CSE 373: Wrap-up

Brad Chamberlain
University of Washington
Spring 1999

Observation

- Data is an attribute common to all programs
  - programs process, manipulate, store, display, gather
  - data may be information, numbers, images, sound
- Each program must decide how to store data
- Choice influences program at every level:
  - execution speed
  - memory requirements
  - maintenance (debugging, extending, etc.)
ADT Tensions

Ideal: a fast, elegant ADT that uses little memory

Generates tensions:
- time vs. space
- performance vs. elegance
- generality vs. simplicity
- one operation’s performance vs. another’s

The Myth of ADTs

Not a perfect black box:
- knowing how an ADT will be used can lead to a good choice of implementation
- also, knowledge of an ADT’s implementation may change how a client uses it

But... ADTs are still a useful concept

Use motivates design
Course Goals

- To introduce several standard data structures
- To teach how data structures are evaluated
- To determine when each structure is useful
- To give you the ability to design, build, and evaluate your own data structures

Course Topics Overview

Data Structures
- Storage:
  - List/Sorted List
  - Stack
  - Queue
  - Binary Search Tree
  - Hash Table
  - Heap
- Structural
  - Tree
  - Graph
- Sparse Arrays
  - operations
    - Insert()    
    - Find()     
    - Delete()   
    - FindMin()/FindMax() 
    - DeleteMin()/DeleteMax() 
    - traversals (sorted vs. complete) 
- traversals 
  - traversals, shortest paths, MSTs 
  - storage, traversals
Course Topics Overview

Algorithms
- categorization of algorithms:
  - recursive vs. iterative
  - primary vs. secondary effects
  - greedy vs. divide-and-conquer vs. other
  - NP problems
  - intractable problems
- types of algorithms
  - searching (linear, binary, using data structures)
  - selection (using data structures, quickselect)
  - sorting (insertion, shellsort, mergesort, quicksort, bucket sort)
  - statistical (median, mean, mode)