CS 101 Computer Programming and Utilization

Lecture 19

Sorting and Searching

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Revision (last lecture was a Q/A session)

- Pointer Arithmetic
  - computing locations in 1d arrays
  - computing locations in 2d arrays
- 4 ways to handle 2d arrays
  - as a continuous 1d array
    - int *A;
  - as a 2d array with both dimensions declared
    - int A[M][N]
  - as 2d array with 2nd dimension delcared
    - int A[ ] [N]
  - as a pointer to pointer
    - int **A;
- when do you use pointers?
  - dynamic allocation and declaration to not happen at the same place
  - returning dynamically created objects/values/arrays
  - use a variable to point to various objects
- why the following code counts 1 string extra?

```
count=0;
while (!f.eof()) {
        f >> str;
        count ++;
}
```

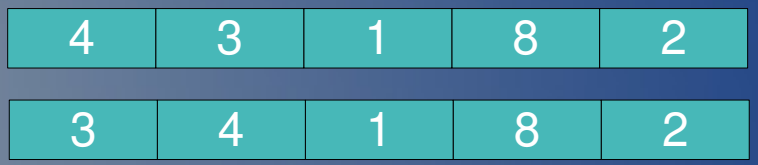
Sorting

- A = { 3, 1, 10, 22, 4, 2, 178, 11, 29 }
- How to sort the array?

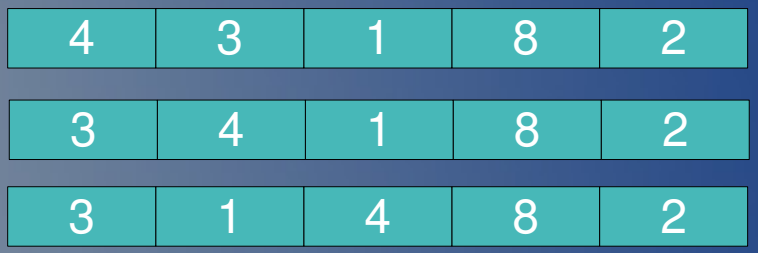
Sorting

keep comparing A[i] and A[i+1] and keep swapping if needed
In each iteration, one element will be at its position
→ Bubble sort

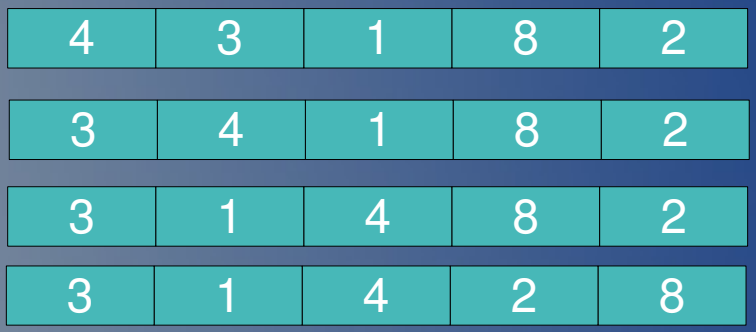
Sorting



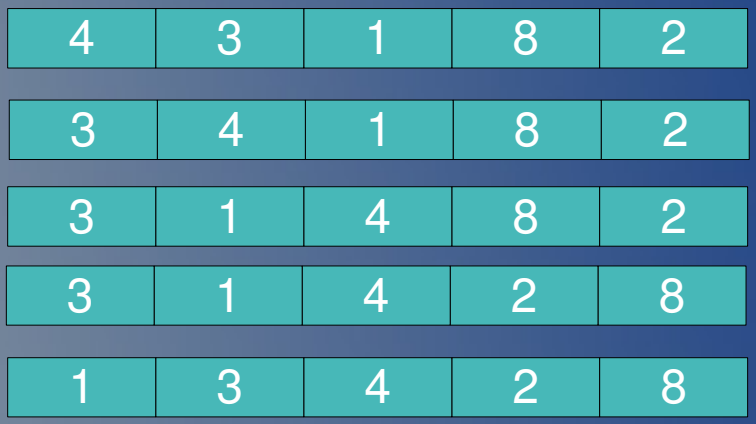
Sorting



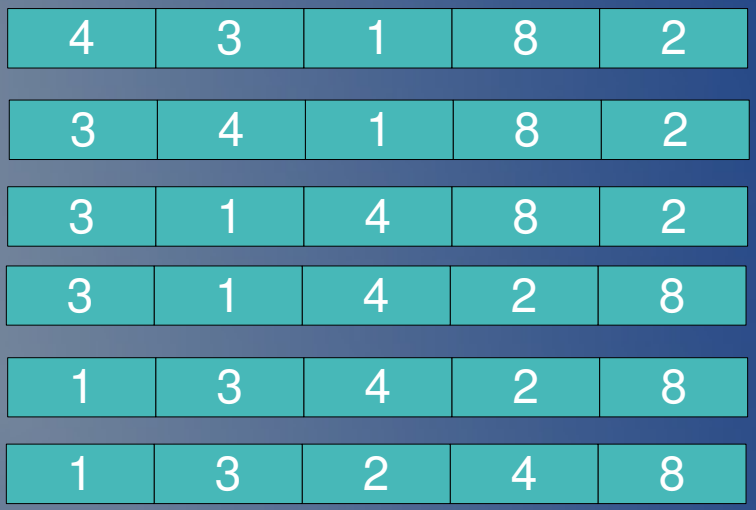
Sorting



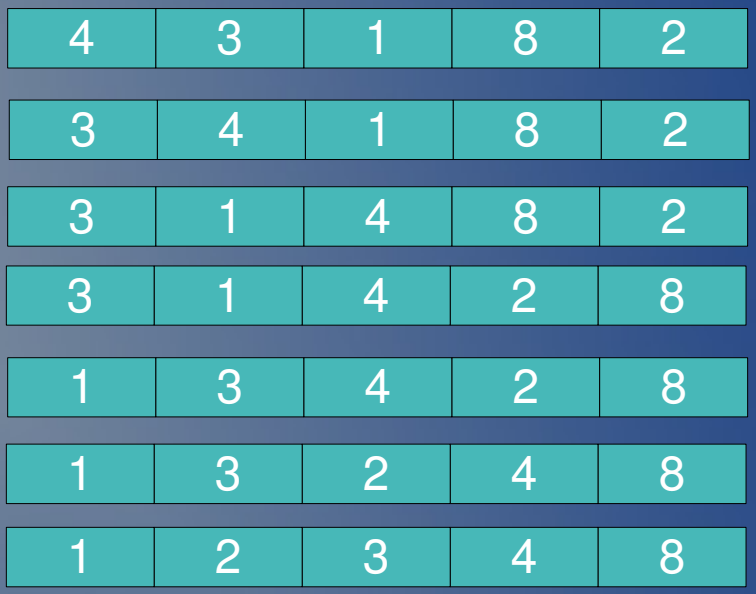
Sorting



Sorting



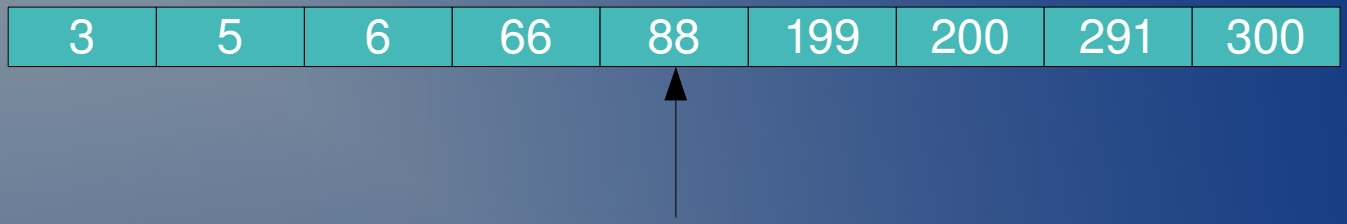
Sorting



Searching through a sorted array Binary Search

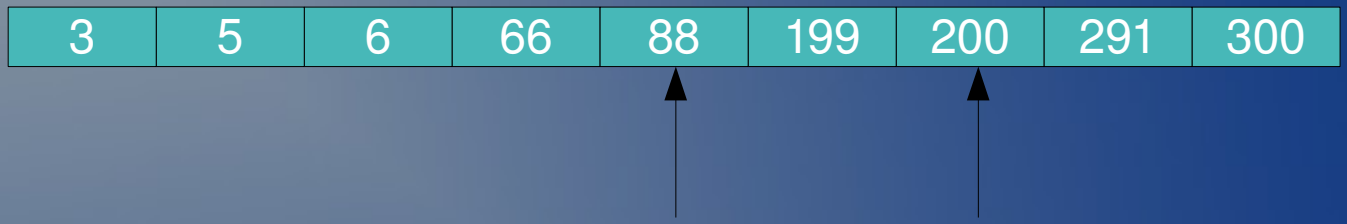
- A = { 3, 5, 6, 66, 88, 199, 200, 291, 300}
- does A have element 291?
- where to start searching?
- we know that the array is sorted
- how to you search a word through a dictionary?
  - do you start from first page always?

Binary Search



Is it the element that we want?
is it smaller than this one?
is it larger than this one?

Binary Search



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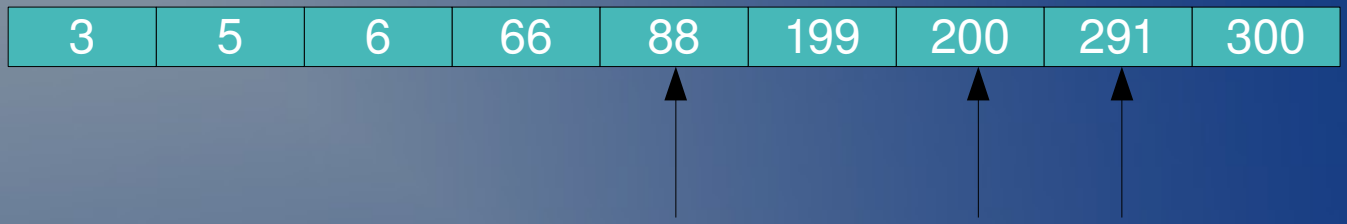
Binary Search



Is it the element?