

2.3 QUICK-SELECT



<https://algs4.cs.princeton.edu>

Quick-select demo

Partition array so that:

- Entry $a[j]$ is in place.
- No larger entry to the left of j .
- No smaller entry to the right of j .

Repeat in one subarray, depending on j ; finished when j equals k .

select element of rank $k = 5$

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
50	21	28	65	39	59	56	22	95	12	90	53	32	77	33

$k = 5$

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Repeat in one subarray, depending on j ; finished when j equals k .

partition on leftmost entry

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
50	21	28	65	39	59	56	22	95	12	90	53	32	77	33

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partitioned array

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
22	21	28	33	39	32	12	50	95	56	90	53	59	77	65

$k = 5$

Quick-select demo

Partition array so that:

- Entry $a[j]$ is in place.
- No larger entry to the left of j .
- No smaller entry to the right of j .

Repeat in one subarray, depending on j ; finished when j equals k .

can safely ignore right subarray

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
22	21	28	33	39	32	12	50	95	56	90	53	59	77	65

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partition on leftmost entry

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22	21	28	33	39	32	12	50	95	56	90	53	59	77	65

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partitioned array

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12	21	22	33	39	32	28	50	95	56	90	53	59	77	65

$k = 5$

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Repeat in one subarray, depending on j ; finished when j equals k .

can safely ignore left subarray

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12	21	22	33	39	32	28	50	95	56	90	53	59	77	65

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12	21	22	33	39	32	28	50	95	56	90	53	59	77	65

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12	21	22	32	28	33	39	50	95	56	90	53	59	77	65

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Repeat in one subarray, depending on j ; finished when j equals k .

stop: partitioning item is at index k

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12	21	22	32	28	33	39	50	95	56	90	53	59	77	65

$k = 5$