BHARATIYA VIDYA BHAVAN'S

SARDAR PATEL INSTITUTE OF TECHNOLOGY

MUNSHI NAGAR, ANDHERI (WEST), MUMBAI – 400 058.

(Autonomous College Affiliated to University of Mumbai)

MASTER OF COMPUTER APPLICATIONS

**Class : F.Y.MCA    Semester : II    Academic Year : 2024-25**

**Course Name : Design and Analysis of Algorithm MC507**

**Subject Incharge : Prof.Nikhita Mangaonkar**

**UCID: 2024510001    BATCH: A    NAME: Atharva Vasant Angre**

**EXPERIMENT NO:   10**

**EXPERIMENT TITLE:** To implement String matching algorithm (Rabin Karp Algorithm)

**Objective:**
1.To understand how to find a pattern in a text using the Rabin-Karp algorithm.
2.To learn how hashing helps match strings quickly.

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**Program code: -**

```
import java.util.Scanner;

public class RabinKarp {
    static final int d = 256; // Number of characters in input alphabet

    public static void rabinKarpSearch(String text, String pattern, int q)
{
        int m = pattern.length();
        int n = text.length();
        int i, j;
        int p = 0; // hash value for pattern
        int t = 0; // hash value for text
        int h = 1;

        // The value of h would be "pow(d, m-1)%q"
        for (i = 0; i < m - 1; i++)
            h = (h * d) % q;

        // Calculate the hash value of pattern and first window of text
        for (i = 0; i < m; i++) {
            p = (d * p + pattern.charAt(i)) % q;
            t = (d * t + text.charAt(i)) % q;
        }

        // Slide the pattern over text one by one
        for (i = 0; i <= n - m; i++) {
            // Check the hash values of current window and pattern
            if (p == t) {
                // If hash values match then only check characters one by
one
                for (j = 0; j < m; j++) {
                    if (text.charAt(i + j) != pattern.charAt(j))
                        break;
                }

                if (j == m)
                    System.out.println("Pattern found at index " + i);
            }

            // Calculate hash value for next window
            if (i < n - m) {
                t = (d * (t - text.charAt(i) * h) + text.charAt(i + m)) %
q;

                // Make sure that t >= 0
                if (t < 0)
                    t = (t + q);
```

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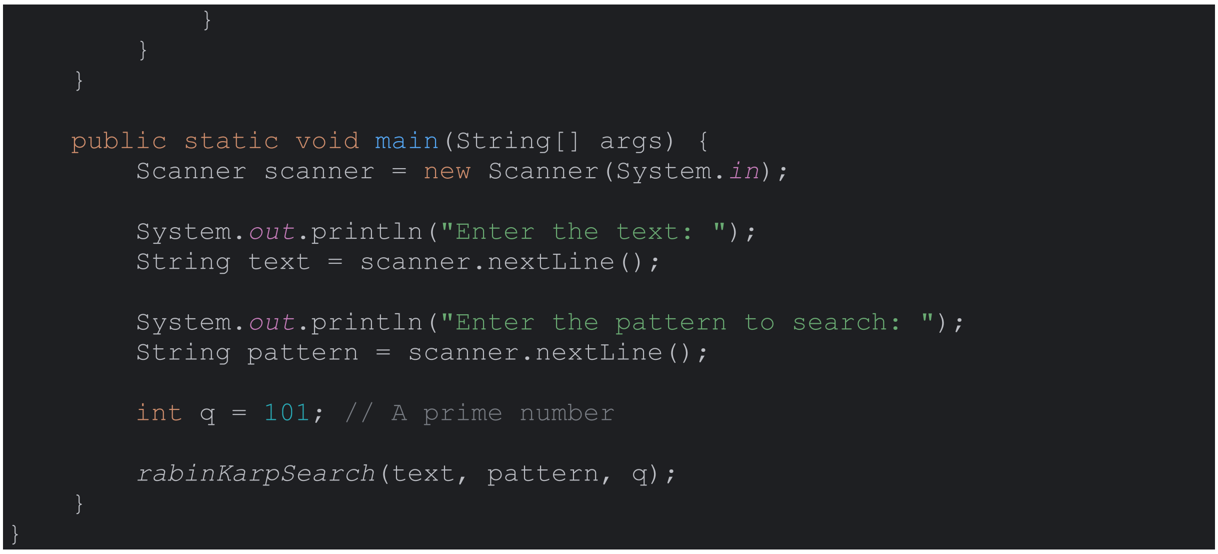
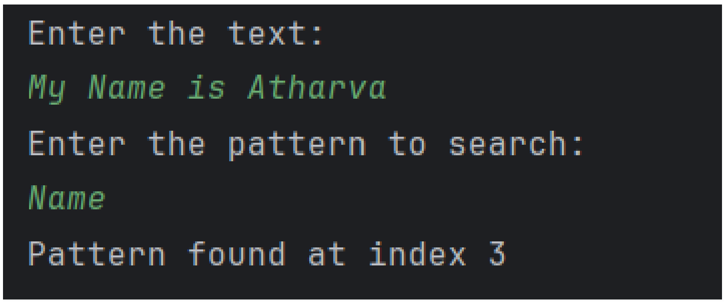


```
            }
        }
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter the text: ");
        String text = scanner.nextLine();

        System.out.println("Enter the pattern to search: ");
        String pattern = scanner.nextLine();

        int q = 101; // A prime number

        rabinKarpSearch(text, pattern, q);
    }
}
```

**Output:**



```
Enter the text:
My Name is Atharva
Enter the pattern to search:
Name
Pattern found at index 3
```

**Conclusion:**

In this experiment, we successfully implemented the Rabin-Karp algorithm to find a pattern within a given text using hashing. The algorithm efficiently calculates hash values to reduce unnecessary character comparisons, significantly speeding up the string matching process for large texts. This experiment enhanced our understanding of how hashing can be used in pattern matching and demonstrated the importance of collision handling and modular arithmetic in string algorithms.