

## WIA1002 Data Structure

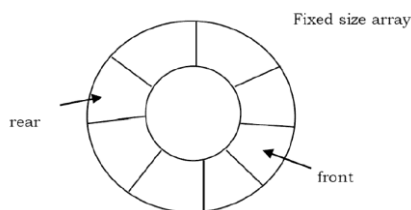
### Tutorial 6: Queue

1. Create the ListNode.java and Queue.java file (only the methods required based on the lecture notes). Then, perform the following:
  - a. Insert three characters B, M, and W into the queue
  - b. Remove one character from the queue
  - c. Print the front element of the queue
  - d. Print the number of elements in the queue

Example output:

```
Queue Implementation using Linked List
Enqueue three nodes
B --> M --> W -->
Dequeue one node
M --> W -->
The front node of the queue is M
The queue size is 2
```

2. Create an ADT queue named **ArrayQueue**. The ADT consists of the following method and the maximum size of the ADT is 10. (Arrange the array in a circle)
  - a. Constructor
  - b. isEmpty
  - c. isFull
  - d. getSize
  - e. enqueue
  - f. dequeue
  - g. peek
  - h. showQueue



Example output:

```
Queue Implementation using Array
Enqueue three nodes
B --> M --> W -->
Dequeue one node
M --> W -->
The front node of the queue is M
The queue size is 2
```

3. Write a Program to simulate a queue when purchasing a new MY phone. Given each customer can purchase 1 – 3 sets of MY phone. The number of MY phone available is 30.

Example output:

```
Simulating a Queue to purchase MY phone
Customer 1 : 1 set(s) -->
Customer 2 : 2 set(s) -->
Customer 3 : 2 set(s) -->
Customer 4 : 3 set(s) -->
Customer 5 : 1 set(s) -->
Customer 6 : 2 set(s) -->
Customer 7 : 2 set(s) -->
Customer 8 : 1 set(s) -->
Customer 9 : 1 set(s) -->
Customer 10 : 3 set(s) -->
Customer 11 : 3 set(s) -->
Customer 12 : 1 set(s) -->
Customer 13 : 3 set(s) -->
Customer 14 : 2 set(s) -->
Customer 15 : 2 set(s) -->
Customer 16 : 1 set(s) -->
Number of Customer : 16
```

4. Write a program to determine whether a string is palindrome. (You can use stack and queue to solve the problem).

Example output:

```
kayak is a palindrome.
Welcome is not a palindrome.
Was it a car or a cat I saw? is not a palindrome.
civic is a palindrome.
race car is not a palindrome.
```

5. Modify Question 4 to ignore the capital letter, punctuation and space characters.

Example output:

```
Was it a car or a cat I saw? is a palindrome.
?civic# is a palindrome.
race car is a palindrome.
redrawer is not a palindrome.
put      it up is a palindrome.
```

6. Write a program to reverse the words in a sentence. (Only Queue is allowed for this question)

Example output:

```
Enter a sentence : A queue is a First In First Out (FIFO) data structure.
The original queue : A --> queue --> is --> a --> First --> In --> First --> Out --> (FIFO) --> data --> structure. -->
Reverse all the elements in the queue : structure. --> data --> (FIFO) --> Out --> First --> In --> First --> a --> is --> queue --> A -->
```