國立清華大學 電機工程學系 一〇二學年度第二學期

EE-2410 資料結構 Data Structure

Homework #2

Due on March 31, 2014

請上助教網站上傳包含【原始碼及執行結果】的綜合 PDF file

助教網頁： http://www.ee.nthu.edu.tw/ee241000

1. (10%) Write a C++ program (using STL preferably) to implement a ***vector-based spare matrix*** class, following the concepts of "*data abstraction*" and "*data encapsulation*". Your class should provide the member function of *smTranspose* as discussed in class. (10%) Your program should have the following features:
   (a) (command line format): %*sm* <*x-dimension*> <*y-dimension*> <*non-zero percentage*>
   where the <*non-zero percentage*> is the percentage of those non-zero elements in the matrix.
   (b) Perform the following in your *main* function:
   - Randomly generate a sparse matrix with the user-specified non-zero percentage. A non-zero element is an integer with the range from 1 to 100. Print out a matrix, A, by setting <*x-dimension=10*> <*y-dimension=10*> <*non-zero percentage=20%*>, in a row-by-row format including those zero elements. (Note: you need to use "operator overloading<<" to print your matrix).
   - Perform "*smTranspose*" on A as discussed in class, to produce a sparse matrix, namely AT.
   - Perform "*smTranspose*" again on AT, producing another matrix, ATT. Print matrix ATT and make sure that ATT is the same as A.

STL reference: STL 網頁: http://www.cppreference.com/wiki/stl/start

繳交資料**:** Combine all your following documents into a single PDF file for submission to the TA web page. On top of the combined PDF file should be a **cover page** with your 系所，中英文姓名，學號等資訊**.**

(a) All your **source codes** (C or C++ file).

(b) Show the **execution trace** of your program.