Data Structures and Algorithms

Lecture 0: Course Introduction

Course Information

- Course Website
  - We will upload our course materials to iSpace.
- Teaching Staff
  - Instructor: Xucheng MENG (蒙许成)
  - –Office: T3-502-R15
    - Email: xuchengmeng@uic.edu.cn
    - Office Hours: Mon 14:00-17:00 & Wed 10:00-12:00
    - TA: Ms. Yue LIANG
    - Email: laurenlyue@uic.edu.cn
    - Office Hours: TBD

Tutorials and Labs

- 1 hour per week
- Time and venue: TBD
- Lab attendance is required

Grading

- Assignments
  - Written assignments (15%)
  - Coding assignments (15%)
- Quiz (10%)
- Midterm Test (20%)
- Examination
  - Final examination (40%)
- Note: Two sections will be graded together!

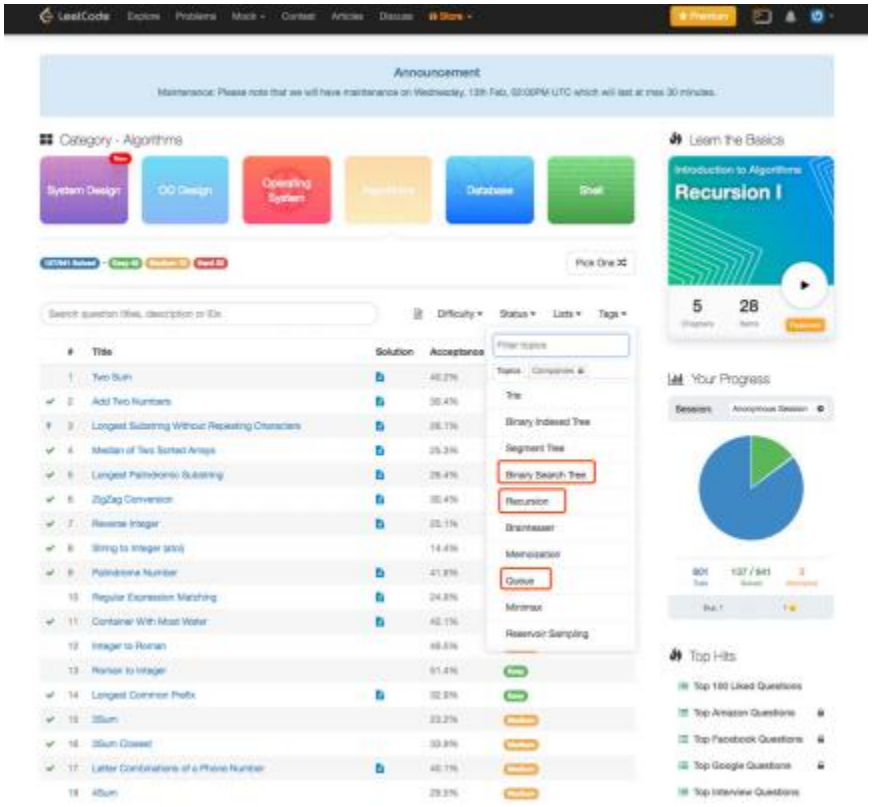
Textbook

- Textbook
  - Data Structures and Algorithm Analysis in **C++**, by Mark Allen Weiss
    - Published by Addison-Wesley, 2007
    - Latest version = 3rd Edition
    - Source codes are available online

- Reference
  - Introduction to Algorithms
  - One of the most classic algorithm and data structure books.
  - Third Edition, The MIT Press, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein

Leetcode

- LeetCode - The World's Leading Online Programming Learning Platform.
- The key to become a successful software engineer.
- Most of the problems are the real interview questions of world leading software companies, e.g. Google, Facebook, etc.
- A good channel to sharpen your programming skills (data structure, algorithm, coding).
- Suggestion: practice according to categories we learned in class (see below).
- Hint: Quiz/Exam will include Leetcode style question.



Plagiarism Policy

- Assignments: Copying from others, or allowing others to copy from you, both grades of you will be 0
- Quiz and Midterm exam : -200%
- Final: an automatic FAIL

You are encouraged to collaborate in study groups.
But, you cannot copy or slightly change other students' solutions or codes. **Honor Matters!**

Course Overview

- A fundamental computer science (CS) course
  - Essential for programming
  - Essential for advanced CS courses
- A challenging course, which needs
  - Mathematical and Logical thinking
  - Programming skills

Course Prerequisite

- Programming
  - Need to know C++
  - Visual Studio or other PC programming environment
  - Good programming skills
  - Translate pseudo-codes into codes
  - Quick review of C++ in the 1st week
- Basic mathematical skills
  - Solving recursive equations (递归方程), manipulation of symbols, etc.
- Computer architecture
  - Pointers (指针), storage, memory access, etc.

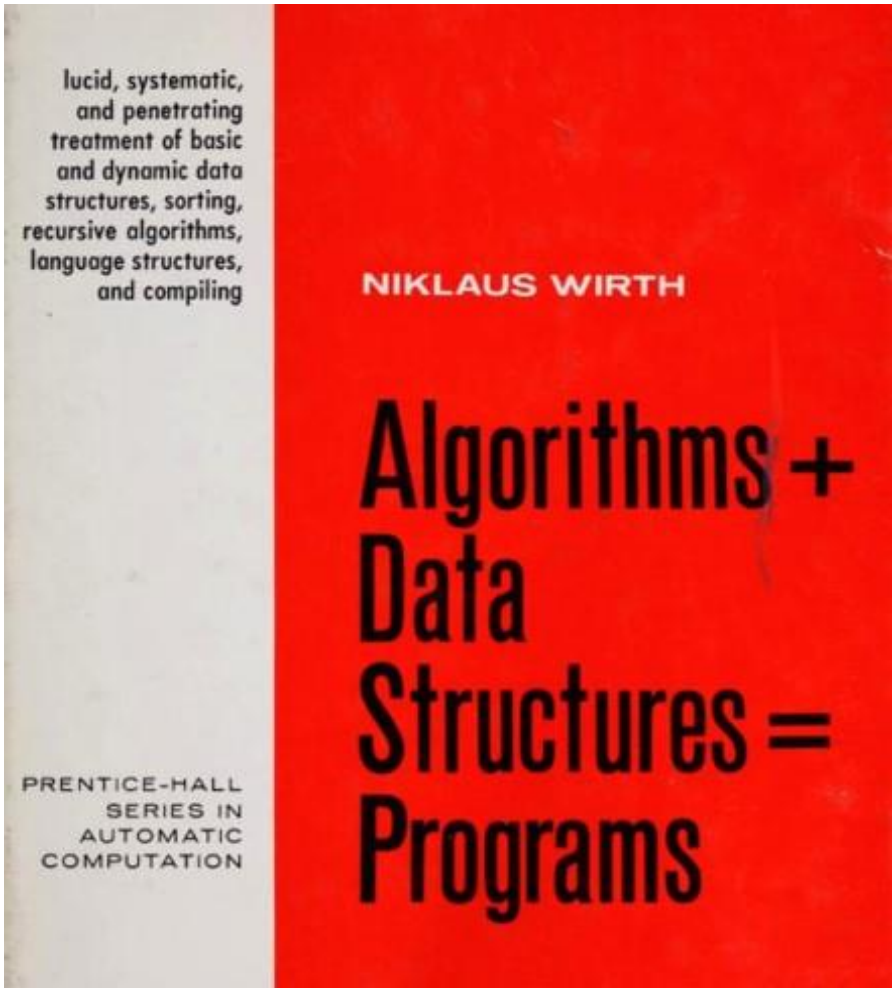
Topics Covered in this Course

- Algorithm Analysis
  - Mathematical Background, Big-O, Running time Calculation
- Abstract Data Type (ADT)
  - Lists, Stacks and Queues
- Trees
  - Tree Traversals, Binary Trees and Binary Search Trees, AVL Trees and B-Trees
- Priority Queues (Heaps)
  - Binary heaps, Applications of Priority Queues, d-Heaps
- Sorting Algorithms
  - Insertion Sort, Heap Sort, Shell Sort, Merge Sort, Quick Sort, Bucket Sort, External Sort
- Graph Algorithms
  - Topological Sort, Shortest-Path Algorithms, Minimum-Span Tree

Overall Goals of the Course

- From programmer to architect
- Learn to solve problems
- Algorithms and Programming go hand in hand
- Learn to analyze your solutions

The importance of Data Structure



1976, Niklaus Wirth (1934-), received the Turing Award in 1984