Architectural Issues
The Case for Orderly Sharing

Gary Herman and Gita Gopal

Bell Communications Research, Inc.
435 South Street, Morristown, NJ 07960 USA
herman@thumper.bellcore.com
gita@thumper.bellcore.com

ABSTRACT

Transaction processing systems with the functionality and throughput desirable to support future telecommunications network applications appear to be beyond the capability of conventional multiprocessor architectures. A central obstacle to realizing such systems is the cost of coordinating access of transactions in the various processors to shared data. In this paper, we introduce the principle of orderly sharing - the efficient coordination of many loosely coupled processing elements acting on shared resources (e.g., data items) through orderly distribution of information regarding the state of resources throughout the system. We illustrate the application of this principle in the context of a novel system called the Datacycle architecture [Herm87a].

1. INTRODUCTION

In this paper we describe an architectural principle, which we term orderly sharing, that may permit the implementation of transaction processing systems with enormous transaction throughputs - tens of thousands of transactions per second. The motivation for our research into such ultra-high throughput systems lies in the evolution of the public telecommunications network towards a fully database-driven network. Such a network creates requirements for functionality, flexibility, and throughput that appear to be beyond the capability of conventional transaction processing architectures.