Data Structure

Lecture#1: Introduction

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In This Lecture

- Motivation to study data structure
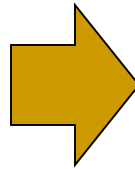- Administrative information for this course

Outline

➡️ ☐ **Motivation**

☐ Course Information

Why do we use Computer?

Is a computer just a faster and bigger calculator?

Why do we use Computer?

- In addition to quickly computing numbers, we use computers to **access, manipulate and organize data**
    - Store PPT file
    - Sort 1 million records to look for top-10 best records
    - Online shopping mall
    - Bank account
    - Social Network Services (SNS)
    - Web

What is Data Structure?

- Data structure
  - Any data representation and its associated operations
  - Organization or structuring for a collection of data items
    - E.g., an array containing a sorted list of exam scores

  - Using proper data structure can make a program super fast (e.g., few days => few seconds)

  - We learn data structure to design efficient algorithms to do tasks efficiently in terms of time and space

What about using fast computers?

- Ill-designed algorithms may require super-linear running time which grows much faster than the CPU's growth rate

- E.g., an algorithm may require $O(n^2)$ running time
  - This means if the input size increases 10 times, the running time increases 100 times.
  - To achieve the same running time, you need 100 times faster (expensive) computer to handle 10 times larger input
  - If you design an $O(n)$ algorithm, then you need only 10 times faster computer to handle the same input!

Goals of this Course

1. Reinforce the concept that costs and benefits exist for every data structure.

2. Learn the commonly used data structures.
   - These form a programmer's basic data structure "toolkit".

3. Understand how to measure the cost of a data structure or program.
   - These techniques also allow you to judge the merits of new data structures that you or others might invent.

Outline

☑ Motivation

➡ ☐ **Course Information**

Course Information

- URL:
  http://datalab.snu.ac.kr/~ukang/courses/17F-DS
  - Some materials and notices will be in eTL

- Office hour
  - Tue, 13:00-14:00 (also, by appointment)
  - Room 301-502

- TA: Beunguk Ahn, Junki Jang, Hyeonsik Jeon
  - Office Hour : see the course homepage

Course Information

- Class meets:

  - Lecture: Tue, Thu 14:00 – 15:15 (Room 302-105)

  - Lab: Mon 18:30 – 20:20 (Room 302-105)

    - (*) You need to prepare a laptop for the lab

    - If you don't have a laptop, you can borrow one in CS department office (10 laptops available)

    - If you have a special reason that you cannot prepare a laptop for the lab, let us know immediately

Textbook

- Cliff A. Shaffer, A Practical Introduction to Data Structures and Algorithm Analysis, Edition 3.2 (Java version), Mar/28/2013.

- (The e-book is freely available at http://people.cs.vt.edu/~shaffer/Book/)

Prerequisites

- M1522.000600 (Computer Programming) or consent of instructor

- Knowledge of the Java programming language enough to be able to design, code, and debug programs

Grading

- 10% Attendance and Quiz
  - Quiz: at the beginning of the class (5 minutes), without notice
- 30% Homework
- 25% Midterm
- 35% Final
- +(5% Participation)

Homework

- Written assignment
  - ~1 per week
  - May require 2~4 hours
- Programming assignment
  - ~1 per every two weeks
  - May require 4~8 hours

Late Policy

- For all homeworks
  - No delay penalties, for medical etc emergencies (bring doctor's note)
  - Each person has 4 'slip days' total, for the whole semester. 10% per day of delay, after that

Plagiarism

- Do not copy other people's works (e.g., homeworks, exams, etc.)
    - Then everyone involved in the plagiarism will get 0 score
- It is fine to discuss ideas about homework with your colleagues, but the homework should be finished independently
    - Write down the names of your colleagues that you discussed your homework with, if any
- Use office hours (of TAs and/or instructor) to ask about homework

Override Form (Choangi)

- We allow only ~30 students using override form due to limited resources
- We already mailed ~30 students who are permitted to get instructor's sign on the override form
- We will send final emails to another group of students who are permitted of the override form tonight
- After that, the only way to get registered in this course is through sugang.snu.ac.kr
- Send your request email to Hyeonsik Jeon (jeon185@gmail.com) so that you are in the waiting list if you haven't done so
  - Check out http://cse.snu.ac.kr/node/27265
  - No need to talk to me after this class

Schedule (Tentative)

Week	Schedule
1 (Sep. 5 ~)	Chapter 1
2	Chapter 2
3	Chapter 3
4	Chapter 4
5	Chapter 4
6	Chapter 5
7	Chapter 6
8 (Oct. 24 ~)	Midterm Exam
9	Chapter 7
10	Chapter 7
11	Chapter 7
12	Chapter 9
13	Chapter 11
14	Chapter 11
15 (Dec. 12 ~)	Final Exam

Advice

- This is an extremely important course in Computer Science and Engineering
  - The time devoted for this course will be fruitful
- If possible, read each chapter before class
  - It is ok to encounter something you don't understand. Just mark it, and later you will understand it when you come back.
- Active participation encouraged
- Use office hours (instructor and/or TA)

Questions?