

Assignment 3

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Question 1

1.1

1.2

1.3

1.4

1.5

Question 2

2.1

See in code

2.2

The contains method scans the list to find the pair of nodes (pred,curr) reachable from head such that $\text{pred.next} == \text{curr}$, $\text{pred.key} < \text{key}$ and $\text{curr.key} <= \text{key}$. The traversal uses hand-over-hand locking.

- Item is not in the list
When $\text{curr.key} == \text{key}$ is false that is $\text{curr.key} < \text{key}$. From the sortedness invariant of the list, $\text{pred.next} == \text{curr}$, and $\text{pred.key} < \text{key}$ we conclude that item cannot be in the set.
- Item is in the list
When $\text{curr.key} == \text{key}$ is true, then from the uniqueness of keys that $\text{curr.item} = \text{item}$. Hence, item is in the set.

Question 3

3.1

Working on that

3.2

The difficulty is to define the criteria where the indexes are valid to be read or written. We had to add two more atomic variables: the first representing how many elements can still be inserted; the second represents the valid indices for reading.

Question 4

4.1

4.2

4.3

4.4