2003

The Road to Client/Server: HP 3000 and PC Integration

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Many HP 3000 customers are considering moving from their traditional serial-connect to a LAN-connect environment to take advantage of Client/Server computing capabilities. Client/Serving computing is designed to take advantage of desktop computers, graphical user interface (GUI) environments, LANs, and software technologies to make it easier and faster to access distributed resources, as well as networking protocols that enable interoperability.

Networking PCs on a LAN with the HP 3000, not only provides the infrastructure to evolve to Client/Server applications in the future, it can provide for timely access to data via the powerful information access tools available today. For example, in a host-terminal environment a Query program must be written to select, group and order data to create a report. A PC offers greater flexibility because the data can be retrieved and saved locally. Cut-and-paste functions can be used to create custom reports. A LAN environment also provides the opportunity to share files and costly resources such as discs and printers with the use of a network operating system.

Of all the benefits a LAN environment has to offer, perhaps the most exciting is the ability to implement an "Intranet". The HP 3000 can be used as an internal (Intranet) or external (Internet) Web server. An internal Web server can provide company information to employees. Information such as the company phone directory, employee benefits and other internal documents can be made available to employees on an internal Web server. Employees can access this information via a "browser" from their desktops. The information can be "static" or retrieved from a database. In either case, the information can easily be kept current and savings in time and costs are realized by reduced printing and distribution of paper documents.

Several components are necessary to move to a LAN environment as well as other services, products and technologies that help maximize the benefits of a networked environment.

Network Design, Installation and Configuration

A good network design is essential for a successful move to a LAN environment. Unfortunately, it is not always simple. There are numerous factors to consider such as the applications, amount of data traffic, number of users, location of users and anticipated growth. The network design also should support the future implementation of high-speed protocols, such 100VG-AnyLAN and emerging technologies.

The actual network installation usually means running cables under floors and through walls, as well as wiring and the connecting of devices. Configuration of the network requires an understanding of protocols, addressing, memory blocks and networking, in general. Unless this expertise exists within your enterprise, it is best to hire a network consultant and/or a Client/Server Integrator.

LAN Technologies

There are several different LAN technologies available. Depending on the needs of the enterprise, multiple technologies may be implemented. There are also three different topologies (physical layouts of the network) which may be utilized.

The three network topologies are:

Ring (data packets travel in a circle)
Star (data packets travel out from a central location)
Bus (data packets travel along a single path)

There are several different LAN network technologies (described below). Note that LAN technology speed is measured in Mbps (millions of bits per second) vs. serial connections in which speed is measured in thousands of bits per second.

Ethernet/802.3
Topology: Star and/or Bus
Speed: 10Mbps, CSMA/CD (Carrier Sense Multiple Access w/Collision Detection)
Environment: HP 3000, HP 9000 and most other vendors. Most common technology.
Benefits: Low cost, ease of installation, many products available
Negatives: Segment lengths, speed

Token Ring/802.5
Topology: Ring/Star
Speed: 4 or 16Mbps
Environment: Most popular at IBM installations
Benefits: IBM support, speed

Negatives: Limited products available, higher cost

100VG-AnyLAN/802.12
Topology: Star
Speed: 100Mbps, Demand priority
Environment: HP 3000*, HP 9000, some other vendors
Benefits: Speed, compatibility with existing LANs and applications, use existing investment in wiring. Well-suited for Imaging, CAD, video and C/S
Negatives: Products just now coming to market

100BaseT
Topology: Star and/or Bus
Speed: 100Mbps, CSMA/CD (Carrier Sense Multiple Access w/Collision Detection)
Environment: HP 3000*, HP 9000, most other vendors
Benefits: Many products on market
Negatives: Uses CSMA/CD protocol, not well-suited for multimedia

FDDI (Fiber Distributed Data Interface)
Topology: Ring via fiber cable
Speed: 100Mbps
Environment: High speed system to system - clusters
Benefits: Speed, resistant to electromagnetic interference, compatible with many vendors
Negatives: Systems must locally located, costly

ATM (Asynchronous Transfer Mode)
Topology: Star
Speed: 25 to 51 Mbps; from 155Mbps
Environment: LAN/WAN, Data/Voice/Video, Workstations, Clusters
Benefits: Speed, Data/Voice/Video
Negatives: Very costly, products just coming to market, network management issues

** Note: 100VG-AnyLAN and 100BaseT4/TX will be available for the HP 3000 in early '97.*

Network Devices

The most common network devices are hubs, bridges and routers. However, the design and size of the network will determine the type of devices required. Hubs, which are used to connect multiple devices to the LAN, add flexibility to the design of the network by enabling devices to be relocated easily. They also are used to overcome cable distance limits.

Bridges and routers are used to connect different LAN segments. Routers are popular for connecting remote locations. Many routers are multi-protocol and can be used to bridge different LAN technologies.

Networking and Middleware for the PC

To connect a PC to a LAN, several networking components are required:

- A Network Interface Card or "NIC" (also called a LAN adapter) for either Ethernet or Token Ring and a software driver for the card. A NIC card is used to connect to and communicate over the LAN wiring. There are several different products available for Ethernet, Token Ring, 100VG. There is also a 10:100 card available which can be used on either a 10 or 100Mb LAN. It is important to verify the card and driver is supported by the chosen software vendor.

- A TCP/IP stack which provides the transport and network layer protocols. TCP/IP is needed to make certain data goes to the right place and in the right order so as not to upset the application receiving the data.

The LAN driver for the NIC card usually comes with the card, however the TCP/IP stack may need to be purchased separately.

Depending on specific applications and needs, one or more additional products is required to *get started:*

- A Virtual Terminal, Terminal Emulator product available from several third-parties such as Walker Richer & Quinn, Wall Data, MiniSoft or Attachmate.
- A TELNET product
- Network Operating System Client Software

A terminal emulator will allow log-on and access to applications on the HP 3000 from a LAN-connected PC, so applications can be run in the same manner as when the user was serially-connected to the HP 3000. Using the virtual terminal protocol with a terminal emulator will provide better performance and functionality than using the TELNET protocol. However, if user log-on access to other non-HP 3000 systems from the PC is desired, a TELNET product (and perhaps FTP for file transfer) is required. Optionally, if a server (HP 3000 or other) with a Network Operating System will be used for file/print sharing, then the PC must have "client" software, such as NetWare.

For access to a Web server (HP 3000 or other), it is necessary to have Web browser software to read and display the Web documents. Of the many browsers in the marketplace, the most popular Windows-based browsers are:

Mosaic - available as freeware from the National Center for Super Computing applications (NCSA)
Netscape Navigator - a supported product from Netscape Communications
Microsoft's Internet Explorer - a supported product from Microsoft

To enhance existing HP 3000 VPLUS applications, there are several products which provide the ability to create a user-friendly Windows Graphical User Interface on the PC such as:

NEWFACE from M.B. Foster & Associates
FACES from API International
WINGSPAN from Software Research Northwest, Inc.
FrontMan from MiniSoft

With these products, the current VPLUS investment is preserved since no changes to the VPLUS source code are required.

The Open DataBase Connectivity (ODBC) driver makes it possible to access data in HP 3000 databases (Image/SQL and/or Allbase/SQL) from a PC. It is bundled with Image/SQL and Allbase/SQL. The ODBC driver for the PC is downloaded from the HP 3000 to the PC* enabling PC users to retrieve information from a HP 3000 database via a PC application such as:

Microsoft Excel
Lotus 1-2-3
Trinzic Forest & Trees
Microsoft Word

** Note: Microsoft Windows 3.1 and MS DOS 5.0 or later are required on the PC. Image/SQL B.F0.24 or later and/or Allbase/SQL A.F0.67 or later is required on the HP 3000.*

Several 4-GL development tools, which support ODBC, are available to develop custom applications to access Image/SQL and/or Allbase/SQL data. These tools include, but are not limited to:

PowerBuilder from PowerSoft
Microsoft Visual Basic
Gupta SQL Windows

There are additional Client/Server tools and utilities which facilitate data access, reporting and developement from Quest Software, O'pin Systems and MiniSoft.

Networking and Software for the HP 3000

All HP 3000 Precision Bus systems come with a 802.3 Local Area Network connection to support DTC and/or LAN traffic. A second HP-PB LANIC card may be purchased for high network traffic environments or to separate DTC and LAN traffic. The necessary networking software components are bundled with the MPE/iX 5.0 platform release. These components include the 802.3 driver for the LANIC card, the TCP/UDP/IP transport, inbound virtual terminal access and the Berkeley Sockets API. ARPA Services (FTP, Telnet Client) are also bundled with MPE/iX release 5.0. The Telnet Server (inbound access) and TCP/IP Network Printing will be bundled in MPE/iX release 5.5.

For Token Ring environments, the Token Ring 3000/iX product (P/N J2167A) provides connectivity to a token ring LAN. 100VG-AnyLAN and 100BaseT LAN technologies will be available for the HP 3000 in early '97.

Network Operating Systems

One of the many advantages a LAN environment offers is the ability to share resources such as printers, discs and files through the use of a Network Operating System. For example, user files can be stored on a server to be shared or for back-up. All the users on a LAN can share the same copy of a PC application. This simplifies the management of updates by eliminating the need to distribute all applications for local installation and ensures everyone is using the same versions.

The HP 3000 can also provide the functionality of a network operating system with products such as NetWare for the HP 3000 for file and print sharing, AppleTalk Services for the HP 3000 for file sharing and NFS/iX Server and Client for the HP 3000 for remote file access. To determine whether to use a NOS on the HP 3000 or to select a native dedicated solution, the environment must be evaluated. For example:

How will the server be used? (business-critical applications and data or casual print and file sharing)
Who will manage the server? (MIS staff or end-users)
What is their area of expertise?
Is an increase in the number of users expected in the next two years?
What are the performance requirements?
Where is the data currently located?
Which solution is most cost-effective?

A dedicated native server offers high performing file and print sharing. The HP 3000 offers all its traditional strengths as a business-critical computing environment with high availability and data integrity. NetWare or AppleTalk for the HP 3000 should be viewed as a communication and integration solution.

The HP 3000 as a Web Server

For more than a year, Web server software for the HP 3000 as been available as freeware. The unsupported freeware version (Version 1.3) was ported from the public domain server of the National Center for Super Computing Applications (NCSA). This version can be downloaded over the Internet/WWW from http://jazz.external.hp.com/ (the HP Commercial Systems Division's external Web server) or obtained through the Interex Contributed Software Library.

On April 1, 1996, a *supported* basic Web server solution for the HP 3000 was available. This product (P/N B5184AA) is a port of the Open Market Web Server software. The Open Market Web Server for the HP 3000 has a performance improvement of at least 200% over the NCSA freeware version. A secure Web server product is also planned for release later in 1996.

MPE/iX release 5.0 or later is required to use the HP 3000 as a Web server with either of the above solutions.

Additional information on PC integration, Client/Server tools and/or the HP 3000 as a Web server is available on HP's Technology Close-Up video broadcasts, "Desktop Integration and Decision Support" (February 1994), "IMAGE/SQL and Client/Server Tools for the HP 3000" (January 1995), and "Using HP Systems as World Wide Web Servers" (April 1996). Copies of these broadcasts, can be ordered at no charge by calling 1-800-224-HP3K or faxing your request to 612-430-3388.

Information on specific HP products can be obtained by contacting your local HP sales representative or reseller or via the World Wide Web at http://www.hp.com.

Glossary

API
Application Programming Interface. The formally defined programming language interface between a program provided by a vendor and its user. APIs, not products, are strategic. They are the important component of any software product. IBM's System Application Architecture, for example, is not a product grouping, but a collection of APIs.

ARPA
Advanced Research Projects Agency. A branch of the U.S. Department of Defense that developed a set of widely used networking protocols.

Bridge
A relatively simple device that passes data from one local-area network (LAN) segment to another without changing it. The separate LAN segments that are bridged use the same protocol.

Client/Server
A concept that functionally divides the execution of a unit of work between activities initiated by an end user or program (client) and resource responses (services) to the activity request. Client/server is an application of cooperative processing in which the end-user interaction with the computing environment is though a programmable workstation that executes some portion of the application (beyond terminal emulation).

Ethernet
A baseband local-area network developed by Xerox Corp. It has a bus topology with Carrier Sense Multiple Access/Collision Detection access control. Ethernet is not identical to the Institute of Electrical and Electronics Engineers 802.3 standard.

File Server
A computer containing files available to all users connected to a local-area network.

FTP
File Transfer Protocol. The application protocol offering file service in the Internet suite of protocols developed by the Advanced Research Projects Agency (ARPA).

Hub
A device from which a number of transmission links radiate. A hub-based network has the same configuration as a star topology.

IPX/SPX

Internetwork Packet Exchange/Sequential Packet Exchange. A network later (IPX) and transport layer (SPX) protocols developed by Novell Inc. used in NetWare implementations.

LAN
Local-Area Network. A data transmission facility connecting a number of communicating devices (e.g., computers, terminals, word processors, printers and mass storage units) within a single building or campus of buildings.

Middleware
Software that supports an application environment isolating it from hardware, networking and operating system dependencies.

NOS
Network Operating System. The software program that provides the LAN user interface and controls network operation. An operating system communicates with the LAN hardware and enables users to share files and peripherals.

Router
Performs a function similar to a local or remote bridge, but routing occurs at Layer 3 of the OSI reference model.

TCP/IP
Transmission Control Protocol/Internet Protocol. TCP/IP is a set of protocols for Layers 3 and 4 of the seven-layer OSI network model. These are, respectively, the network and the transport layers. TCP/IP has been developed under the auspices of the Department of Defense. It has achieved de facto standard status, particularly as higher-level layers over Ethernet. TCP/IP implementations are available as products from more than 60 vendors, including HP, IBM, DEC, AT&T, and Sun.

TELNET
Telecommunications Network Protocol. The application protocol offering virtual terminal service in the Internet suite of protocols developed by ARPA.

References:
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