

Algorithm performance



Searching analysis



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by Christine Alvarado, Mia Minnes, and Leo Porter, 2015.

By the end of this video you will be able to...

- State and justify the asymptotic performance for
 - linear search,
 - binary search
- in the best case and in the worst case

	Best case	Worst case
Linear Search		
Binary Search*		

* Assuming data is sorted

Linear Search: Basic Algorithm

Start at the first **index** in the array

while **index** < **length** of the array:
 if toFind matches current value,
 return true
 increment index by 1

return false

Linear Search: Basic Algorithm

Start at the first **index** in the array

while **index**

E.g. `hasLetter(String word, char letter)`

increment index by 1

return false

	Best case	Worst case
Linear Search	$O(1)$	
Binary Search*		

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while **index**

E.g. `hasLetter(String word, char letter)`

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Linear Search	$O(1)$	$O(n)$
Binary Search*		

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Binary Search: Basic Algorithm

Initialize **low = 0**, **high = length of list**

while low <= high:

mid = (high+low)/2

 if toFind matches value at mid,

 return true

 if toFind < value at mid

 high = mid-1

 else low = mid+1

return false

Binary Search: Basic Algorithm

Initialize **low = 0**, **high = length of list**

while low <= high:

mid = (high+low)/2

if toFind matches value at mid,
return true

if toFind < value at mid

high = mid-1

else low = mid+1

return false

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Binary Search*	$O(1)$	

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Binary Search: Basic Algorithm

Worst case : don't find!

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Binary Search: Basic Algorithm

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while low <= high:

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if toFind matches value at mid,

return true

if toFind < value at mid

high = mid-1

else low = mid+1

times to half size?

return false

	Best case	Worst case
Linear Search	$O(1)$	$O(n)$
Binary Search*	$O(1)$	$O(\log n)$

* Assuming data is sorted

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Binary Search*	$O(1)$	$O(\log n)$

* Assuming data is sorted