Transform Yourself

Alternating Disks Sorting Puzzle

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Estd : 1984

Problem Description

Alternating disks You have a row of 2n disks of two colors, n dark and n light. They alternate: dark, light, dark, light, and so on. You want to get all the dark disks to the right-hand end, and all the light disks to the left-hand end. The only moves you are allowed to _ make are those that interchange the positions of two neighboring disks. Design an algorithm for solving this puzzle and determine the number of moves it takes.

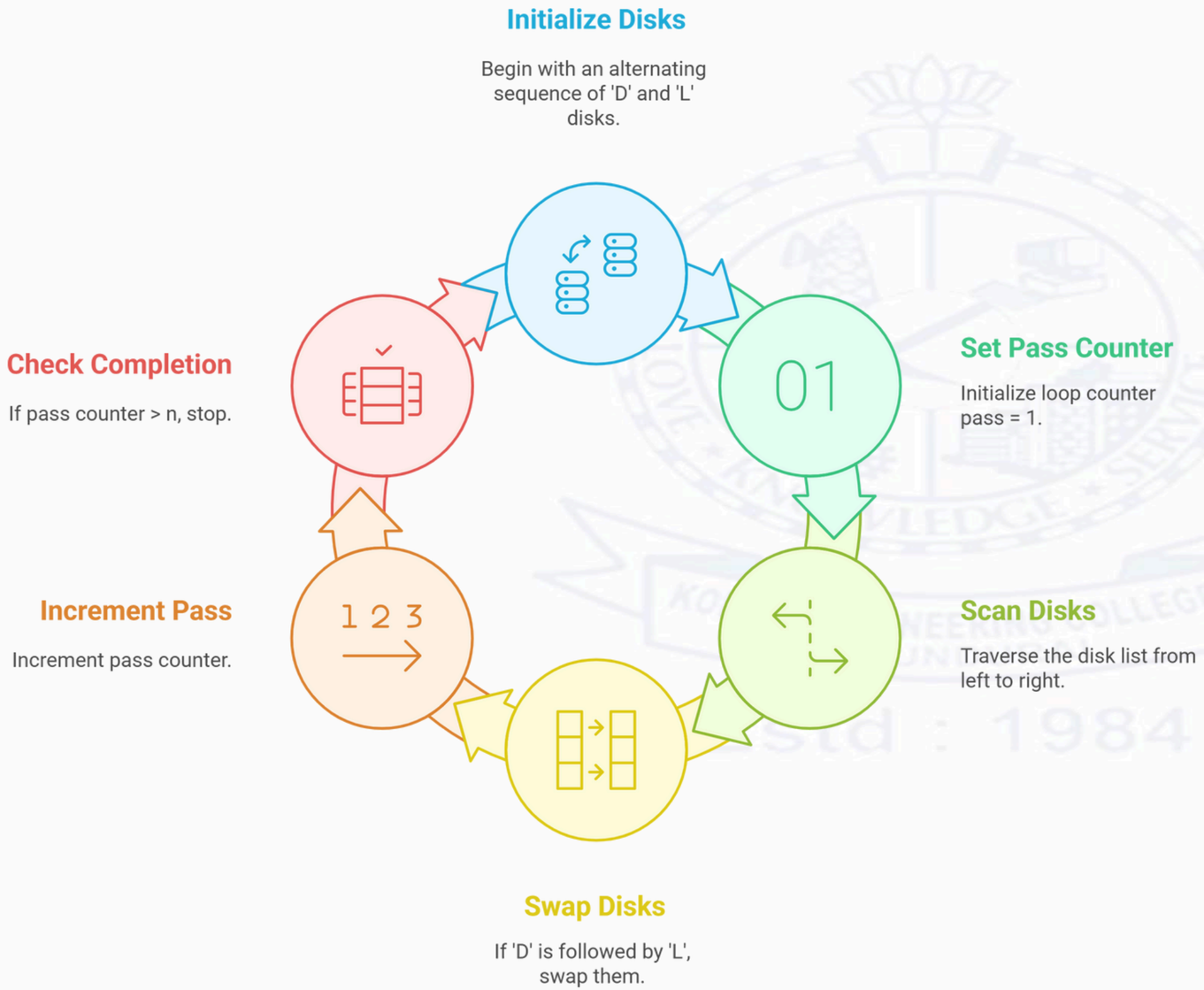
Problem Summary:

To start with an alternating sequence of disks: Dark, Light, Dark, Light, ... for a total of 2n disks (n dark and n light).

Goal: Move all light disks to the left and all dark disks to the right.

Allowed move: swap adjacent disks only.

Algorithm Design Technique



Technique Used : Iterative Swapping (Bubble Sort Strategy)

Approach Used : Brute Force

Data Structure

Data Structure Used: Array/List

Each disk is represented as a character:

- 'D' for dark disk
- 'L' for light disk

Easy indexing and swapping with arrays/lists

Example:
Initial configuration: ['D', 'L', 'D', 'L', 'D', 'L', 'D', 'L']

Input Size and Efficiency

Number of disks: 2n (n is the number of dark/light disks)

Typical values of n used in problems: $2 \leq n \leq 1000$

Efficiency

Time Complexity:
Each pass takes up to 2n - 1 comparisons/swaps
There are n passes → $O(n^2)$ time

Space Complexity:
Only one list used → O(n) space

Sample Input and Output

Input:

n = 3

Initial: ['D', 'L', 'D', 'L', 'D', 'L']

Output (Final):

['L', 'L', 'L', 'D', 'D', 'D']

Step 1: D L D L D L → L D L D D L

Step 2: L D L D D L → L L D D D L

Step 3: L L D D D L → L L D D L D

Step 4: L L D L D D → L L L D D D

Total Moves: 9

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Thank you!