

**WIA1002/WIB1002 Data Structure****Lab 10: Queue****Question 1**

a) Write a generic queue class called `MyQueue` using `LinkedList`. Implement the following methods:

- a. `public MyQueue(E[] e)`
- b. `public MyQueue()`
- c. `public void enqueue(E e)`
- d. `public E dequeue()`
- e. `public E getElement(int i)`
- f. `public E peek()`
- g. `public int getSize()`
- h. `public boolean contains(E e)`
- i. `public boolean isEmpty();`
- j. `public String toString()`

b) Write a test program that :

- a. Have an initialize queue items consists of *Durian* and *Blueberry* in a `fruitQ`
- b. Then add new items in the following order: *Apple*, *Orange*, *Grapes*, *Cherry*.
- c. Display the queue.
- d. Show the top item.
- e. Get the queue size.
- f. Delete *Durian*.
- g. Get item in index position of 2
- h. Check whether the queue consists of *Cherry*
- i. Check whether the queue consists of *Durian*
- j. Display the queue using the `isEmpty()` condition.

**Question 2**

Write a Java program that uses a Queue to determine if the input string is a palindrome or not.

### Question 3

When a share of common stock of some company is sold, the capital gain or loss is obtained by calculating the difference between the share's selling price and the price originally paid to buy it. This rule is easy to understand for a single share. However, if we sell multiple shares of stock bought over a long period of time, then we must identify the shares actually being sold. A standard accounting principle for identifying which shares of a stock were sold in such a case is to use a FIFO protocol – the shares sold are the ones that have been held the longest.

For example, suppose we buy 100 shares at \$20 each on day 1, 20 shares at \$24 on day 2, 200 shares at \$36 on day 3, and then sell 150 shares on day 4 at \$30 each. Then applying the FIFO protocol means that of the 150 shares sold, 100 were bought on day 1, 20 were bought on day 2, and 30 were bought on day 3. The capital gain or loss in this case would therefore be  $(100 * 10) + (20 * 6) + (30 * -6) = \$940$ .

Write a program that takes as input a sequence of transactions of the form “*buy x share(s) at \$y each*” or “*sell x share(s) at \$y each*,” assuming that the transactions occur on consecutive days and the value x and y are integers. Given this input sequence, the output should be the **total gain or loss** for the sequence, using the FIFO protocol to identify shares.

Example Output (*Note: the example output is only for your reference purposes; you may solve the aforementioned problem with different approaches*):

```
Enter your query (In format 'Buy / Sell x shares at $y each'): Buy 100 shares at $10 each
Buying now...
Queue for Share: Queue: [100]
Queue for Price: Queue: [10]
Enter your query (In format 'Buy / Sell x shares at $y each'): Buy 50 shares at $20 each
Buying now...
Queue for Share: Queue: [100, 50]
Queue for Price: Queue: [10, 20]
Enter your query (In format 'Buy / Sell x shares at $y each'): Sell 50 shares at $20 each
Selling the shares now...
Total Capital Gain / Loss: 500
Queue for Share: Queue: [50, 50]
Queue for Price: Queue: [10, 20]
Enter your query (In format 'Buy / Sell x shares at $y each'): Sell 60 shares at $30 each
Selling the shares now...
Total Capital Gain / Loss: 1500
Total Capital Gain / Loss: 1600
Queue for Share: Queue: [40]
Queue for Price: Queue: [20]
Enter your query (In format 'Buy / Sell x shares at $y each'): Sell 50 shares at $35 each
Selling the shares now...
Total Capital Gain / Loss: 2200
No shares to sell!
Queue for Share: Queue: []
Queue for Price: Queue: []
Enter your query (In format 'Buy / Sell x shares at $y each'):
Final Capital Gain / Loss: 2200
BUILD SUCCESSFUL (total time: 1 minute 5 seconds)
```