(input2);

        System.out.println("Is " + input1 + " divisible by 7 " + (output1 ? "Yes" : "No"));
        System.out.println("Is " + input2 + " divisible by 7 " + (output2 ? "Yes" : "No"));
    }
}
```





Question-4

Find the n’th term in Look-and-say (Or Count and Say) Sequence. The look-and-say sequence is the sequence of the below integers:

1, 11, 21, 1211, 111221, 312211, 13112221, 1113213211, …

How is the above sequence generated?

n’th term is generated by reading (n-1)’th term.

The first term is "1"

Second term is "11", generated by reading first term as "One 1"

(There is one 1 in previous term)

Third term is "21", generated by reading second term as "Two 1"

Fourth term is "1211", generated by reading third term as "One 2 One 1"

and so on

Input: n = 3

Output: 21

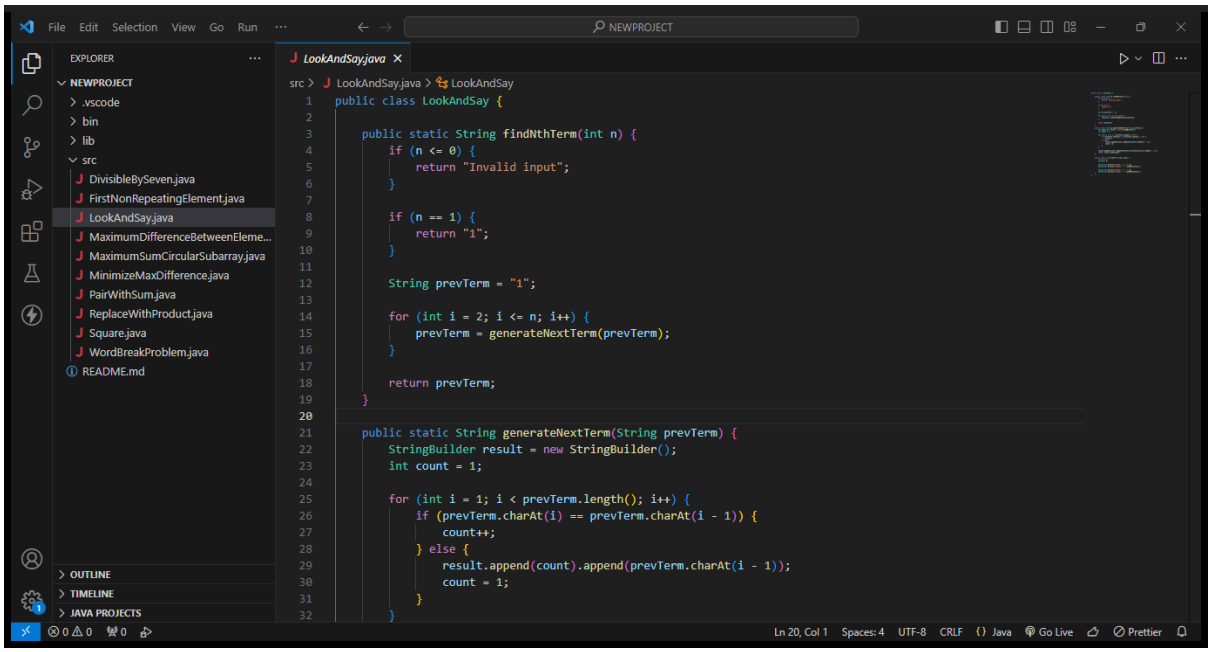
Input: n = 5

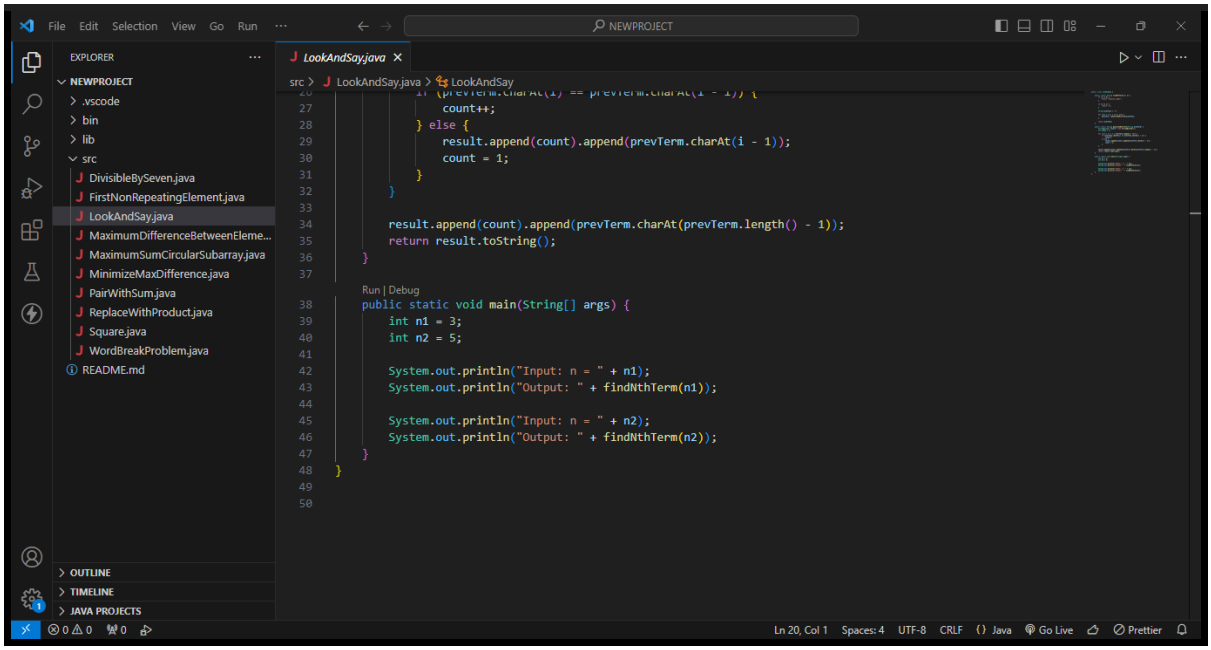
Output: 111221

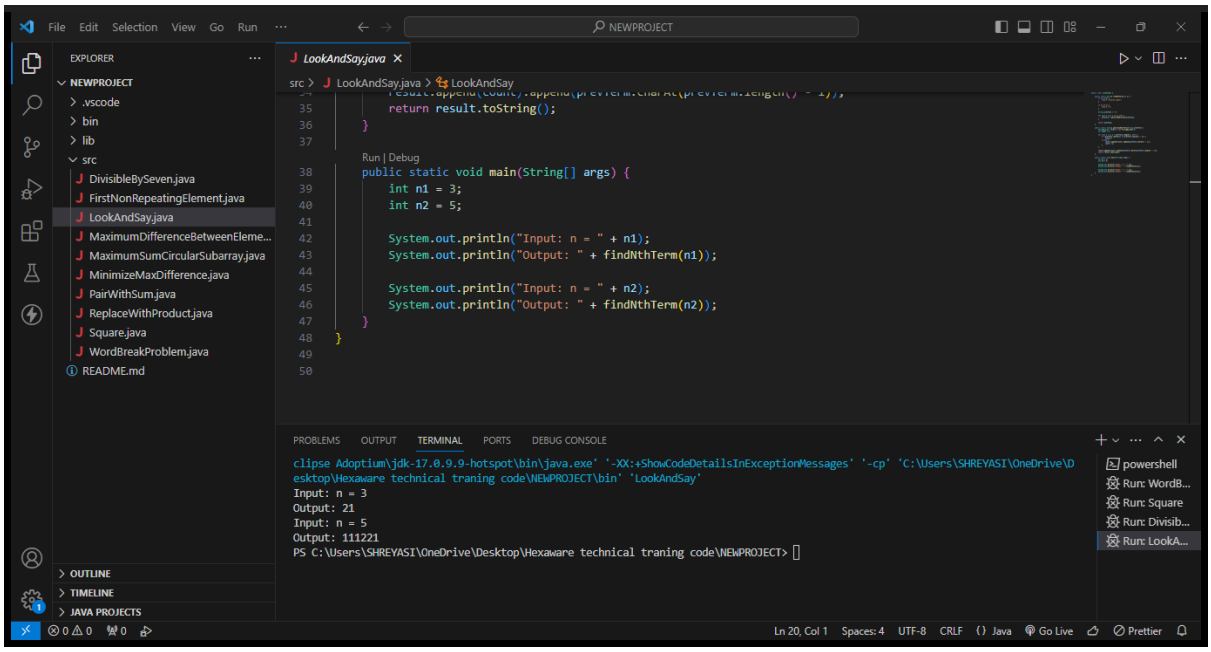
```
public class LookAndSay {

    public static String findNthTerm(int n) {
        if (n <= 0) {
            return "Invalid input";
        }

        if (n == 1) {
            return "1";
        }

        String prevTerm = "1";
```

```
    for (int i = 2; i <= n; i++) {
        prevTerm = generateNextTerm(prevTerm);
    }

    return prevTerm;
}

public static String generateNextTerm(String prevTerm) {
    StringBuilder result = new StringBuilder();
    int count = 1;

    for (int i = 1; i < prevTerm.length(); i++) {
        if (prevTerm.charAt(i) == prevTerm.charAt(i - 1)) {
            count++;
        } else {
            result.append(count).append(prevTerm.charAt(i - 1));
            count = 1;
        }
    }

    result.append(count).append(prevTerm.charAt(prevTerm.length() - 1));
    return result.toString();
}

public static void main(String[] args) {
    int n1 = 3;
```

```
        int n2 = 5;

        System.out.println("Input: n = " + n1);
        System.out.println("Output: " + findNthTerm(n1));

        System.out.println("Input: n = " + n2);
        System.out.println("Output: " + findNthTerm(n2));
    }
}
```




File Edit Selection View Go Run
NEWPROJECT
EXPLORER
NEWPROJECT
.vscode
bin
lib
src
DivisibleBySeven.java
FirstNonRepeatingElement.java
LookAndSay.java
MaximumDifferenceBetweenEleme...
MaximumSumCircularSubarray.java
MinimizeMaxDifference.java
PairWithSum.java
ReplaceWithProduct.java
Square.java
WordBreakProblem.java
README.md
OUTLINE
TIMELINE
JAVA PROJECTS
LookAndSay.java
src > LookAndSay.java > LookAndSay
count++;
} else {
result.append(count).append(prevTerm.charAt(i - 1));
count = 1;
}
}
result.append(count).append(prevTerm.charAt(prevTerm.length() - 1));
return result.toString();
}
Run | Debug
public static void main(String[] args) {
int n1 = 3;
int n2 = 5;
System.out.println("Input: n = " + n1);
System.out.println("Output: " + findNthTerm(n1));
System.out.println("Input: n = " + n2);
System.out.println("Output: " + findNthTerm(n2));
}
}
Ln 20, Col 1 Spaces: 4 UTF-8 CRLF {} Java Go Live Prettier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src > LookAndSay.java > LookAndSay
return result.toString();
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public static void main(String[] args) {
int n1 = 3;
int n2 = 5;
System.out.println("Input: n = " + n1);
System.out.println("Output: " + findNthTerm(n1));
System.out.println("Input: n = " + n2);
System.out.println("Output: " + findNthTerm(n2));
}
}
PROBLEMS OUTPUT TERMINAL PORTS DEBUG CONSOLE
clipse Adoptium\jdk-17.0.9.9-hotspot\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\SHREYASI\OneDrive\Desktop\Hexaware technical traning code\NEWPROJECT\bin' 'LookAndSay'
Input: n = 3
Output: 21
Input: n = 5
Output: 111221
PS C:\Users\SHREYASI\OneDrive\Desktop\Hexaware technical traning code\NEWPROJECT>
powershell
Run: WordB...
Run: Square
Run: Divisib...
Run: LookA...
Ln 20, Col 1 Spaces: 4 UTF-8 CRLF {} Java Go Live Prettier