

ABSTRACT

A STUDY OF INTERPROCESS COMMUNICATION IN
A DISTRIBUTED COMPUTING ENVIRONMENT

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The efficiency of interprocess communication in a distributed computing environment is of interest to the application programmer. A typical question may be how well the processes in a distributed application interact, share information and work together in solving an application problem. A critical factor here is the transfer time of data in inter-machine communication. Realistic estimates of the costs related to interprocess communication may be obtained only from an operational distributed system.

In this study, a minimal software configuration to facilitate process execution and communication in a heterogeneous computing environment is presented. Measurements of message passing times, based on the observed performance behaviour from a user's perspective, were used as parameters in a queueing network model of the software system implemented.

The major sources of delay are identified, and the

effects of enhancements to the software implementation, processor speed, background load on the host processors and network, are evaluated in the queueing network model.

Model results show that (1) high-level communication primitives are expensive, (2) the round-trip transmission time of network packets dominates the elapsed time in message communication, (3) the copying of data into and out of the network interface can become a bottleneck in the system, (4) performance of the system is sensitive to processor speed, and (5) performance is unaffected by network speed.

These results can serve as guidelines in future design efforts to provide efficient interprocess communication for distributed applications.