UCSC Silicon Valley Extension

Advanced C Programming

Quicksort

Instructor: Radhika Grover

Overview

- Select an element from the array to be sorted as pivot.
- The pivot can be first, last, or a random element.
- Put elements smaller than the pivot before the pivot, and elements greater than the pivot after the pivot.

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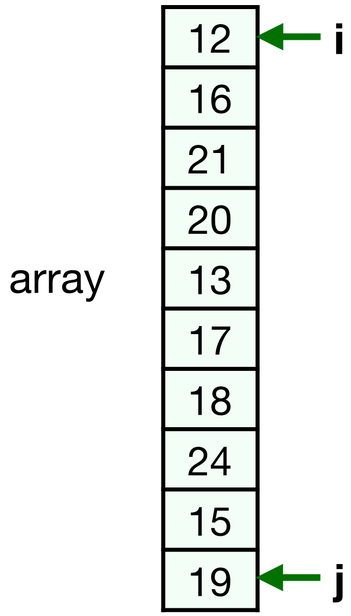
Quick Sort

Suppose array[0] = Pivot element = 12



while arrray[j] > Pivot => decrement j

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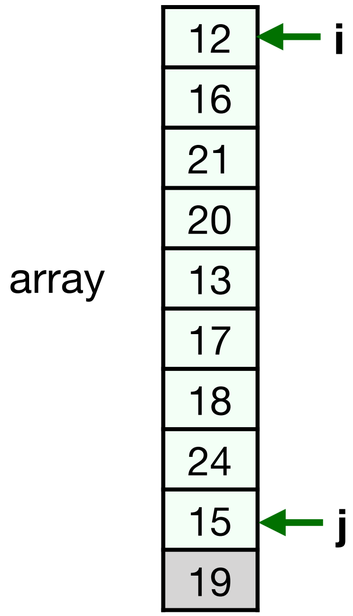
Quick Sort

array[0] = Pivot element = 12



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Quick Sort

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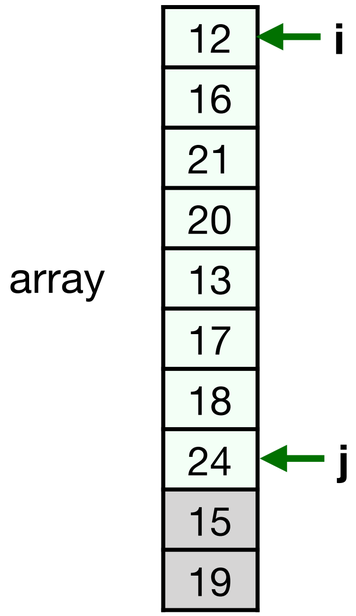

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Quick Sort

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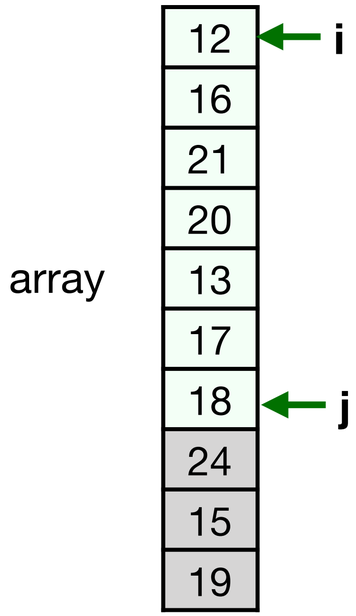

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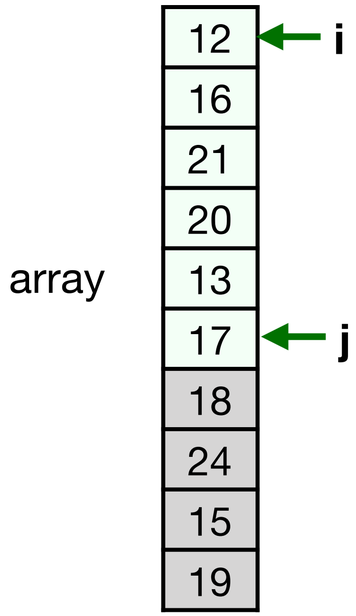

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Quick Sort

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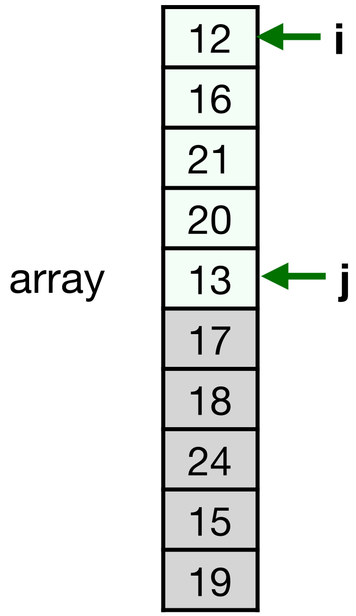

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Quick Sort

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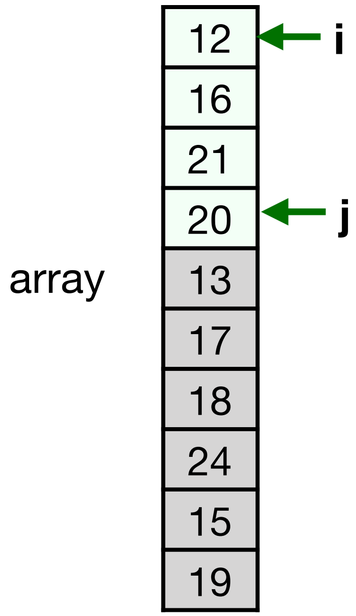

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Quick Sort

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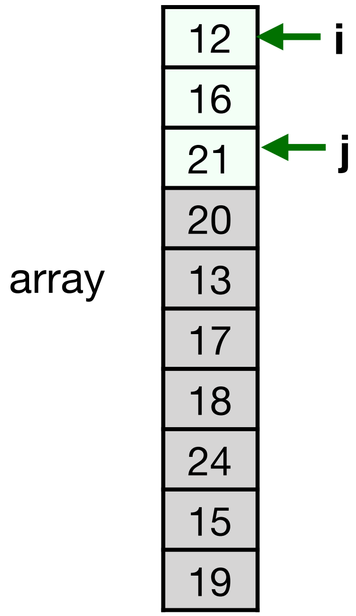

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Quick Sort

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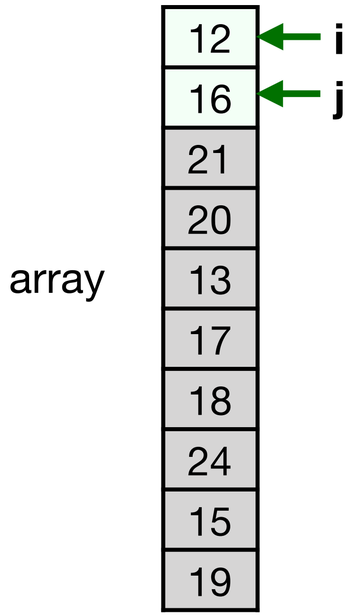

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Quick Sort

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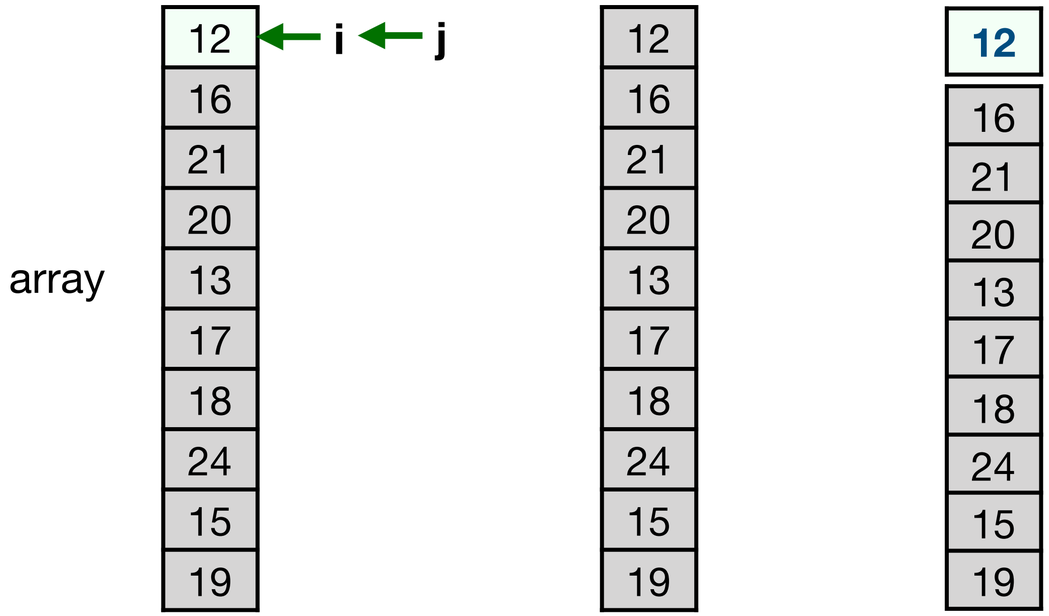

Pivot element is in correct position in array
i > = j => Partition again

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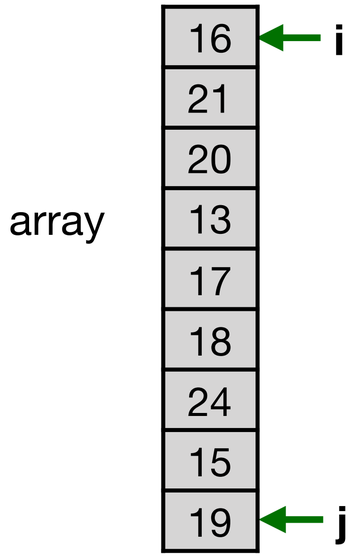
Quick Sort

array[0] = Pivot element = 16



while arrray[j] > Pivot => decrement j

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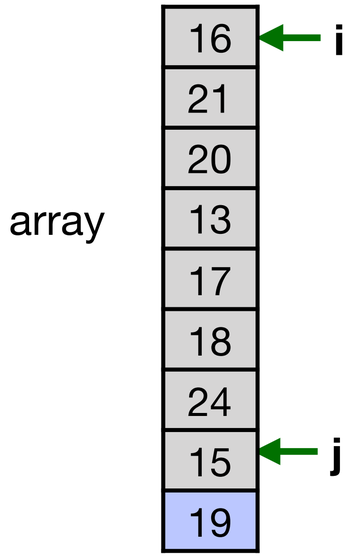
Quick Sort

array[0] = Pivot element = 16



Swap array[i] and array[j]

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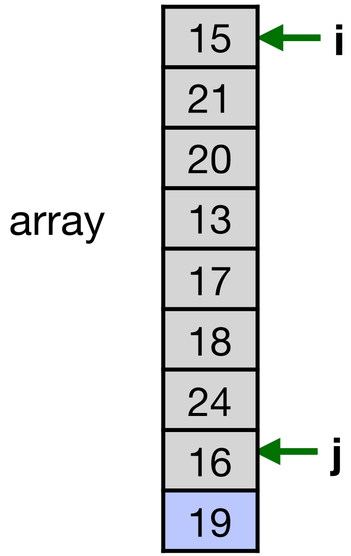
Quick Sort

array[i] = Pivot element = 16



while arrray[i] < Pivot => i++

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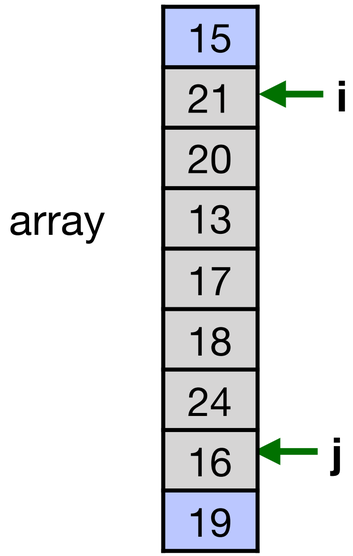
Quick Sort

array[i] = Pivot element = 16



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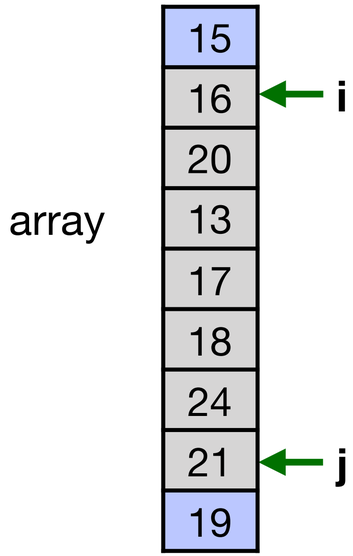

while arrray[j] > Pivot => j++

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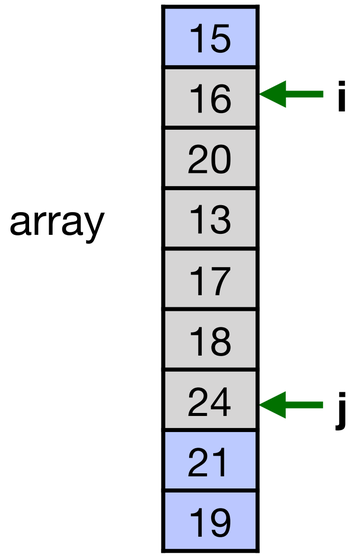
Quick Sort

array[i] = Pivot element = 16



while arrray[j] > Pivot => j++

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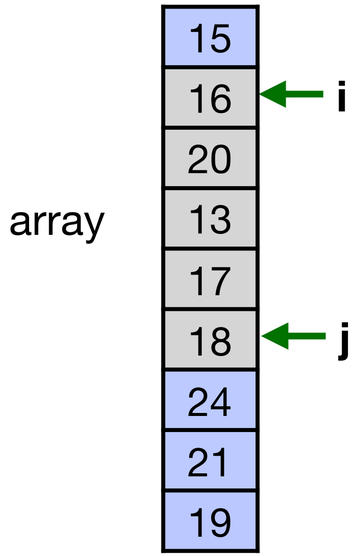
Quick Sort

array[i] = Pivot element = 16



while arrray[j] > Pivot => j++

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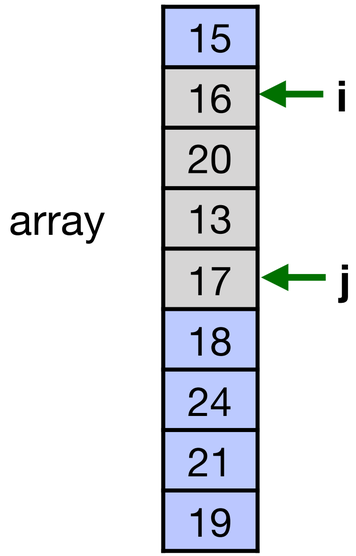
Quick Sort

array[i] = Pivot element = 16



while arrray[j] > Pivot => j++

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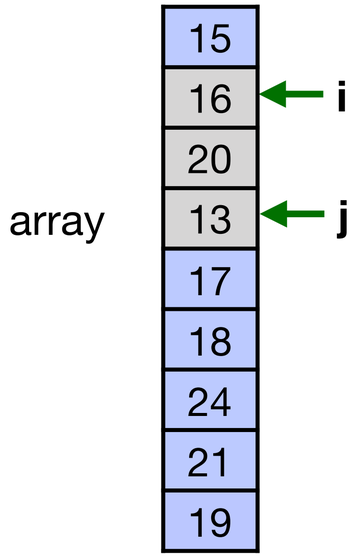
Quick Sort

array[i] = Pivot element = 16



Swap array[i] and array[j]

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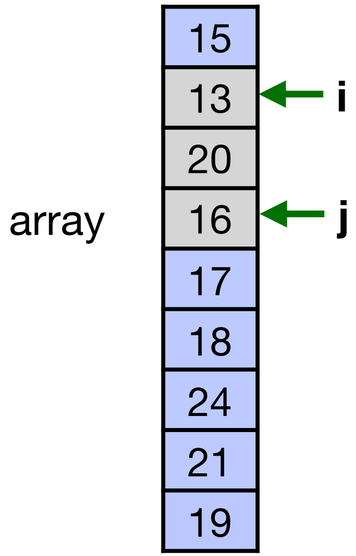
Quick Sort

array[i] = Pivot element = 16



while arrray[i] < Pivot => i++

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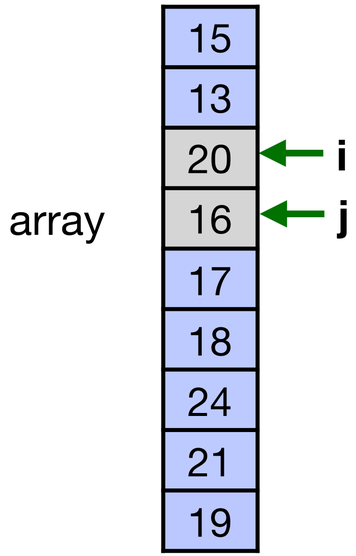
Quick Sort

array[i] = Pivot element = 16



Swap array[i] and array[j]

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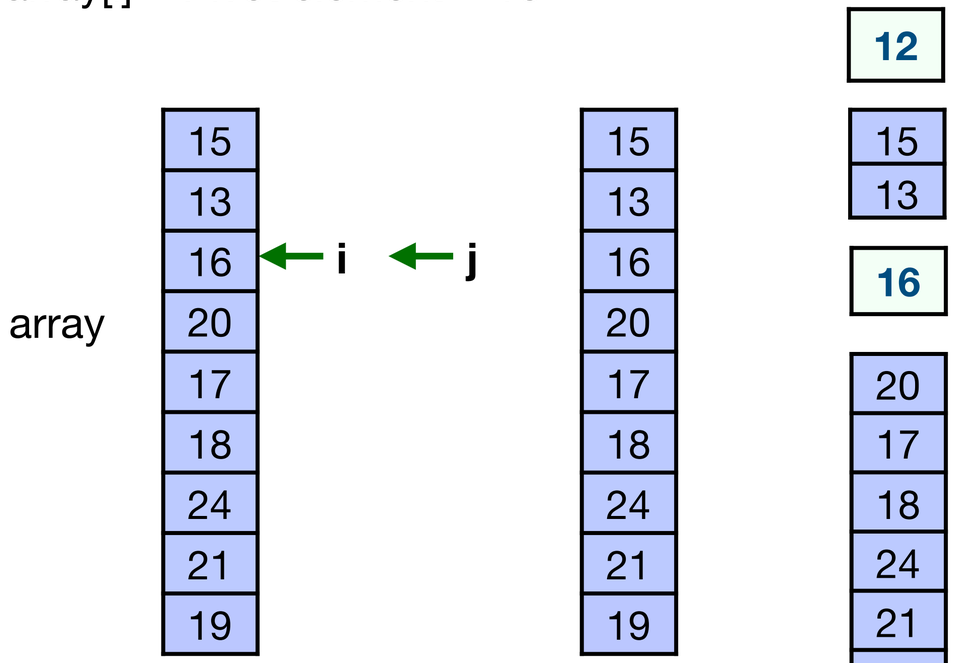
Quick Sort

array[i] = Pivot element = 16



i > = j => Partition

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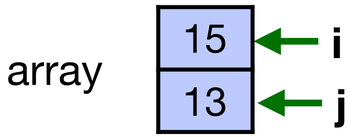
Quick Sort

array[i] = Pivot element = 15



Swap array[i] and array[j]

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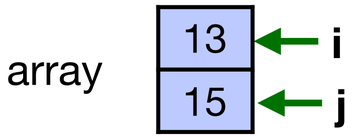
Quick Sort

array[i] = Pivot element = 15



while arrray[i] < Pivot => i++
while arrray[j] > Pivot => j++

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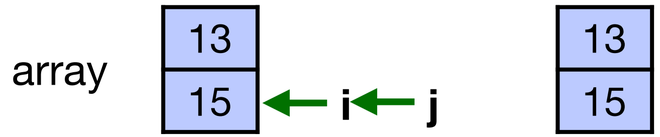
Quick Sort

array[i] = Pivot element = 15



12
13
15
16
20
17
18
24
21
19

i > = j => Partition

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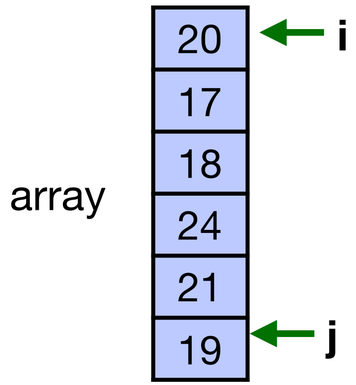
Quick Sort

array[i] = Pivot element = 20



Swap array[i] and array[j]

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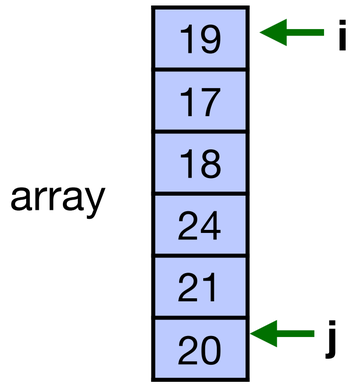
Quick Sort

array[i] = Pivot element = 20



while arrray[i] < Pivot => i++

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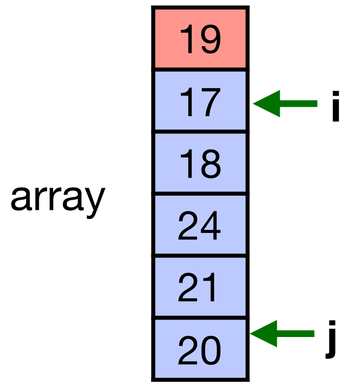
Quick Sort

array[i] = Pivot element = 20



while arrray[i] < Pivot => i++

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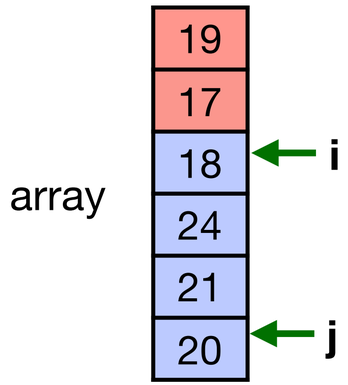
Quick Sort

array[i] = Pivot element = 20



while arrray[i] < Pivot => i++

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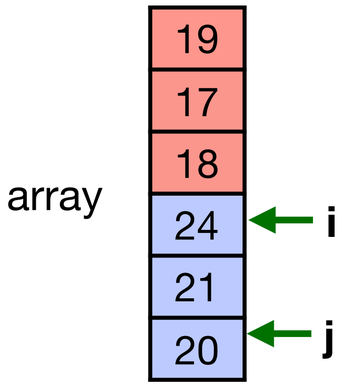

Swap array[i] and array[j]

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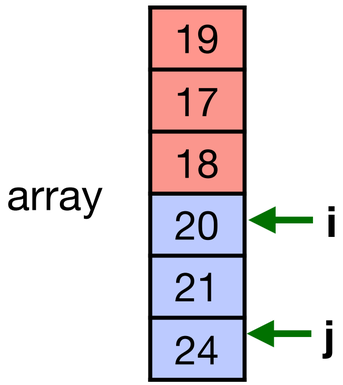
Quick Sort

array[i] = Pivot element = 20



while arrray[j] > Pivot => j++

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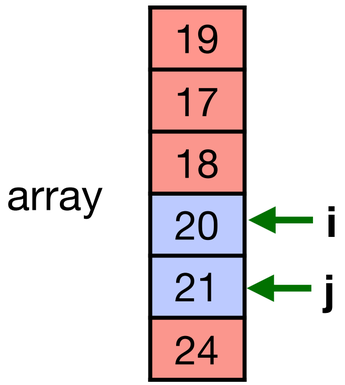
Quick Sort

array[i] = Pivot element = 20



while arrray[j] > Pivot => j++

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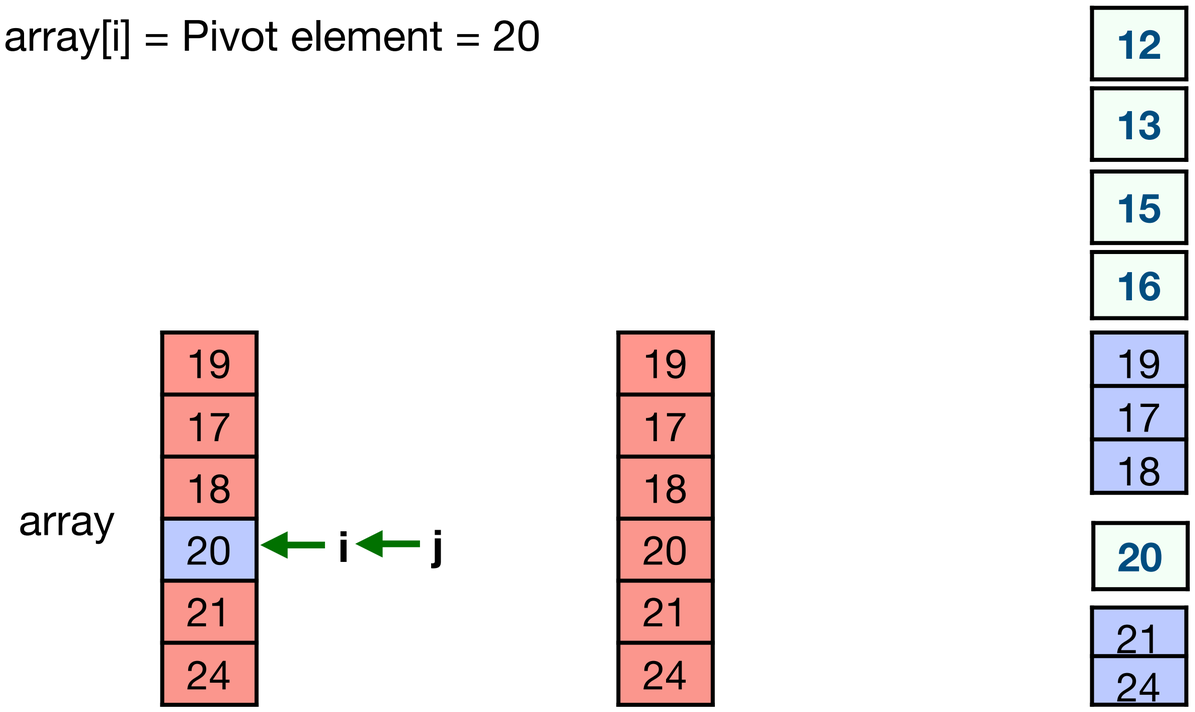
Quick Sort

array[i] = Pivot element = 20



i > = j => Partition

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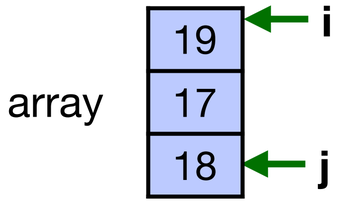
Quick Sort

array[i] = Pivot element = 19



Swap array[i] and array[j]

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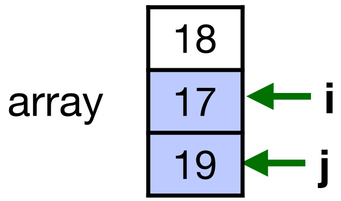
Quick Sort

array[i] = Pivot element = 19



while arrray[i] > Pivot => i++

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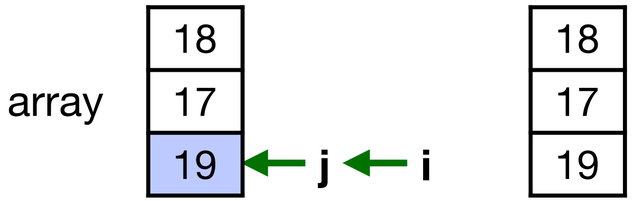
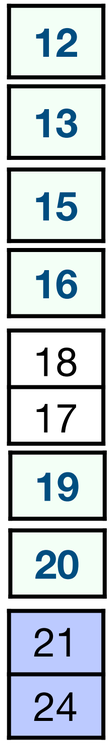
Quick Sort

array[i] = Pivot element = 19





i > = j => Partition

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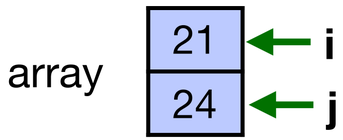
Quick Sort

array[i] = Pivot element = 21



while arrray[j] > Pivot => j++

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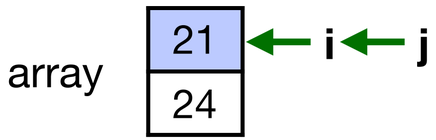
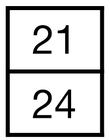
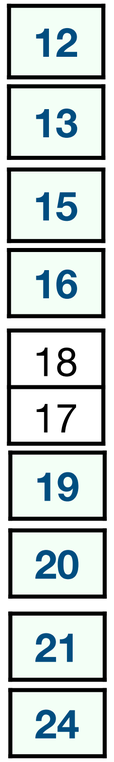
Quick Sort

array[i] = Pivot element = 21







i > = j => Partition

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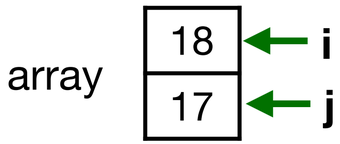
Quick Sort

array[i] = Pivot element = 18



Swap array[i] and array[j]

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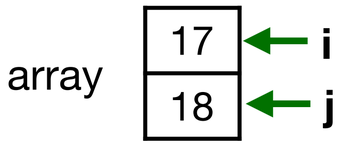
Quick Sort

array[i] = Pivot element = 18



while arrray[i] > Pivot => i++

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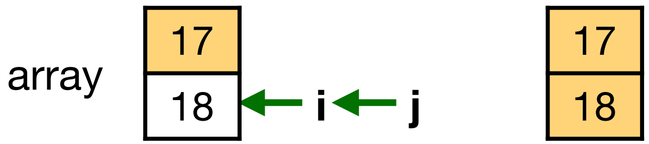
Quick Sort

array[i] = Pivot element = 18



i > = j => Partition

Solution

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