

## Divide And Conquer

### Quick sort

Idea: Select a random pivot, put it in its correct position, and sort the left and right part recursively.

Time Complexity: Avg =  $O(N \log N)$ , Worst Case =  $O(N^2)$

```
void swap(int arr[], int i, int j) {
    int temp = arr[i];
    arr[i] = arr[j];
    arr[j] = temp;
}

int partition(int arr[], int l, int r) {
    int pivot = arr[r];
    int i = l - 1;

    for (int j = l; j < r; j++) {
        if (arr[j] < pivot) {
            i++;
            swap(arr, i, j);
        }
    }
    swap(arr, i + 1, r);
    return i + 1;
}

void quickSort(int arr[], int l, int r) {
    if (l < r) {
        int pi = partition(arr, l, r);
        quickSort(arr, l, pi - 1);
        quickSort(arr, pi + 1, r);
    }
}
```

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