

Lotus

White Paper

**Lotus Messaging:
Value Beyond Basic E-Mail**

September 1999



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Introduction

Electronic messaging has evolved beyond basic e-mail, to include support for collaborative Web applications and corporate intranets, as well as enhanced services for mobile users and their fast-growing array of wireless communication devices. We still call it “e-mail,” but we have come to rely as heavily on these new services as we do the telephone for business communication.

All leading messaging vendors offer support for evolving Internet standards; therefore it is important for organizations of all sizes to make competitive comparisons with an appreciation for a broader context. First, the level of integration of standards within a messaging architecture determines its ability to support future growth and change. And all messaging architectures are not created equal in this respect. Second, while standards provide a common denominator for interoperable communication, they should not serve to limit the functionality that organizations demand from their messaging systems.

Electronic messaging must serve as the foundation for collaborative solutions and other strategic applications that can yield a competitive edge and support future growth. These solutions are as varied as the companies that deploy them: from automating everyday processes like HR approvals, to empowering a mobile workforce with ubiquitous access to key information via any device, to strengthening e-business relationships, to creating high-value Knowledge Management “portals.” The complete dependence of this entire new class of mission-critical technologies on a robust, flexible messaging infrastructure makes the choice of a messaging system the most crucial IT decision for many organizations.

A Complete Solution

Above all other considerations, the messaging infrastructure must be industrial strength, by virtue of its overarching importance. It must be secure, to protect key business assets. It must be cost-effective to manage, and provide real business value in the form of a consistently high return on investment.

A complete messaging solution, however, must be flexible enough to accommodate change and growth. In particular, its architecture must allow customers to incorporate value-added services beyond basic e-mail, which reflect emerging trends in electronic communication. These currently include:

- Integrated Web access.
- Rapid deployment of applications over Web protocols.
- Ubiquitous access to both messages and business data from any location, via any device (laptop, palmtop, cellular phone, etc.).
- A common, unified inbox for all forms of messages: e-mail, fax, pages and even voice mail.
- Enterprise scale workflow.
- Live chats, shared applications and other forms of real-time collaboration.

Value Beyond Messaging

A messaging foundation whose value can be extended to embrace the full spectrum of collaborative applications can only be delivered by a vendor whose architecture — and vision — extend beyond e-mail. The business value that accrues when an organization is able to cost-effectively and rapidly leverage its messaging infrastructure to exploit opportunities beyond basic messaging is a critical “missing piece” in many cost of ownership analyses.

Lotus® Development, the worldwide leader in messaging, is the only vendor who offers a complete, integrated foundation that can take organizations beyond basic e-mail to advanced messaging capabilities and collaborative Web solutions. Lotus Messaging leverages the proven power of the Lotus Domino™ Server family of products. Domino provides native support for whatever messaging clients (Web browsers, Microsoft Outlook, Eudora, etc.) customers may wish to deploy. In addition, Domino is the perfect complement to the world’s leading collaborative client — Lotus Notes®.

The Domino Server provides a unified, standards-based, platform-independent foundation that is built from the ground up to support a virtually unlimited range of mail-enabled solutions. Designed from the outset to be customized and extended, the Domino messaging architecture can rapidly evolve to meet new business challenges without compromising reliability, scalability, manageability or affordability.

Domino offers a complete messaging solution that delivers:

- **Reliability.** Only the proven, industrial-strength Domino Server Family offers the high availability of clustering, with partitioning and failover for mail and applications (including Web applications). The entire Domino architecture is optimized for database reliability, performance and on-line maintenance, providing the utmost protection from data loss and disruption of service.
- **Security.** Domino offers the strongest Internet mail security possible for signing and encrypting messages while seamlessly integrating a Public Key Infrastructure (PKI) and X.509 V3 certificates. Domino security is simple to administer and supports any mix of centralized and decentralized functions. It protects data at rest, as well as during transmission. Domino also offers the broadest available range of access controls, to meet both inter- and intra-organizational requirements.
- **Manageability.** The entire Domino infrastructure can be managed from a central location, ensuring a consistent level of service enterprise-wide. Domino’s specialized administration client, the Domino Administrator, provides an intuitive, logically organized interface that radically simplifies monitoring and control for deployments of all sizes.
- **Outstanding mobile support.** The Domino architecture can give users instant access to time- and revenue-sensitive information at any time, from anywhere, via wireless devices from pagers to Personal Digital Assistants (PDAs). Domino also provides a single inbox from which to send and receive e-mail, voice messages, faxes and pages. These capabilities extend the messaging infrastructure to reach more people, more ways, more quickly. And they make it far easier to stay 100% in touch and “in the loop” while traveling.

- **Scalability.** Domino can take full advantage of even the most powerful computing platforms, including many CPUs, gigabytes of memory and terabytes of disk. Equally important, the entire Domino architecture scales to span enterprises. Domino offers a replicated directory capable of storing millions of entries; and the ability to create databases of unlimited size. A single server can easily support tens of thousands of simultaneous mail users, for example.
- **Integration with the current environment.** Domino offers superb integration with all popular server platforms (Windows NT, AS/400, UNIX, S/390 and OS/2). Domino supports all transports and protocols, and offers built-in services for integration with enterprise systems like SAP, PeopleSoft and many more. This enables customers to extract more value from current investments.
- **Industry-leading support for open standards.** For maximum interoperability with other messaging systems, Domino and Notes™ support all the latest Internet standards, including *native* SMTP/MIME routing and Internet addressing, plus full support for the latest E/SMTP extensions, HTTP, HTML, NNTP, POP3, IMAP, LDAP, SSL, S/MIME and SNMP.

Domino costs less to own because its integrated architecture decreases the number of messaging system components that must be managed. Domino also reduces ownership cost by providing superior tools for more efficient administration. Moreover, Domino enables organizations to get the most from current investments in hardware, software, networks and training.

But in the final analysis, the key asset that accrues from Lotus Messaging is not simply reduced cost, but *unsurpassed business value*. The Domino Server enables customers to quickly create high-ROI solutions that solve business problems and open up new opportunities. This inherent adaptability also enables the Domino architecture to respond to organizational growth and change. In short: Lotus Messaging offers higher value because its value extends far beyond messaging.

About Lotus Domino and Notes

The Domino Server Family is an integrated messaging and Web application software platform for growing companies that need to improve customer responsiveness and streamlines business processes.

The only solution built on an open, unified architecture, Domino offers organizations a complete solution for all their messaging requirements: from basic e-mail to collaborative Web applications. The Domino Mail Server combines full support for the latest Internet Mail standards with Domino's industry leading messaging capabilities — all in one manageable and reliable architecture.

Domino is trusted by the world's leading companies to deliver secure communication, collaboration and business applications. Domino Servers set a new standard for rich Internet messaging, ease of administration, integration with back-end systems and reliability.

To learn more about the Domino Server Family, visit www.lotus.com/domino.

Lotus Notes is the leading integrated e-mail and collaboration client for the Internet and intranets. Notes offers an easy-to-use, open, and customizable environment; so users can work comfortably, with power and flexibility that exceeds expectations. Notes combines the most popular features Lotus cc:Mail™ and Lotus Organizer with full Internet standards support — to deliver integrated, state-of-the-art e-mail, calendaring, group scheduling, Web browsing and information management.

To learn more about Lotus Notes, visit www.lotus.com/notes.

Lotus: The Market Leader

Lotus Domino and Notes are the most widely deployed messaging system of any kind, and their lead over competing products continues to grow. The unparalleled success of Domino reflects the vision of Lotus and IBM: to provide our customers with a choice of products that meet business requirements from basic messaging to collaborative solutions, and securely connect people anytime, anywhere, on any device. No other vendor offers comparable experience, comparable support, or an equivalent range of interoperable solutions.

The Lotus Messaging Architecture

Lotus Messaging sets a standard for messaging reliability, scalability, interoperability, manageability and integrated features, which far exceeds the capabilities of competing architectures. Built on industrial strength Domino Server technology, Lotus Messaging provides a standards-based, extensible foundation for e-mail, Calendaring and Scheduling, real-time collaboration, bulletin boards, ad hoc workflow, and anytime/anywhere messaging for mobile users.

As Figure 1 illustrates, the Lotus Messaging architecture rests on a proven, cross-platform foundation, whose basic components are:

- The reliable, flexible and ultra-scalable Domino message store.
- Domino's fully integrated, standards-based, collaborative services (security, replication, directory and message routing).
- The Domino Administration Client, which leverage Domino application services to deliver unmatched power and ease of use for administrators.
- Support for all Internet client protocols (SMTP, POP3, etc.), as well as high-function Notes Remote Procedure Calls (NRPCs), enabling customers to choose whatever mix of clients meets their needs today and in the future.

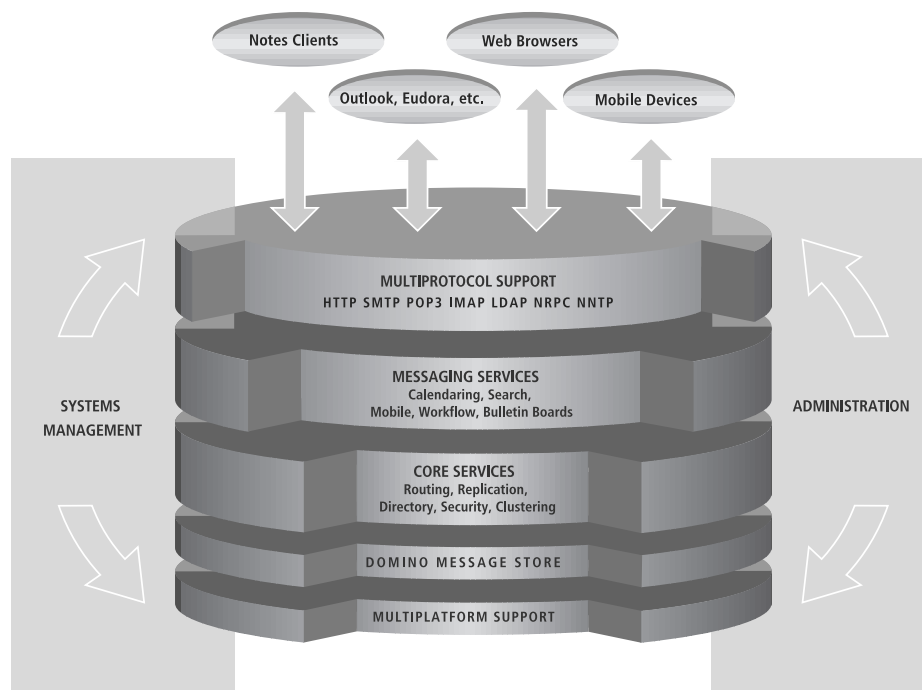


Figure 1: The Lotus Messaging Architecture

These components are introduced below. Subsequent sections describe Domino application services, the Domino Administration Client and other key components of the Domino Server in more detail.

Multi-platform Support

The Domino architecture supports more platforms and more transport protocols than any other e-mail system:

	Windows NT	UNIX	AS/400	S/390	OS/2 Warp
TCP/IP	✓	✓	✓	✓	✓
X.PC (Notes)	✓	✓	✓	✓	✓

On Windows NT, Domino also provides support for NetBIOS/NetBEUI, SNA, AppleTalk, Banyan VINES, X.25, SPX, and SPX II.

Multi-platform support enables customers to deploy their Domino messaging infrastructure on whatever servers best meet organizational needs — including systems already in place. Domino is tightly integrated with platform-specific services; and the inherently scalable Domino messaging architecture takes full advantage of even the most high-performance computing platforms, including many CPUs, gigabytes of memory and terabytes of disk.

Deploying Domino on highly scalable server platforms facilitates server consolidation and partitioning, which can yield lower cost of ownership: administration and maintenance are simplified, and the number of moving parts in the network are reduced. Deployment on high-performance platforms also leverages the increased availability of these systems. For example, Domino on industrial strength UNIX, AS/400 and S/390 servers can offer system availability greater than 99.9%.

The Domino Message Store

The Domino architecture offers a fundamental advantage: its message store is also its database. The Domino message store was designed from the outset to provide the flexibility required to support not only messaging, but also any mail-enabled application. This means that customers do not need to deploy and manage two separate infrastructures for mail and applications.

Integrated Domino Services

Domino is an integrated messaging and Web application platform. It makes comprehensive services like message routing, security, workflow, and replication available to all applications, not just messaging. In addition to its built-in services, Domino supports all Internet standards and other key open standards, so customers get the benefit of whatever technology best meets their needs for reliability, interoperability and ease of administration.

Domino Administration

The entire Domino network can be centrally monitored and controlled via a single interface, the Domino Administrator client. This unified architecture allows a business to proactively manage its network to an optimal level of service. No messaging system offers greater built-in manageability than Domino, with features like:

- **Simplified installation and configuration.** A Domino Mail server can be up and running in minutes using default settings.
- **Messaging tracking.** Administrators can track any message, even across Domino domains. End users can check the status of messages they've sent.
- **Remote server administration.** All servers in the organization can be centrally monitored and controlled. Administrators can perform everyday tasks like moving, adding and deleting users across the network, with drag-and-drop ease.
- **Automated usage reporting.** Domino Mail servers automatically analyze a broad range of statistics related to server performance and connectivity, such as the number of mail versus HTTP users connected to a server, or the top e-mail users by message size or number of messages.

Comprehensive Standards Support

Domino messaging *is* Internet messaging, offering the industry's most comprehensive support for all the latest Internet standards. Internet addressing, SMTP routing, and MIME content support are all *native*.

The result is a high degree of interoperability with the widest possible range of tools and systems; and the ability to cost-effectively extend e-mail and applications to customers, suppliers and other partners. Comprehensive standards support also means more options with respect to the choice of security model, deployment of messaging clients (any client works with the Domino Server), and enterprise directory access.

The Domino Server supports all these key Internet standards:

- Full implementation of HTTP, so Domino can serve both HTML documents and Domino data to Web clients.
- HTML version 3.2: Domino renders any object requested by a Web client into HTML.
- Full support of URL syntax, for direct addressing of objects stored both in Domino databases and on the file system.
- Native MIME encoding of data and file objects stored on the server, with no conversion. Plus all the latest E/SMTP and S/MIME extensions.
- POP3 and IMAP e-mail protocols.
- LDAP V3.
- SSL V3: Domino can negotiate with the client to use the highest version of SSL they have in common; either V3 or V2.

- SOCKS version 4, so customers can provide Internet access to Notes Clients and Domino Servers via an existing SOCKS server over the IP protocol.
- HTTP Proxy: Notes Clients and Domino Servers can access a remote Domino Server through any standard HTTP Proxy that supports the SSL Tunneling Specification. All native Notes Remote Procedure Calls (NRPCs) are retained and tunneled through HTTP. This allows customers to utilize new or existing HTTP Proxy servers to give Domino-based users access to the Internet.

Multi-client Support

The Domino messaging architecture supports the widest range of messaging clients in the industry: from the Lotus Notes client to Netscape Navigator to Eudora and other POP3 and IMAP4 Internet mail clients to Microsoft Outlook to wireless devices like Personal Digital Assistants (PDAs), data-enabled cellular phones and pagers.

Comprehensive client support enables customers to:

- Deploy whatever mix of clients best meets users' needs.
- Upgrade the messaging infrastructure without changing the clients on users' desktops.
- Save on software purchases, training and related expenses.
- Receive all their messages in one place, and access them via whatever device is most convenient.

Users can access mail on a Domino server with any popular Web client; native SMTP routing ensures 100% message fidelity. Domino also provides password-level authentication for users of non-Notes clients, as well as certificate-based authentication via X.509 and SSL.

Domino also supports client access via the Messaging Application Programming Interface (MAPI) 1.0 specification. This enables customers to use MAPI clients like cc:Mail Release 8 with the Domino infrastructure. MAPI support also lets Domino Servers and Notes Clients interoperate with communications-based features like "Send..." in Microsoft Office and other desktop applications.

The Lotus Notes Client

While Domino supports every popular e-mail client, the Lotus Notes client offers customers more: enhanced mobile services, a superior environment for collaborative applications, superior Calendaring and Scheduling features, and stronger security than other clients can provide.

Notes combines rich functional capability with the familiar look-and-feel of a Web browser. Notes is not only the most easy-to-use e-mail and collaboration client available; it also provides innovative information management tools, comprehensive group scheduling features and outstanding support for mobile users. Notes also provides comprehensive support for e-mail and Web standards that enable it to work with any server, not just Domino.

With support for Internet mail standards, Notes provides one universal in-box from which users can manage all their e-mail accounts — whether they're on a Lotus Domino server or hosted by an Internet service provider. In addition, users can receive faxes, pages, and voicemail messages directly in their Notes in-box, creating a truly universal messaging environment.

Notes employs familiar, Web-inspired features and capabilities, making it very easy for users to find and work with information from many sources. But in addition to the capabilities of Web browsers, Notes also provides:

- The ability to include rich text, graphics, video and all other types of rich content and formatting in e-mail messages.
- Type-ahead addressing.
- Optional automatic spell checking.
- The ability to track any message sent via a Domino server.
- Print Preview.
- Native MIME and HTML content support, for improved message fidelity for non-Notes recipients.
- Multi-platform support. Notes runs on Windows 95/98, Windows NT 4.0 and Macintosh.

As Figure 2 shows, Notes e-mail features are innovative, yet intuitive. Bookmark buttons and Navigation tabs make it easy to move among tasks and applications. The header and body of the message are displayed separately, so users can scroll through an e-mail and still see the header information. As illustrated, the body of the message can contain rich text, tables, embedded graphics, even a table within a table. It is also possible to personalize messages; by adding letterhead and a signature, for example.

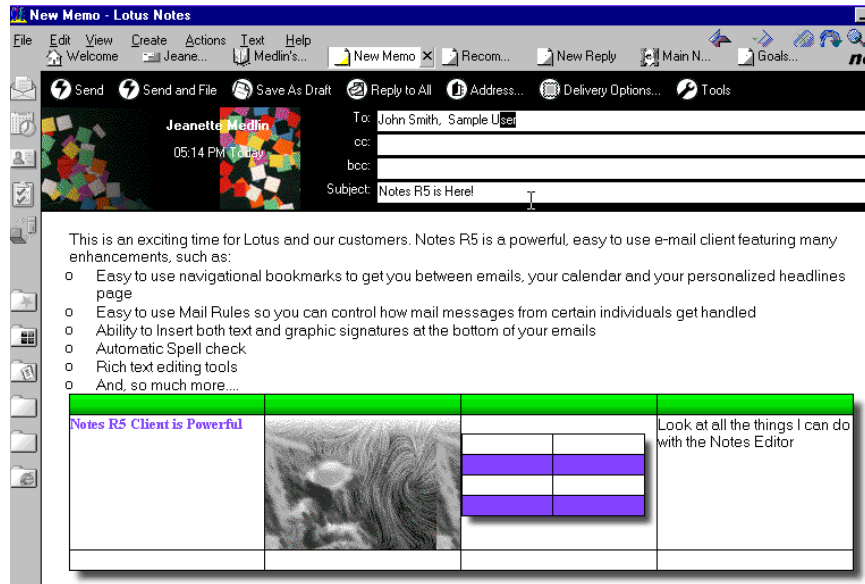


Figure 2. Notes e-mail features

Notes also offers a broad range of features to help end users organize and manage information from their e-mail inbox, their calendar, the Web and other sources.

Figure 3 shows the Notes “Welcome Page,” which each user (or organization) can customize to organize and present the information of his or her choice.

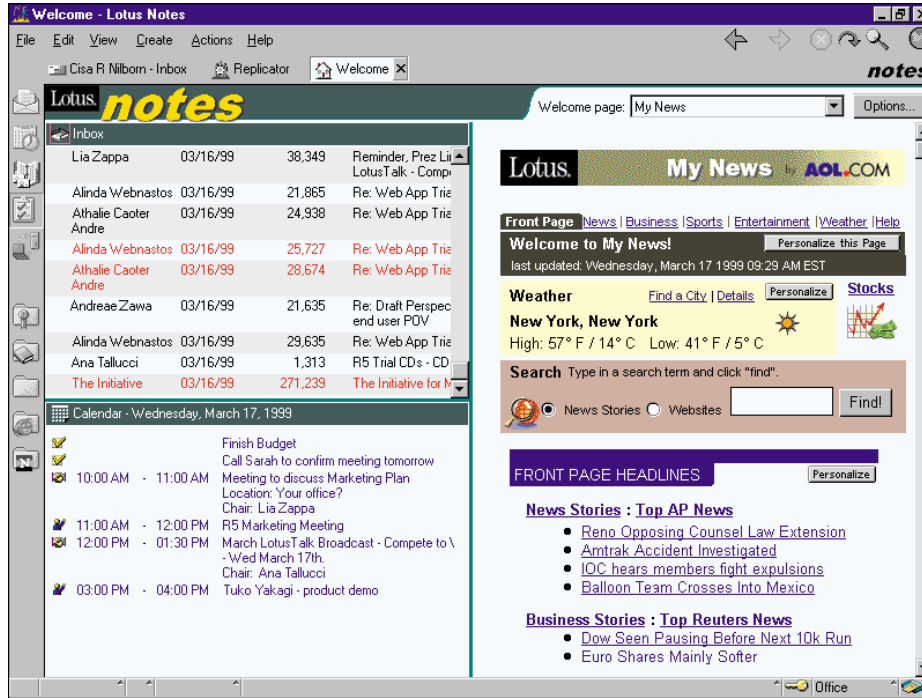


Figure 3. The Notes Welcome page

Personalized headlines allow users to customize the way information is presented. Important mail messages are sifted from the rest and displayed in the top left frame. The lower left frame shows today’s calendar. On the right is a real-time view of a personalized Web page. Browser-style navigation buttons (Forward, Stop, Refresh, etc.) enable new users to be instantly comfortable with Notes.

State-of-the-art Notes search capabilities make it easier to locate information wherever it resides. Users can search not only the documents on their desktop, but also any and all Domino databases and file systems available via their network. Notes searches can find information in a user’s inbox, another Domino database, a 1-2-3 spreadsheet or a Microsoft Word document, for example.

Figure 4 shows the Notes calendar. From here a user can check appointments, schedule meetings, view any range of months, weeks or days, choose which dates to view, and more.

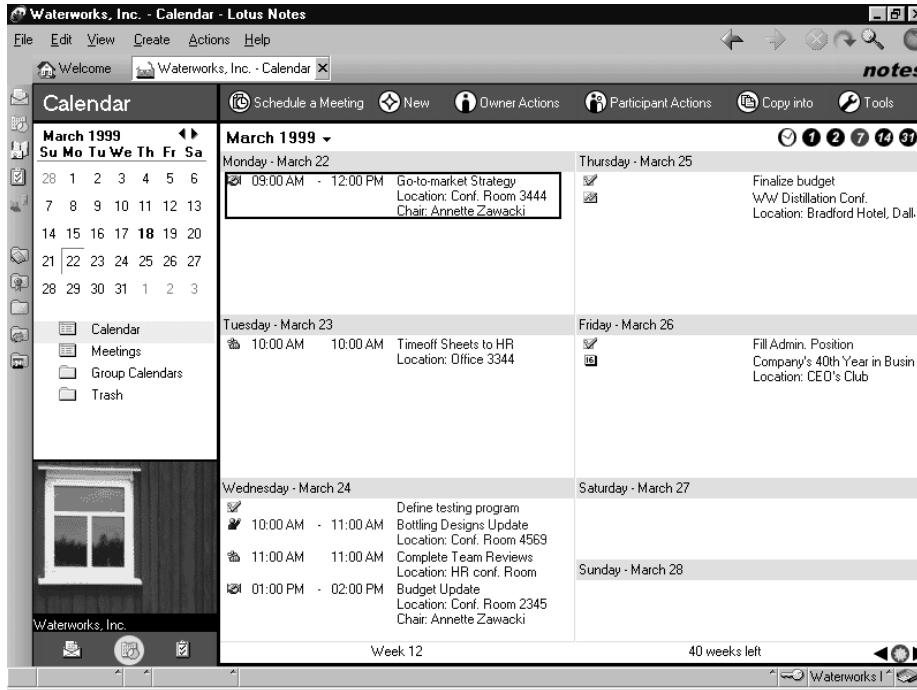


Figure 4. Notes Calendaring & Scheduling

Based on Lotus Organizer, the all-time best-selling Personal Information Manager (PIM) product, Notes calendaring and group scheduling features are easy to use, powerful and flexible. In addition, users' calendars are integrated with their To-do lists and other PIM features.

Rapid Development of Collaborative Web Applications

The Domino Server is the industry's premier Web application server and interactive Web application development environment, combining native support for all key Internet standards and protocols with Domino's rich application development facilities. Domino not only allows customers to use Web technology to send and receive mail via Internet standards, it gives them the best tools available for building, managing and hosting content-rich interactive Web sites — for the highest return on an investment in Web technology within and among organizations.

Domino gives Web clients interactive access to dynamic data and applications on a Domino Server. This means that Web clients can securely search a Domino database; create, edit and delete documents; and take advantage of Domino content navigation features like the ability to expand or collapse views. Domino serves HTML files as well as data in Domino databases, and runs CGI scripts activated by Web clients. And the Domino full text search engine can be used to search Domino-hosted Web site content.

Domino access controls and other security features fully support interaction with Web clients:

- The Domino Directory includes an encrypted field for Web client passwords.
- Web clients can be authenticated by user name and password.
- Web users may be added to Domino access control lists, groups, etc. and assigned roles.
- Access controls at all levels are applicable to users of Web clients.
- Domino provides Secure Sockets Layer (SSL) support for server authentication and encryption of data in secured sessions.

Domino Development Tools

For customers who are ready to deploy collaborative applications, the Domino Designer client adds rapid application development and deployment (RADD) capability to Domino. RADD features include:

- Built-in connection services, for live access to relational databases, transaction systems and ERP applications — without programming.
- Comprehensive application services like workflow and messaging, optimized for building and managing integrated, collaborative solutions.
- Domino Objects, which make it simple to add services like security and workflow to application.
- Web-ready templates, for instant application deployment.
- Extensive Java support; developers can employ Java applets and Java servlets in Domino applications, as well as creating Domino server agents in Java.
- Simplified deployment and maintenance via Domino replication, integrated development tools and comprehensive standard support.

Developers can use a wide range of tools and languages with Domino Designer:

- Popular HTML authoring tools like NetObjects Fusion and Microsoft FrontPage.
- Popular Java IDEs like Symantec Cafe and IBM VisualAge for Java.
- Popular scripting tools, such as ScriptBuilder.
- Domino Global Workbench, which enables developers to cost-effectively build and maintain collaborative Web applications in multiple languages.
- The Notes API, which gives C and C++ programmers access to Domino and Notes services.
- LotusScript®, a cross-platform BASIC-compatible, object-oriented scripting language and integrated development environment.
- Microsoft Visual Basic.
- XAPIA Common Mail Calls (CMC), Vendor Independent Messaging (VIM) and MAPI APIs.

Customers can also choose from among hundreds of off-the-shelf Domino applications, or take advantage of the expertise of a Lotus Business Partner.

Domino Messaging Services

In the Lotus Messaging architecture, the Domino Server provides integrated services such as security and replication, which support the messaging application. Messaging, in turn, provides services like messaging routing and multi-client support form the foundation for an unlimited range of other, mail-enabled applications.

This section discusses key Domino services, which are fully integrated with Domino messaging and readily available to other applications: message routing, database services, directory services, security and replication.

The Uniquely Flexible Domino Message Store

The Domino Server message store is a highly flexible container that does not distinguish between messages and other objects: multimedia information in any form can be easily stored, managed and retrieved, whether via links or through manipulation by users or other programs. This design allows the Domino message store to serve as a database for use by all applications, not just messaging. Thus, customers need not deploy a separate infrastructure for mail and applications.

Since its own configuration parameters are also part of each instance of the message store, this information can be served to Web browsers and e-mail clients in their native format. This capability is part of the foundation for multi-client support in Domino, as well as for Web and multi-client applications.

Optimal Scalability and Reliability

To ensure adequate scalability for any purpose, the size of the Domino message store is limited only by the available hardware. A Domino message store can even span physical storage system boundaries. A highly optimized format minimizes I/O contention, so writes to disk are fewer and more efficient.

For the ultimate in reliability and protection from data loss, the Domino message store supports state-of-the-art transaction logging. Databases operations are recorded sequentially, reducing I/O activity while optimizing data integrity and speeding server restarts.

24x7 Availability

The Domino and Notes architecture features true 24x7 availability — there is no need to take a Domino Server out of service for routine maintenance. Multinational organizations and round-the-clock operations can always send and receive mail.

Message store backup; message defragmentation and compacting; database indexing; and testing/fix-up of data corruption caused by network or hard disk problems; can all proceed while data is on-line and in use.

Shared Mail

The Domino message store can optionally be configured to use “shared mail” (also called a Single Copy Object Store, or SCOS) — saving significant amounts of disk space and reducing message traffic. Whether a message is addressed to two people or hundreds, shared mail enables the server to store a single copy of the message in its object store. For example, if one user sends a 1MB message to ten people, the result would be one 1MB instance of the message in the object store, and ten associated pointers in various mail databases; a storage savings of nearly 9MB for that one message alone. On servers configured for shared mail, each recipient receives a message header, plus a pointer to the message in the server’s shared mail database. This model fully supports all mail operations (edit, forward, delete, etc.)

The Domino Router

With the rise of the Internet, SMTP/MIME has rapidly emerged as a standard protocol for message transport. To provide customers with the highest possible degree of message fidelity, interoperability and performance for standards-based messaging, the Domino router stores MIME messages natively as Notes items and objects. No conversion is required to receive or send HTML and MIME message content between Notes and the Internet. Thus, Notes users can exchange messages with Internet mail users with no loss of fidelity.

The Domino router offers high-performance, high-fidelity routing for both messaging and applications, across a broad range of protocols. For example, Domino customers that rely on multiple protocols can route messages over both SMTP and native Notes Remote Procedure Calls (NRPCs). For compatibility with current systems, NRPCs support a wide range of protocols.

In addition, the Domino router gives administrators new ways to reduce costs and improve network efficiency, including:

- Multiple routing modes
- Extensive anti-spam features
- Native Internet addressing support
- Comprehensive E/SMTP support

Multiple Routing Modes

Domino supports multiple routing modes, allowing customers to choose whatever method optimizes performance and cost for their organization. These modes are often used in an environment where on-premise servers are receiving mail from a host provider:

- Push Only. The default mode for both Notes and SMTP routing, and the routing method most commonly used. In this example, the Domino server could “push” messages to the Internet Service Provider (ISP) server.
- Push/Pull. This option may provide cost savings for some organizations. For example, it may be cost-effective for smaller deployments, because it allows one Domino server running SMTP to support Internet mail routing for an entire organization via a single dial-up connection. At a pre-scheduled time, the

Domino server sends any queued outgoing mail to the ISP, followed by a “request to initiate” command. The ISP then pushes the queue of messages to Domino, which routes them to recipients.

- Pull Only. This option gives organizations a way to define a connection for receiving mail only. For example, an organization may subscribe to one or more mailing lists pertaining to industry issues. Here, the ISP server dials into the Domino SMTP server at a pre-scheduled time, rather than vice versa.
- Push/Wait. Here, the ISP server “waits” for the Domino SMTP server to send a “request to initiate,” rather than polling at a pre-scheduled time. The source server then pushes queued messages to the destination server. This option offers yet another way to meet specific routing requirements, which may dictate that mail arrive only at specified times of day (off-peak times, for instance).

Anti-Spam Features

The router’s anti-spam features give administrators more control over routing settings, and help prevent unwanted mail from wasting valuable system resources and employees’ time. Domino implements all IETF “best known practices” and much more, including:

- Reverse host IP lookup, an extra security precaution which looks up and verifies the IP address of the connecting host server. If the name is not found the connection is refused.
- Verification of the sending domain; when enabled, Domino looks up the domain specified by the MAIL FROM command.
- Anti-relay, which prevents the relaying of messages from specific sending hosts or to specific destination domains.
- The ability to deny/allow mail sent via SMTP based on the sender’s address.
- The ability to deny/allow mail received via SMTP based on the recipient’s address.
- The ability to specify a maximum message size quota for users, and/or to automatically give large messages low priority.

Figure 5 shows some of the router's anti-spam controls.

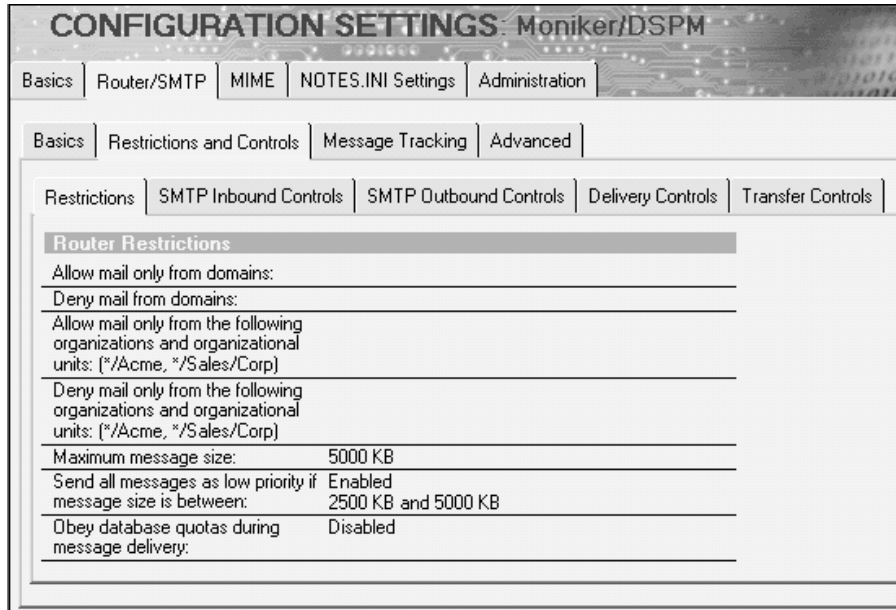


Figure 5. Domino anti-spam controls

Native Internet Addressing

Domino supports native Internet addressing; every user can have a Notes e-mail address, an Internet address, or both. This allows administrators to design a flexible messaging routing infrastructure that best meets organizational needs; for example, companies can now use the same address format for in-house use and external use.

Depending on whether it will be routed over SMTP or Notes Remote Procedure Calls, the Domino router automatically picks the appropriate address to use. A built-in tool can automatically generate unique Internet addresses for all users in the Domino Directory. New users are assigned an Internet address when they are registered.

E/SMTP Support

To optimize SMTP performance and enhance message presentation and fidelity, Domino supports the latest base SMTP specification (including RFC 2045-2049), plus the latest E/SMTP (Extended SMTP) specifications. Supported E/SMTP extensions include:

<i>RFC</i>	<i>Function</i>
RFC 1652	8-bit MIME over SMTP
RFC 1870	SIZE declaration over SMTP
RFC 1891	Delivery Status Notifications
RFC 1892	Multi-part/Report Content Type
RFC 1893	Enhanced Mail System Status Codes

continued

<i>RFC</i>	<i>Function</i>
RFC 1894	Message Format for DSNs
RFC 1985	SMTP Remote Message Queuing
RFC 2197	SMTP Command Pipelining

Enterprise-scale Directory Services

The Domino Directory, a scalable and secure infrastructure component with full LDAP V3 support throughout, can easily handle the directory requirements of even the largest enterprises, with proven support for millions of entries. Changes made in any instance of the Directory can be propagated throughout the organization by robust, secure Domino replication, which guarantees synchronization of all copies of the Directory.

Figure 6 shows the Domino Directory architecture. This architecture meets the requirements of both mobile and LAN-connected users for a smaller, more manageable directory, without compromising enterprise directory requirements.

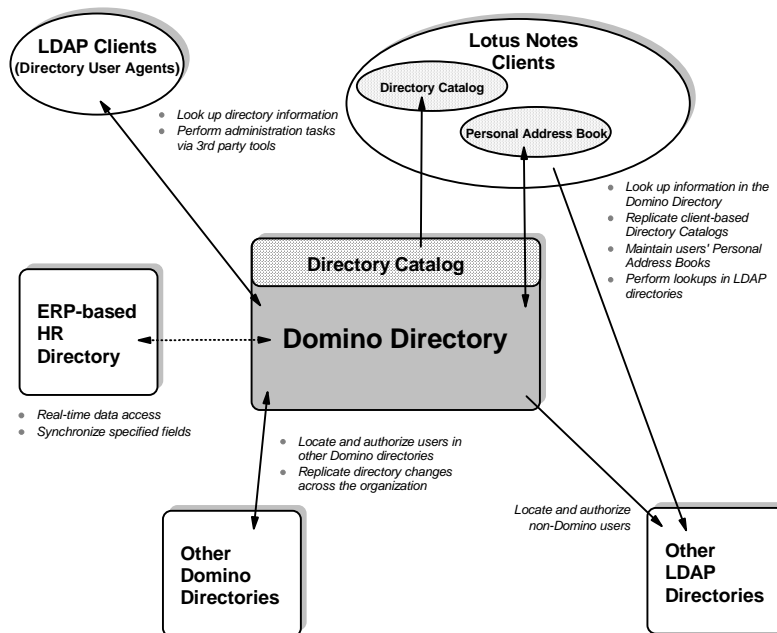


Figure 6. The Domino Directory architecture

The Domino Directory is a cornerstone of the Domino and Notes security model. It holds both the certificates used to authenticate all users when they log in; certificates, in turn, hold the public keys used for signatures and encryption. The Directory is also central to network management and configuration. It maintains users, groups, connection records, roles, and other means of access control that allow centralized (even off-line) management of the entire network infrastructure. Support for “Directory Assistance” enables Domino applications and Notes users to quickly search for information in directories in other Domino domains or in any LDAP directory.

The Domino Directory also supports delegated network management via access controls over fields in the Directory itself. Any field or group of fields can be restricted to a given user, group or role. Multiple levels of control over user access, down to the level of fields within documents, support delegation of responsibility for maintaining specific fields in the Domino Directory or specific network configuration parameters, etc. This allows management of enterprise mail server connections to be restricted to mail administrators, for instance, while delegating the maintenance of users' office locations to Human Resources.

As directories become rich and useful stores of information beyond mail addresses, the Domino Directory has the flexible delegation model to allow an appropriate mix of centralized and decentralized administration. Administrators can also delegate responsibilities to a role rather than a specific user, simplifying the enterprise-wide administrative hierarchy.

The Domino Directory provides support for an unlimited number of fields of *any data type*, for data such as department codes — even photographs and other graphics. Administrators can make changes to the number or type of fields (i.e., the directory schema) wherever and whenever necessary. Changes are replicated throughout the network, automatically synchronizing all copies of the Directory. Unlike some of its competitors, Domino does not require administrative staff to simultaneously update all copies of the Directory in order to implement a schema change. And Domino and Notes' ability to replicate only the parts of a Directory record that have changed (down to the field level) further reduce both replication time and network traffic associated with directory synchronization across the network.

The Directory Catalog

The Directory Catalog is a highly compressed version of the enterprise Domino Directory. It dramatically improves the speed of name lookups, and gives mobile users full access to e-mail addresses even when disconnected from the network.

The Directory Catalog provides both LAN-connected and mobile/disconnected users with type-ahead addressing, name lookups, and local LDAP searches. The degree of compression is impressive: for example, the IBM worldwide Domino Directory (over 300,000 entries) resides in a Directory Catalog well under 50Mb in size.

The Notes Personal Address Book

As an adjunct to the Directory Catalog, Notes users have a "Personal Address Book" on their Notes desktop. A Personal Address Book can contain arbitrary contact information, such as birthdays and other personal notes, and is not synchronized with the enterprise Domino Directory. When resolving an address, the Notes client automatically "cascades" from the Personal Address Book to the Directory Catalog (if available) or the enterprise Domino Directory.

LDAP Support in Domino and Notes

The Domino Directory supports the latest industry standards for directory access (LDAP), so it can participate in a multi-directory environment. LDAP, the Lightweight Directory Access Protocol, is a common protocol for accessing information stored in directories. It lets clients that support LDAP search directories on servers also running LDAP. The main purpose of LDAP today is to make it easier for users to properly address e-mail.

Domino supports the latest release of LDAP (currently LDAP V3). LDAP support in Domino lets mail clients, applications, and servers securely access directory information. An organization's employees can access the Domino Directory from a Web browser as easily as from a Notes Client. In addition, organizations can make appropriate directory information (such as a "white pages") securely available to users of Web browsers and Internet clients outside the corporate firewall.

Robust security allows customers to specify exactly what directory information is visible to LDAP clients and how searches can be configured. Domino provides the following security features for LDAP searches:

- Basic password authentication, to authenticate users and groups in external directories.
- Secure Sockets Layer (SSL) connections; for additional security.
- Anonymous connections, which provide a way for the general public to access "white pages" without authentication, while restricting access to all other directory contents.

To maximize integration with other directories, the following features are also provided:

- The ability to use the Domino HTTP server to authenticate clients using a different directory. This enables organizations to utilize an existing LDAP directory with passwords, X.509 certificates and other information for non-Notes users (and for Notes users, if desired).
- "Directory Assistance" to resolve LDAP lookups in non-local directories; such as the Four-11 public directory, or intranet LDAP directories like NetWare Directory Services (NDS).
- Full support for the LDAP Data Interchange Format (LDIF) standard for importing and exporting directory information between LDAP servers. An LDIF file contains a series of records, each of which describes a directory entry. Exported directory information can be imported into another LDAP directory via an import utility. A Domino Directory can be synchronized with a Windows NT Active Directory via LDAP, for example.

Alternate Name Support

Alternate name support allows users of Notes clients or Web clients to display their names one way for recipients who share their language, and another for those who don't. This allows users to represent their names in their local language format — a critical feature for multinational organizations, or anywhere that cultural or national conventions are important.

Besides making e-mail more friendly, this feature can also greatly simplify user/group administrative tasks. And, unlike other implementations, alternate names in Domino provide the same access and security privileges as the user's primary name. Users can also send mail to, and search on, both names.

Robust Security Services

All components of the Domino and Notes architecture utilize the proven Domino security model, widely regarded as the most robust and flexible in the industry. The Domino and Notes Public Key Infrastructure (PKI) is by far the most widely deployed security infrastructure in existence. Domino can also be a Certificate Authority (CA), issuing X.509 certificates not only to Notes clients, but also to other clients like Web browsers.

Public key authentication eliminates the need to transfer passwords across the network. Used along with each user's Private Key, it makes possible digital signatures and end-to-end encryption of messages.

The Domino and Notes architecture provides four levels of security:

1. Authentication, which reliably verifies that users seeking access to network resources are who they claim to be.
2. Digital signatures, where Domino Servers and Notes Clients verify the authenticity of the sender, and ensure that the information received was not modified during transmission.
3. Access control, for specifying who can use a resource and what they can do with it. Access control is applicable to servers, individual databases, documents (including those referenced via links) and fields within documents.
4. Encryption, for secure communication of information between individual users. Encryption can be applied to:
 - Databases, including documents and fields within those databases, whether they are located on servers or clients.
 - Data in transmission channels, including both bulk data transmission between servers and client-to-server transmission. This permits secure transmission across non-secure media, including the Internet.

Features built from these basic security capabilities include:

- Roles-based access, which permits safe delegation of administrative responsibility.
- The ability to use Domino as a Certificate Authority (CA), issuing X.509 certificates not only to Notes clients, but also to other clients like Web browsers.
- Certificate revocation, to instantly deny all access to users whose authorization is revoked. Password expiration allows Domino administrators to enforce an expiration period on passwords for Notes user IDs.
- Secure Internet access and publishing. End-to-end encryption allows for secure communication among Domino Servers via the Internet. Domino fully supports Secure Sockets Layer (SSL), for server authentication and data encryption. Web browsers can be authenticated based on user name and password; administrators can fine-tune browser access based on predefined roles.
- X.509 certification provided by third-party Certificate Authorities (or by a Domino-based CA), enabling bi-directional encryption between a browser or other Internet client and the Domino Server.
- Execution Control Lists. Many Web technologies, including e-mail, Java and HTML, can contain an embedded object. These objects, when they take the form of mail bombs, Trojan horses or viruses, can be used to compromise the security of recipients' systems and data. To mitigate the risk associated with this malicious use of technology, Domino provides Execution Control Lists (ECLs) to control the actions that embedded objects can perform. ECLs specify what programs (based on the certificate of the sender) can be trusted to execute on the desktop, and whether a program that can run can read and/or write data.
- Encryption of local databases. Domino Servers and Notes Clients use the private key to perform the encryption, providing secure password protection. Private key encryption functionality also enables administrators to enforce local security (including the enforcement of access control levels), ensuring that data is secure when end users or third parties replicate a protected database.
- Dual Key Pairs. For additional security, Domino and Notes give customers the option to issue a separate pair of public/private keys for signing messages, and another pair for encrypting/decrypting messages.

High Availability

For customers requiring the utmost in scalability and reliability, such as Internet Service Providers offering Domino-based services or enterprise customers with large-scale messaging deployments, Lotus offers clustering and partitioning with the Domino Enterprise Server.

Domino Server Clustering

Domino clustering includes failover and load balancing. Clustering permits a gradual increase in capacity by adding servers to the cluster as demand increases. Load balancing and failover ensure high availability by distributing the workload across the cluster, and automatically switching processes to another server if a server goes down. Real-time replication ensures that applications hosted on servers in a cluster remain synchronized. Domino clustering works across operating systems, Domino versions, and locations.

Domino Server Partitioning

Partitioning allows a single server platform to host up to six separate Domino server applications (depending on hardware and operating system limitations), while still providing the same level of security and reliability as the equivalent number of separate physical systems. Partitioning allows customers to leverage maximum benefit from highly scalable Domino platforms like UNIX, AS/400 and S/390.

Proven Replication Services

Domino replication technology maximizes off-line productivity, supporting by far the most comprehensive and convenient messaging support available for “road warriors” and telecommuters. Domino gives mobile and remote users full-fidelity access to all their important Domino-based information, through efficient, reliable replication of mail files, calendars and directories (in addition to discussions and other applications).

For example, users can choose to download subsets of their mail to save time and space on their laptops; for instance, their inbox and drafts but none of their folders. For Notes users, Domino also supports selective downloading of specific parts of documents, such as message headers only, or the full message minus any attachments, for additional time and space savings. Users can even download part of a message and request the rest later. Notes provides constant feedback to the user during replication on the number of documents remaining to be downloaded and the estimated time required.

Domino’s ability to replicate only the parts of a database that have changed — down to the level of fields within documents — further reduces both replication time and the message traffic associated with replication of mobile databases and directories.

Domino and Notes also support replication of a compressed subset of corporate directory information specifically tailored to mobile Notes users. The Directory Catalog includes only those fields deemed necessary for fast, easy mobile use (such as names, phone numbers and e-mail addresses); it takes up only a fraction of the disk space required by the complete directory. The Directory Catalog makes it both feasible and convenient for mobile Notes users to locally maintain an up-to-date corporate directory.

Location profiles let Notes users and Domino administrators pre-configure important settings for any location from which mobile access takes place:

- Communication method and related parameters
- Connection interval
- Scope of replication (send only, receive only, receive message headers only, etc.)

Location profile information can be pre-configured by administrators and distributed to clients. Once a location is set up, all a user must do to access a Domino server from that location is select its name from a pop-up menu. A mobile user returning at the office, for instance, might switch from the “Dial-up” to the “Office” location profile, which would automatically reconfiguring Notes for LAN access.

Domino Administration and Management

The superb manageability of a Domino and Notes messaging system lowers the cost of ownership of the enterprise mail network by facilitating centralized control of policy-making and monitoring functions, while giving customers the option to distribute administrative functions as appropriate.

Via one intuitive interface — the new Domino Administrator — IT staff can monitor and control every aspect of the Domino infrastructure, such as user/group management, configuring e-mail clients, upgrading users from other mail systems, message tracking, monitoring and reporting, and more.

Many common administrative operations are automated. For example, changing a user's home server is a drag-and-drop operation. Domino takes care of moving the mail file, modifying the Directory, even changing desktop settings. Administrators gain greater productivity and greater control with this powerful and flexible tool.

Task-oriented Administrative Interface

Figure 7 shows the Domino Administrator's main window. The left pane provides a hierarchical view of the entire Domino deployment. The tool bar makes a variety of commonly-used functions like disk status checking, database compacting, and database move operations available with a single mouse click.

Tabs logically organize the presentation of information by task. For example, the Files tab lets administrators easily manage files and applications. The People and Groups tab provides a common interface for all user and group management processes, like user registration and certification. From the Monitoring tab, administrators can view a graphical representation of all their servers, tasks statistics and IP services. From the Messaging tab, shown below, administrators can initiate a mail trace, view and manipulate their routing topology, view scheduled reports and more.

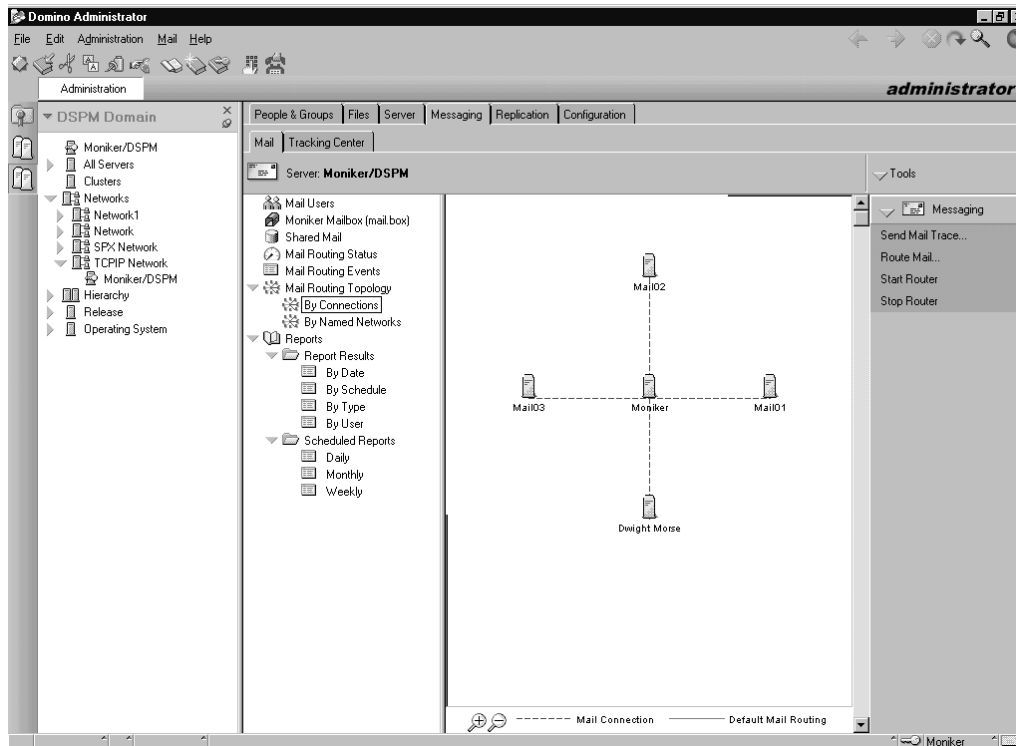


Figure 7. The Domino Administrator main window

Centralized Configuration Management

Domino lets administrators centralize configuration management, reducing the skill level required at remote sites. For example, all server connections can be defined centrally in the Domino Directory and replicated across a distributed organization. Similarly, configuration parameters established at install time can be replicated to other servers and used to automate their configuration. These capabilities make it easy for organizations to implement a standardized methodology for rolling out new servers.

With Domino and Notes, administrators can choose between delegating or centralizing responsibility for maintaining the Domino Directory. Forms-based directory maintenance lets administrators add or delete users by filling out a form. Some aspects of directory management can even be automated, such as using Domino Enterprise Connection Services (DECS) to synchronize the Domino Directory with other databases maintained by departments such as Human Resources or Payroll.

User and Group Management

Adding and deleting users, updating their account settings, etc. can consume a high percentage of administrators' time and effort. The Domino Administrator makes these everyday tasks simpler and faster to perform.

User registration is simple, for example, as Figure 8 illustrates. Administrators can set password quality, mail quotas, Internet addresses, mail settings and other parameters on a single screen, or move a user to a new server with drag-and-drop ease. By clicking the Groups button a user can instantly be added to a group. The Other icon is used to automatically add Windows NT users and groups to Domino.

Register Person -- New Entry Moniker/DSPM

Advanced

Basics

Mail

ID Info

Groups

Other

Registration Server... Moniker/DSPM

First name M| Last name Short name

Joe | User JUser

Password Password Quality Scale

Weak Strong

Set internet password Acceptable user password (8)

Internet address Internet Domain

JoeUser@Lotus.com Lotus.com Format...

The Internet address (above) is created using the person's name (above), the internet domain and internet address format components. You can also edit the internet address directly. It must be unique in the address book.

Add person Import Text file... Migrate people...

Registration queue:

User Name	Registration Status	Date
-----------	---------------------	------

Register All Register Delete Options... Done

Figure 8. Domino group management

Built-in Upgrade Services

Lotus and IBM are committed to giving our customers control over their upgrade process. Recognizing that each e-mail implementation is unique, we provide a range of tools, training, support and consulting, to ensure that each customer has the resources they need make a smooth transition to Domino messaging.

Domino includes built-in upgrade services for Lotus cc:Mail, Lotus Organizer, Microsoft Exchange, Microsoft Mail, Novell GroupWise and Netscape Mail. These tools significantly reduce the effort and expense required to upgrade an e-mail network to Domino. Open APIs allow Lotus Business Partners and third-party developers to create custom upgrade services.

Customers can automatically move users and their mail files (singly or in groups) from supported systems to Domino using only the Domino Administrator, as shown in Figure 9. Users can also be imported automatically from any LDAP directory. Future releases will support auto-import from the Windows NT Active Directory, when it becomes available.

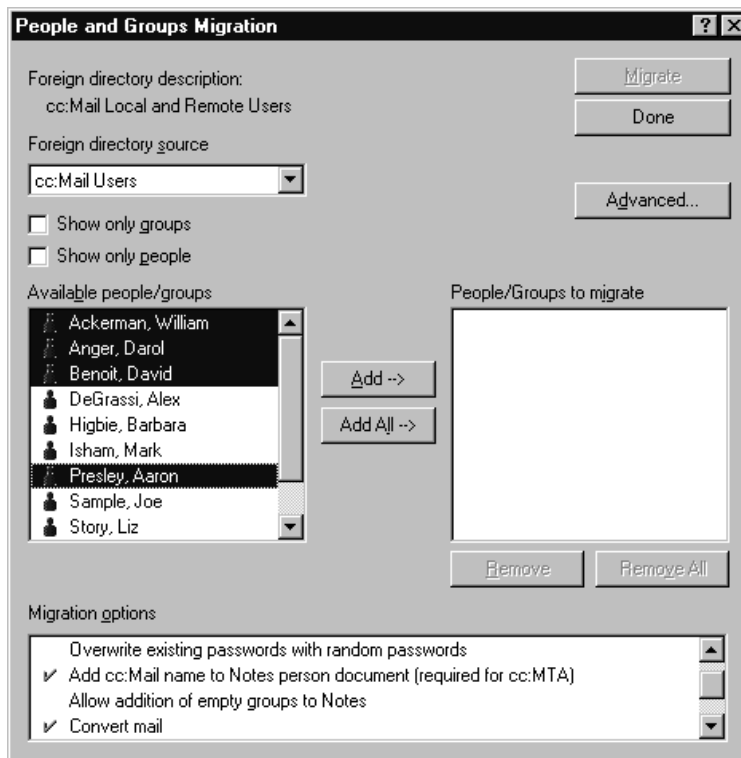


Figure 9. Automatically moving users to Domino

Dynamic Client Configuration

Dynamic client configuration gives administrators more control over users' desktops, reducing support and Help Desk costs while making life easier for end users. User Setup Profiles are used to configure new bookmarks, update customizable user interface parameters, and configure connections and security settings for new users. This helps ensure, for instance, that all team members have the latest versions of all the applications they need on their desktops. It also makes it easy to configure different "Welcome" pages for different groups.

Figure 10 shows an example User Setup Profile for the SALES group. New bookmarks for the Lead Management, Benefits Enrollment and Sales Discussion databases will be added to the desktops of these Notes users the next time each of them logs on to get e-mail or interact with a Domino application (or immediately, for LAN-connected users). A new copy of the Directory Catalog will also be added to their desktops.

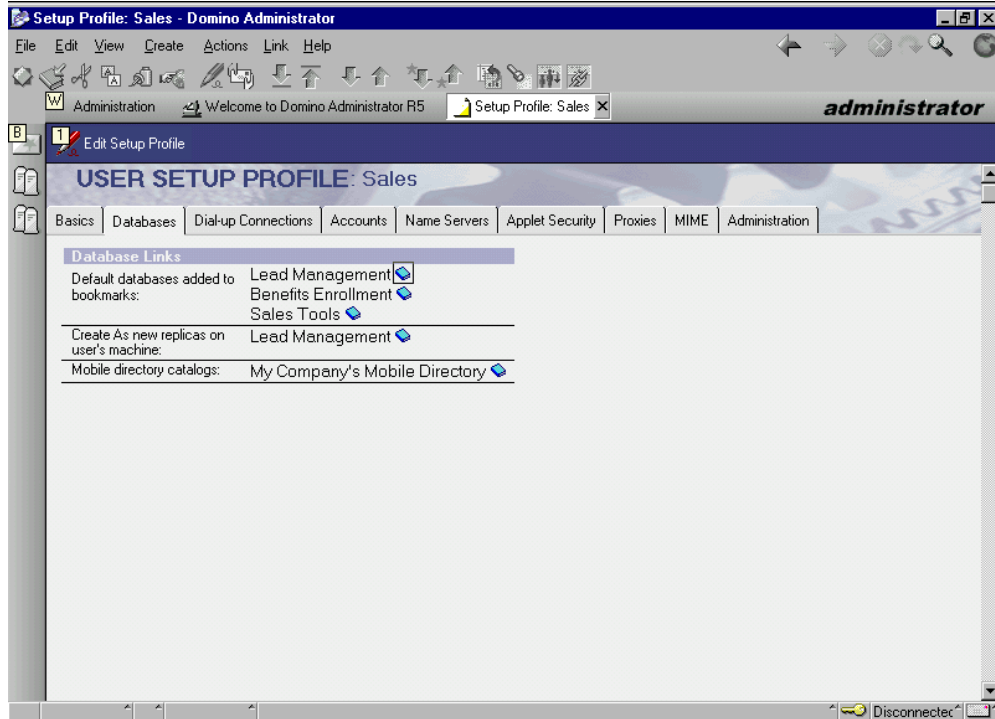


Figure 10. A sample User Setup Profile

Message Routing Control

The Domino Administrator offers full control over the router configuration, in order to optimize it for each deployment's specific needs. The result is increased system performance, reduced communication costs and better security. (Domino message routing is discussed above.)

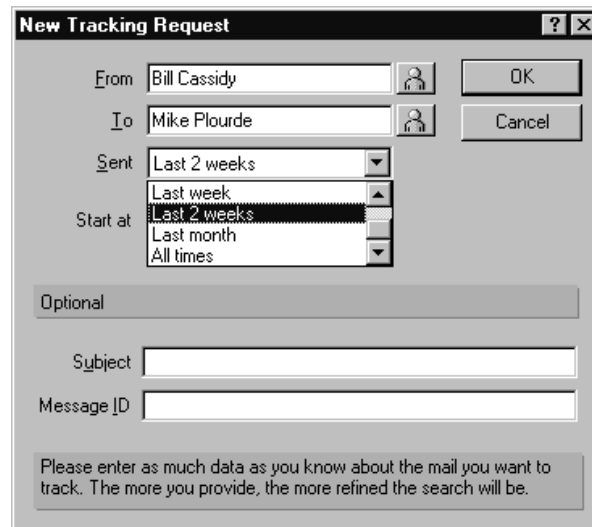
With point-and-click ease, administrators can:

- Configure the router type (Push only, Pull only, Push/pull or Push/wait).
- Control the delivery of inbound and outbound messages based on size, time of day and other parameters.
- Set anti-spam controls, to block messages from specific addresses or domains, stop messages based on their size, and more.
- Configure SMTP/MIME settings
- Set Domino startup parameters; these are defined in the Domino Directory and are automatically replicated to other servers across the network if desired.

Message Tracking

With Domino servers, authorized administrators can track any message; end users can also track their own messages. The ability to track messages helps verify system status with respect to both routing and performance.

The settings in the Domino Administrator (shown in Figure 11) offer flexible, fine-grained control. For example, administrators can choose to “turn off” message tracking for specific users, such as executives. Or, messages can be logged by subject. Messages can also be tracked via Domino's Web administration interface.



New Tracking Request [?] [X]

From: Bill Cassidy [Person Icon] [OK]

To: Mike Plourde [Person Icon] [Cancel]

Sent: Last 2 weeks [Dropdown]

Start at: Last week [Dropdown]
Last 2 weeks [Dropdown]
Last month [Dropdown]
All times [Dropdown]

Optional

Subject: [Text Field]

Message ID: [Text Field]

Please enter as much data as you know about the mail you want to track. The more you provide, the more refined the search will be.

Figure 11. Domino Message Tracking

Message Reporting

The Domino Administrator enables authorized administrators to create a broad range of graphical messaging reports, including eleven predefined report types. Reports can be generated on demand or scheduled automatically. Better message reporting helps administrators proactively address problems and maintain optimal network efficiency. Available standard report types include:

Top 25 users by number of messages	Top 25 receivers by number of messages
Top 25 users by message size	Top 25 receivers by message size
Top 25 senders by number of messages	Most common message routes
Top 25 senders by message size	Summaries of mail delivery by volume

Report data is stored in Notes format so that administrators can easily generate custom reports. Figure 12 illustrates a request for a report on which users sent the largest total volume of message data over the past week.

Figure 12. Messaging reporting using the Domino Administrator

Monitoring

Domino monitoring provides real-time status information on servers, services, users and mail queues. For customers with mixed environments, it works with R3, R4 and/or R5 servers. Monitoring gives administrators complete, graphical control over which servers and server tasks are monitored, and what events (mail events, replication events, etc.) and statistics (number of messages delivered, total number of mail messages routed, minimum delivery time per message, etc.) are gathered. Consistent server monitoring is critical for proactive troubleshooting and capacity planning.

Web-based Server Administration

Designed to offer greater convenience and flexibility for administrators, Domino's Web-based administration capabilities allow many common server management tasks to be performed from any convenient location via the Internet or intranet, using a Web browser.

With Domino's Web administration capabilities, authorized browser users can securely and easily:

- Check server statistics like the number of mail messages in the queue, and the amount of disk space and/or memory available
- Access and edit server configuration documents
- Manage database access controls
- Access and review server logs, replication events, routing events and shared mail
- Add, edit, and delete users or groups in the Domino Directory
- Use the remote server console
- Create, delete, compact, index and replicate databases
- Create mail reports (e.g., the top 25 users by number of messages)
- Track mail messages
- Change Domino server configurations (NOTES.INI)
- Access Domino Administration Help

Figure 13 shows the Domino Web administration interface being used to check server disk space utilization.

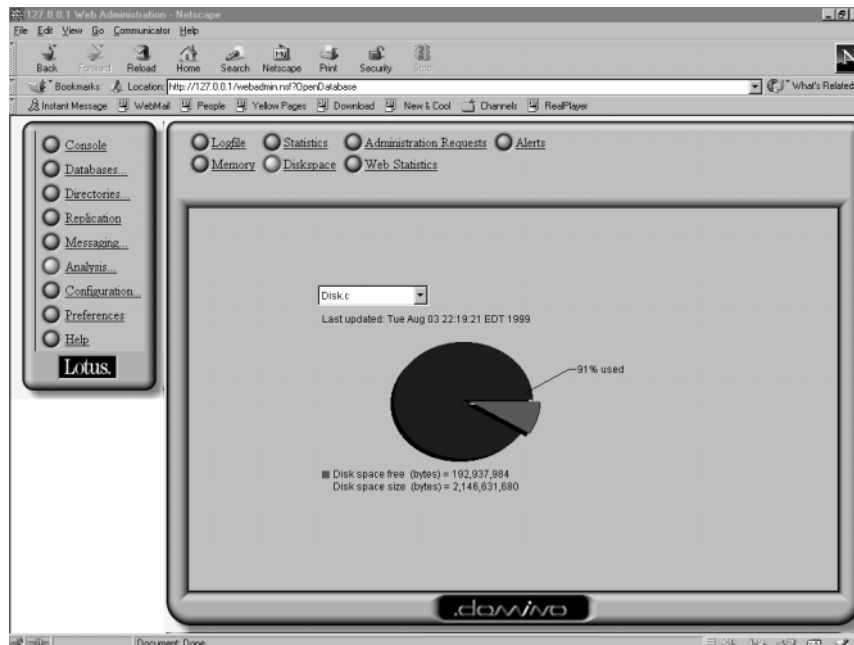


Figure 13. The Domino Web administration interface

Integration with Enterprise Network Management Architectures

Lotus Development and vendors of the messaging industry's leading system management architectures have integrated Domino monitoring and control features with enterprise system management solutions. Customers can easily manage Domino and Notes with the same tools they use to manage their distributed computing environments, like Tivoli TME-10, HP OpenView, Sun Net Manager, Computer Associates Unicenter, BMC Patrol and Candle CleverWatch. Network administrators or Domino administrators can view the status of the entire network from a single access point.

Because organizations make decisions about how to manage their network independent of the decision about which messaging, Internet and groupware/intranet product(s) they will deploy, Domino and Notes let customers leverage existing resources and expertise — while providing the industry's most robust, scalable and high-performance management solutions for enterprise messaging.

Integration of Domino and Notes with customers' corporate management strategies reduces the cost of ownership, while increasing reliability and predictability. Integrated management facilitates the automation of commonly performed tasks, decreases staffing requirements, and minimizes the need for Domino- and Notes-specific knowledge on the part of administrators.

Integration with Windows NT

Domino's integration with Microsoft Windows NT is unsurpassed among client/server messaging systems, including Microsoft Exchange. NT integration features in Domino include:

- Directory synchronization of user and group addition/deletion between the Domino Directory and the Windows NT Registry.
- A single log-in for the NT Domain and Domino, for users of Notes Clients running on Windows NT.
- Password synchronization between NT Internet user passwords and Domino HTTP passwords.
- Administrators can register multiple users in Windows NT when registering them with Domino.
- Domino runs as a Windows NT service.
- Since Domino runs as a Windows NT services, it can be monitored from the NT Performance Monitor.
- A direct Remote Access Service (RAS) interface; RAS can be used to access Domino servers as well as NT network services.
- The Domino Enterprise Server's clustering, application failover and load balancing work alongside, and complement, Microsoft's less comprehensive "Wolfpack" clustering for NT.
- Notes client software can be distributed to users' desktops via the application distribution capabilities of SMS.

- Domino log information can be directed to the NT Event Log, so administrators can view all events in the NT Event Viewer.
- Domino can use IIS as its HTTP stack.

Year 2000 Readiness

Lotus Domino Servers and Notes Clients meet the Lotus and IBM criteria for “Year 2000 Readiness.” For the latest information on Lotus and IBM policy regarding Year 2000 readiness, and on resources to help support the transition to Year 2000, please visit www.lotus.com/y2k.

Conclusion

For many organizations, the current or perceived future need to cost-effectively create “e-collaboration” solutions has made the choice of messaging vendors the single most important IT decision. Lotus Messaging delivers immediate value with best-of-breed e-mail, while providing a value-add path to advanced messaging and collaborative solutions.

With Lotus Messaging, companies can expand opportunities and revenues by managing time and resources more effectively; communicating with customers, partners and employees more effectively; and reducing cycle times across a broad spectrum of processes.

A vendor’s vision is also part of its value proposition. For Lotus and IBM, messaging is not a commodity: it is our business focus. Our leadership vision in this market has long set us apart, and our products and services set the standard for innovation. Along with our thriving community of Business Partners, Lotus has the messaging services and solutions today that organizations need to grow and to embrace new business challenges.

For More Information

To learn more about Lotus Messaging products, contact a local Lotus sales office or visit the Lotus Messaging Home Page at www.lotus.com/messaging.



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