CS 2351
Data Structures
資料結構

Course Syllabus & Overview

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What is Data Structure?

- In computer science,
  - An algorithm is a self-contained step-by-step set of operations to be performed, to solve a problem.
  - A *data structure* is a particular way of *storing* and *organizing* data in a computer so that it can be used *efficiently.*
- Different kinds of data structures are suited to different kinds of algorithms/applications.
  - B-Tree for databases application
  - Hash table is used in compilers for looking up identifiers.

From wikipedia

When is Data Structure Important?

- What if the problem size is small?
  - Suppose you have to maintain a personal address book which contains 10 records of your friends
    - Each record stores a name and an address.
  - What will you do if you want to lookup the record of a particular friend, say Mike?
  - You can go through each record in sequence until the target name is found!
- What if you maintain an address book of a city (~10^6)?
  - And each record needs to append more information, e.g., Gender, TEL, Job, etc?

When is Data Structure Important?

- Real problems occur when your problem size is getting BIG!
  - For example, an address book of 10^6 records.
  - You can divide the book into 10^4 parts, hiring 10^4 employees to do the lookup tasks!
  - You can first ***sort*** the records in its name and then perform the lookup!
  - How to *organize* the data such that it is suitable for *sorting algorithm*?

Why is Data Structure Important?

- Data structure is important because it dictates
  - The types of operations that can perform on the data
  - How efficiently these operations can be carried out
  - How dynamic we can be in dealing with the data
    - For example, whether we can add additional data on the fly or if we need to know about all of the data up front
- The way you *organize* the data determines how you solve a problem
- And, the way you solve a problem determines how *efficiently* the problem can be solved

Why is Data Structure Important?

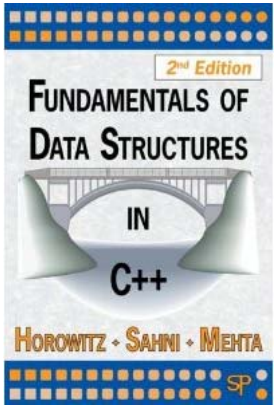
- Data structures is fundamental to Computer Science.
- Data structures play a key role in other courses:
  - Algorithms, compilers, image processing, computer graphics, networks, …

What Will We Learn?

- Techniques to design and implement large-scale computer programs
- Data abstraction and encapsulation, algorithm specification, performance analysis and measurement
- Basic data structures to represent data:
  - Arrays, stacks, queues, linked lists, trees, and graphs, …
- Basic algorithms to manipulate above data structures:
  - Sorting, string matching, minimum spanning trees, matrix multiplication, and shortest paths, …

Textbook

- ***Fundamentals of Data Structures in C++***, 2nd ed., by Horowitz et al.



Course Outline

Topics	Textbook
Intro. to C++ and Algorithm	Chapter 1
C++ and Arrays	Chapter 2
Stacks and Queues	Chapter 3
Linked Lists	Chapter 4
Trees	Chapter 5
Graphs	Chapter 6
Sorting	Chapter 7
Hashing	Chapter 8
Advanced Topics	

Course Information

- Classroom
  - 台達104
- Class time:
  - 星期二 10:10-12:00
  - 星期四 10:10-11:00
  - 星期三 (上機考) 18:30-19:30
- Course webpage:
  - iLMS (http://lms.nthu.edu.tw/)

Instructor & TAs

Name	高榮駿	TAs
Office	台達館609室	台達館735室
TEL	03-5731306	03-5715131 ext. 80943
E-Mail	jungchuk@cs.nthu.edu.tw	蕭溢豐 s101062122@m101.nthu.edu.tw 李書毅 s106062611@m106.nthu.edu.tw 羅翊嘉 s106064535@m106.nthu.edu.tw
Office Hours	週四 4:30-5:30pm	週二 7-8pm

Tentative Workload & Evaluation

- Assignments (25%)
- On-line quizzes (15%)
  - NTHU Online Judge System, http://acm.cs.nthu.edu.tw/
  - On-line quizzes are held in PC rooms
- Midterm (25%)
- Final exam (25%)
- Class participation (in-class quizzes and Q&A) (10%)

加簽規定

- 資料結構兩班都有加簽人數上限
  - 因為電腦教室電腦數量有限
- 加簽方式(如果想要加簽的人數過多)
  - 開學第一堂課繳交加簽單，以便統計人數
  - 兩天內，通知加簽結果
    - 兩班一併審查
    - 以加簽單上的email通知加簽結果

Game Rules

修課須知

- 必需熟知**C & C++**。
  - 不熟知C++的學生建議先修C++。
- 請同學確保能收到iLMS的信，避免跑入垃圾信箱，可將iLMS信箱設為聯絡人。
  - 每封信請詳讀，確保同學自身權益，不得以"我沒有注意到那封信"為理由來要分數。

關於問題詢問

- 為了提升解答的效率，請同學將問題一律發佈在iLMS的討論區。
  - 助教們有空會上線觀看，並為各位解答。
  - 發問前請先到討論區爬文
    - 重複詢問的問題，助教將不予回答
  - 私下用email詢問的問題，助教將不予回答。
  - 希望同學能不吝在討論區與大家分享你知道的答案，協助同學解決問題。
  - 如果是個人問題，可於TA office hour詢問助教。
- 同學們可利用更有效率的管道尋找解答
  - 例如與其他同學討論或google等。

上機考規則

- 時間為星期三18:30-19:30
- 地點為指定的教室
  - 資電館326、328、電機系電腦教室407
- 必須簽到，該次才有算分數
- 上機考沒有補考，沒有遲交
- 可攜帶筆電、紙本資料(上課講義, 參考書籍)
- Only C or C++
- 完成後方可離開教室
- 被抓到作弊者一律0分計算

上機考規則與注意事項

- 自行申請**Online Judge (OJ)帳號**
  - 申請網址：http://acm.cs.nthu.edu.tw
  - 帳號規則：DS**K**+學號，例如 DS**K**106062555
  - 註冊OJ帳號必須用學校信箱，否則會收不到認證信
  - **考試一律使用規定的帳號格式，否則不予計分**

上機考規則

- 考試結束後會公布測資
- 每次上機考總共有四筆測資，以通過筆數計算分數，如下

	1/4	2/4	3/4	4/4
成績	60	75	90	100

作業規則與注意事項

- 作業、程式碼嚴禁抄襲
  - 抄襲者與被抄襲者都一律0分計算！
- 作業繳交期限為兩個星期，不接受遲交
- 沒有屍體分數，遲交零分且不得補交

作業規則

- 每次作業共有四筆測資，以通過筆數計算分數，如下

	1/4	2/4	3/4	4/4
成績	60	75	90	100