

Quiz 1: hand-over-hand

- How to linearize unsuccessful add and remove?
- How to linearize contains?
- Prove starvation-freedom (assuming starvation-free locks)

Quiz 2: optimistic

- Show that validation is **necessary**
 - ✓ Hint: consider an algorithm without validation and show that an update can get **lost** because of a series of concurrent removes
- Is validation necessary for contains?
- Show that the algorithm is **not** starvation-free (even if all locks are)

Quiz 3: lazy

- Show that both conditions in the validation check are **necessary**

Hint: consider concurrent removes on two consecutive nodes, or a remove concurrent to an add of a preceding node

- Determine linearization points for all operations:
 - ✓ add (successful or not)
 - ✓ remove (successful or not)
 - ✓ contains (successful or not)

Hint: for an unsuccessful contains(x), linearization point may vary depending on the presence of a concurrent add(x)