

LRU

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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
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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) {

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        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);

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

sc.close();
}

}
```