Algorithm

Sieve of Eratosthenes

MAIN IDEA | *Cross out all the multiple number from 2 → n*

EXAMPLE : Find all prime number in the following list

2, 3, 4, 5, 6, 7, 8, 9, 10

Step 1: $2, 3, \xcancel{4}, 5, \xcancel{6}, 7, \xcancel{8}, 9, \xcancel{10}$

Step 2: $2, 3, \xcancel{4}, 5, \xcancel{6}, 7, \xcancel{8}, \xcancel{9}, \xcancel{10}$

Prime : 2, 3, 5, 7

Merge Sort

MAIN IDEA | *Find the mid point and then split array into half*
Merge sort the left array
Merge sort the right array
Merge left and right array
Better apply to LinkedList

EXAMPLE : Sort the following list

1. $\begin{array}{|c|c|c|c|c|c|}\hline 4&3&7&2&1&6\\\hline\end{array}$

↙ ↘

2. $\begin{array}{|c|c|c|}\hline 4&3&7\\\hline\end{array}\ \begin{array}{|c|c|c|}\hline 2&1&6\\\hline\end{array}$

↙ ↘ ↙ ↘

3. $\begin{array}{|c|c|}\hline 4&3\\\hline\end{array}\ \begin{array}{|c|}\hline 7\\\hline\end{array}\ \begin{array}{|c|c|}\hline 2&1\\\hline\end{array}\ \begin{array}{|c|}\hline 6\\\hline\end{array}$

↙ ↘ ↙ ↘

4. $\boxed{4}\ \boxed{3}\ \boxed{7}\ \boxed{2}\ \boxed{1}\ \boxed{6}$

↘ ↙ ↘ ↙

5. $\begin{array}{|c|c|}\hline 3&4\\\hline\end{array}\ \begin{array}{|c|}\hline 7\\\hline\end{array}\ \begin{array}{|c|c|}\hline 1&2\\\hline\end{array}\ \begin{array}{|c|}\hline 6\\\hline\end{array}$

↘ ↙ ↘ ↙

6. $\begin{array}{|c|c|c|}\hline 3&4&7\\\hline\end{array}\ \begin{array}{|c|c|c|}\hline 1&2&6\\\hline\end{array}$

↘ ↙

7. $\begin{array}{|c|c|c|c|c|c|}\hline 1&2&3&4&6&7\\\hline\end{array}$

Quick Sort

MAIN IDEA

All about partition

Pick one pivot random, first number, mid or last number

Any number less then pivot going to left array

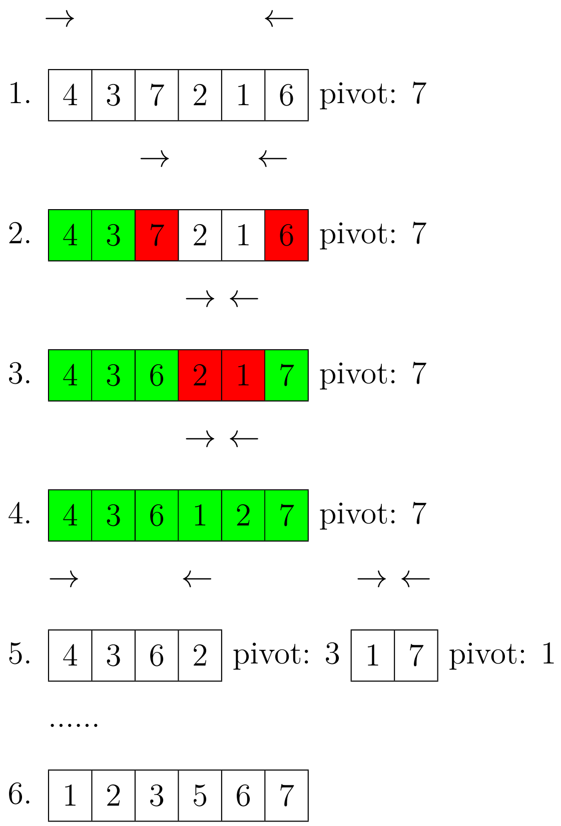
Any number equal to pivot going to mid array

Any number greater then pivot going to right array

Recursively sort the left and right array

Better apply to array

EXAMPLE : Sort the following list



Quick Select

MAIN IDEA

Similar as quick sort

The difference is quick sort recursively sort left, mid and right Quick Select only recursively sort left or right