1246 計算機概論與程式設計

2019/12/16 Lab 13

上機考注意事項

1. 時間: 2019/12/23 18:30-21:30
2. 地點: EC315、EC316
3. 範圍: 全, 但不包含 malloc, linked list
4. 可以帶**課本和紙本講義**, 且無法連網
5. 請使用**公用帳號**登入
6. 大家這學期辛苦了 助教有指導不周 還感謝各位體諒 :)

Lab review

Lab11 - Steps: 從 a 走到 b 的最少step。(走越大步，需要越少step)

當 diff 小於 "下步的步長 * 2" 時，diff 的三種情況：

1. diff = 0: 結束
2. diff < 下步的步長: +一步
3. diff > 下步的步長: +兩步

Lab review

Lab11 - Cola

歸納下來, 會發現只有兩種情形

1. 用發法一換完可樂, 剩下一個空瓶子: 直接輸出答案
   這種情形, 不論如何借空瓶子, 都不可能還足夠的空瓶子回去, 因此可以直接輸出答案。

2. 用發法一換完可樂, 剩下兩個空瓶子: 答案+1
   這種情形, 可以借一瓶空瓶子一次, 湊齊三瓶, 在將換到的可樂空瓶還回去, 剛好一瓶不剩, 就等於可以喝多到一瓶, 因此+1。

Lab review

Lab11 - Decoding the message

1. 讀取每行以空白隔開的字串 (使用 for, strtok...)
2. 依序判斷字串長度是否大於所需讀取字元的位置(strlen)
3. 若字元位置小於該字串長度, 則取得字元
4. 若字元位置大於該字串長度, 則移往下個字串, 回到步驟2
5. 重複步驟 1~4
6. 輸出結果

Lab review

Lab12 - Rare Easy Problem: 給定 N - M 找 N, 其中 M = N/10 取整數

設 N = 10 * x + y, 則 M = x。(x, y: [0, 9])

Input = N - M = 9 * x + y, 找出所有可能的解即可算出 N。

結果最多只有兩種可能:

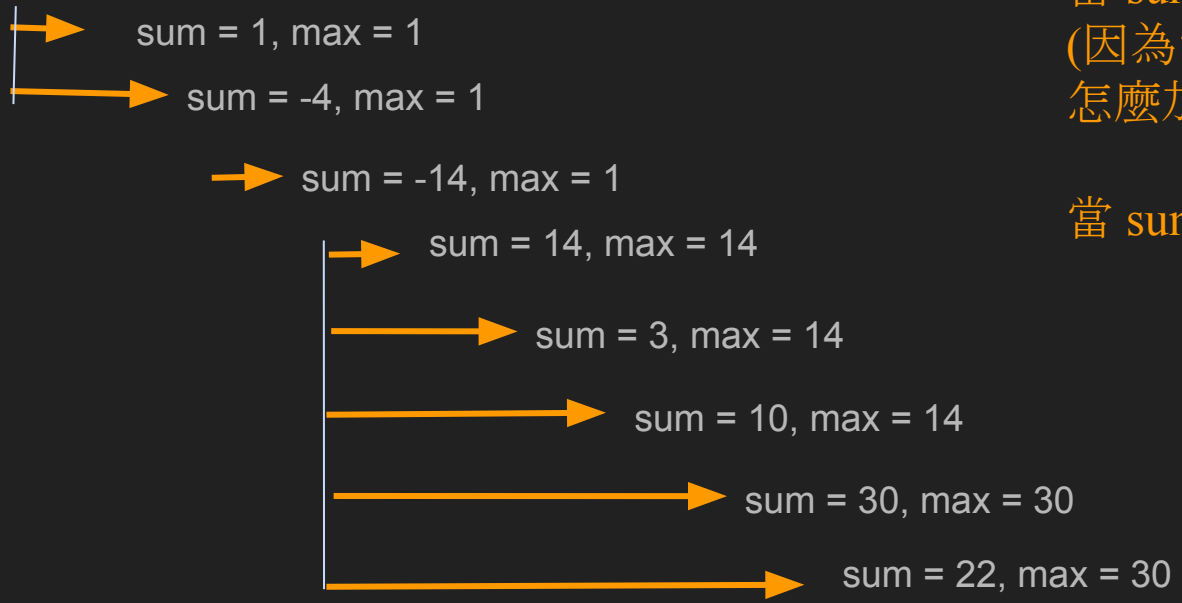
1. 一組解

2. 兩組解:
   因為當 y = 0, 9 * x + y = 9 * (x - 1) + (y + 9)
   或者當 y = 9, 9 * x + y = 9 * (x + 1) + (y - 9)

Lab review

Lab11 - Largest Sum Game

1, -4, -14, 14, -11, 7, 20, -8



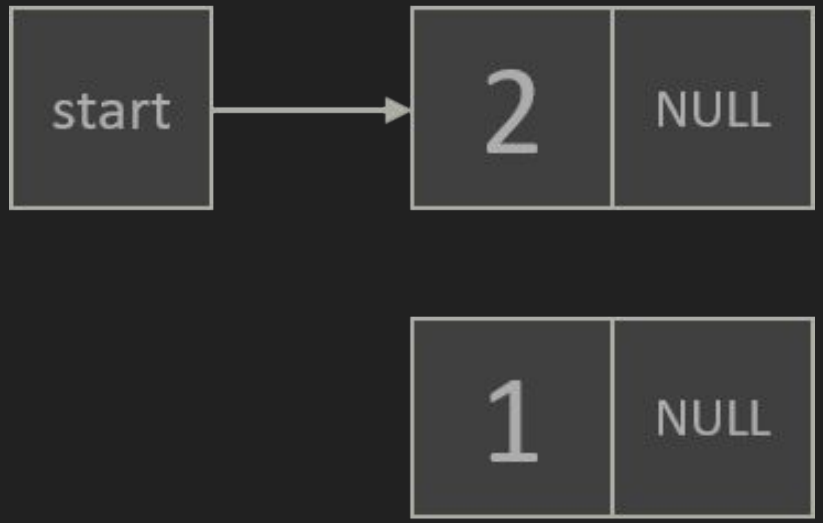
當 sum < 0 時, sum 歸零
(因為當 sum 小於 0 時, 不管之後怎麼加, 都不會是最大值)

當 sum > max 時, max = sum

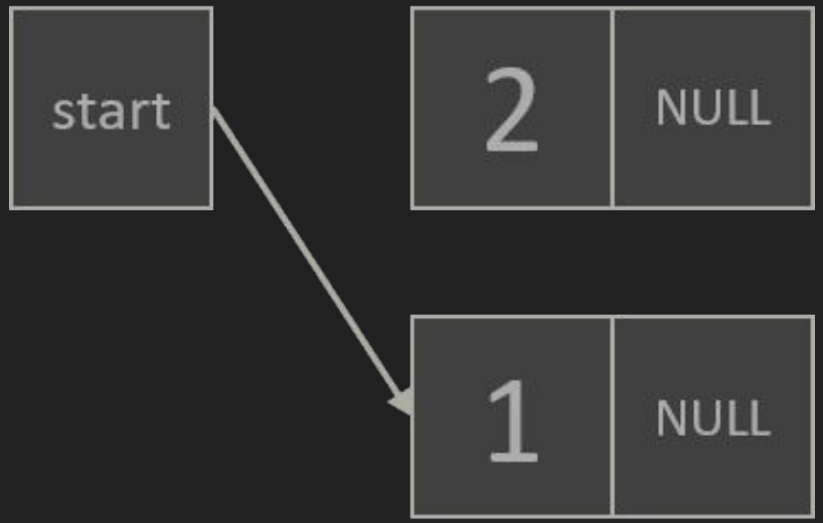
Linked List

Linked List - Add to the front

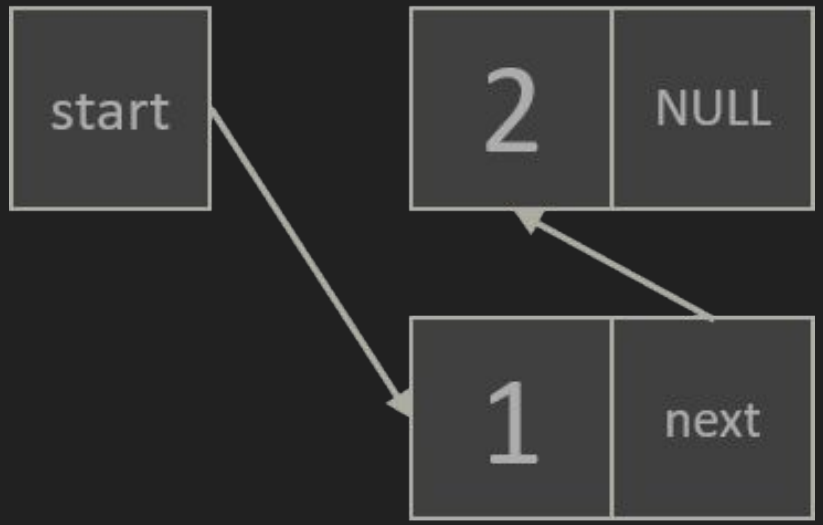
Linked List - Add to the front



Linked List - Add to the front



Linked List - Add to the front



Linked List - Add to the front

Linked List - Add to the end

Linked List - Add to the end

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Linked List vs. Array

BASIS FOR COMPARISON	ARRAY	LINKED LIST
Basic	It is a consistent set of a fixed number of data items.	It is an ordered set comprising a variable number of data items.
Size	Specified during declaration.	No need to specify; grow and shrink during execution.
Storage Allocation	Element location is allocated during compile time.	Element position is assigned during run time.
Order of the elements	Stored consecutively	Stored randomly

Linked List vs. Array

Accessing the element	Direct or randomly accessed, i.e., Specify the array index or subscript.	Sequentially accessed, i.e., Traverse starting from the first node in the list by the pointer.
Insertion and deletion of element	Slow relatively as shifting is required.	Easier, fast and efficient.
Searching	Binary search and linear search	linear search
Memory required	less	More
Memory Utilization	Ineffective	Efficient

Lab 13

Question 1 (40%)

創建一個指定長度 M 的linked list, 依序存入 M 個正整數
接著輸入N 並給定N個index

實作一個int getValueByIndex(node* start, int index);
來查找linked list中第index個node的值

若指定的index超出linked list長度, 則輸出0

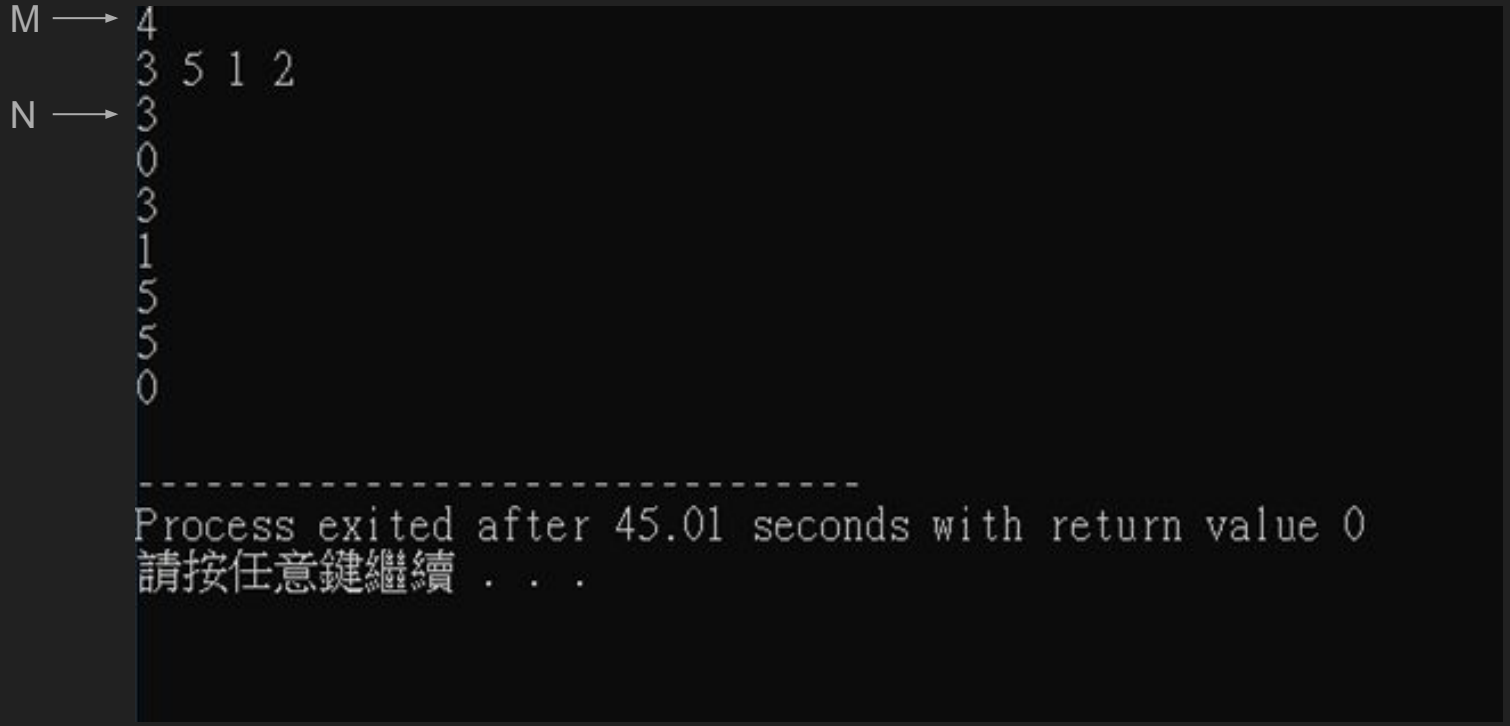
linked lists 長度M[1-10], 整數範圍[1-100],
測資N[1-10], index[0-100]

Question 1 (40%)

node 參考

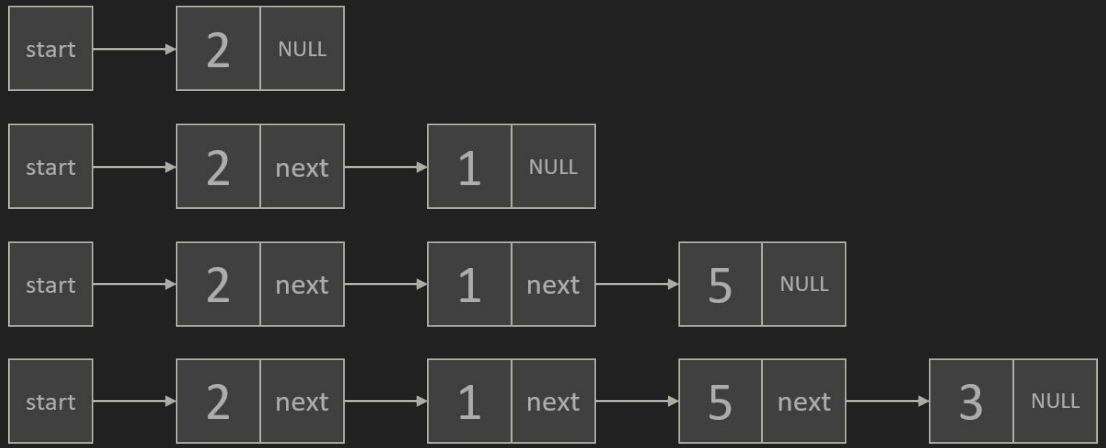
```
struct node {
    int value;
    struct node* next;
};
```

Question 1 Sample Output



Question 1 Sample Output Step-by-Step

building linked list



accessing linked list

Question 2 (30%)

Rectangles

在給定的所有長方形中, 找出所有長方形都有重疊的面積。

輸入:先給一個數字M(0<M<=20), 表示接下來有幾筆測資, 每筆測資會先給一個數字N(0<N<1000), 表示有幾個長方形, 接下來的N行會給四個數字[-10000,10000], 分別為左下, 右上的座標(例如輸入為1 2 3 4表示左下座標為(1,2), 右上為(3,4))

輸出:所有長方形的重疊面積

Question 2 Sample Output