```java
import components.set.Set;

/**
 * Lets the user test the {@code hashCode(String)} method, by reading text lines
 * from a file (whose name is supplied by the user), and then outputting the
 * distribution of lines into buckets.
 *
 * @author Put your name here
 *
 */
public final class HashingExploration {

    /**
     * Private constructor so this utility class cannot be instantiated.
     */
    private HashingExploration() {
    }

    /**
     * Computes {@code a} mod {@code b} as % should have been defined to work.
     *
     * @param a
     *            the number being reduced
     * @param b
     *            the modulus
     * @return the result of a mod b, which satisfies 0 <= {@code mod} < b
     * @requires b > 0
     * @ensures <pre>
     * 0 <= mod  and  mod < b  and
     * there exists k: integer (a = k * b + mod)
     * </pre>
     */
    public static int mod(int a, int b) {
        assert b > 0 : "Violation of: b > 0";

        if (a > 0 && b > 0) {
            while (a >= b) {
                a = a - b;
            }
        } else if (a < 0 && b > 0) {
            while (-a >= b || a <= b) {
                a = a + b;
            }
        } else if (a < 0 && b < 0) {
            while (a <= b) {
                a = a - b;
            }
        }

        return a;
    }

    /**
     * Returns a hash code value for the given {@code String}.
     *
     * @param s
     *            the {@code String} whose hash code is computed
     * @return a hash code value for the given {@code String}
     * @ensures hashCode = [hash code value for the given String]
```

```
65      */
66     private static int hashCode(String s) {
67         assert s != null : "Violation of: s is not null";
68
69         int hash = 0;
70
71         for (int i = 0; i < s.length(); i++) {
72             hash = hash + s.charAt(i);
73         }
74
75         return 0;
76     }
77
78     /**
79      * Main method.
80      *
81      * @param args
82      *            the command line arguments
83      */
84     public static void main(String[] args) {
85         SimpleReader in = new SimpleReader1L();
86         SimpleWriter out = new SimpleWriter1L();
87         /*
88          * Get hash table size and file name.
89          */
90         out.print("Hash table size: ");
91         int hashTableSize = in.nextInteger();
92         out.print("Text file name: ");
93         String textFileName = in.nextLine();
94         /*
95          * Set up counts and counted. All entries in counts are automatically
96          * initialized to 0.
97          */
98         int[] counts = new int[hashTableSize];
99         Set<String> counted = new Set1L<String>();
100        /*
101         * Get some lines of input, hash them, and record counts.
102         */
103        SimpleReader textFile = new SimpleReader1L(textFileName);
104        while (!textFile.atEOS()) {
105            String line = textFile.nextLine();
106            if (!counted.contains(line)) {
107                int bucket = mod(hashCode(line), hashTableSize);
108                counts[bucket]++;
109                counted.add(line);
110            }
111        }
112        textFile.close();
113        /*
114         * Report results.
115         */
116        out.println();
117        out.println("Bucket\tHits\tBar");
118        out.println("------\t----\t---");
119        for (int i = 0; i < counts.length; i++) {
120            out.print(i + "\t" + counts[i] + "\t");
121            for (int j = 0; j < counts[i]; j++) {
122                out.print("*");
123            }
```

```
124             out.println();
125         }
126         out.println();
127         out.println("Total:\t" + counted.size());
128         in.close();
129         out.close();
130     }
131
132 }
133
```