import java.util.Scanner;

public class LRU {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

// Input the number of pages in the reference string

System.out.println("Enter the number of pages in the reference string:");

int ref\_len = sc.nextInt();

int[] reference = new int[ref\_len];

// Input the reference string

System.out.println("Enter the reference string (space-separated page numbers):");

for (int i = 0; i < ref\_len; i++) {

reference[i] = sc.nextInt();

}

// Input the number of frames (buffer size)

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

int frame\_len = sc.nextInt();

int[] buffer = new int[frame\_len];

int[][] matrix = new int[ref\_len][frame\_len];

int fault = 0, hit = 0;

// Initialize buffer with -1 (indicating empty)

for (int i = 0; i < frame\_len; i++) {

buffer[i] = -1;

}

// Process each page in the reference string

for (int i = 0; i < ref\_len; i++) {

int search = -1;

// Check if page is already in buffer (Page hit)

for (int j = 0; j < frame\_len; j++) {

if (buffer[j] == reference[i]) {

hit++;

search = 1;

break;

}

}

// If the page is not found (Page fault)

if (search == -1) {

int lruIndex = 0;

int leastRecentlyUsed = i; // Initialize LRU with current index

// Find the least recently used page

for (int j = 0; j < frame\_len; j++) {

boolean found = false;

// Search in the history for the least recently used page

for (int k = i - 1; k >= 0; k--) {

if (buffer[j] == reference[k]) {

found = true;

if (k < leastRecentlyUsed) {

leastRecentlyUsed = k;

lruIndex = j;

}

break;

}

}

// If the page was never used, select this index for replacement

if (!found) {

lruIndex = j;

break;

}

}

// Replace the least recently used page

buffer[lruIndex] = reference[i];

fault++;

}

// Update the matrix for visual output

for (int j = 0; j < frame\_len; j++) {

matrix[i][j] = buffer[j];

}

}

// Display the resulting page frames

System.out.println("\nPage Frame Status at each reference:");

for (int i = 0; i < ref\_len; i++) {

for (int j = 0; j < frame\_len; j++) {

if (matrix[i][j] == -1) {

System.out.print(" -\t");

} else {

System.out.print(matrix[i][j] + "\t");

}

}

System.out.print("\n");

}

// Print page fault and hit statistics

System.out.println("Page fault: " + fault);

System.out.println("Page hit: " + hit);

sc.close();

}

}

