CMPS 5433 - Parallel Processing
Homework #3 - Article Questions

Software and the Concurrency Revolution, Herb Sutter, James Larus, Microsoft
ACM Queue Magazine, September 2005

Due: Tuesday, February 16 - Class time

Answer the following questions as relates to the article and Parallel Processing. Answers must be typewritten and written in essay format.

1. The author discussed 3 potential methods for realizing parallelism in programs:
   a) Explicit  
   b) Implicit  
   c) Automatic
   For each method, give a definition of them method then state & briefly discuss the advantages and disadvantages of it.

2. Give a clear definition and explanation of the following terms. Be certain to relate the term to parallel processing. You may need to use an additional source (other than the article). DO NOT copy material without quoting and citing as appropriate. Write in your own words. (I have read the Wiki versions of the information and will notice if you copy.)
   a) mutable - immutable (object or state)
   b) granularity (of a program or data)
   c) coupling (between tasks or processes)
   d) data race (or race conditions)
   e) lock (global interpreter lock)
   f) transactional memory
   g) livelock
   h) stress testing
   i) lock convoy

3. Discuss the 3 reasons the authors believe the "concurrency revolution" will be more disruptive than the transition to OOP.

4. Inconsistent and non-deterministic results can occur when access to shared data is not carefully synchronized. The authors claim that a lock (e.g. a semaphore or monitor) such as that used in sequential processing will not necessarily work in a parallel environment. Name and describe 3 features of concurrency (parallel processing) that prevent the traditional lock from working in the parallel environment.

5. The authors state that 4 new tools are needed for parallel programming to develop into a high-quality and cost-effective process. These are (a) defect detection, (b) debuggers, (c) bottleneck detection, and (d) testing aids. Discuss these needs as relates to parallel processing.