

Building a Better List-Set

EECS 3/495 “Rust”

Spring 2017

Can we do better?

Coarse-grained synchronization:

- Lock the whole object for each operation

Can we do better?

Coarse-grained synchronization:

- Lock the whole object for each operation
- Easy to reason about :-)

Can we do better?

Coarse-grained synchronization:

- Lock the whole object for each operation
- Easy to reason about :-)
- But sequential bottleneck :-)

Four strategies

1. Fine-grained synchronization

Four strategies

1. Fine-grained synchronization

:-) Can synchronize on different parts of object concurrently

Four strategies

1. Fine-grained synchronization

- :-) Can synchronize on different parts of object concurrently
- :-) But lots of locking/unlocking overhead

Four strategies

1. Fine-grained synchronization

- :-) Can synchronize on different parts of object concurrently
- :-) But lots of locking/unlocking overhead

2. Optimistic synchronization

- :-) No need to lock while traversing
- :-) But need to validate, and may require expensive retries

Four strategies

1. Fine-grained synchronization
 -) Can synchronize on different parts of object concurrently
 - (But lots of locking/unlocking overhead
2. Optimistic synchronization
 -) No need to lock while traversing
 - (But need to validate, and may require expensive retries
3. Lazy synchronization
 -) Less work needed than optimistic synchronization
 - (But contended operations still need to retry

Four strategies

1. Fine-grained synchronization
 -) Can synchronize on different parts of object concurrently
 - (But lots of locking/unlocking overhead
2. Optimistic synchronization
 -) No need to lock while traversing
 - (But need to validate, and may require expensive retries
3. Lazy synchronization
 -) Less work needed than optimistic synchronization
 - (But contended operations still need to retry
4. Lock-free synchronization
 -) No longer at the mercy of the scheduler
 - (But complex, and maybe high overhead