Efficient Synchronization on Multiprocessors with Shared Memory (Classic Reprint)

By Clyde P Kruskal

Forgotten Books, United States, 2015. Paperback. Book Condition: New. 229 x 152 mm. Language: English . Brand New Book ***** Print on Demand *****.Excerpt from Efficient Synchronization on Multiprocessors With Shared Memory Shared memory provides convenient communication between processes in a tightly coupled multiprocessing system. Shared variables can be used for data sharing, information transfer between processes, and, in particular, for coordination and synchronization. Constructs such as the semaphore introduced by Dijkstra inDi, and the many variants that followed, provide convenient solutions to many synchronization problems involving arbitrary number of processes. These constructs are supported in hardware by machine instructions that atomically execute a Read-Modify-Write cycle. Such instructions exist on most modern CPUs. An atomic Read-Modify-Write operation only requires that it be semantically atomic, although it is often processed atomically also. The serial bottleneck created by this atomic processing, while acceptable for small scale parallelism, can seriously impair the performance of a system with thousands of processors. Frequent accesses to a shared variable not only slow down those processes performing the access, but may cause the entire machine to thrash. Large-scale shared memory parallel processors are likely to use multistage packet switched interconnection networks for processor to memory traffic. These...

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