

2. ALGORITHM ANALYSIS

- ▶ *binary search demo*
- ▶ *sorted rotated array demo*

Lecture slides by Kevin Wayne

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<http://www.cs.princeton.edu/~wayne/kleinberg-tardos>

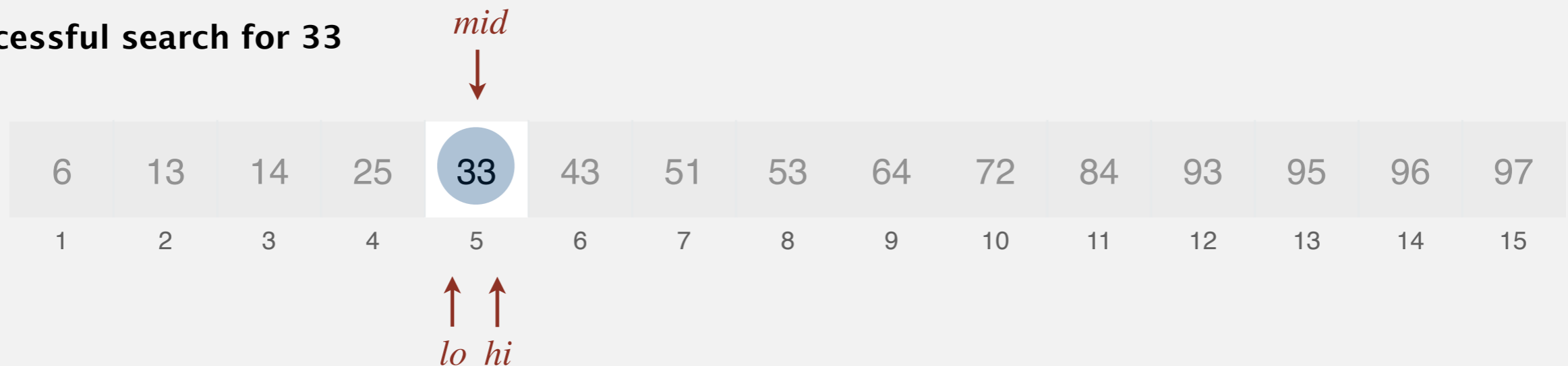
Binary search demo

Goal. Given a sorted array and a key, find index of the key in the array.

Binary search. Compare key against middle entry.

- Too small, go left.
- Too big, go right.
- Equal, found.

successful search for 33



return index 5

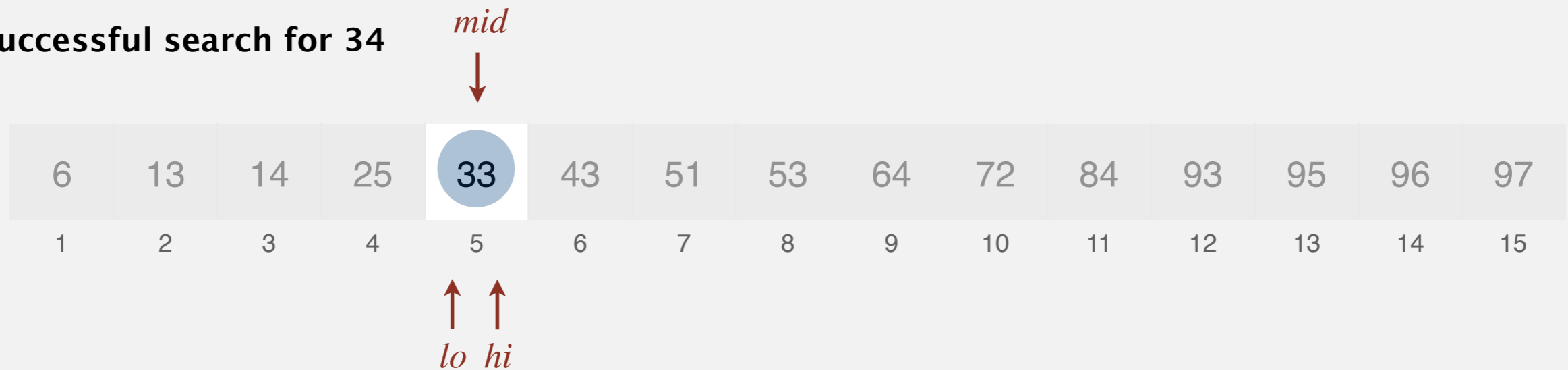
Binary search demo

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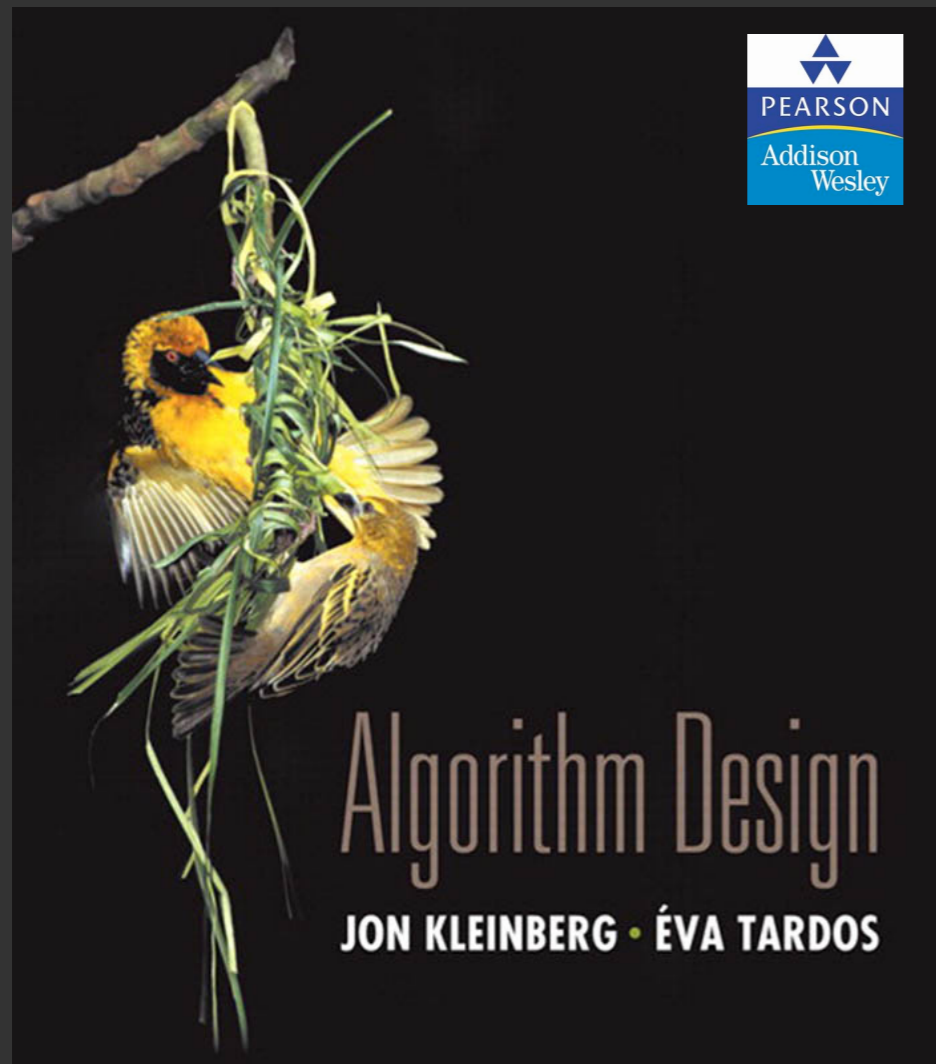
Binary search. Compare key against middle entry.

- Too small, go left.
- Too big, go right.
- Equal, found.

unsuccessful search for 34



return -1 (not found)



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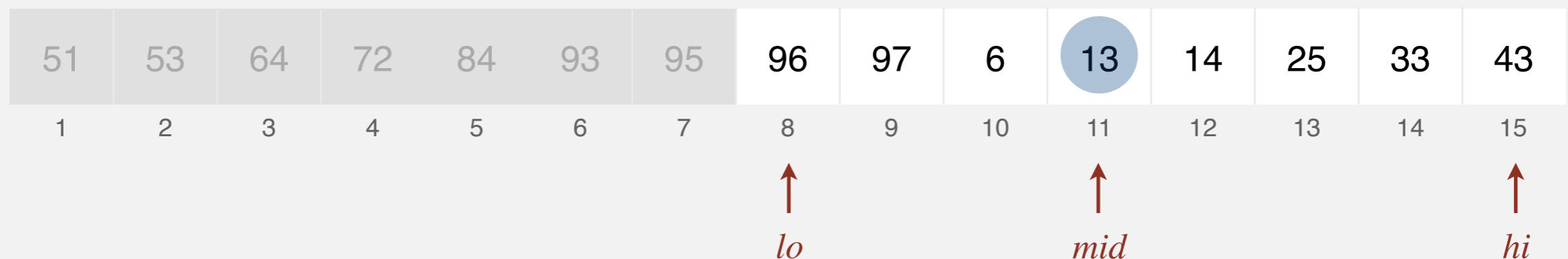
Sorted rotated array demo

Goal. Given a rotated sorted array of n distinct integers, find index of smallest element.

Invariant. $A[lo] > A[hi]$.

Binary search. Compare middle entry $A[mid]$ to last entry $A[hi]$.

- Less, go left.
- Bigger, go right.



Sorted rotated array demo

Goal. Given a rotated sorted array of n distinct integers, find index of smallest element.

Invariant. $A[lo] > A[hi]$.

Binary search. Compare middle entry $A[mid]$ to last entry $A[hi]$.

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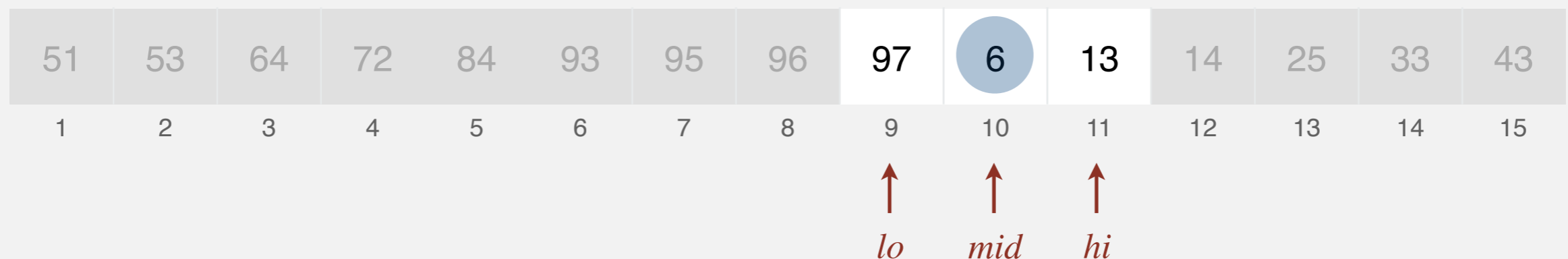
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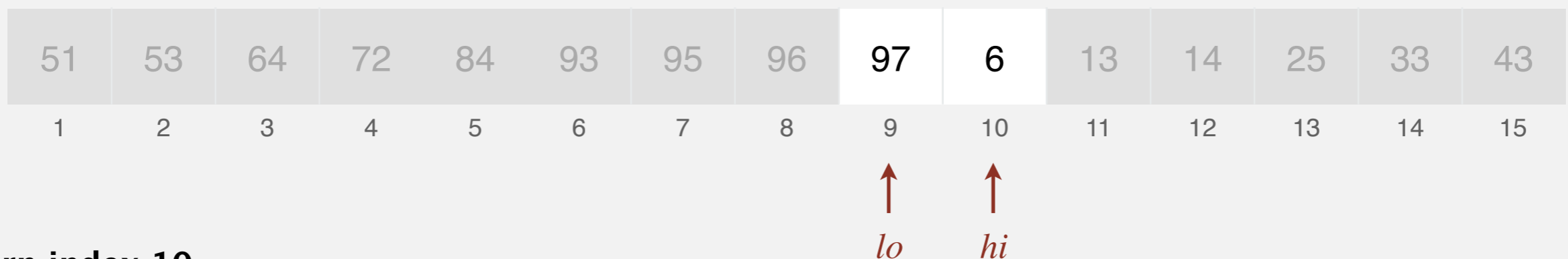
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return index 10