## Algorithms

## Quick sort



The students arrange them self by height

So everyone needs to find them place by comparing

This Algorithm follows **Divide and conquers**

When **Pivot** finds his place, He divides all students into 2 groups

One group is higher than him, other group sorter than him

So others don’t need to search other side to them place

### Parallelism and Concurrency

t1 t2 t3 t4 conquer is when doing tasks parlay (assume

ordering service) need to deal with one variable (reduce available items). How to handle this kind common variable is conquer.

t1 t2 t3

### Partition

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |

l group shorter than pivot r group higher than pivot

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 7 | 6 | 10 | 5 | 9 | 2 | 1 | 15 | 7 |
| l |  |  |  |  |  |  |  | r |

i group 🡺 till find other group member

j group 🡸 till find other group member

Then swap them

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 7 | 6 | 10 | 5 | 9 | 2 | 1 | 15 | 7 |
| l🡺 |  | l |  |  |  |  |  | r🡸r |

i and j start...

i find 10, j find 7, need to swap them

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | | 2 | | 3 | 4 | 5 | 6 | 7 | 8 |
| 7 | | 6 | | 7 | 5 | 9 | 2 | 1 | 15 | 10 |
|  |  | | l🡺 | |  | l |  | r |  | 🡸r |

i and j continue...

i find 9 , j find 1, need to swap them

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | | 2 | | 3 | 4 | 5 | 6 | 7 | 8 |
| 7 | | 6 | | 7 | 5 | 1 | 2 | 9 | 15 | 10 |
|  |  | |  | |  | l🡺 | r | l🡸r |  |  |

i and j continue...

i find 9 , j find 2

Unfortunately they found them from other side

Need swap them pivot and r

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | | 2 | | 3 | 4 | 5 | 6 | 7 | 8 |
| 2 | | 6 | | 7 | 5 | 1 | 7 | 9 | 15 | 10 |
|  |  | |  | |  |  |  |  |  |  |

pivot find his exact place

now we have 2 separated groups

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | | 2 | | 3 | 4 | 5 | 6 | 7 | 8 |
| 2 | | 6 | | 7 | 5 | 1 | 7 | 9 | 15 | 10 |
| l |  | |  | |  | r |  | l |  | r |