

### Administrivia

- Reminder: Homework 1 on the Web. I said please try to turn something in by classtime Monday, but if not everyone can do that, Wednesday could work too.

Slide 1

### Numerical Integration Example, Revisited

- How to parallelize using Java? well, first must rewrite in Java (`NumIntSeq.java` on sample programs page).
- Now rewrite to use multiple threads, based on same strategy we used for OpenMP — split loop iterations among threads, give each its own copy of work variables, compute sum based on “reduction” idea. Some things must be done more explicitly in Java (making the program in some ways more like MPI’s SPMD model); see `NumIntPar1.java` on sample programs page.  
Notice however that this problem would make good use of `java.util.concurrent`’s support for tasks/threads; see `NumIntPar2.java` on sample programs page.

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### Synchronization in Java, Continued

Slide 3

- `synchronized` methods/blocks can be used to ensure that only one thread at a time accesses some shared variable.
- For more complex synchronization problems, can use `wait` and `notify` (or `notifyAll`):  
`wait` suspends executing thread (adds to "wait set").  
`notify` wakes up one thread from the wait set. `notifyAll` wakes up all threads in the wait set. Newly-awakened thread(s) then compete to reacquire lock and continue execution.  
Can only be done from within `synchronized` method/block.  
Typical idiom — loop to check condition, `wait`.
- Example — bounded buffer class (`BoundedBuffer.java`, `TestBoundedBuffer.java` on sample programs page).

### Controlling Threads in Java

Slide 4

- Preferred method of controlling one thread from another uses "interrupted" status. (Early version of Java provided other methods, e.g., `stop` — now deprecated.)
- Set status with `interrupt` (instance method).
- Check status with `isInterrupted` (instance method) or `interrupted` (static method), or by catching `InterruptedException` thrown by `wait`, `sleep`, `join`, etc.
- Example — bounded buffer test program (`TestBoundedBuffer.java` on sample programs page).

## Minute Essay

- None — sign in.

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