

LRU

```
import java.util.*;
```

```
public class LRUPageReplacement {
```

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

```
        Scanner sc = new Scanner(System.in);
```

```
        System.out.print("Enter the number of pages: ");
```

```
        int n = sc.nextInt();
```

```
        int[] pages = new int[n];
```

```
        System.out.print("Enter the reference string (page numbers): ");
```

```
        for (int i = 0; i < n; i++) {
```

```
            pages[i] = sc.nextInt();
```

```
        }
```

```
        System.out.print("Enter the number of frames: ");
```

```
        int f = sc.nextInt();
```

```
        int[] frames = new int[f];
```

```
        Arrays.fill(frames, -1);
```

```
        int pageHits = 0, pageFaults = 0;
```

```
        System.out.println("\n==== LRU Page Replacement Simulation =====");
```

```
        for (int i = 0; i < n; i++) {
```

```
            int page = pages[i];
```

```
            boolean hit = false;
```

```
            // Check if page is already present
```

```
for (int j = 0; j < f; j++) {  
    if (frames[j] == page) {  
        hit = true;  
        pageHits++;  
        break;  
    }  
}
```

```
if (!hit) {  
    pageFaults++;  
    int pos = -1;
```

```
    // Empty frame available?
```

```
    for (int j = 0; j < f; j++) {  
        if (frames[j] == -1) {  
            pos = j;  
            break;  
        }  
    }  
}
```

```
    // If no empty frame → find LRU (least recently used)
```

```
    if (pos == -1) {  
        int bestAge = -1, idx = 0;  
        for (int j = 0; j < f; j++) {  
            int age = 0;  
            for (int k = i - 1; k >= 0; k--) {  
                if (pages[k] == frames[j])  
                    break;  
                age++;  
            }  
            if (age > bestAge) {
```

```

        bestAge = age;

        idx = j;
    }

}

pos = idx;
}

frames[pos] = page;
}

// Display current frame state
System.out.print("After referencing page " + page + " → Frames: ");
for (int j = 0; j < f; j++) {
    if (frames[j] == -1)
        System.out.print("- ");
    else
        System.out.print(frames[j] + " ");
}
System.out.println(hit ? " (Hit)" : " (Fault)");
}

// Final Results
System.out.println("\n===== Final Results =====");
System.out.println("Total Page References: " + n);
System.out.println("Total Page Hits:    " + pageHits);
System.out.println("Total Page Faults:    " + pageFaults);

float hitRatio = ((float) pageHits / n) * 100;
float faultRatio = ((float) pageFaults / n) * 100;

System.out.printf("Hit Ratio: %.2f%%\n", hitRatio);

```

```
System.out.printf("Fault Ratio: %.2f%%\n", faultRatio);
```

```
sc.close();
```

```
}
```

```
}
```