LECTURE 0

INTRODUCTION

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BOSTON UNIVERSITY

Introduction

Course Staff

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Faculty Advisor: Dora Erdos

Course Webpage

- https://www.howchenn.com/teaching/fall2022
- Class Piazza: https://piazza.com/bu/spring2023/cs200a1
- All announcements will be made here
- Ask questions either publicly or privately.

Recommended Materials

- **Instructors' Favorite:**
  Competitive Programmer's Handbook
  https://cses.fi/book/book.pdf

- Classics:
  Introduction to Algorithms (CLRS)
  Algorithm Design (Kleinberg)

Prerequisite Knowledge

- Basic Understanding of Algorithms and Data Structures
  (CS112, CS330, EC330) * But Not Required To Enjoy the Course

Academic Policy

III. Violations of this Code

Violations of this Code involve attempts to be dishonest or deceptive in the performance of academic work in or out of the classroom, alterations of academic records, alterations of official data on paper or electronic resumes, or unauthorized collaboration with another student or students. Violations include, but are not limited to:

A. Cheating on an examination or assignment. Any attempt by students to alter their performance on an examination or assignment in violation of the stated or commonly understood ground rules.

B. Plagiarism. Representing the work or ideas of another as one's own; and/or using another's work or ideas without crediting the source. Plagiarism includes, but is not limited to, the following: copying the answers of another student on an examination; copying or restating the work or ideas of another person or persons in any oral or written work (printed or electronic) without citing the appropriate source; using audio or video footage that comes from another source (including work done by another student) without permission and/or acknowledgement of that source; and collaborating with someone else in an academic endeavor without acknowledging their contribution. Plagiarism can consist of acts of commission (appropriating the words or ideas of another as one's own), or omission (failing to acknowledge/document /credit the source or creator of words or ideas).

C. Misrepresentation, falsification, or fabrication of data presented for surveys, experiments, reports, etc., which includes but is not limited to: citing authors who do not exist; citing interviews that never took place; citing field work that was not completed; and falsely claiming attendance at mandatory class events.

D. Theft of an examination. Stealing or otherwise discovering and/or making known to others the contents of an examination that has not yet been administered.

E. Unauthorized communication during examinations. Any unauthorized communication may be considered automatic

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Course Structure

- Graded on **Attendance** (90%) and **Participation** in class contest (10%) (5 questions)
- 50 minutes, we will focus on "solving" in class
    - Further discussion after class
- Course Outline
    - Basic Concepts
      C++, Vim, Efficiency
    - Useful Algorithms and Reduction Concepts
      Graph, Maxflow, Spanning Tree, String, DP
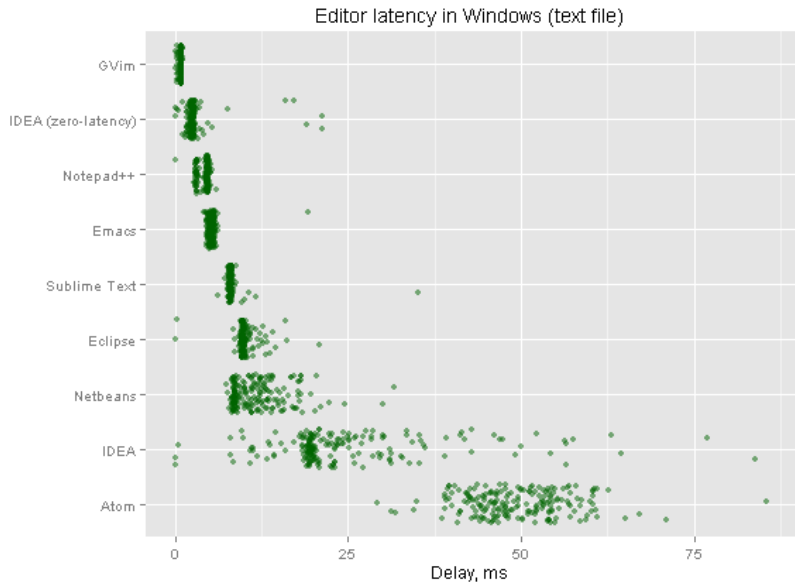   - Advanced Algorithms
      Convex Hull, FFT

Vim Wizardry

Choice of Text Editor

- Why?
    - Fast once you get the hang of it
    - Flexible for Personal Configuration and very powerful
- IDE?
    - Good for developing software
    - Overkill (Features), too slow for fast problem solving
- Which one to use?
    - Up to you!

Latency

Editor latency in Windows (text file)

Modes

- Command Mode: $\langle Esc \rangle$
- Insert Mode:

i	enter insert mode
I	move cursor to the front of the line and insert mode
A	("append") to the end of the line
O	("open") a line ABOVE
o	("open") a line below

Syntax

"diw" deletes the word on the cursor

Verb				Noun		
	d	delete			iw	in word
	c	change			ip	in paragraph
	y	yank			it	in tag (HTML)
	>	indent			i"	in quote
	v	visual			...	in something

Movement

- w move by a word
- b move "back" by a word
- combine moves with number: Ex) 5j to go 5 lines down
- gg to go to top, G to go to bottom

Command line

While in command mode, use ":" to issue a specific vim command.

:5	jump to line 5
:r "path-to-file"	paste a textfile
:w	save
:q	quit
:q!	force quit (if you don't save)
:wq	save and quit

Configuration

- .vimrc is very powerful, you can install plugins, set compiler options etc...
- Make sure you have GCC compiler installed (`sudo apt-get install build-essential`)
- Create a configuration file `.vimrc` in home directory.
- Add the following lines to toggle relative numbering

```
augroup numbertoggle
    autocmd!
    autocmd BufEnter,FocusGained,InsertLeave * set rnu
    autocmd BufLeave,FocusLost,InsertEnter * set nornu
augroup END
```

- Add the following lines to your .vimrc for fast compilation and execution
- **(Compile and Run)**
  ```
  autocmd filetype cpp nnoremap ⟨F8⟩ :w ⟨bar⟩ !g++
  -std=c++17 -Wshadow - Wall % -o %:r -O2
  -Wno-unused-result && ./%:r ⟨CR⟩
  ```
- **(Check previous output)**
  ```
  autocmd filetype cpp nnoremap ⟨F9⟩ :!%:r ⟨CR⟩
  ```
- **You're set!**
- ⟨**Optional**⟩ **My full setting**:
  https://github.com/du00d/competetive-programming/blob/master/vim/.vimrc