Morphing: Safely Shaping a Class in the Image of Others

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IFIP WG 2.11 M5

Motivation: Remove Redundancy

A Synchronization Proxy:

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class SynchronizedList implements List {
   final List l;
   final Object mutex;

   public int size () {
      synchronized(mutex) { return l.size();    }
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   public boolean remove (int i) {
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class SynchronizedCollection implements Collection {
   final Collection l;
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   // repeat for all methods in Collection
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A Synchronization Proxy:

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class SynchronizedSet implements Set {
   final Set l;
   final Object mutex;

   public int size () {
      synchronized(mutex) { return l.size();    }
   }
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Outline

Synchronization Proxy with MJ:

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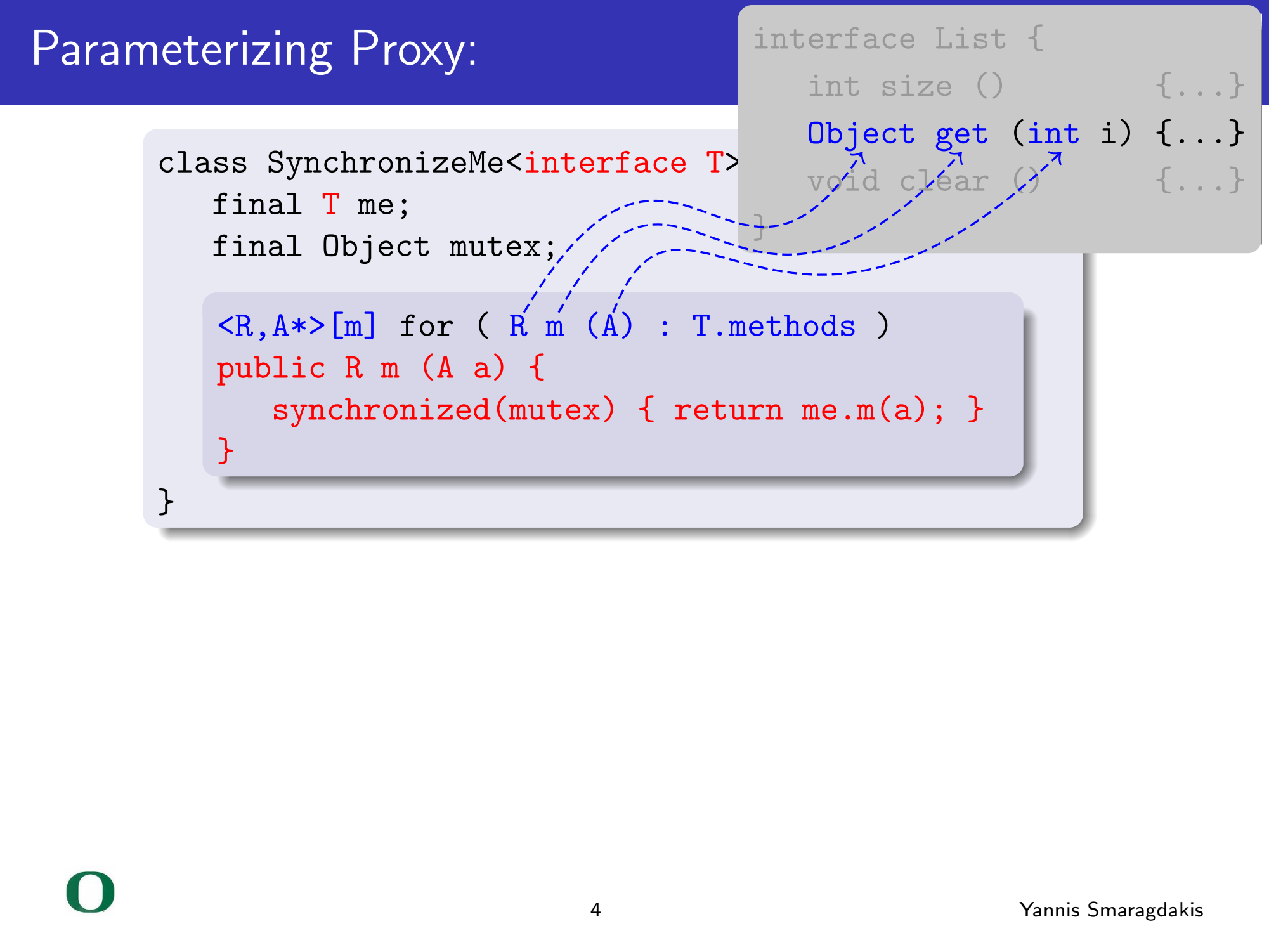

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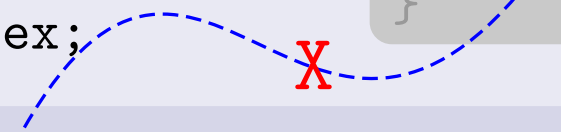

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    final List me;
    final Object mutex;

    public int size () {
        synchronized(mutex) { return me.size(); }
    }
    public Object get (int a) {
        synchronized(mutex) { return me.get(a); }
    }
}
```

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Drawbacks:

- No language synergy.
- No modular type safety!

Outline

1. Morphing with MJ

2. Modularly Type Safe
   - Overview - What Is Modular Type Safety?
   - Validity of References: Range Subsumption
   - Uniqueness of Declarations: Range Disjointness

3. Concluding Remarks

Outline

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What Is Modular Type Safety?

```
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Challenges in Modular Type Safety

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- Validity of Reference $\Leftrightarrow$ Subsumption
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Outline

Valid Reference

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- m $\mapsto$ n

Then there were two...

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   }

   <P,B>[n] for ( public P n (B) : T.methods )
   public P n ( B arg1, B arg2 ) {
      if ( arg1.compareTo(arg2) > 0 )
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Outline

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- Modularly type safe.
  - Type system proven sound.

Questions?