

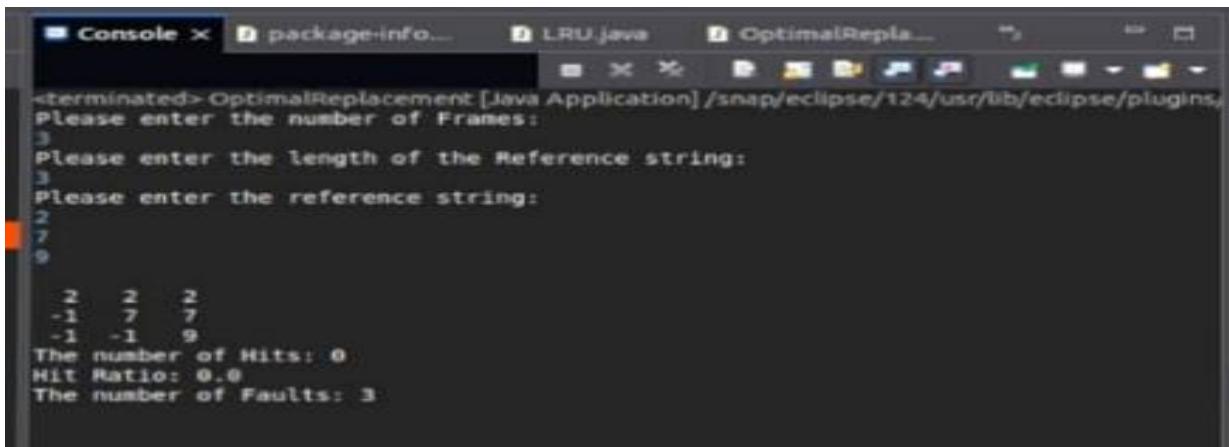
```
1 package A4;
2
3 import java.io.BufferedReader;
4 import java.io.IOException;
5 import java.io.InputStreamReader;
6
7 public class OptimalReplacement {
8     public static void main(String[] args) throws IOException {
9         BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
10
11         int frames, pointer = 0, hit = 0, fault = 0, ref_len;
12         boolean isFull = false;
13         int buffer[];
14         int reference[];
15         int mem_layout[][][];
16
17         System.out.print("Please enter the number of Frames: ");
18         frames = Integer.parseInt(br.readLine());
19
20         System.out.print("Please enter the length of the Reference string: ");
21         ref_len = Integer.parseInt(br.readLine());
22
23         reference = new int[ref_len];
24         mem_layout = new int[ref_len][frames];
25         buffer = new int[frames];
26
27         for (int j = 0; j < frames; j++) {
28             buffer[j] = -1;
29         }
30
31         System.out.println("Please enter the Reference string values: ");
32         for (int i = 0; i < ref_len; i++) {
33             reference[i] = Integer.parseInt(br.readLine());
34         }
35
36         System.out.println();
37         for (int i = 0; i < ref_len; i++) {
38             int search = -1;
39             for (int j = 0; j < frames; j++) {
40                 if (buffer[j] == reference[i]) {
41                     search = j;
42                     hit++;
43                     break;
44                 }
45             }
46         }
47     }
48 }
```

```
46
47     if (search == -1) { // Page Fault
48         if (isFull) {
49             int index[] = new int[frames];
50             boolean index_flag[] = new boolean[frames];
51
52             for (int j = i + 1; j < ref_len; j++) {
53                 for (int k = 0; k < frames; k++) {
54                     if ((reference[j] == buffer[k]) && (index_flag[k] ==
55                         false)) {
56
57                         index[k] = j;
58                         index_flag[k] = true;
59                         break;
60                     }
61
62                     int max = index[0];
63                     pointer = 0;
64                     if (max == 0)
65                         max = 200;
66
67                     for (int j = 0; j < frames; j++) {
68                         if (index[j] == 0)
69                             index[j] = 200;
70                         if (index[j] > max) {
71                             max = index[j];
72                             pointer = j;
73                         }
74                     }
75                 }
76
77                 buffer[pointer] = reference[i];
78                 fault++;
79
80                 if (!isFull) {
81                     pointer++;
82                     if (pointer == frames) {
83                         pointer = 0;
84                         isFull = true;
85                     }
86                 }
87             }
88
89             for (int j = 0; j < frames; j++) {
90                 mem_layout[i][j] = buffer[j];
91             }

```

```
92 }
93
94     System.out.println("\nPage Replacement Table:");
95     for (int i = 0; i < frames; i++) {
96         for (int j = 0; j < ref_len; j++) {
97             System.out.printf("%3d ", mem_layout[j][i]);
98         }
99         System.out.println();
100    }
101
102    System.out.println("\nThe number of Hits: " + hit);
103    System.out.println("Hit Ratio: " + (float) hit / ref_len);
104    System.out.println("The number of Faults: " + fault);
105 }
106
107 }
```

Output:



The screenshot shows the Eclipse IDE interface with the 'Console' tab selected. The application window title is 'OptimalReplacement [Java Application]'. The console output is as follows:

```
<terminated> OptimalReplacement [Java Application] /snap/eclipse/124/usr/lib/eclipse/plugins,
Please enter the number of Frames:
3
Please enter the length of the Reference string:
3
Please enter the reference string:
2
7
9

2 2 2
-1 7 7
-1 -1 9

The number of Hits: 0
Hit Ratio: 0.0
The number of Faults: 3
```