Network Station S/1000: A New Java Device

By Eddie Ho, Steve Heracleous, and Ravi Mandava

The IBM Network Station Series 1000 extends the IBM Network Station family of network computers by delivering robust support for business applications written in Java while effectively meeting other desktop computing demands, from accessing traditional business applications to accessing the corporate intranet and the Internet.

Like all IBM Network Stations, Series 1000 offers the power of network computing to everyone throughout the enterprise. Most important, the Series 1000 supports the Java Virtual Machine (JVM) 1.1.2, thereby delivering the full power of Java™ applications. This JVM level supports the classes and execution environment for Java applications. Over time, a new version will be upgraded to provide a richer level of functions.

With the Network Station™ Series 1000, all data and applications—as well as configuration, maintenance, and troubleshooting—reside on the server. This results in a computing environment that is easier, safer, and less expensive to set up and maintain. In addition, the Series 1000 significantly enhances the enterprise's ability to do all the desktop-level computing it needs, using the cost-effective power of the network.

The Java-focused Network Computer

The IBM Network Station Series 1000 is the Java-focused network computer. It is designed with adequate compute power to run applications locally. The previous models (100 and 300) are designed to access server-based applications with limited Java and network bandwidth capability. Figure 1 shows the Series 1000 at a glance.

The IBM Network Station Series 1000 is optimized for running business-critical applications and personal productivity tools that take advantage of Java. It also accommodates extensive use of corporate intranets or the Internet. The IBM Network Station lets you do the following:

- Run Java applets and applications directly on the Network Station. The industry is pursuing an architecturally neutral programming model using the Java language and platform technology. Eventually, the Internet will become the universal server for all types of content and applications. The Network Station is designed to execute applets on demand with the highest level of performance.

- Access Windows™ applications via multi-user implementations of Windows NT™ on a PC server. The

Network Station is also an efficient X protocol server capable of displaying Windows NT applications in a multi-user environment. The WinCenter Pro environment enables graphics and audio to be exported.

- Use a browser to access multiple servers (IBM and others), including corporate intranet and Internet servers. The Network Station has a locally executed browser and is functionally equivalent to the Netscape Navigator™ 3.0 level of function. As the business environment makes the transition to Internet-/intranet-centric applications, the browser is the essential converged user interface for all Web-enabled applications.

- Access 3270 and 5250 terminal applications. The Network Station supports the 3270 and 5250 client for convenient access to enterprise-based applications. This access is critical to preserve the existing production environment while making the transition to a more Web-centric model.

- Work with applications on AIX® and UNIX® servers using X-Windows server support. The Network Station can optimize networked resources by combining the processing power of the servers and the Series 1000.

All-in-One Application Access Device

With the Network Station, traditional business applications are available where and when you need them. They also have a new user-friendly, productivity-enhancing graphical front-end. This graphical window interface allows concurrent access to existing server-based applications or Web-enabled applications.

A new, highly graphical commercial or personal productivity application, such as Lotus eSuite WorkPlace™ (from Lotus Development Corporation) written in 100% Pure Java language, will run on the IBM Network Station Series 1000, along with other familiar platform-specific applications from OS/390™, AS/400®, UNIX, and Windows NT environments. Figure 2 shows connectivity using the Network Station. See the sidebar for more information about Lotus eSuite Workplace.

Network Station Series 1000 at a Glance

Network Station Software	Release 2.5
Terminal support	3270, 5250, X-Windows server
Java Virtual Machine	1.1.2
Web browser	Supported
Windows applications	Via multi-user implementations of Windows NT on a PC Server[1]
Lotus Notes®	Via Web browser and Domino server
Memory	32 MB EDO (base) expandable to 64 MB, 2 SIMM Sockets, Optional 512 KB SRAM cache memory
Connectivity	Ethernet 10/100 Mb or Token Ring 4/16 Mb
I/O ports	One serial, one parallel
Video support	Minimum: 640x480 VGA Maximum: 1600x1280 SXGA 2 MB (base) VRAM
Monitor support	Video graphics array (VGA) Super video graphics array (SVGA) Super extended graphics array (SXGA)
Smart card support	Hardware support only
Input devices	102-key PC keyboard, two-button mouse
Audio support	16-bit audio

[1] *Such as WinCenter available from Network Computing Devices, Inc.*

Figure 1. Network Station Series 1000 at a Glance

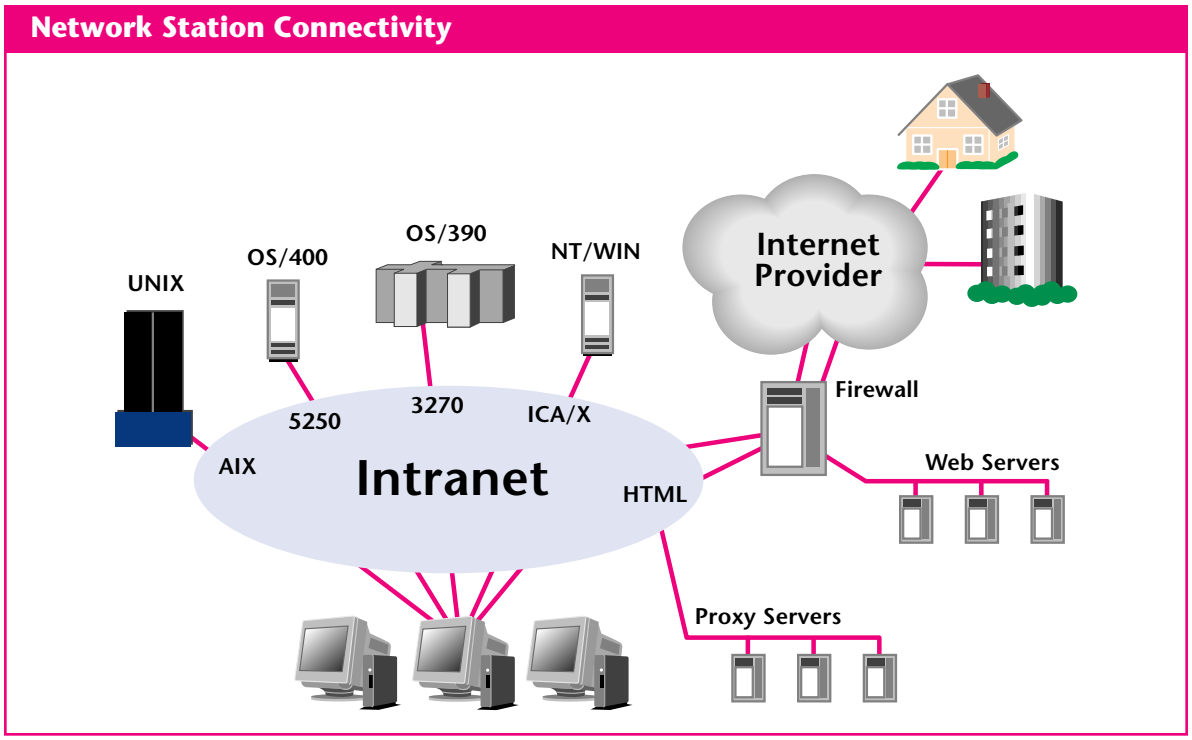

Figure 2. Connectivity of the Network Station

Desktop Consolidation Using Network Station

The IBM Network Station Series 1000 is an ideal desktop solution for the following:

- Deploying new Java-based business applications. You can develop a Java application on a familiar platform. The Network Station can then provide the most optimized execution environment if the virtual machine has the same level and is 100% pure.
- Activating existing business applications with user-compelling graphical front-ends. The Network Station can modernize the dull green screen-based application, thereby improving your productivity with a higher level of window concurrency.
- Moving to Internet and intranet architectures that still need access to business applications on multiple servers. The Network Station can provide a single desktop consolidation strategy and eliminate the need for multiple types of terminals.
- Accessing applications delivered through corporate extranets (e.g., order tracking, package tracking, human resources).
- Providing concurrent access to multiple platforms. In a traditional Web application development environment, concurrent access to multiple platforms is a basic requirement. Java application developers often need access to multiple servers and the Internet. The Network Station allows developers to code and debug on the server's platform, then conduct a production test via the browser. If the design is download-on-demand, the local Java runtime is already tuned and optimized.
- Storing vital data centrally rather than on local PCs. This is important to security-conscious organizations, such as financial institutions, insurance companies, and government agencies.

- Replacing inefficient or difficult-to-maintain older terminals and/or older PCs or adding new terminals or PCs.
- Consolidating PCs—running PC applications on the server to cut desktop-level maintenance and troubleshooting costs.
- Increasing information technology (IT) functions at a low cost.

Java Virtual Machine Environment

The Network Station Series 1000, unlike its predecessors, can run the Java Virtual Machine Version 1.1. This version offers many new features. It also provides functional fixes for defects and enhancements as

Introducing the Lotus eSuite WorkPlace

The new Lotus eSuite WorkPlace provides a whole new way of looking at network computing and Java. The WebTop productivity technology is another level of integration for a total Java desktop. Current PC space has very efficient desktop productivity tools; however, they are all OS specific and can be accessed using a Network Station in a multi-user environment. A total Java desktop running on the Network Station enhances the office productivity of end-users, but still allows centralized control of all contents. Java-based applications developed in other platforms can be easily integrated in the desktop.

Lotus eSuite WorkPlace, a new class of productivity software, is designed specifically for the emerging network computing environment. The eSuite WorkPlace provides a single point of access to everything most computer users need, including business productivity applets, integration with existing applications, terminal emulation, e-mail, calendaring and scheduling, and the Internet.

Lotus eSuite WorkPlace allows anyone in an organization to access the Web, manage documents, and perform tasks crucial to their work. IT managers and network administrators can customize the eSuite WorkPlace. When users need additional capabilities, simply supplement eSuite WorkPlace with the appropriate Java applet—including applications built with the eSuite DevPack, or any third-party Java applet or application.

Included with the eSuite WorkPlace is a set of eSuite business productivity applets that provide the basic functions users need to work more productively, without complicated "extras." The eSuite applets are 100% Pure Java, so they cross all computing platforms. This allows IT managers to deploy eSuite applets quickly across the enterprise, yet maintain and upgrade them centrally.

Lotus eSuite WorkPlace includes:

- Desktop user interface, including a Web browser, terminal emulation, and file manager
- Business productivity components, including a word processor, spreadsheet, presentation graphics, calendar, address book, e-mail, project scheduler

Lotus eSuite components share a common, easy-to-use interface called the InfoCenter. This is where you can set attributes and access the functionality of any eSuite applet to enable users to get up and running quickly.

Lotus eSuite WorkPlace is the ideal solution for PC users who want an easier, more flexible, productive working environment. At the same time, eSuite WorkPlace provides terminal users with access to a whole new range of desktop tools and capabilities, along with improved access to existing host-based business applications.

For the latest information about Lotus eSuite, visit the World Wide Web at *http://eSuite.lotus.com*.

well as performance improvements. The highlights of Version 1.1 consist of the following:

AWT enhancements. JVM Version 1.1 offers many enhancements compared to Version 1.0.2. These enhancements, which solve Abstract Window Toolkit (AWT) deficiencies, include application programming interfaces (APIs) for printing, easier and faster scrolling, pop-up menus, clipboard (for copy and paste), user-defined cursors per component, a delegation-based event model, imaging and graphics enhancements, and more flexible font support for internationalization.

JavaBeans. The JavaBeans™ API defines a software component model for Java, allowing third-party ISVs to create and ship Java components that end users can combine together into applications.

JAR file format. The Java Archive (JAR) is a platform-independent file format that allows Java developers to bundle multiple class files, graphics, and sound files into one file that can subsequently be downloaded in a single HTTP transaction. This greatly enhances the download speed of a set of classes and support files required to execute an applet since multiple HTTP transactions (one per class file) are now avoided. In addition, the resulting JAR file is compressed, which further enhances the download speed.

Security and signed applets. JVM 1.1 provides a tool that allows developers to assign a JAR file, which typically contains class files, image, and sound files. The appletviewer can then allow a trusted entity to run any downloaded applets in signed JAR files with the same privileges as a Java application would have on the client platform (accessing local storage).

Furthermore, the Java Security API provided with the Java Development Kit (JDK) 1.1 enables developers to incorporate security functionality into their Java applications. The first release of Java Security in JDK 1.1 contains a subset of this functionality, including APIs for digital signatures and message digests.

RMI/object serialization. Remote method invocation (RMI) enables developers to create distributed Java applications. Methods of remote Java objects can be invoked from other Java virtual machines residing on different hosts. Using a naming service provided by RMI, a Java object can call a method of a remote Java object. RMI uses object serialization to marshal and unmarshal parameters to the remote object. Object serialization allows encoding of objects into a stream of data bytes (which can be directed to persistent storage) and the reconstruction of the object from such a stream of data bytes. It also allows for lightweight object persistence.

Reflection. Reflection enables a Java program to examine the class definition of an object at runtime. It also supports the extraction of the full definition of the accessible APIs for the `object=s` class, which lists the constructors, methods, and variables. Accessing variables and invoking the methods are supported.

Java DataBase Connectivity. Java Database Connectivity (JDBC) provides a standard SQL interface for uniform access to a wide range of relational databases. Using JDBC, developers can build higher level interfaces, tools, and access front-ends to relational databases.

Other Enhancements. JVM 1.1 provides other numerous enhancements, including:

- Internationalization allows applets and applications to be developed using a local mechanism, localized message support, and display of Unicode characters.
- Networking enhancements are available in the `java.net` base classes.

- I/O enhancements allow character streams based on 16-bit Unicode characters rather than 8-bit bytes.
- Inner classes have an interface by which classes can define other classes/interfaces as part of their definition. This new language feature applies to Java the concepts of lexical scoping and block structure found in many other programming languages, but not available in Java 1.0.
- Java Native Interface (JNI) has a mechanism by which Java can reference native (to a particular platform) libraries.

Conclusion

The Network Station Series 1000 with its integrated desktop can consolidate all your desktop devices into one. It can also bridge your computing environment to the future with the promise of a platform-neutral execution environment.

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