



## CSE 373: Wrap-up

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## 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

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CSE 373 – Data Structures and Algorithms

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## Course Topics Overview



### Data Structures

- |  |       |   |
|--|-------|---|
| <ul style="list-style-type: none"> <li>– Storage:             <ul style="list-style-type: none"> <li>• List/Sorted List</li> <li>• Stack</li> <li>• Queue</li> <li>• Binary Search Tree</li> <li>• Hash Table</li> <li>• Heap</li> </ul> </li> <li>– Structural             <ul style="list-style-type: none"> <li>• Tree</li> <li>• Graph</li> </ul> </li> <li>– Sparse Arrays</li> </ul> | } × { | <p><u>operations</u></p> <ul style="list-style-type: none"> <li><b>Insert()</b></li> <li><b>Find()</b></li> <li><b>Delete()</b></li> <li><b>FindMin()/FindMax()</b></li> <li><b>DeleteMin()/DeleteMax()</b></li> <li><i>traversals (sorted vs. complete)</i></li> </ul><br><ul style="list-style-type: none"> <li><i>traversals</i></li> <li><i>traversals, shortest paths, MSTs</i></li> <li><i>storage, traversals</i></li> </ul> |
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## 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, bucketsort)
  - statistical (median, mean, mode)