Grand Review

CSE 373
Data Structures
Lecture 23

Algorithms and Data Structures
• Plumbing and wiring of programs.
• Design is a very creative activity.
  › There are no formulas
  › There are tried and true methods
• Think first - program later
  › Design, design, design
  › Code

Applied Algorithm Scenario

Real world problem → Wrong problem
Abstractly model the problem → Wrong model
Find abstract algorithm → Incorrect algorithm
Adapt to original problem → Poor performance
Evaluate

Evaluation Step Expanded

Algorithm Correct? → no
  → New algorithm
  → New model
  → New problem

Choose Data Structures

Performance? → unsatisfactory
  → New data structure
  → New algorithm
  → New model

Implement

Tool Kit

• Data Organization
  › Lists, trees, arrays
  › Priority queues
  › Up-trees
  › Connections between them
• Algorithmic approaches
  › Recursion
  › Divide and Conquer
  › Depth-first search
  › Greedy
• Abstractions
  › Graphs
• Algorithms
  › Sorting
  › Shortest paths
  › Huffman codes
• Analysis
  › Recurrences
  › Worst case
  › Amortized

What’s Next

• Specific Applications (CSE 417, 410, 415)
  › Graphics, simulation, games, networks, systems
• Programming Languages and Compilers (CSE 413)
  › Languages and their implementations
• Software Engineering
  › Engineering large programs
• Algorithms (CSE 417)
  › Deeper study of algorithms
  › Mathematical
• Computational Complexity (CSE 417)
  › Study of the inherent time and storage needed to solve problems.