

CLIENT/SERVER

Solutions

The Way Must Be Tried

York University's recently implemented OSF/DCE system serves as a model for IBM Canada.

It's no wonder York University, of North York, Ontario, chose its motto to be *Tentanda Via* — the way must be tried. Canada's third largest university, with an international reputation for excellence in teaching, research and scholarship in both graduate and undergraduate studies, is pioneering a new computing environment to serve its more than 46,000 students and 5,000 faculty and staff. Thousands of PCs, several servers and a variety of host computer systems scattered throughout the campus are being linked into one heterogeneous client-server network.

Plan for the new network began in late 1991, when York University set a mandate to convert from its mainframe-based computing system to a full-scale client-server architecture. The decision to go client-server was mainly cost-driven. The mainframe-based administration system was too expensive to maintain and expand. Looking beyond immediate needs, the university saw its future technical direction charted by the client-server model. A plan was established to outsource the mainframe and re-develop applications throughout the next three to five years, the result of which would be one Student Information System to service all student and administrative needs.

York's SIS is the core information system for nearly every department. It governs all functions of administration, such as student enrollment, helping determine student qualifications, registration and alumni programs. It provides services to a variety of departments that must access and interact with the SIS applications.

York University made the strategic decision to implement the Open Software Foundation's Distributed Computing Environment as its general network platform. Because the DCE made sense for York, and because of its availability, the motivation was there to move more rapidly to a client-server architecture.

Perhaps the most interesting aspect of York's Student Information System is its unique structure; the SIS design requirements dictated a client-server approach. A variety of applications were created to address specific needs, with each running on its

own UNIX server: there's a database server, an audio-response server, a security server, a mail server, a directory server, etc.

The middleware that ties it all together is the OSF's DCE. This is the technology that enables the client-server computing of York's SIS.

Adoption of RPC

As a whole, the SIS provides York with the highest levels of security offered for this type of distributed system. Because of its rich services environment, such as security and name services, York uses the Remote Procedure Call (RPC) portion of DCE. RPC's development tool consists of a language and compiler that support the development of distributed applications following the client-server model. The RPC also includes a run-time service that implements the network protocols the application's client and server components use. York plans to use the DCE with other applications later on.

It was in early 1992 that York began exploring the intrinsic features of the X Window System and the benefits of PC X server software. Because it is client-server, the X Window System permits multiple applications from multiple network hosts to run and coexist in separate windows on a single video monitor. X has two components: the X server, which controls the keyboard, mouse, and monitor, and the X clients, which are applications that use the X Window System protocol. Although the server and client can run on the same piece of hardware, the beauty of X is that the clients (or applications) displayed by the server can run on several hosts across the network.

The client-server nature of X allows applications to run either locally or remotely on other computers across the network. In fact, X applications may run on any computing platform across almost any link, with the more common hardware from companies such as Sun, Hewlett-Packard, IBM and Digital. This "network transparency" and hardware device independence — probably the most attractive features of X — were essential if X was to work in the university's mixed computing environment.

York was already using a number of copies of eXceed PC X servers across the campus, and Computing Services knew that



Ontario's York University serves more than 50,000 students and faculty.

this technology would fit neatly into its plans. By the summer of 1992, the Student Information System project was underway,

providing connectivity by utilizing the Windows-based eXceed PC X servers. In April of 1993, a site license of eXceed software was negotiated and is now installed at the university.

Bryon Olive of CAIL Systems (Markham, Ontario), the solutions provider selected by York to help in planning, installing and integrating the X Window System layer, explained that "York needed to access and interact with a number of host applications from a single PC desktop. Hummingbird's eXceed/W PC X server software was the glue between X and Microsoft Windows, allowing for complete interaction between both environments. Not only did it seamlessly integrate with York's information system architecture, it also proved to be the most economical approach."

In December of 1992, MIS Technical Support personnel at York began to act on the mandate to move MIS to a PC-based environment. York purchased PS/2 Model 90s (486 machines) and needed to provide connectivity across Ethernet/Token Ring networks to access VMS, UNIX, Novell and IBM mainframe systems. York wanted the ability to utilize a single desktop device to access all services, and began to set standards on how MIS would employ the PC resources. Taking a step by step approach, York's Computing Services installed the operating system, then the TCP/IP transport layer, then the X Window System layer and finally the applications.

No implementation of this scale and complexity can be without its hurdles, and York was no exception. The CAIL Professional Services team and Hummingbird's development people worked on and resolved certain timing issues. Another difficulty was encountered with the third-party transport layer software, which appeared X-related. Hummingbird's technical support pinpointed the problem for the transport manufacturer, and CAIL and York worked with the various suppliers to rectify the problem. In March

Hummingbird's eXceed/W

PC X server software

was the glue between

X and Microsoft

Windows...Not only

did it seamlessly

integrate with York's

information system

architecture, it also

proved to be the

most economical

approach.

1993, new versions of the TCP/IP transport software were installed, eliminating the concurrency problems.

In January, 1993, the University's Computing and Communications Services struck an alliance with IBM Canada's National Support Centre, with a prime directive to bolster York's knowledge and skills in the area of DCE and to accelerate its implementation both economically and effectively. IBM Canada posted a systems engineer on campus as an observer, and to help produce an instruction-type document for other IBM customers.

The document will offer recommendations to organizations planning to implement similar computing systems. The CCS will eventually serve as a Briefing Center for IBM customers who want to see the system in action and better understand DCE and client-server computing.

Said Jim Davey, technical architect for client-server solutions at IBM Canada's Client Server Centre, and the project manager for the York alliance, "York is on the leading edge, and we're excited about working with them in making DCE one of the core strategic aspects of its SIS project. IBM is keen on

using DCE across all of its platforms. We're seeing DCE gain in popularity in terms of a technology that enables client-server computing. This is a rare opportunity not only for IBM, other IBM customers and York University, but for the people who are making this thing happen."

Tentanda Via. The way must be tried.

— Lorraine Neal, marketing and public relations officer, Hummingbird Communications Ltd. (Markham, Ontario).



**HUMMINGBIRD
COMMUNICATIONS LTD.**

2900 John Street, Markham, Ontario, Canada L3R 5G3
Telephone: (905) 470-1203, Fax: (905) 470-1207

In Europe: 37 rue de Vermont, 1202 Geneve, Switzerland
Telephone: 41 (22) 733 18 58, Fax: 41 (22) 733 64 03