USER DOCUMENT

Problem Description

This program finds the **kth smallest element** in an unsorted integer array using a recursive partition-based algorithm. The first element is always chosen as the pivot.

File Location

Your GitHub repository:
https://github.com/[YourGitHub]/CSCI301/Project4

How to Compile

On the GitHub terminal or local machine:
g++ -o ksmall main.cpp

How to Run

Run the compiled program:
./ksmall
The program will prompt for:

1. Number of elements in the array.
2. The array elements.
3. The value of k.

Example:
Enter number of elements: 6
Enter 6 elements: 6 3 1 10 8 4
Enter k (1-based index): 4
The 4th smallest element is 6

Input Requirements

- n (number of elements) must be positive.
- k must be between 1 and n.
- Elements must be integers.
- If k is out of range, program outputs:
- Error: k is out of range

Test Plan

1. **k in S1**
   Input: 6 3 1 10 8 4, k=2 → Output: 3
2. **k is pivot**
   Input: 6 3 1 10 8 4, k=4 → Output: 6
3. **k in S2**
   Input: 1 3 5 2 19 3 4, k=6 → Output: 5
4. **Boundary (k=1)**
   Input: 12 7 3 25 9, k=1 → Output: 3
5. **Boundary (k=n)**
   Input: 12 7 3 25 9, k=5 → Output: 25
6. **Invalid case**
   Input: 10 20 30 40, k=6 → Output: Error: k is out of range