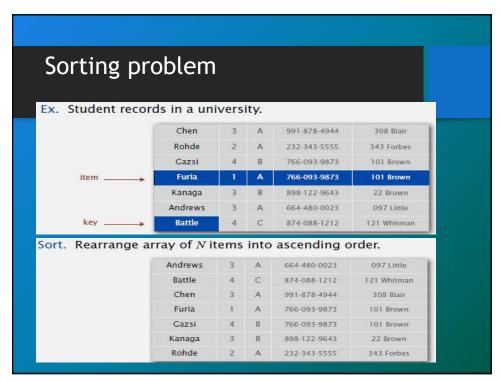
Data Structure and Algorithms

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1

Agenda

- Searching and sorting
- · Concept of internal and external sorting
- Sort stability
- Sorting methods: Bubble, insertion, Quick, Merge, shell and comparison of all sorting methods.
- Case Studies Set Operation, String Operation
- Fibonacci Series.



3

Sorting Algorithms

- Several algorithms are presented, including *Bubble* Sort, Selection Sort, insertion sort, shell sort, Merge Sort, and quicksort.
- Sorting by insertion is the simplest method, and doesn't require any additional storage.
- Shell sort is a simple modification that improves performance significantly. Probably the
- most efficient and popular method is quicksort, and is the method of choice for large arrays.

Sorting Algorithms

- Sorting
 - A process that organizes a collection of data into either ascending or descending order
- Categories of sorting algorithms
 - An internal sort
 - Requires that the collection of data fit entirely in the computer's main memory
 - An external sort
 - The collection of data will not fit in the computer's main memory all at once but must reside in secondary storage

5

Sorting Algorithms and Their Efficiency

- Data items to be sorted can be
 - Integers
 - Character strings
 - Objects
- Sort key
 - The part of a record that determines the sorted order of the entire record within a collection of records

Sort Stability- Stable Sort

- A sorting algorithm is stable if any equal items remain in the same relative order before and after the sort
- Why do we care?
 - "data exploration" Client code will want to sort by multiple features and "break ties" with secondary features

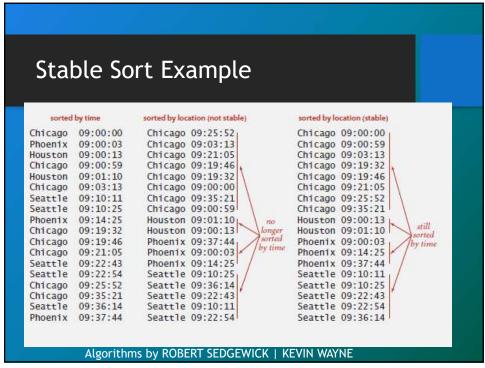
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[(8, "fox"), (9, "dog"), (4, "wolf"), (8, "cow")]

[(4, "wolf"), (8, "fox"), (8, "cow"), (9, "dog")]

[(4, "wolf"), (8, "cow"), (8, "fox"), (9, "dog")]

Unstable
```

7



Sorting Algorithms

- Elementary Techniques
 - Bubble Sort
 - Insertion Sort
 - Shell Sort
- Two classic Algorithms- Divide and Conquer
 - Quick Sort
 - Merge Sort

9

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