Prioritized Mutual Exclusion Support for RT-CORBA

Goals

Supporting prioritized mutual exclusion on a distributed system by way of implementing the extensions to known protocol for prioritized mutual exclusion for distributed systems. The extensions are meant for intent locking support coupled with read, write and upgrade lock modes.

Status
Done with the final version of the simulator for prioritized version. A series of run can be made and results can be obtained. Parameters can be tweaked in many ways.

Work Done (During Last Month)
o   Focus during this month was adding some features and configurability to the implementation of the simulator for the prioritized version of the protocol.
o   Following features are added to the simulator to make it versatile and configurable to all external parameters:
    o   Request mix can be specified with higher precision e.g. 70% IR, 20% R, 8% U and UW and 2% W requests is chosen for current simulations.
    o   The sequence in which nodes make requests is randomized, which is closer to real usage.
    o   Can specify range of critical section length, range of inter request interval and range of network latency requests should experience. Actual values are randomized within these intervals.
    o   Priorities of the requests are randomized and request latencies are tracked according to their priorities as well as according to their types.
    o   Time handling is improved to work with microseconds, milliseconds or seconds of latency/CS length/free time.
    o   Same simulator can now work for unprioritized as well as prioritized version of the protocol. Single point of modifications.

o   MPI was understood with some hands-on and training sessions at NCSC. Understood IBM SP environment to make use of supercomputing facility.
o   Entry to OOPSLA 2002 student research competition was made which came through.
o   The length of the local operations may pose one problem. If they are in the order of hundreds of microseconds, the claim that the local operations are far shorter than the network latency may no longer hold true. Especially for the MPI version of the implementation.

Future Work (Up to foreseeable future)
o   With the added features and configurability it is possible to obtain results with various parameters. It should reveal some new properties of the protocol.

- Porting of the simulator for MPI and IBM SP environment and a series of simulations for the same.
- Shoot for ICDCS 2003 with a stronger claim for predictability and other reviewers' suggestions.
- Shoot for IPDPS 2003 with MPI version of results if high performance can be claimed.
- Shoot for RTSS 2003 with real-time focus of the protocol in non-MPI environment, better algorithmic claim.

Nirmit Desai
nvdesai@unity.ncsu.edu
Date: 08-05-2002