**TITLE:** Using Divide and Conquer Strategies design a class for Concurrent Quick Sort using C++.

**THEORY:**

Quicksort (sometimes called partition-exchange sort) is an efficient sorting algorithm, serving as a systematic method for placing the elements of an array in order. Developed by Tony Hoare in 1959, with his work published in 1961, it is still a commonly used algorithm for sorting. When implemented well, it can be about two or three times faster than its main competitors, merge sort and heapsort. Quicksort is a comparison sort, meaning that it can sort items of any type for which a "less-than" relation (formally, a total order) is defined. In efficient implementations it is not a stable sort, meaning that the relative order of equal sort items is not preserved. Quicksort can operate in-place on an array, requiring small additional amounts of memory to perform the sorting.

**Time Complexity:**

* Best Case: O(*n* log *n*)
* Worst Case: O(*n*2)
* Average Case: O(*n* log *n*)

**ALGORITHM:**

1. Choose an element as pivot.

2. Start indexes at left and (right-1) elements

3. Move left index until we find an element> pivot

4. Move right index until we find an element < pivot

5. If indexes haven’t crossed, swap values and repeat

steps 3 and 4

6. If indexes indexes have crossed crossed , swap pivot and left index

values

7. Call quicksort on the subarrays to the left and right

of the pivot value

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*OUTPUT\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

pvg@PC:~/ $ g++ quick.cpp -fopenmp

pvg@PC:~/ $ ./a.out

Enter Number of Elements:7

Enter Elements: 119

90

85

66

47

39

24

The Entered Array= {119, 90, 85, 66, 47, 39, 24}

24,90,85,66,47,39,119, Thread No. 1

Thread No. 0

24,90,85,66,47,39,119, Thread No. 0

Thread No. 1

24,39,85,66,47,90,119, Thread No. 0

24,39,85,66,47,90,119, Thread No. 1

Thread No. 0

Thread No. 1

24,39,47,66,85,90,119, Thread No. 1

Thread No. 0

24,39,47,66,85,90,119, Thread No. Thread No. 01

24,39,47,66,85,90,119

, Thread No. 1

Thread No. 0

The Sorted Array= {24, 39, 47, 66, 85, 90, 119}

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/