Data Structure

Lab Session #4:
Lists, Stacks, and Queues

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Goals

- Learn how to manipulate a queue
  - Fill in the following methods in MyQueue.java
    - enqueue, dequeuer, pop, clear.
- Print the sample output corresponding to the sample input
  - Please carefully observe the I/O specification.

Notice

- Please raise your hand and ask to T.A. if you have a problem to implement it.
- You need to stay for at least an hour.

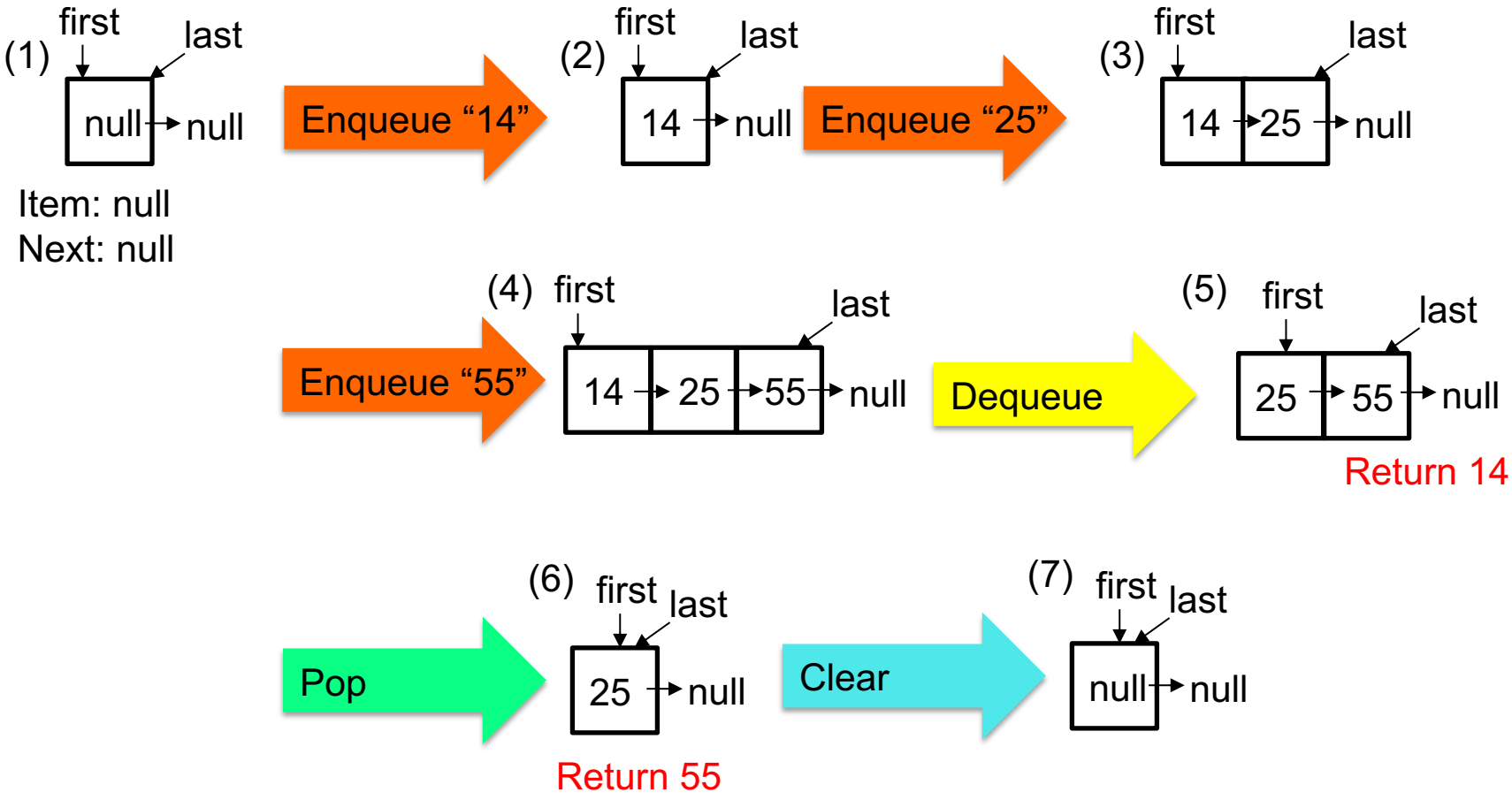
Build a project

- Download the project for this lab from eTL.
- Extract the project, and open it in InteliJ
  - See the slide of 1st lab session to check how to open the project in Eclipse.

Queue

- FIFO: First in, First Out
- Restricted form of list: Insert at one end, remove from the other.

Queue


(1)
first
last
null
null
Item: null
Next: null
Enqueue “14”
(2)
first
last
14
null
Enqueue “25”
(3)
first
last
14
25
null
Enqueue “55”
(4)
first
last
14
25
55
null
Dequeue
(5)
first
last
25
55
null
Return 14
Pop
(6)
first
last
25
null
Return 55
Clear
(7)
first
last
null
null

I/O Specification

- enqueue

Input format	Output format
`ENQUEUE (item)`	`ENQUEUE (item) (curr queue)`
Description	
- **Enqueue an (item)** - **(item) is an element to be inserted.**	
Example Input	**Example Output**
`ENQUEUE Chris`	`ENQUEUE Chris (Ada Bob Chris)`

I/O Specification

- dequeue

Input format	Output format
`DEQUEUE`	`DEQUEUE (item) (curr queue)`

Description

- **Dequeue an item.**
- **(item) is the first element that is removed from the queue.**
- **Return "null" when the queue is empty.**

Example Input	Example Output
`DEQUEUE`	`DEQUEUE Ada (Bob Chris)`

I/O Specification

- pop

Input format	Output format
`POP`	`POP (item) (curr queue)`
Description	
- **Pop an item.** - **(item) is the last element that is removed from the queue.** - **Return "null" when the queue is empty.**	
Example Input	**Example Output**
`POP`	`POP Ellen (Chris Dan)`

I/O Specification

- size

Input format	Output format
`SIZE`	`SIZE (size) (curr queue)`
Description	
- **Print size of the queue.**	
Example Input	**Example Output**
`SIZE`	`SIZE 3 (Ada Bob Chris)`

I/O Specification

- clear

Input format	Output format
`CLEAR`	`CLEAR -  (curr queue)`
Description	
- **Clear the queue. (Remove all items in the queue.)**	
Example Input	**Example Output**
`CLEAR`	`CLEAR  -  ()`

I/O Specification

- print

Input format	Output format
`PRINT`	`PRINT -  (curr queue)`
Description	
- **Print items in the queue.**	
Example Input	**Example Output**
`PRINT`	`PRINT -  (Ada Bob Chris)`

Sample Input

```
ENQUEUE Ada
ENQUEUE Bob
SIZE
DEQUEUE
DEQUEUE
SIZE
ENQUEUE Chris
ENQUEUE Dan
ENQUEUE Ellen
SIZE
POP
DEQUEUE
POP
SIZE
ENQUEUE Frank
ENQUEUE Gill
SIZE
CLEAR
PRINT
```

Sample Output

```
Operate Value    Queue
---------------------
ENQUEUE Ada      (Ada)
ENQUEUE Bob      (Ada Bob)
SIZE    2        (Ada Bob)
DEQUEUE Ada      (Bob)
DEQUEUE Bob      ()
SIZE    0        ()
ENQUEUE Chris    (Chris)
ENQUEUE Dan      (Chris Dan)
ENQUEUE Ellen    (Chris Dan Ellen)
SIZE    3        (Chris Dan Ellen)
POP     Ellen    (Chris Dan)
DEQUEUE Chris    (Dan)
POP     Dan      ()
SIZE    0        ()
ENQUEUE Frank    (Frank)
ENQUEUE Gill     (Frank Gill)
SIZE    2        (Frank Gill)
CLEAR   -        ()
PRINT   -        ()
```

Questions?