國立清華大學 電機工程學系 一〇四學年度第二學期

EE-2410 資料結構 Data Structure

Homework #3

Due on April 18, 2016

請上 iLMS 上傳包含【原始碼及執行結果】的綜合 PDF file

(抄襲之作業將以零分計算)

1. [**Mazing Problem**] Consider the implementation of a search program for a mouse trapped in a maze. The starting position of the mouse is assumed to be at (1, 1), and the exit is assumed to be at (10, 10). As discussed in class, the horizontal axis goes from left to right, and the vertical axis goes from top to bottom in the maze.

   Out of the 10x10=100 squares, some are valid (for which the mouse can get into), and some are invalid (for which the mouse cannot get into). By linking your program to an object file named **maze1.o** (to be downloaded from the iLMS system), whether a square is valid or not can be checked by calling a function, i.e., ***is_valid*(*x*, *y*)**, where **(*x*, *y*)** is the coordinate of a square. A return value of 1 means the square of query is "valid", and on the other hand, a return value of 0 means invalid.

   (a) Find a valid path for the mouse, if followed, can lead the mouse from the starting position at (1, 1) to the exit at (10, 10). Report the **total number of steps** in this path, and report its **entire trajectory**. Here, the trajectory consists of a sequence of steps, with each step denoted as (*x*, *y*, *z*), where (*x*, *y*) is the coordinate of a square and *z* is a enumeration type of variable indicating a direction out of {N, NE, E, SE, S, SW, W, NW}.

   (b) Convert your results into a 2-dimensional array, and print it out on the screen with the "taken squares" marked with "*", while leaving the "non-taken squares" blanks.

繳交資料**:** Combine all your following documents into a single PDF file before submission to iLMS. On top of the combined PDF file should be a **cover page** with your affiliation (e.g., the department of your major, name, registration number, etc) 系所，中英文姓名，學號等資訊**.**

1. All your **source codes** (C or C++ file).
2. The **execution results** of running your programs.