ATM High Performance Distributed Computing Laboratory

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Abstract
The New York State Center for Advanced Technology in Computer Applications and Software Engineering (CASE) at Syracuse University has established an ATM High Performance Distributed Computing (HPDC) Laboratory within the center that provides ATM connections to several other units both on and off campus. This HPDC Laboratory has been established to provide a research testbed for multimedia and ATM related studies and provide a controlled environment where enabling technologies and applications can be developed and evaluated. In this paper, we describe the computing environment of HPDC Laboratory and overview some of the ongoing projects.

1 Introduction

The advent of high speed networking technology such as Asynchronous Transfer Mode (ATM) has created great opportunities and challenging research problems. ATM provides the technology necessary for full multimedia applications, which include real-time video conferencing, full-motion video and Video-on-Demand (VOD), as well as High Performance Distributed Computing (HPDC) applications.

The New York State Center for Advanced Technology in Computer Applications and Software Engineering (CASE) at Syracuse University has established
a HPDC Laboratory within the center that provides ATM connections to several other units both on and off campus. The HPDC Laboratory has been constructed to provide a controlled environment where enabling technologies and applications can be developed and evaluated. The resources at HPDC Laboratory will allow experimentation with real-world applications on today's high speed networks in a manner that takes full advantage of network capabilities. Currently, there are several ongoing projects for multimedia and ATM related studies at the HPDC Laboratory. These include a High Performance Computing and Communication (NET-HPCC) design tool, a high speed message passing system for distributed computing (NYNET Communication System), Expert system based Network Management System (ExNet), and designing a Virtual Distributed Computing Environment (VDCE). These projects were selected because they represent a wide variety of network-based applications that can utilize efficiently the resources of the HPDC Laboratory. The first section of this paper describes the current environment and system architecture of the HPDC Laboratory. The second section provides an overview of the ongoing projects. Finally, the third section contains the summary and concluding remarks.

2 Network Topology at the HPDC Laboratory

The HPDC Laboratory at CASE Center at Syracuse University is based on two IBM 8260 Hubs, a GTE SPaNet ATM switch, and a Cabletron MMAC-Plus Enterprise switch. The four switches are connected using a ring topology. The Cabletron MMAC-Plus switch provides a connectivity to a Fore ASX-200 ATM switch which is located at the Northeast Parallel Architectures Center (NPAC) at Syracuse University. The Fore ASX-200 switch at NPAC provides a connectivity to the NYNET. NYNET is a high-speed fiber-optic communications network linking multiple computing, communications, and research facilities in New York State. (See Figure 1).

NYNET ATM testbed uses high-speed ATM switches interconnected by fiber-optic Synchronous Optical Network (SONET) links to integrate the parallel computers and supercomputers available at NYNET sites into one virtual computing environment. Most of the wide area portion of the NYNET operates at speed OC-48 (2.4 Gbps) while each site is connected with two OC-3 (155 Mbps). The upstate to downstate connection is through DS-3 (45 Mbps) link.

The full topology at the HPDC Laboratory is shown in Figure 2. Currently, one IBM hub has eight IBM RS6000 workstations with Turboways 155 ATM adapters, while the other has four Pentium 166 PCs with 155 Mbps OC-3 interfaces. Two of them have the PCI based ATM adapters from Zeitnet Inc and the other two have the PCI based ATM adapters from Efficient Inc. These PCs are running both Linux and Windows NT operating system. All workstations and PCs are connected using UNI 3.1 and Classical IP over ATM. Four SUN