Parallel Programming

Recitation Session 12

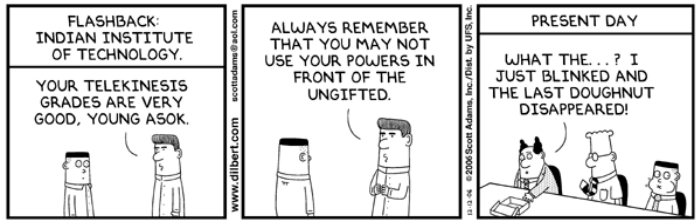
Thomas Weibel <weibelt@ethz.ch>

Laboratory for Software Technology,
Swiss Federal Institute of Technology Zürich

June 3, 2010

Executive Summary

- Linearizability
- Assignment 11
  - Proving program properties
  - Possible executions



Outline

Definition

- Each method should
  - "take effect"
  - Instantaneously
  - Between invocation and response events
- Object is correct if this "sequential" behavior is correct
- Any such concurrent object is Linearizable

Is it really about the object?

- Each method should
  - "take effect"
  - Instantaneously
  - Between invocation and response events
- Observation: methods must appear to execute in a one-at-a-time sequential order
- Sounds like a property of an execution
- A linearizable object: one all of whose possible executions are linearizable

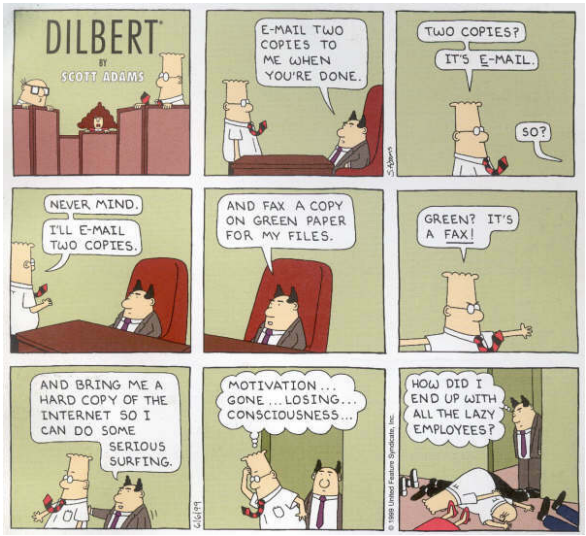
Linearizability in Practice

- Herlihy and Shavit, *The Art of Multiprocessor Programming*, Chapter 3
  www.elsevierdirect.com/companions/9780123705914
- Hendler, et al., *A Dynamic-sized Nonblocking Work Stealing Deque*,
  www.springerlink.com/index/Y7HQ174L92170355.pdf
- Michael and Scott, *Simple, Fast, and Practical Non-blocking and Blocking Concurrent Queue Algorithms*,
  portal.acm.org/citation.cfm?id=248052.248106

Outline

Variant of Peterson's Solution

- Proving that this variant of Peterson's solution works
- Equivalent to question 2 of the example exam
- See lecture of June 1st, 2010



Outline

0 1 2

```
1) T0:
   read f, eval
   print f

2) T1:
   read f
   f++
   store f

3) T0:
   read f, eval
   print f
   read f, eval

4) T1:
   read f
   f++
   store f

5) T0:
   print f
```


0 0 2

```
1) T0:
   read f, eval
   print f
   read f, eval
   print f

2) T1:
   read f
   f++
   store f

3) T0:
   read f, eval

4) T1:
   read f
   f++
   store f

5) T0:
   print f
```


0 1

```
1) T0:
   read f, eval
   print f

2) T1:
   read f
   f++
   store f

3) T0:
   read f, eval
   print f

4) T1:
   read f
   f++
   store f

5) T0:
   read f, eval
```

The value 2 will not always appear.

The End

Enjoy your “vacations” and best of luck for the exam!