Course: Data Structures (CSE CS203A, 114-1)
Quiz II: Array, Linked List, Stack and Queue
October 21, 2025, 16:30~17:00

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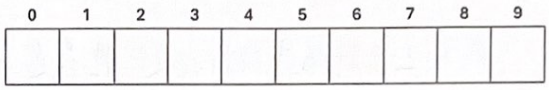
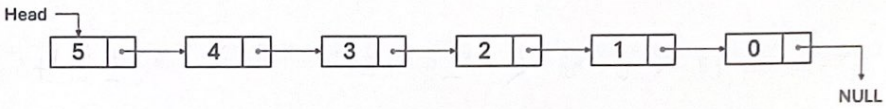
Data Structures: Visualization

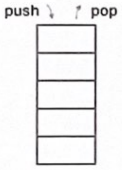
(1) Array



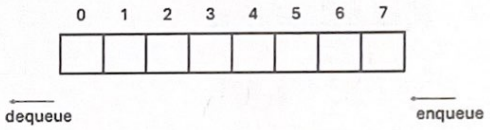
(2) Linked List



(3) Stack



(4) Queue



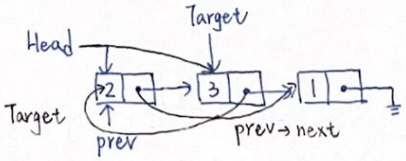
Q1: (30 pts; 10 pts for each) **Describe the mechanism of the function**
MoveTo(node *head, node *target, node*destination)

A1: Write a short paragraph explaining how the **MoveTo** function works (you may answer in English or Mandarin).

① Are there any **additional variables** required? If so, explain why they are necessary.

需要一個 prev，因為 singly linked list 只能單向遍歷，所以要追縱 node 的前一個 node 需要其他指標。

② **Draw a visualization** of the singly linked list to support your explanation.



③ Is there any **variation of a linked list** (e.g., doubly linked list or circular linked list) that can simplify or improve this operation?

doubly linked list 可以更簡潔，因為其每一個 node 都包含一個 prev 跟 next。

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Q2: (40 pts, 10 pts for each) **Definition of Data Structures**

Define the following data structures and list their fundamental operations.

A2:

① Definition of "Stack"

像一個陷害的坑，只能從上面新增或移除，是一種後進先出（LIFO）的線性資料結構。

② Definition of "Queue"

像排隊一樣，先排的優先服務，是一種先進先出（FIFO）的線性資料結構。

③ Preliminary operations of "Stack"

Push：新增元素到頂部

PoP：從頂部移除元素

④ Preliminary operations of "Queues"

Enqueue（Add q）：在後端新增元素

Dequeue（Delete q）：在前端移除元素

Q3: (30 pts) **AI Copilot Application**

Choose **up to two** data structures from the visualization list above.

Compose a **single prompt (within 300 words)** that you would use with an **AI Copilot** to explore or learn advanced concepts related to your chosen data structures.

A3:

在學習單向連結串列中，如何使用 Dummy node 來簡化頭部操作或空串列的程式碼邏輯？請用中文詳細解釋。

從時間複雜度的角度進行分析，使用 array 和 linked list 實作 stack 時，處理動態調整大小時的 Trade-offs？請用中文詳細解釋。

如果我要嘗試同時支援 O(1) 的 Insere_first 和 O(1) 的 Delete_last 操作，單向連結串列和雙向連結串列和陣列，哪種資料結構最適合？請用中文解釋原因。

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