

# Message Passing Support in the Avalanche Widget <sup>1</sup>

Mark R. Swanson  
Ravindra Kuramkote  
Leigh B. Stoller  
Terry Tateyama

E-mail: {swanson,kuramkot,stoller,ttateyam}@cs.utah.edu  
WWW: <http://www.cs.utah.edu/projects/avalanche>

UUCS-96-002

Department of Computer Science  
University of Utah  
Salt Lake City, UT 84112, USA

March 10, 1996

## **Abstract**

Minimizing communication latency in message passing multiprocessing systems is critical. An emerging problem in these systems is the latency contribution costs caused by the need to percolate the message through the memory hierarchy (at both sending and receiving nodes) and the additional cost of managing consistency within the hierarchy. This paper, considers three important aspects of these costs: cache coherence, message copying, and cache miss rates. The paper then shows via a simulation study how a design called the Widget can be used with existing commercial workstation technology to significantly reduce these costs to support efficient message passing in the Avalanche multiprocessing system.

---

<sup>1</sup>This work was supported by a grant from Hewlett-Packard, and by the Space and Naval Warfare Systems Command (SPAWAR) and Advanced Research Projects Agency (ARPA), Communication and Memory Architectures for Scalable Parallel Computing, ARPA order #B990 under SPAWAR contract #N00039-95-C-0018