Domino Rnext
Technical Overview

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Please note: This technical overview is a draft. It will be updated with each new preview or beta release, resulting in a finished article with the gold release of the next major release of Notes/Domino.

With the release of Domino Rnext, Lotus continues to play a major role in the eBusiness revolution. To meet the challenges of business globalization, frequent mergers and acquisitions, and the increasing demand for Web-based business tools, Lotus has combined both evolution and innovation in its latest upgrade of Domino server technology. The features in Domino Rnext build on the features in Release 5 to address rapidly changing industry trends and meet their challenges head on. Rnext innovations provide the latest in Web server technology, including improvements in security, new hosting features, and changes in directory structure, all designed to improve server performance and reduce the cost of running your business. Rnext also continues to provide innovative collaborative Web services. And you can still build a single application that works the same way for both Web and Notes clients.

Server Scalability and Performance

Domino Rnext includes a number of enhancements to server scalability and performance.

IMAP server

Earlier releases of Domino were based on a layered approach to the IMAP server. This approach made quite a few demands on the server, and as a result, affected server performance. In Rnext, we have redesigned the server so that core IMAP semantics are implemented in NSF. The new thread model also allows you to stream operations between NSF and the IMAP client. In addition, Multipurpose Internet Mail Extensions (MIME) storage has been improved and streamlined.

Replication

Mail messages are getting bigger every day, and more and more often they have large attachments. In Release 5, you had the option to truncate large messages, but that feature was limited: if you had small attachments with a mail message, they would automatically be truncated as well. Now you have the option to specify whether to truncate the message itself, or to truncate the attachments. You can also use a slider to control exactly at what size Domino should start to truncate.

A new streaming replication feature also improves mail server performance. Streaming replication involves a single server request, which then pulls in all the data (Notes documents and their attachments) in the database. This feature dramatically reduces replication time, and works in all client/server scenarios.

In addition, you now have the option to replicate documents in ascending size order. With this new design, you no longer have to wait until the replication is over before seeing replicated documents in folders. They appear individually, as soon as they are pulled into the system. You can also begin to work on the replication before the database has finished replicating.

Client/server interactions

Client/server interactions are also more efficient in Rnext. For example, an advantage of the new streaming feature is that, because attachments are also streamed, Open and Save operations are more efficient. Client/server interactions are also dramatically improved by less frequent unread table exchanges, as there is a significant reduction in the number of bytes exchanged between client and server.

The administrator client server console has also been improved. For example, server event messages are color coded by severity, and we've associated event severity with unique icons. You can customize event message colors and modify both server and local console colors. You can also filter specific types of events from the console display.

Another performance enhancement is the use of incremental view reading, used to update design information and, in selected cases, user views. For example, when you move a document from one folder to another, the server is requested to provide just the incremental change it will take to fill the screen with the new view.

Network compression

Rnext has a new, optional network compression feature to enhance server performance. Network compression reduces the number of bytes sent during transactions by approximately 50%. Fewer packets result in fewer collisions on heavily loaded Ethernets. To use network compression, you must enable it on both the client and the server.

Formula engine

The Rnext formula ("Compute") engine has had a major overhaul, resulting in computation performance one to two times faster than in previous Domino releases. The formula engine now includes view selection expressions, view column formulas, and forms.

Full-text search

The Domino Rnext full text search feature has also undergone major changes. Most data is now updated in place. In addition, Domino uses the NSF buffer manager for memory services, which improves caching and balances memory between NSF and FT. Furthermore, a new search processor results in closer integration of text and field retrieval and significantly faster Boolean processing.

Server startup and server performance

Rnext optimizes server startup to speed recovery and improve uptime. Improvements include:
- Transaction logging of key views, which assures that you won't need to rebuild those views should the server crash.
- The ability to log information about the availability index, which reports back the health of the server. This index will more consistently indicate the state of the clustered server and make cluster load balancing easier to administer.
- Optimized process starts also improve server performance.
- Optimization of the agent manager startup procedure avoids opening all databases, and therefore slowing server performance.
- Optimization of the schedule manager to reduce overhead on server startup.
- Inclusion of a persistent directory manager cache.
- Enhanced cluster support, including automatic detection of software failures and automatic fault recovery—now available across all Domino platforms.

Web Application Platform

Lotus recognizes that the Internet is a heterogeneous environment. As a

result, Rnext supports alternative Web servers. In Rnext, you can plug in either Apache—the world's most popular Web server—or Netscape in much the same way you can plug in the IIS Web server in earlier releases.

The Domino server is designed as a cross platform product so that you have a choice of both hardware and operating system. We support simultaneous development and testing across Windows and Unix platforms, and virtually simultaneous development and testing across the IBM iSeries and zSeries as well.

Rnext integrates and refines the most current Web technology, including:
- Apache Tomcat
- Netscape Enterprise Server
- MSFT IIS
- Servlet 2.2 container
- JSP 1.1 processor
- J2EE API's, including JNDI 1.2, JavaMail 1.1, JDBC 2.0, JAF 1.0

The Domino Rnext server supports NSF as a packaging and distribution vehicle for your Web applications. It also supports offline applications with Domino Off-Line Services (DOLS).

Improvements to Domino Rnext in its role as a Web application platform were the result of three main goals:
- Move to a complete, standards-based programming model.
- Improve performance and scalability.
- Rearchitect external HTTP stack support.

Standards-based programming model
Domino Rnext uses a standard J2EE programming model, which includes the following features:
- Servlets
- Java Server Pages
- Java Beans
- Custom tag libraries (to help developers access Domino services easily, without having to write low level Java code)
- Variety of programming interfaces (i.e. JDBC)

The programming model also integrates the Bean Scripting Framework (BSF) to support other languages, such as LotusScript. Using the Rnext programming model, developers can work together to create robust applications using LotusScript, Java, and other languages—all in the same application. Domino Rnext provides sets of tags that provide quick access to Domino databases and Domino objects. You can use a third party design tool along with Domino Designer to aid in more efficient application-building collaboration—and still keep the power of the Domino backend.

The Java Server console runs on any supported Domino platform and has the same features as other consoles—and more. You can issue native operating system commands from the console. You can also connect to multiple servers simultaneously, and to specific server "groups," to send commands to a group of servers at the same time.

Server Framework
The Domino Web application framework includes the following:
High level tags and JavaBeans to allow for easy integration with the Domino platform, including:
- Mail, C & S, Discussion, Team Place, and Workflow
- Lower level tags to allow the building of Web applications at the View, Form and field level.
- A client side framework to enable the creation of rich Web clients that include the following features:

Menus
Navigators
Validation
Rich text editing

Furthermore, any Web application created in Domino will be Web container
agnostic, and can run in containers such as WebSphere and BEA.

Performance and Scalability
The Web application platform includes a number of features that enhance
both performance and scalability. These features include:
- Single sign-on across clusters
- A rearchitected HTTP stack
- Improved servlets and JSPs to provide better performance than R5
  Web agents
- Server-wide design note cache, shared design

Domino Hosting Features
The Domino Rnext server includes new hosting features that allow multiple
organizations to be transparently hosted by a single logical Domino server.
This virtual server feature simplifies server administration and application
support, and meets the challenges raised by company acquisitions and
mergers. Hosting features offer the following benefits, discussed in detail
below:

Virtualization
Virtualization dramatically reduces the complexity of server administration.
The administrator works with only one server, yet each organization on that
server can function as if it is hosted by its own unique server. For example,
each organization has its own HTTP application and file locations. The
server also has organization-specific authentication controls. Access
Control Lists (ACLs) ensure that organization-private databases remain
secure; however, multiple organizations hosted by the logical server can
also access shared databases.

Scalability
Scalability features include the following:
- Support for a configuration-only directory to improve server
  performance
- Virtualization of the Domino Directory and name lookup to provide
  excellent performance for any size directory
- Support for the use of a network sprayer to put different protocol
  servers on different hosts for the same organization

Availability/reliability
Rnext's optimized startup procedures improve recovery time, and improve
uptime. In addition, Domino's enhanced cluster support provides the
following features:
- Operating system cluster support for redundant CPUs and disks for
  recovery from hardware failures
- Domino cluster support for recovery from hardware failures
- Automatic detection of software failures
- Automatic server restart, with improved restart speed on all platforms
- Automatic fault recovery

Total Cost of Ownership (TCO) reduction
Rnext includes a number of administration features that give you powerful,
centralized control over Domino, reducing your administrative tasks, as well
as reducing your TCO. For example, Rnext includes server access control
lists, which allow you to securely delegate different levels of administration
to different administrators.

Rnext also introduces policy-based management. A policy is a collection of settings related to end users that can be applied either retroactively to existing users or to new users when they're entered in the system. Policies give you more control over the end-user/client environment, and they go well beyond the Release 5 profiles. They also simplify administration. They are easy to set up and apply, and, because they use a parent/child, hierarchical model, they are easy to extend.

Domino Rnext enhances administration features to support both ASP administration of end users and organization administration of end users securely. You also have the ability to generate bills and reports on a per organization basis. In addition, the new activity logging service provides consistent and complete reporting, which can easily be broken into organization reports. The HTTP log can also be easily broken into organization reports.

SmartUpdate architecture
Domino Rnext includes a new feature called Smart Update. A major cost of deploying Domino in the past has been upgrading all the desktops in a system. Smart Update lets you install upgrades at the desktop level with the push of a button. Desktop policies specify installation and upgrade information so there is no longer any need for you to upgrade each desktop individually. Once the new version is installed, the system shuts down and restarts automatically.

RedZone
Domino Rnext has a new feature called RedZone, which monitors server performance and charts statistics based on that information. It also offers suggestions for improving server performance.

Statistics and Tools
Another innovative capability in Rnext is a set of tools to analyze the wealth of statistics and information you have about each Domino server, and about your domain of servers. These tools can help you plan and run individual systems, as well as your whole domain, more efficiently.

Changes to directories
A major goal of Domino Rnext is to make Domino easy to integrate in a multi-directory environment. Large enterprises are beginning to see the advantages of a centralized directory configuration, as it gives them more control and less overhead and is, in the end, easier to manage. With Domino Rnext, you have the option of moving from a distributed directory architecture and making Domino the central directory. If you do this, you only need to store the complete Domino directory, with all of its person and group information, on one central server. You can then store the smaller configuration directories with Domino specific data on the other servers in your domain. The centralized directory information is available to all users, but you save on disk space because you no longer need to store the whole directory on each server. You also save on time, as you are no longer required to replicate your directory across all the servers in your domain.

We have enhanced the implementation of LDAP capabilities and improved the performance of LDAP directory access.

New Security Features
In the 1990s, Lotus was one of the first companies to use public key encryption, and we continue to lead the way in security. Rnext recognizes the fact that today's computing environments are heterogeneous, using different clients (for browsing and messaging), different servers, different security protocols, and even different security vendors, each providing a different security component, such as certificate authorities, single sign-on servers, and firewalls. For example, a company might run Notes and

Outlook clients for secure messaging (with Domino and Exchange backends, respectively). Those clients might in turn be issued certificates from Verisign. To maximize this kind of environment, Rnext provides the following support for new security standards:

- Smartcard support
- S/MIME enhancements
- Single sign-on (so users don't have to remember multiple usernames and passwords and only need to be authenticated once)

New certificate authority
Domino's new optional certificate authorization process gives you integrated registration of Notes keys and Internet keys. The certificate authority process is a "locked box" task that runs on the server and lets lower echelon administrators perform certification tasks without access to the certifier ID or password. The process of granting certificate authority is also simple to perform: You load the certificate authority server task, and, in a dialog box, designate those administrators authorized to use that particular certifier.

Internet password management
Domino's HTTP password management provides the administrative function you need to protect your Internet environment. HTTP passwords are synchronized with Notes ID passwords, and as administrator, you can more easily manage password quality, as well as expiration and change intervals.

User security panel
The new user security panel let you use one common user interface to manage all of your security features.

Messaging

New products, including iNotes Web Access and Domino Everyplace Servers, are extending access to Domino's messaging infrastructure, from desktop to laptop, to the Web, to cell phones, and Palm Pilots, you'll be able to access the power of Domino Rnext from almost anywhere. In addition Rnext includes powerful features for managing and controlling your messaging infrastructure.

For example, you can filter mail content to stop the flow of SPAM through your routers.

You can integrate anti-virus tools and other third-party applications through SMTP hooks that let you integrate at a lower level and improve performance. You can also automatically append corporate disclaimers to outgoing mail to protect you from litigation or confidentiality issues. Finally, mail file quota management lets you control the size of your users' mail files so that you can better manage disk storage.