

***Functional Comparison of Novell Open Enterprise
Server/eDirectory and Microsoft Server 2003/Active Directory***

P r e p a r e d f o r :

Novell.

November 9, 2005

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Introduction

The following is a functional comparison between Novell's Open Enterprise Server/eDirectory and Microsoft Server 2003/Active Directory. It has been authored by an independent Microsoft and Novell partner who for the purpose of this document is referred to as the "third party evaluator".

The goal of this engagement was to provide Novell with an objective view of the strength's and challenges of its operating system and directory as compared to the strengths and challenges of the competitive Microsoft products.

The project team was comprised of a Project Manager, a Senior OES/eDirectory Subject-Matter Engineer, and a Senior Windows Server 2003/Active Directory Subject-Matter Engineer.

As part of this engagement, and agreed upon between the third party evaluator and Novell, the project team has reviewed the following components that are inherent, included, or are an entitlement associated with the licensed network operating system:

- ✦ **Directory Services**
- ✦ **Infrastructure Services**
- ✦ **Web Services**
- ✦ **Certificate Services**
- ✦ **Print Management**
- ✦ **File Management**
- ✦ **Identity Management**
- ✦ **Patch Management**
- ✦ **Administration and Monitoring**
- ✦ **High Availability and Disaster Recovery**
- ✦ **Client Integration**
- ✦ **Collaboration**
- ✦ **Offline File Synchronization**

For each component, the project team evaluated the following if applicable:

- ✦ **Ease-of-use**
The time, effort, and perceived simplicity/complexity performing common tasks
- ✦ **Functionality**
The capability of the component to perform its core/intended function, as well as the capability of the component to perform additional/non-core functions
- ✦ **Scalability**
Limitations/Abilities of the component relative to growth
- ✦ **Flexibility**
Limitations/Abilities of the component relative to change
- ✦ **Security**
The component's inherent and/or default protection against denial-of-service and information compromise
- ✦ **Innovation**
The quality by which the component represents a new approach or way of thinking that is likely to re-define how the component is designed and/or used in the future
- ✦ **Openness**
The ability for the component to integrate with other widely-used systems, architectures, platforms, and standards

The following pages detail the methodology and context used in this engagement as well as the results of the comparative evaluation.

Methodology

A project team comprised of a Project Manager, a Senior OES/eDirectory Subject-Matter Engineer, and a Senior Windows Server 2003/Active Directory Subject-Matter Engineer was assembled. Though the input for product comparison was not limited to these three people alone, the three-person team was ultimately responsible for gathering all input to the process of comparing the applicable Microsoft and Novell products.

For the purpose of comparison, Novell's Open Enterprise Server SP1 (and its inclusions/entitlements) was compared to Microsoft Windows Server 2003 SP1 Standard Edition (and its inclusions/entitlements). Both the Netware and Linux kernels were considered when evaluating Novell's Open Enterprise Server SP1.

To help support and form comparative viewpoints, the third party evaluator elicited the following input:

Engineer Experience

The project engineers held one-on-one discussions with other engineers that have worked with the products over time. This provided a more well-rounded view of the products and some of its peripheral inclusions.

Customer Experience

The third party evaluator was also able to draw upon their experiences of working with both Novell and Microsoft customers. Amongst these were comparisons customers have performed on their own over time as well as engagements where the third party evaluator assisted a customer in defining their business and technology needs as related to a NOS and Directory decision. For context, the third party evaluator works primarily in the SMB market.

Research of Existing Product Information

The project engineers researched existing product information, as well as other third party reviews of the products' features, strengths and weaknesses. Resources used for this included but were not limited to white papers, websites, QArticles and TID's.

Comparative Testing

Project engineers built virtual machines and performed testing when necessary to demonstrate and compare functionality, and validate assertions made during comparative discussions.

Evaluation

The following abbreviations have been used in this section

OES:	Novell's Open Enterprise Server SP1
eDir:	Novell's eDirectory
WS03:	Microsoft's Windows Server 2003 SP1 Standard Edition
AD:	Microsoft's Active Directory
ADAM:	Microsoft's Active Directory Application Mode
MS:	Microsoft
ZEN:	Novell's ZenWorks
SMS:	Microsoft's Systems Management Server
MIIS:	Microsoft Identity Integration Server
IDM:	Novell's Identity Management
SUS:	Microsoft Software Update Services
WSUS:	Microsoft's Windows Software Update Services
YOU:	YaST Online Update

Directory Services

Overview

A directory service is an important part of a distributed computing environment that provides a way to locate and identify the users and resources available in the system. In its simplest form, directory services are like the white pages of a telephone book: Using specific input (a person's name); a user can receive specific output (a person's address and telephone number). Directory services also provide the functionality of the yellow pages, using general input (for example, "where are the printers?" where a user can receive a browsable listing of printer resources.)

Ease-of-use

eDirectory can be installed with a minimal amount of effort. No external services are required. Active Directory can also be installed with a minimal amount of effort, however requires a utility to be run after the build of a server. While this utility is simple, it requires the existence of a DNS service that supports Active Directory server records, a new format created by Microsoft for Active Directory. If this DNS service is not available when Active Directory is installed, an option to create it will be presented.

By-and-large, ease-of-use factors are negligible between these two products. Microsoft earns small points having its interface look and feel like its popular desktop operating systems, making novice users more comfortable working with it. Novell earns larger points however by a more simple installation process, role-based administration, and the ability to administer access rights at the folder and file level through a single interface.

Functionality

Both services do a solid job providing core functionality; user authentication, user attribute storage, and management of credentials and rights.

Notable functionality value with the Novell product is its LDAP integration, which supports the higher LDAP v3 standard to which application vendors are writing. For LDAP v3-compliance in a Microsoft world, one needs to install the free ADAM product, but this can leave one managing an additional directory.

Notable functionality value with the Microsoft product is Active Directory's support of group policies. This adds control and management of the user workstation environment. The group policy functionality, inherent in the Microsoft product is only matched by eDirectory when the end user licenses and implements ZenWorks.

Scalability

Novell holds a stronger position with scalability; however the weight customers place on this only starts to show in larger environments. In our experience, mid-market customers do not place a large amount of emphasis on eDirectory's scalability over their perceptions of other things they may gain going with Active Directory. Isolating scalability on its own however, eDirectory scales to over a billion objects. Servers can host multiple contexts and replicas, where with Active Directory, a single server can only host a single domain. While it is arguable that both products could scale to handle the same demands, Microsoft will ultimately require a larger hardware footprint to do so in large environments. Our larger customers place emphasis on this, and have chosen eDirectory over Active Directory, citing scalability and the impact of the hardware footprint at the top of their list for their choice.

Flexibility

eDirectory is viewed as a more flexible product. eDirectory allows administrators to more easily manage the schema. For example, Active Directory does not permit the removal of an Active Directory schema class where eDirectory does.

eDirectory also provides tools such as DSrepair, DSMerge, and Backup and Restore that allows on-the-fly maintenance. Users are unaffected when performing database maintenance in the eDirectory world, while similar Active Directory maintenance requires downing the server and may be more invasive to the production environment.

eDirectory also offers more flexibility around setting password policies, where the security boundary for Active Directory is the domain. Properties such as password expiration, complexity, etc. that can be set at a user and group level in eDirectory, have to be applied to an entire domain or not at all with Active Directory.

Additionally, the ability to merge and break apart Active Directory forests is considered far more complex than the corresponding actions in eDirectory. Where organizations often acquire, merge and sell off portions of their businesses, this need is prevalent, and is better handled by Novell.

Security

As mentioned above, eDirectory offers more granularities for setting password policies, where the security boundary for Active Directory is the domain. Properties such as password expiration and complexity, etc. that can be set at a user and group level in eDirectory, have to be applied to an entire domain or not at all with Active Directory.

Out-of-the box, the default Active Directory network authentication protocols (NTLM and LM) are inherently weak and vulnerable to network sniffing. Administrators can eliminate the use of these protocols by creating an Active Directory group policy, but many administrators neglect to do so (and cannot do so if they are supporting Windows 95/98 clients). This means that Active Directory is still inherently vulnerable to easy hacking of usernames and corresponding passwords when employing the NTLM and LM protocols. eDirectory does not inherently possess this vulnerability. If Active Directory is supporting only Windows 2000 Pro clients and above, this risk can be mitigated via group policy.

Out-of-the-box, eDirectory natively uses certificates to encrypt communications between servers and workstations (TSL/SSL) when the Novell client software is used. While Microsoft supports IPSEC to further secure the network in this fashion, it is not an out-of-the-box functionality.

Innovation

eDirectory is independent of OS platform. This concept is not necessarily new (having previously existed with Banyan's StreetTalk, which could run on Vines, NT, and various flavors of Unix). Comparatively however, Novell's implementation of a cross platform directory is more slick and functional, and comparatively, where Microsoft's directory only runs on Windows, this can be considered innovative.

On the Active Directory side, Active Directory group policies answer many requests for a methodology to manage the workstation environment and reduce the costs associated with personal computers. While this is not innovative in and of itself, its inclusion with the directory is, as are the benefits of the "Intellimirror" technologies (that include redirection of the "My Documents" folder, desktop management and software deployment).

Openness

eDirectory is a clear winner in this category. The directory is supported on Netware, Windows, and Linux, where Active Directory is only supported on Windows. eDirectory supports LDAP v3 where Active Directory supports LDAP v2.

Novell SLP is based on previously-established standards, where Active Directory support in DNS is based on RFCs established for the benefit of Microsoft.

Additionally, Novell is seen as a supporter of open standards in their programming, business actions, and marketing messages. Microsoft is often still seen in an opposite light.

Infrastructure Services

Overview

Core Network services that support connectivity, name resolution and login (DNS, DHCP, WINS, SLP, Browsing)

Ease-of-use

Installation and management of services on both platforms is simple and straight-forward. DHCP and DNS changes take slightly longer in eDirectory than they do in Active Directory, but functional differences are negligible.

SLP is less prone to configuration mis-management than Microsoft DNS. Our 24x7 support organization reports far more issues associated with Microsoft DNS than it does SLP.

DHCP is stable on both platforms. Our anecdotal evidence is that Microsoft DHCP databases experience corruption more often than Novell's, but it is not a support issue seen much of overall.

Functionality

Neither Microsoft nor Novell provides core network services or features that are required by the other to operate. For example, OES does not support WINS services. Novell DNS does not support Active Directory server records. Microsoft does not support SLP. This makes both products equally function-limited to any environment that wishes to run both and minimize the overhead of these network services.

Scalability

Microsoft and Novell services can both scale to support large enterprises.

Network browsing in a Novell network is simpler, less bandwidth-intensive, more stable, and manageable. Microsoft browsing is "chatty", malfunctions more often, and lacks an interface for management and resolution of browsing issues. It also can be the source of less relevant error messages that dilute an administrator's view of more relevant error messages.

Flexibility

Microsoft supports WINS and DHCP services across all their platforms. DNS and certificate services must operate on Windows 2000 or 2003 servers. Meanwhile, Novell SLP services can run on Netware, Linux, Windows, AIX, Solaris, or HP-UX servers. Novell DNS and DHCP can operate on any version of Netware. These factors make Novell more flexible.

Security

Both Novell and Microsoft support secure updates of DNS services.

Both Microsoft and Novell DHCP services do not securely provide IP addresses.

Microsoft allows unsecured updates to the WINS database and to the browse list.

Innovation

Both Microsoft and Novell have produced innovative improvements of core network services over the years. Such innovations have improved connectivity, name resolution, login, and browsing. Examples of Microsoft innovations have been dynamic updating of DNS services and WINS. Examples of Novell innovations have been SLP.

Openness

Both vendors follow established RFCs for DHCP and DNS services. However, Microsoft had RFC's created for DDNS. WINS and browsing services are proprietary with Microsoft. Such is not the case with SLP. Novell has adopted SLP from the original RFC and is responsible for future development of such.

Web Services

Overview

Services delivered via the web that provide a way of exchanging data for both users and applications to use. Web Services provide an interface to exchange data between software applications on the web and call or execute remote software modules through the web.

Ease-of-use

Microsoft Windows Server 2003 includes the IIS web server and the .NET Framework components. Installation of each is quick and easy through the Add/Remove Windows Components GUI. Administration of web sites can be done through a browser or through a MMC snap-in.

Novell provides the open-source Apache web server which is installed easily as an option when the server is built or added later on. The Novell Mono components are installed separately.

Functionality

Both vendors provide a fully functional web environment, however Novell's possesses some valuable additional functionality.

Netware fully supports J2EE standard 1.3 and comes with a fully functioning database and application server. J2EE applications must be converted to run in Microsoft environment and Microsoft's web environment does not come with an application server.

Scalability

Both Microsoft and Novell solutions are in wide use within Fortune 1000 companies. In addition each manufacturer's technologies are broadly-deployed within the top 1000 application servers (as surveyed by "Port 80 software").

Flexibility

Novell's approach to web services is more flexible. Novell's vision incorporates a wider range of industry standards that operate across many vendors' platforms. This enhances the potential for interoperability.

Microsoft's technologies are largely proprietary and rely on the market penetration of its products for support within the development community.

Security

Both products are in wide use in very large and public environments. When properly configured, each set of technologies has been determined to be sufficiently secure. Meanwhile, despite the larger penetration of Apache, IIS is the larger target for internet attacks.

According to <http://www.attrition.org>, a Web site that reports Web site defacements and break-ins, only 21% of the Web servers on the Internet are IIS Web servers, yet over 60% of all reported Web page defacements and break-ins involve IIS.

Innovation

Microsoft created the .NET vision and the supporting technologies. Novell assembled the MONO vision from existing industry Internet standards.

Openness

The .NET environment is proprietary. Novell MONO follows industry standards and often relies on open source software. Microsoft claims to follow numerous industry standards, but this debate continues to rage in the community.

Certificate Services

Overview

Enables one to configure certificates, establish and verify the identity of certificate holders, set policies that control how a certificate is to be used, revoke certificates if they should no longer be considered valid, and publish certificate revocation lists (CRLs) that help users verify a certificate's status.

Ease-of-use

Installation of services for Microsoft is through Add/Remove programs, Add/Remove Windows components. Administration of the service is through an MMC snap-in. Certificate delivery is done either automatically through an Active Directory group policy or manually through a web browser.

Installation of services for Novell is through the console programs, Add/Remove, and managed through iManager.

Installation of certificates is equally simple on either platform; however the certificate services are automatically installed with Novell, where additional configuration is required on Microsoft.

In certain situations, the use of Microsoft certificate services can create an additional login for users.

Functionality

Microsoft Server 2003 provides a simple public key architecture.

Novell Certificate Server provides public key cryptography services that are natively integrated into Novell eDirectory and that allow one to mint, issue, and manage both user and server certificates.

Scalability

Microsoft Certificate Services can be designed into a multi-tier model with a single root and many levels of subordinate services.

The Organizational Certificate Authority is compatible with applications such as LDAP services, Portal Services, Web Server.

Flexibility

Microsoft provides a small number of certificate templates that may be modified. Only Windows clients can participate in certificate services and Internet Explorer is the only supported browser clients may use to obtain a certificate. Novell certificate services support more browser types than Microsoft.

Security

With Windows Server 2003/Active Directory, administrative accounts can manage the certificate authorities. Only domain members may obtain a certificate when an Active Directory group policy is used to distribute them. When the service is installed, an Active Directory group is created that limits the servers allowed to distribute certificates within the domain. Netware/eDirectory can do the same.

Innovation

Integrating certificates with Active Directory follows a model invented by Novell and used as a default methodology to secure communications within an eDirectory tree. Novell is considered the innovator in this category for this reason.

Openness

Novell's certificate services are stronger in this category.

With Microsoft, an Enterprise root certificate authority and its subordinates are supported only on Windows servers. In theory, stand-alone certificate services in the Microsoft model can inter-relate with certificate services from other vendors.

With Novell, certificates issued by the Organizational Certificate Authority are X.509 v3 compliant and can also be used by third-party applications.

Print Management

Overview

The total management of the print environment

Ease-of-use

Novell fully supports all versions of Microsoft workstation operating systems. Windows Server 2003 can support legacy client operating systems but with great difficulty. In this, Novell supports legacy Windows clients for setting up printing, better than Microsoft does.

Both Novell and Microsoft have developed mature methods of creating print queues, managing them, and securing them.

Microsoft provides driver support for most "known" printers at the time that Windows Server 2003 was released. On OES, Administrators must provide vendor print drivers when creating a Novell print queue. Initially, this made OES print driver distribution slightly more labor intensive than Microsoft, but these differences are negligible.

Functionality

Novell's printing solution is more functional than Microsoft's. Some of the functions that make it so however (encrypted printing over the internet, or printer queues clustering) are less valuable to the customer-base serviced by our firm. Larger or global customers may find value in these features, but few, if any of our customers print via the public internet.

Microsoft and Novell both support server-based print queues that can easily install printers and their corresponding drivers to users' workstations.

Novell iPrint enables workstations to receive centrally-managed print drivers, but print directly to network printers via IP. iPrint also permits encrypted printing over the Internet. Microsoft can match this functionality, but with much more complexity.

Novell print queues provide more robust auditing and printer health monitoring.

Novell supports printer queue clustering where Microsoft does not.

Scalability

Novell supports printer queue clustering where Microsoft does not.

Both Microsoft and Novell support printer pooling.

No maximum number of print queues is defined for either operating system (server hardware performance is likely the limiting factor.)

Flexibility

Novell fully supports all versions of Microsoft workstation operating systems. Windows Server 2003 can support legacy operating systems but with great difficulty. In this, Novell supports legacy windows clients for setting up printing, better than Microsoft does. Microsoft considers their legacy operating systems at end-of-life, so provides limited support for printing.

Novell supports Macintosh and Linux client OS for printing. Microsoft supports Unix printing (not Macintosh) but it requires the setup and separate administration of the LPR print service.

Security

Novell user queues can be defined by groups. Microsoft supports access control permissions on printers.

Novell supports encrypted print jobs while Microsoft does not.

Both Novell and Microsoft allow delegated permissions to manage print queues.

Microsoft digitally signs print drivers to insure they meet standards and to preserve OS integrity (though users may elect to ignore warnings for drivers that are not signed.)

Innovation

iPrint is a clear advantage for Novell providing easy Internet and IP printing. However, it should be noted that our experience is that few, if any customers print via the public internet.

Openness

IPP is supported by both Microsoft and Novell.

Both vendors implement proprietary print management solutions.

Third party support remains strong for both environments though some vendors are dropping support for IPX based printing.

Novell supports Macintosh and Linux clients for printing. Microsoft supports Unix printing (not Macintosh) but it requires the setup and separate administration of the LPR print service.

File Management

Overview

Locating, sharing, and securing files

Ease-of-use

Creating file shares and setting permissions is straight forward in both environments. However administration is easier with Novell. One can administer file access through the eDirectory administration tools centrally. Novell administrators don't have to give permissions on each server, where Microsoft administrators do. Microsoft administrators must deal with share and NTFS permissions which is confusing, and by using both, can create conflicts that cause unintended consequences.

Configuring advanced options is handled by Microsoft in several different interfaces including Computer Management, MMC utilities and Active Directory group policies. Novell simplifies this by relying only on iManager to manage these features.

FTP is more robust in a Novell environment in that you can access multiple servers from one FTP site.

Functionality

Basic File Sharing – supported by both

Distributed File Services – supported by both

SAN – supported by both

Boot from SAN – supported by both

iSCSI support – supported by both

NAS – supported by both

Backup – supported by both

Software RAID – supported by both

Encryption – supported by both

User Document Recovery – supported by both

(Snapshot (Novell) / Volume Shadow Copy (Microsoft))

Volume Management – supported by both

(More flexible and granular with Novell)

Disk Quotas – supported by both

(More flexible and granular with Novell)

Salvage File – only supported by Novell

File Shredding – only supported by Novell

Flush Files – only supported by Novell

Disk Defrag – supported by both

(Better with Novell)

Scalability

Microsoft - Maximum volume size 256 TB

Novell - Maximum volume size 8 TB

Microsoft - Maximum files per volume is 4.3 billion

Novell - Maximum files per volume is 8 trillion

Microsoft - Maximum file size is 16 TB

Novell - Maximum file size is 8 TB

Flexibility

Novell is better at Volume Management, and supports dynamic re-sizing of volumes.

Microsoft supports file services for Unix and Apple clients. Novell supports Unix, Linux, Apple, and Windows clients. Novell supports NSS, CIFS, AFS file systems and others.

Refer to "Ease-of-use" section for additional comments on flexibility

Security

Both vendors support file, folder and volume access rights.

Both vendors support file encryption.

Microsoft optionally supports SMB (digital) signing between clients and servers.

Novell supports encrypted communications by default between the Novell client and servers.

Innovation

Novell first brought to market many of the features that both vendors have in common making them the innovator in this space.

Openness

Novell's approach is more open than Microsoft's. Novell supports more file systems and client types than Microsoft. Certain file systems follow previously established industry standards.

Identity Management

Overview

Outside of functionality inherent in Active Directory, Windows Server 2003 does not include any identity management solutions with its OS and directory. Novell's OES includes IDM 2.0 bundled edition which allows for synchronizing between eDirectory, NT domains, and Active Directory domains. Full-featured IDM 2.0 is available from Novell for additional costs, as is Microsoft's Identity Integration Server (MIIS). A comparison of these two products was outside the scope of this evaluation.

Ease-of-use

Not applicable for Windows Server 2003/ Active Directory. Additional identity management functionality is not included.

The included IDM 2.0 bundled edition, easily allows for the synchronizing of username, password, context and rights between eDirectory, NT domains, and Active Directory domains. In comparison to its predecessor (DirXML), IDM is more straightforward and graphical.

Functionality

Not applicable for Windows Server 2003/ Active Directory. Additional identity management functionality is not included.

Out-of-the-box, the IDM 2.0 bundled edition included with OES, synchronizes username, password, context and rights between eDirectory, NT domains, and Active Directory domains. With additional customization/development, the IDM product included with OES can offer very granular levels of identity management, where again, Windows Server 2003 includes nothing.

Scalability

Not applicable for Windows Server 2003/ Active Directory. Additional identity management functionality is not included.

IDM 2.0 can synchronize information across numerous applications and directories, and claims to have the ability to manage over a billion accounts.

The architecture on which the product is implemented allows it to be implemented in a "modular" fashion, allowing an organization to start off only synchronizing select applications and/or directories, and later expand this into other applications and/or directories as such are introduced or brought into the meta-directory environment.

Flexibility

Not applicable for Windows Server 2003/ Active Directory. Additional identity management functionality is not included.

Novell's identity management solution is very flexible. The interface can be installed on all major OS's. It supports integration between eDirectory, Active Directory, iPlanet, Oracle, SAP, PeopleSoft, LDAP v3, and *many* other applications and directories. Its customizability via driver development and customization provides a high degree of flexibility for defining which information is synchronized to and from applications and directories, and under which circumstances and to what degree synchronization occurs.

Additionally, the architecture on which the product is implemented allows it to be implemented in a "modular" fashion, allowing an organization to start off only synchronizing select applications and/or directories, and later expand this into other applications and/or directories as such are introduced or brought into the meta-directory environment.

Security

Not applicable for Windows Server 2003/ Active Directory. Additional identity management functionality is not included.

The inclusion of IDM 2.0 bundled edition with OES enhances security in and of itself as it allows for the consolidation of user and rights creation, password management, and the provisioning/de-provisioning of resources.

Innovation

Not applicable for Windows Server 2003/ Active Directory. Additional identity management functionality is not included.

Openness

LDAPv3 compliant

Not platform-specific

The purpose of the solution is to tie together applications and directories and it does so for numerous Novell and non-Novell products alike.

Patch Management

Overview

Patch management is the process of controlling the deployment and maintenance of interim software releases into production environments. It helps to maintain operational efficiency and effectiveness, overcome security vulnerabilities, and maintain the stability of one's production environment.

Novell supports client and server patching for no extra cost on its Linux-kernel-based operating systems, but does not include a patching solution for the Netware kernel. Microsoft supports patching on Windows 2000 platforms and above via SUS, WSUS, and Windows Update (all free entitlements with the licensed OS).

For additional costs and functionality, Microsoft offers its SMS product. Novell offers ZENWorks Patch Management. A comparison of these products was outside the scope of this engagement.

Ease-of-use

Microsoft WSUS is managed through a browser interface. WSUS, the successor to SUS has a straightforward installation process and user-friendly interface. Reporting features are fairly easy to leverage. The product can be used to assess, track, and remediate patching on both Microsoft servers and clients.

OES's Linux kernel utilizes YOU to assess, track, and remediate patching on Linux servers and clients. It requires no additional installation, is easy-to-use and has a user-friendly interface. Its reporting features are also easy to leverage.

Functionality

Novell's OES Linux kernel and Windows Server 2003 provide essentially the same patch functionality to their prospective OS's.

Scalability

YOU and WSUS can both be architected in a two-tiered structure, allowing both to scale to manage patching for numerous servers and clients.

Flexibility

Neither YOU nor WSUS provides patching support outside its own realm of OS. YOU patches SUSE Linux servers and clients, WSUS and Windows Update patches Windows servers and clients (Windows 2000 and up).

Security

Microsoft WSUS can provide updates to any Microsoft client system (Windows 2000 and above) or to limited systems through an Active Directory group policy. YOU does not provide for targeting specific groups of systems. It has the "all or nothing" patching ability that Microsoft's SUS had before WSUS.

With WSUS, administration is limited to users with administrative privileges on the server hosting WSUS. Similarly, YOU limits administration to users that have [Root] privileges.

Innovation

n/a

Openness

Neither YOU nor WSUS provides patching support outside its own realm of OS. YOU patches SUSE Linux servers and clients, WSUS and Windows Update patches Windows servers and clients (Windows 2000 and up).

Administration and Monitoring

Overview

The process of administering network server services, monitoring their performance and insuring their availability

Ease-of-use

Administration:

Windows Server 2003 and Active Directory are administered through a variety of tools including the computer management utility, control panel applets, and Active Directory Users and Computers. Each utility has its own unique functions and methods of operation, though most follow the MMC model.

OES and eDirectory performs administration through web based and fat client utilities (iManager, ConsoleOne, iMonitor, NWadmin, Remote Manager, YaST). With various snap-ins the administrator can manage the entire environment. However, like Microsoft administration, OES falls short of providing a single, stable, reliable interface for all administrative functions.

Monitoring:

Monitoring is much more complex with OES than it is with Windows Server 2003 due to a lack of a central logging facility. Each component; eDir, volumes, Core OS, NMAP, NFAP, IDM, SLP has their own logs and the levels of alerts are inconsistent. Most logging is turned off by default.

The lack of central logging could be off-set by Novell if the trapping/SNMP system was kept current, however the traps supported are from versions 3x and 4x, and do not support the issues of modern eDirectory, NMAP and Netware systems. Microsoft doesn't support trapping, but again, the existence of central logging with Windows Server 2003 makes its lack of trapping irrelevant.

Both OS's provide weak tuning, troubleshooting and health-check tools (based on those tools made available to customers and VAR's) however Novell provides good manual eDirectory health check guidelines.

Functionality

The administrative tools included with both OS's perform the core administrative functions required. iManager has been disappointing due to a lack of stability and numerous snap-in versions.

Language support is better with OES largely since language support with Windows Server 2003 requires a separate domain.

Review "Ease-of-use" section for additional comments on Functionality

Scalability

Microsoft's tools are generally meant to manage a single server with the exception of some of the Active Directory utilities. OES tools are meant to manage directory wide. There are still some server level tools. In this, OES's philosophy on management tools is one that scales greater than that of Microsoft

Flexibility

Microsoft's tools are platform specific. While Windows 2000, 2003 and NT servers can co-exist in the same Active Directory domain, the tools to manage them are specific to that version of the operating system. In addition, the tools only manage Windows servers.

OES tools are not platform specific and will run on various operating systems; however they are designed to manage eDirectory, Netware and SUSE Linux.

OES tools provide role-based management/administration at a granular level

Security

Novell wins in this category relative to Administration. With Windows Server 2003/ Active Directory, most tools require that the user have full administrative privileges in order to use the tool. Since there a number of administrative activities to be performed within an organization, this generally results in numerous people possessing administrative access (more than what might be optimal). OES tools are granular and role based, which enhances security management relative to administration and the level of access required to perform such.

Innovation

The concept of a fully web-based platform for management and administration is innovative. The Novell tools themselves lack stability and consistency, but in time, with these issues worked out, Novell will emerge as an innovator relative to administration.

Openness

Microsoft's administration and monitoring utilities only work with Microsoft systems.

OES tools are not platform specific and will run on various operating systems.

High Availability and Disaster Recovery

Overview

The ability to provide system support for increased availability of network data, applications and services, and to quickly recover from unplanned outages.

Ease-of-use

Those things that both products provide (RAID, tape backup, etc.) are easily integrated by both products. Those things that only OES provides (clustering (not offered with WS03 Standard Edition), are easy to implement and manage.

Functionality

Both support hardware and software RAID

Both recover from tape

Both have fault tolerance for authentication (Domain Controllers for Microsoft maintain complete read/write copies of the database. Partition replicas do the same for OES)

Clustering is included out-of-the box for OES and is not for WS03 Standard Edition (requires WS03 Enterprise Edition)

Data-mirroring is included with OES. Corresponding functionality exists at the folder level with WS03 via DFS (Distributed File Service).

There is an option to accept only digitally-signed drivers with WS03 (to ensure one is not bringing incorrect drivers into the environment)

Scalability

OES clustering supports up to 2 nodes out-of-the-box. Microsoft Standard Edition has no out-of-the-box cluster support.

Flexibility

With Microsoft servers, updates can be cause for re-boots. This effects availability.

Novell Cluster Services supports: eDirectory, GroupWise, BoarderManager, ZENworks, Novell iFolder, Novell Remote Manager (Portal Services), Netscape Enterprise Server, Apache Web Server, WebSphere, Novell Internet Messaging System, Novell Internet Printing, Novell Distributed Print Services, Oracle WebDAV, Symantec Norton Antivirus, Pervasive Btrieve, DHCP, FTP, LDAP, NFS, CIFS, AFP.

Security

Recovery of Active Directory requires a special account and password created at the time Active Directory is installed. This activity requires downing the domain controller and may affect the availability of certain services.

OES clustering security is managed through eDirectory and role-based services.

Innovation

Microsoft has been late-to-market with native support for high availability and disaster recovery features. They still rely heavily on third-party solutions and integration.

OES was an early-adopter of iSCSI support.

Openness

Microsoft provides the hooks for third-party vendors to integrate with its server products, but all standards are proprietary.

OES clustering supports the Netware and the Linux kernel and also has support for third party products.

Client Integration

Overview

The integration of components required on the workstation for the client device to take complete advantage of the server environment.

Ease-of-use

Novell eDirectory requires installation of the Novell client. This is a quick and easy install and once installed, eDirectory can distribute updates to the client software as needed.

The Microsoft client components are native to the Windows operating systems. Legacy systems generally require installation of the Active Directory DS client components.

Microsoft has an advantage when the client devices are Windows OS (since the network client is already incorporated into the client OS). Linux and Apple clients are not natively supported with WS03/AD.

Functionality

OES provides a number of configuration options that can be of value to a Novell network administrator. Use of these options help increase login and file access speed in a Novell environment (though this may not necessarily be any quicker than similar functions in a Microsoft environment). There are essentially no configurable options in the Microsoft client components.

Scalability

n/a

Flexibility

Microsoft provides minimal flexibility in the configuration of the client component.

Novell provides many options to configure the client software to improve the user experience. The default selections are generally satisfactory, and can be changed if warranted.

OES provides native support of Linux and Apple clients. Microsoft provides native support for only Windows client operating systems.

Security

Due to the pervasiveness of Microsoft Windows, any workstation running a Microsoft operating system has the potential to connect and interact with a Microsoft network. There are many reasons why this might not be desirable. Browsing a Microsoft network may require an account on the target system (i.e. servers in a domain) but systems using peer-to-peer networking may be configured for open access.

The Novell client software is freely available from the Novell web site. Installation requires the user to be a local administrator on the machine. Browsing a Novell network requires a Novell account with proper privileges.

Both Novell and Microsoft rely on their directories to secure services to Unix and Mac clients.

Innovation

Novell is one of the first to fully support the Linux client and provide core networking services and native eDirectory authentication and file/print support.

Openness

Microsoft only provides client software for Windows systems. Microsoft services for Apple and Unix clients provide limited functionality. No customization of the Microsoft client software is permitted.

Novell provides client software for Windows, Linux, and Apple systems. Novell allows its customers to customize the client software (such as including the company logo.)

Collaboration

Overview

Share information, collaborate on documents, and collect team knowledge. To these ends, OES includes native file sharing as well as virtual office. WS03 includes file sharing and SharePoint services (the SharePoint portal requires additional licensing)

Ease-of-use

File sharing on both platforms is straightforward and easy to setup. Novell has the advantage in this category due to its inclusion of Virtual Office. This inclusion provides iFolder, iPrint, eGuide, SecureChat, Discussion Forums, Email gadget, NetStorage, Calendaring Gadget, and personal and team web pages. Microsoft SharePoint services provide file sharing via a web browser, but do not provide the many other functions of Novell's Virtual Office.

Functionality

Virtual Office provides iFolder, iPrint, eGuide, SecureChat, Discussion Forums, Email gadget, NetStorage, Calendaring Gadget, and personal and team web pages. Microsoft SharePoint services provide only file sharing via a web browser.

Scalability

The collaboration features of Virtual Office can scale to the entire directory. Virtual Office is also supported in a clustered environment. Microsoft SharePoint services is not supported in a clustered environment (scalability is limited to the hardware platform on which it resides)

Flexibility

Virtual Office will run on Netware, Linux and Windows, and supports numerous web browsers. Microsoft SharePoint services run only on Windows, and is only supported on IE.

Security

SharePoint services can be secured using multi-factor authentication, SSL, and users are required to authenticate to Active Directory.

Virtual Office can be secured using multi-factor authentication, SSL, and users are required to authenticate to eDirectory.

Innovation

iFolder was an innovation in that it was one of the first methods to provide secure file collaboration over the internet via a web-browser without the need for additional licensing.

Openness

Microsoft SharePoint services run only on Windows, and are only supported on IE. Virtual Office will run on Netware, Linux and Windows, and supports numerous web browsers. The fat client for iFolder however, only runs on Windows.

Offline File Synchronization

Overview

Synchronization of files between remote desktops, mobile devices and network storage devices (i.e. servers) to enhance mobile services and provide transparent backup for users. Microsoft provides "offline folder synchronization" for this need. Novell's iFolder provides this functionality with the key difference being its ability to synchronize over the web.

Ease-of-use

Users can configure a folder for offline folder synchronization easily in Windows Explorer by right clicking a folder, choosing the option to make the folder available offline, and then following the instructions in the wizard Microsoft provides. Administrators who understand how to create a group policy will find it a simple task to either permit or deny offline folder synchronization. To synchronize with mobile devices such as PDA's, Microsoft requires third-party software.

iFolder requires installation of the iFolder client and server component. These are easy installs, but are in fact additional installations. After such is installed, users can right click on any folder to which they have access and make it part of the iFolder client. To synchronize with mobile devices such as PDA's, Novell requires third-party software.

Functionality

The big advantage iFolder has over Microsoft's offline folder synchronization is its ability to synchronize files over the web. This is a key piece of functionality for remote users who don't physically connect to their network or connect via VPN on a frequent basis.

Relative to synchronization of users on the WAN, Microsoft allows client systems to configure network folders for offline use. This feature copies the contents of a folder to a workstation and synchronizes changes with the network when the workstation reconnects. Administrators can elect to either permit or not permit this activity on specific folders or across the domain through an Active Directory group policy. A group policy setting allows the user's "My Documents" folder to be copied locally and synchronized automatically.

OES administrators can also accomplish the same tasks with iFolder. Users can access their files securely through NetStorage and their shared network drives.

Scalability

There is no limit to the number of servers that each can support, however, iFolder will require additional client and server component installations for all clients and server encompassed by iFolder. This hindrance however is a negligible difference.

Flexibility

Microsoft Offline Folder synchronization may be configured by either the user, or the network administrator to meet each individual's needs. The same is true for iFolder. Additional flexibility exists with iFolder in its ability to share across computers and users, and its allowance of users to own multiple iFolders.

Security

There is significant danger storing documents of any type on mobile systems. Mobile systems are at great risk to theft and damage. Neither Novell nor Microsoft encrypts files by default in a local offline folder. Furthermore, neither technology requires user authentication via cached directory settings to access the local offline folder.

To synchronize, users of both technologies must authenticate to the directory.

iFolder supports SSL encryption when the files are being transferred to and from the server. Additionally files are encrypted on the server.

Innovation

Microsoft's "My Briefcase" concept was its original entry in the off-line file synchronization market (with NT). However, over time, Novell's iFolder has far surpassed this technology. It is far more functional, allowing secure synchronization over the web and allowing one to share one's iFolder with other users in eDirectory. It also allows one to participate as owners or members of iFolders in multiple accounts.

iFolder Auto-provisions users from the administrator-specified enterprise LDAP containers, groups, and users and creates a list of users with whom one can share iFolders.

iFolder User Guide for Novell iFolder 3.0 authenticates users with enterprise LDAP directory services.

iFolders in the enterprise can be managed centrally with policy-based administration tools

Openness

Microsoft's technology for Offline File Synchronization is proprietary to Microsoft clients and Windows servers.

iFolder supports Netware, Linux, and Microsoft servers, and supports Apple, Linux and Microsoft clients.

Summary Scorecard:

	Ease-of-Use	Functionality	Scalability	Flexibility	Security	Innovation	Openness
Directory Services	X	X	N	N	N	X	N
Infrastructure Services	X	X	N	N	X	X	N
Web Services	X	N	X	N	N	M	N
Certificate Services	N	N	X	N	X	N	N
Print Management	N	N	N	N	N	N	N
File Management	N	N	M	N	N	N	N
Identity Management	N	N	N	N	N	N	N
Patch Management	X	M	M	X	M	N/A	X
Administration and Monitoring	M	M	N	N	N	N	N
High Availability and Disaster Recovery	N	N	N	N	N	N	N
Client Integration	M	N	N/A	N	N	N	N
Collaboration	N	N	N	N	X	N	N
Offline File Synchronization	M	N	X	N	N	N	N
Differences are Negligible / Strengths off-set	X						
Overall Strength Belongs to Microsoft	M						
Overall Strength Belongs to Novell	N						
Not applicable	N/A						

Additional Observations

- This evaluation shows OES and eDirectory to be superior products to their Microsoft counterparts in most areas encompassed by the evaluation.
- The functional advantages of OES/eDirectory seem to have greater impact in environments with larger object counts and geographical footprints. Conversely, customers with smaller object counts and geographic footprints may not always place enough value in these functional Novell “wins” to keep them on Novell or move them to Novell. As we did a rough mapping of our customers, we found a couple interesting trends:
 - The number of customers using WS03/AD for their core file/print and authentication is significantly greater than that using OES/eDir (in terms of customer count, not user count)
 - However, the number of our larger customers using OES/eDir far outweighs those using WS03/AD.
 - None of the customers we mapped, used our firm to migrate them from one platform to another (i.e. as defined by what they use for their core file/print and authentication, they have either been a “Microsoft shop” or a “Novell shop” for as long as they have been a customer)
 - One possible conclusion we drew from this mapping was that smaller accounts (~50-1,000 users) choose and stay on WS03/AD, where larger accounts (4,000 users and up) often choose and stay on eDir/OES.

There was a general sense by this account-size mapping and by some of the features with which Novell convincingly wins in our evaluation, that despite there being exceptions on both sides, OES/eDir may be more of a “large account” play, and WS03/AD more of a “small to mid-market” play.

- While Microsoft doesn’t win more often than Novell does in the ease-of-use category, it wins for ease-of use in a few major categories (Print Management, Administration & Monitoring, Client Integration, Offline File Synchronization) and has negligible or off-setting differences for ease-of-use in Directory Services, Infrastructure Services, Web Services, and Patch Management.
- Microsoft wins or has negligible or off-setting differences in the areas of Patch Management. However arguably, the industry’s need for patch management (and specifically a free/included patch management solution that is independent of a larger software distribution solution) is mostly a demand by the patching needs of Windows clients. The project team felt this negated the value of Microsoft’s patch management wins in this evaluation. In other words, the category where Microsoft wins most convincingly is one largely created as a result of having to manage Microsoft operating system vulnerabilities.