Summary: The ”Great” DS Course

Course Summary

C++ and ADT (Abstract Data Type)

- Object Oriented Programming
  - Class, Object, Inheritance, Polymorphism, Overriding, Overloading, Template

- Hopefully, you are at the following status
  - "Not perfect, but I have some confidence to play with C++, probably by making more practices"

  - Learning a new programming language is not a critical issue
    - A more important thing is "design, design, design". Algorithms are how you express your good design with systematic procedures.

Asymptotic Analysis

- Order-wise analysis of algorithms
- A new eye to look at the macroscopic behavior of the world
- “How much money do you have?”
- “How much money do you have in an asymptotic sense?”
- New things that you have learned
  - Probabilistic analysis of a randomized algorithm
  - Amortized analysis

Basic Data Structures

- Stack: LIFO
- Queue: FIFO
- Sequence
  - Linked List
  - Array

(Key, Value) pairs: Priority Queue and Maps

- Priority Queue
  - Removemin and insert
- Maps
  - Orderedmap
    - SkipList
  - Unorderedmap
    - Hashtable

Search Trees

- BST (Binary Search Tree)
- AVL Tree
- 2-4 Tree
- Red-Black Tree
- Often, it is important to consider “cases” in a systematic manner
  - Not good: try some cases, and find other corner cases → Long debugging time

Graph

- Basics
  - Node, edge, spanning trees, connected components, tree, forest
- Traversal
  - DFS, BFS
- Shortest path
- Minimum Spanning Tree

Sorting

- Insertion, Selection Sort
  - Simple sequence-based
- Heap Sort
  - PQ based
- Divide-and-conquer
  - Merge sorting
  - Quick sorting: randomized algorithm

Final Words

Ethics

- Thanks for your care about ethics
- Happy that almost no cheating cases are observed
- Important
- Things that we have to keep in our mind, always.

Where You Are

- Freshman, Sophomore
  - Take classes in broad areas
  - Don’t just take each path
    - This will turn out to be an obstacle, when you want to something great later.
- Junior
  - Busy with taking major courses. Stick out (잘 버텨라)
- Senior
  - Look back your past. It’s time to become professional whatever you do (a graduate program, getting out to a real field, etc)

Question is With What You Manage to Live

- What was and is your dream?
- What make your most excited?
- Buying a house, having a good car, taking good trips every year?
  - They are almost guaranteed (housing is still a little bit expensive, though)
- Miserable people
  - Now: people who do not have enough money?
  - Future: people who are having a non-exciting job

How Can We Make Our Life Excited?

- Do something which …
  - Gives mentally-high rewards (큰 보람, 다른 사람에 도움, 좀 더 의미있는 일, 그냥 나의 fun을 위한 paycheck을 주는 일 말고)
  - Heats your heart
  - gives the chance to show your leadership
  - etc …

In the end …

- Confidence

- How to overcome
  - 과학고 떨어지고
  - 영재고 떨어지고
  - 열심히 해도 학점 잘 안 나오는 것 같고 의 느낌들

- How to encourage you
  - KAIST에 들어왔고
  - 그 어려운 과목들 다 이수 잘했고,
  - 실험, 전프구 모두 잘 돌파해내고, 나 참 잘하고 있다의 긍정적인 느낌들

Thank You Very Much

- For attending this class
- Hope that I see you in some other classes
- I tried my best, but clearly not perfect
- Although I don’t remember all of your names, but I remember your faces
- Feel free to visit me, if you want to talk about anything
  - Your future, my love story, nice dinner, chatting over a drink …