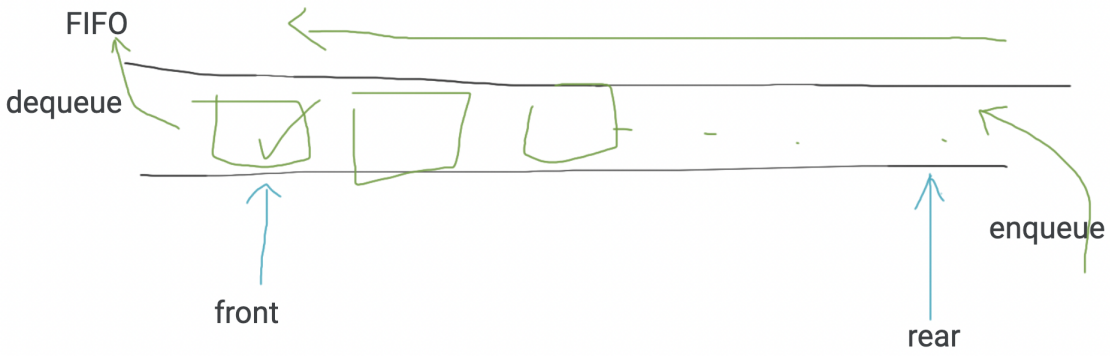
Phill-DS-1108

Queue

- FIFO (first in first out)
- enqueue, dequeue, front, rear (從左到右)
- 注意 array size
- -1 代表重置 初始狀態 → 避免元素搬動




```
#include <iostream>
#define MAX_SIZE 10
using namespace std;

class QueueArray{
  private:
    int front, rear; // index
    int arr[MAX_SIZE];

  public:
    QueueArray(): front(-1), rear(-1){}

    void enqueue(int data){
      if(rear >= MAX_SIZE-1){
        cout << "已經滿了喔" << endl;
        return;
      }

      arr[++rear] = data; // 有 element
```

```
      if(front==-1) front=0; // new element -> front 連動更新
    }

    int dequeue(){
      if(front ==-1){ //初始或被重置後的狀況 -> 空的queue
        cout << "已經空了喔"<< endl;
        return -9999; //錯誤碼
      }
      int value = arr[front];
      if(front==rear) // 為了 maintain front rear 機制
      {
        rear=front=-1;  //這種作法的好處是不用搬動 array
      }//取出最後一個元素 重置queue
      else{
        front++; //取出來了(變垃圾) front 向後指
      }
      return value;
    }

    bool isEmpty(){
      (front==-1)?true:false; //利用重置機制
    }
};


int main()
{
    QueueArray qu;
    qu.enqueue(94);
    cout << qu.dequeue() << endl;

    qu.enqueue(94);
    qu.enqueue(87);
    cout << qu.dequeue() << endl;
    cout << qu.dequeue() << endl;

    qu.enqueue(87);
    cout << qu.dequeue() << endl;
    cout << qu.dequeue() << endl;


    return 0;
}
```

Linked List

```
#include <iostream>
using namespace std;

struct Node{
  int data;
  Node* next;
};

class QueueList{
  private:
    Node* front;
    Node* rear;

  public:
    QueueList(): front(nullptr), rear(nullptr){}

    void enqueue(int data){
      Node* newNode = new Node; //產生實體
      newNode-> data = data;
      newNode-> next = nullptr;
      if(rear==nullptr){ //設定好重置 初始
        front = rear = newNode; //queue 只有我
        return;
      }

      rear->next = newNode;
      rear = newNode;
    }

    int dequeue(){
      Node *temp = front;
      front = front->next;
      int result = temp->data;
      if (front == nullptr) rear = nullptr;
      delete temp;
      return result;
    }

    bool isEmpty(){
      return front==nullptr; //真的空了
    }

    ~QueueList (){
      while(!isEmpty()) dequeue();
    }
};
```

練習

客服服務

- 一通通進來 → 一通通serve
- class Service
  - addServiceTask()
  - pickupServiceTask()

```
class Service{
  private:
    QueueList abc;

  public:
    void addServiceTask(int ticket){
      abc.enqueue(ticket);
      cout << "Customer " << ticket << "added to serivce queue"<< endl;
    }

    void pickupServiceTask(){
      if(abc.isEmpty()){
        cout << "No customer" << endl;
        return;
      }
      int taskId = abc.dequeue();
      cout << "Customer "<< taskId <<" is being serverd."<<endl;
    }
};

int main()
{
    Service dell;
    dell.addServiceTask(101);
    dell.addServiceTask(102);

    dell.pickupServiceTask();
    dell.pickupServiceTask();
    dell.pickupServiceTask();
    return 0;
}
```