

Slide 1

Administrivia

- Reminder: Homework 1 due today (MPI part) and Thursday (Java part).
- (Review minute essay question from last time.)

Slide 2

Synchronization in Java, Continued

- `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. Waked-up 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 3

- 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).

Not-So-Simple Point-to-Point Communication in MPI, Again

Slide 4

- For not-too-long messages and when readability is more important than performance, `MPI_Send` and `MPI_Recv` are probably fine.
- If messages are long, however, buffering can be a problem, and can even lead to deadlock. Also, sometimes it's nice to be able to overlap computation and communication.
- Therefore, MPI offers several other kinds of send/receive functions, including:
 - Synchronous (`MPI_Ssend`, `MPI_Recv`) — blocks both sender and receiver until communication can occur.
 - Non-blocking send/receive (`MPI_Isend`, `MPI_Irecv`, `MPI_Wait`) — doesn't block, program must explicitly test/wait.
 - Which is faster/better? probably best to try them and find out. (Sample programs `exchange*`.)

Minute Essay

- This wraps up the quick PAD I-level tour of our three environments. Any questions at this point?

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