1 # CS3134 #14

10/21/03

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2 # Administrivia

- HW#3 due Thursday
  - There was a typo on the HW, talk to me if this is an issue
- Started grading midterms, hopefully back by Thursday
- Newcunix ➔ cunix this weekend

3 # Agenda

- Radix sort
- Quicksort

4 # Radix Sort

- Radix is the “base” of a system of numbers
- Very simple, fast algorithm
- Sort by *digit*, one at a time
  - Sort on the 1s digit
  - Sort on the 10s digit; keep relative order of equal 10s the same, i.e., go left-to-right on the 1s digit
  - Sort the 100s digit
  - Etc.
- Problem: where to store intermediate results?
- Can sort 100 numbers in 2 passes! ~ O(2n)
- But… that’s essentially O(n log n)!
- There’s no free lunch, but this works very well for specialized keys

5 # Quicksort: Partition

- Relies on concept of *partition*
  - A number s.t. two groups are formed: those smaller than the number, and those larger than the number
  - “Pivot”
  - Walk from both edges
    - If left is smaller than pivot, walk left
    - If right is larger than pivot, walk right
    - Otherwise, swap the two
    - What if we cross?
  - Last element is the pivot?
- Code? p. 338

6 # Quicksort: Recursion

- Given pivot, we:
  - Partition the array in two;
  - Quicksort the left “half”;
  - Quicksort the right “half”.
- And recurse!
- That’s it (p. 338)
  - Well, must be very, very careful
- Analysis?
  - *Usually* O(n log n), and in-memory

- But there are some problems…

7 Next time

- Finish Quicksort
- Start trees