












Algorithm Design: Searching

Searching

Search Results in New CX1003 > quick check

 quick check 2 - line 1 and 2 -remove.py	E:\LF work\LF current Courses\New CX1003\Content\...	Type: Python File	Date modified: 6/22/2018 12:34 PM Size: 227 bytes
 quick check 2 - line 1 and 2 -remove.py	E:\LF work\LF current Courses\New CX1003\TEL\3E2	Type: Python File	Date modified: 6/22/2018 12:34 PM Size: 227 bytes
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 quick check 2 - line 1 and 2.py	E:\LF work\LF current Courses\New CX1003\TEL\3E2	Type: Python File	Date modified: 6/22/2018 12:34 PM Size: 279 bytes
 quick check 1.py	E:\LF work\LF current Courses\New CX1003\Content\...	Type: Python File	Date modified: 6/5/2018 10:55 PM Size: 85 bytes
 quick check 1.py	E:\LF work\LF current Courses\New CX1003\TEL\3E2	Type: Python File	Date modified: 6/5/2018 10:55 PM Size: 85 bytes
 quick check 2.py	E:\LF work\LF current Courses\New CX1003\Content\...	Type: Python File	Date modified: 2/16/2018 4:13 PM Size: 253 bytes
 quick check 2.py	E:\LF work\LF current Courses\New CX1003\Content\...	Type: Python File	Date modified: 2/16/2018 4:13 PM

Hard Drive (E:)
Hard Drive (E:)

 searching algorithms

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About 191,000,000 results (0.35 seconds)

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In computer science, a search algorithm is any algorithm which solves the search problem, namely, to retrieve information stored within some data structure, ...
Classes · For virtual search spaces · For sub-structures of a ... · References





At the end of this lesson, you should be able to:

- Describe the process of searching
- Explain the importance of different types of searching algorithms
- Search for a given value in an array using linear search and binary search
- Apply search algorithms in problem solving
- Recognize that “no single” best search algorithm applies to all scenarios

Topic Outline



Importance of Searching



Linear Search



Binary Search



Comparison of Searching Algorithms

Searching Pizza Hut in North Spine Plaza

- Starts at the first item
- Is it the one I am looking for?
- If not, go to next item
- Repeats until found or all the items are checked

  in North Spine Plaza?

List of Food & Beverage in North Spine

 Bakery Cuisine

Subway

Peach Garden Chinese Restaurant

Mr Bean

Pizza Hut

FOUND

The Soup Spoon Union

North Spine Food Court

- Iterates over the sequence, one item at a time, until the specific item is found or all items have been examined
 - The element that needs to be found is called a search key
- Linear search/ sequential search
 - Intuitive approach
 - Starts at the first item
 - Is it the one I am looking for?
 - If not, go to next item
 - Repeats until found or all the items are checked
- This approach is necessary if items are not sorted

Searching in a Sorted List



in North Spine Plaza?

List of Food & Beverage in North Spine



Bakery Cuisine

Mr Bean

North Spine Food Court

Peach Garden Chinese Restaurant

Pizza Hut

Subway

The Soup Spoon Union

NOT HERE

If items are sorted

Searching in a Sorted List (Cont'd)



in North Spine Plaza?

List of Food & Beverage in North Spine



Bakery Cuisine

Mr Bean

North Spine Food Court

Peach Garden Chinese Restaurant

Pizza Hut

Subway

The Soup Spoon Union

NOT HERE

If items are sorted

- Given a list of data, **searching** is finding the location of a particular value or reporting that the value is not present.
- It is one of the fundamental problems in computer science and programming.
- Sorting is done to make searching easier.
- There are multiple searching algorithms to solve problems.
 - How do we know which algorithm is better?

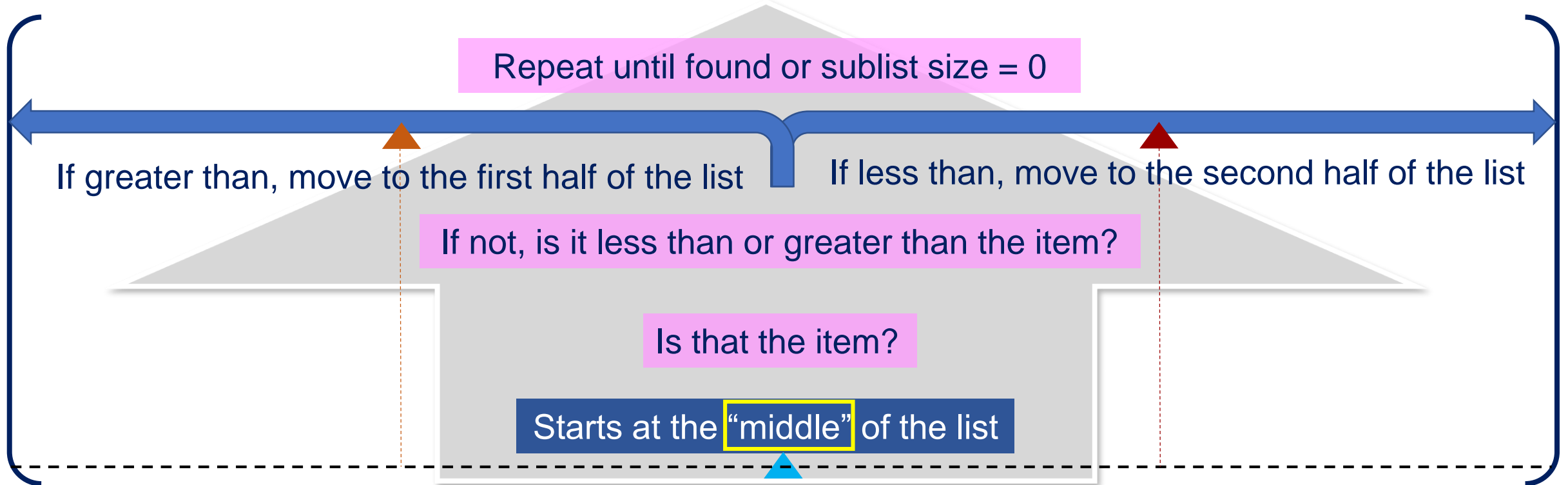
Searching in a Dictionary



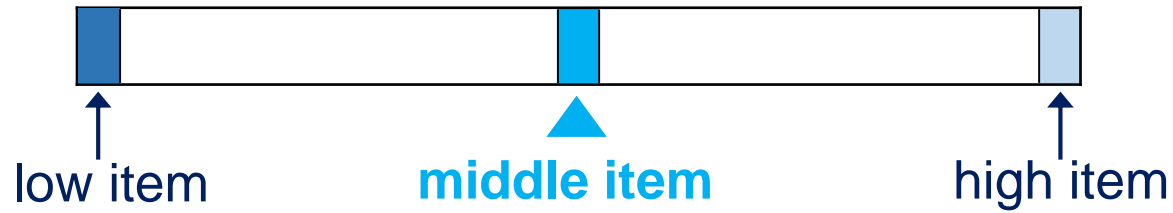
Binary Search on List of Ascending Order

- If items are sorted then you can **divide-and-conquer**
- *dividing your work in half with each step*

Generally a good thing!



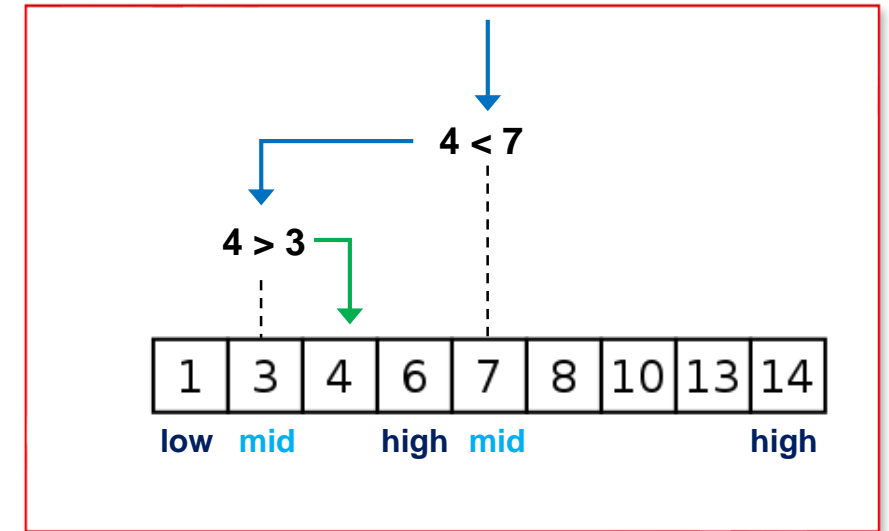
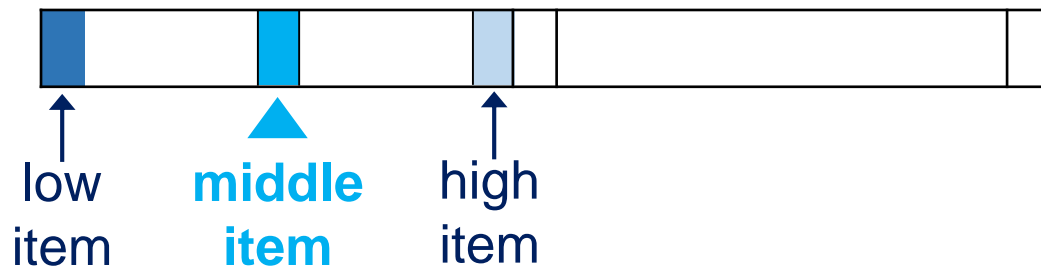
Binary Search Illustration



Is the middle item what we are looking for?

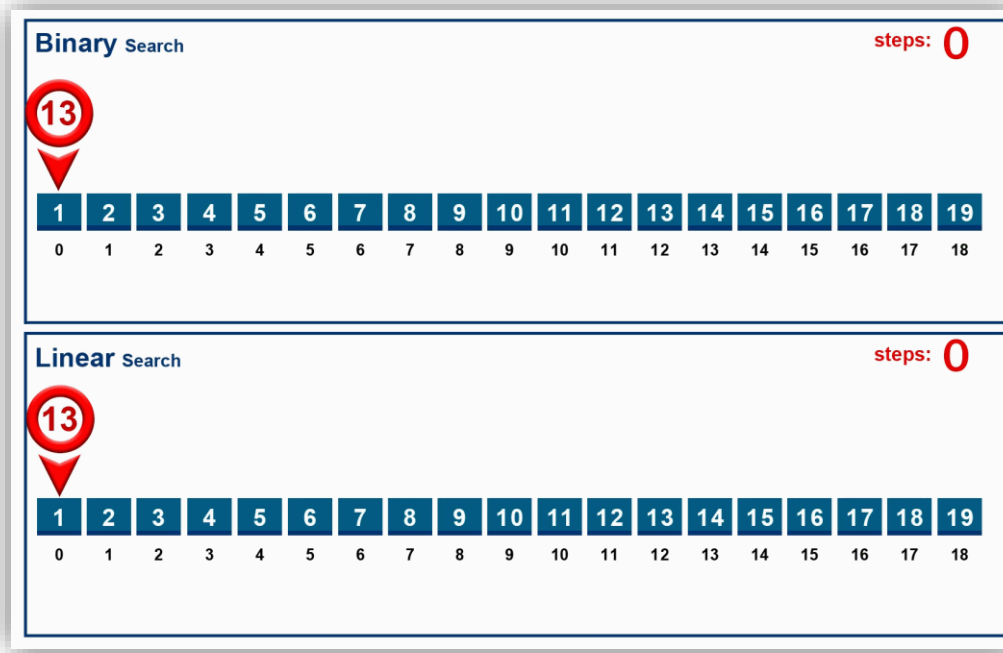
If not, is it lower or greater than the target item?

(**Assume lower**)



Linear Search vs. Binary Search

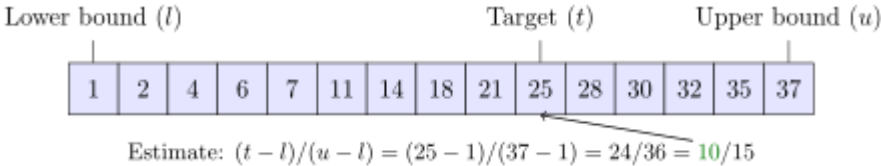
Variance of Hi-Low
Number Guessing Game



Algorithm	Best Time Complexity	Average Time Complexity	Worst Time Complexity	Worst Space Complexity
Linear Search	$O(1)$	$O(n)$	$O(n)$	$O(1)$
Binary Search	$O(1)$	$O(\log n)$	$O(\log n)$	$O(1)$

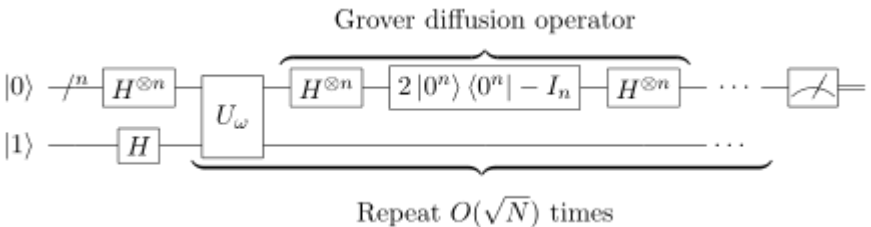
Other Searching Algorithm

Interpolation Search



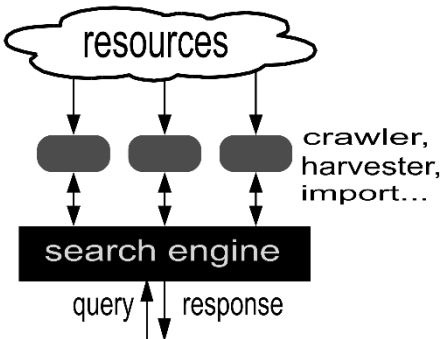
more like what people really do

Grover's Algorithm

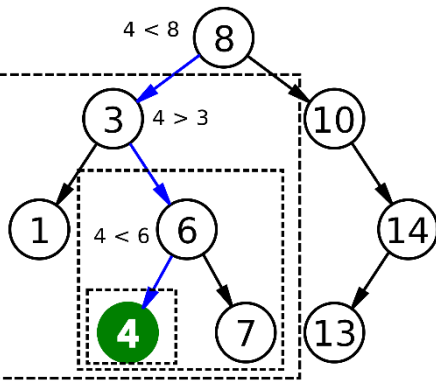


waiting for quantum computers to be built

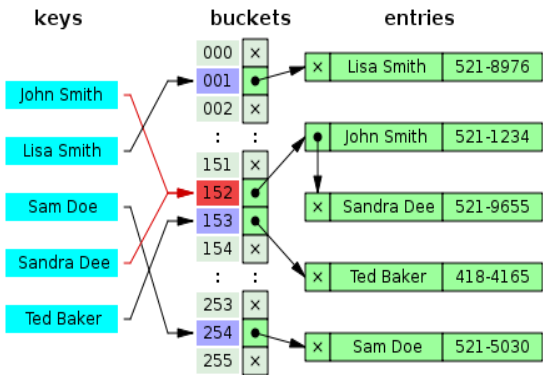
Indexed Searching



Binary Search Trees

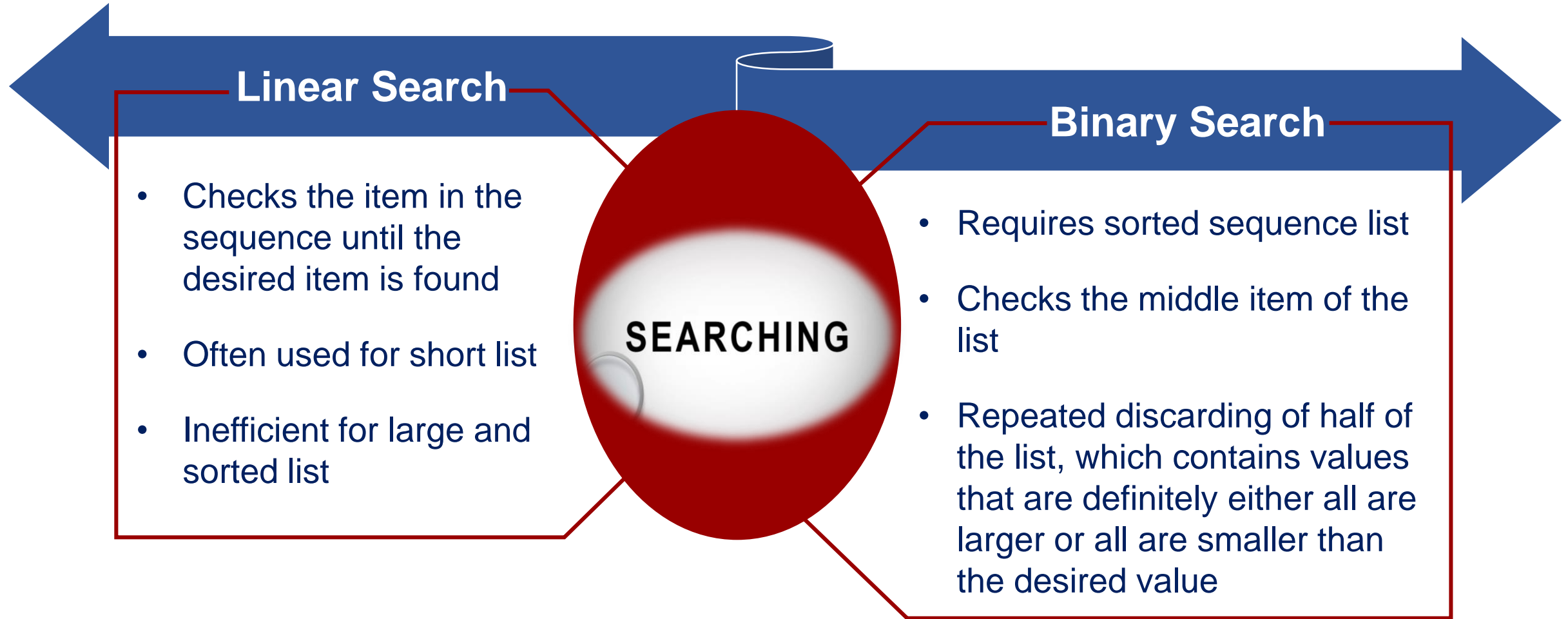


Hash Table Searching

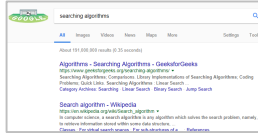






Best-first

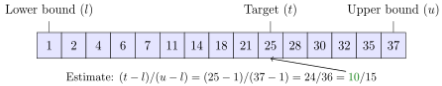
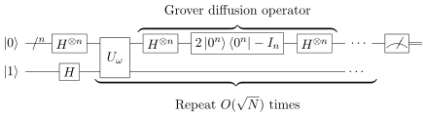
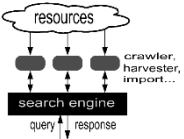
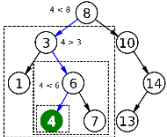
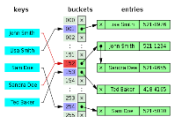




References for Images

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