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Microsoft® Exchange Server 2010

UNLEASHED

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Microsoft® Exchange Server 2010 Unleashed

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Introduction

In the past 15 years, we have written a book on every version of Exchange Server since its inception built on at least two years of early adopter beta experience. This book, *Microsoft Exchange Server 2010 Unleashed*, is the latest of our efforts. However, because Exchange Server 2010 is effectively based on Exchange Server 2007 and could potentially be considered a major service pack update to the product, there are enough differences in the new release that it required complete rethinking of the way we wrote this book.

Rather than being just an email and calendaring product, Microsoft added a handful of new server roles to Exchange Server 2007 to improve security and reliability that Microsoft further enhanced in Exchange Server 2010. In addition, Exchange Server 2010 greatly expands on Microsoft's offering in the areas of unified messaging that it entered into the marketplace with Exchange Server 2007. Exchange Server 2010 has not enhanced the Unified Messaging server role, but Exchange Server is now clearly the backbone of an entire unified communications strategy that Microsoft has built over the past several years. Beyond just email and calendaring, Exchange Server 2010 is now the foundation for voice and mobile communications.

Just a decade and a half ago, email was just one of a number of different ways people communicated. Early implementations of Exchange Server (v4.0, v5.0) had organizations tolerant if a server was down for a day or two. Today, email has become an extremely important, if not primary, method of communication for organizations. Downtime on an Exchange server can bring an entire organization to its knees. With Exchange Server 2010 adding voice mail and mobile communications into the messaging environment, an Exchange Server 2010 server and environment can no longer tolerate failures caused by viruses and spam, nor system downtime caused by server crashes or database corruption.

You will find that the improvements Microsoft has made to Exchange Server 2010 are not only evolutionary improvements, but highly critical if not absolutely essential to Microsoft's responsibility to help organizations maintain a safe, secure, and reliable communications infrastructure. This book covers all the aspects of Exchange Server 2010 from introducing the technologies, to properly planning and designing Exchange Server, to the implementation, management, and support of an Exchange Server 2010 environment built on tips, tricks, and best practices from more than two years of early adopter implementations in the field.

This book is organized into 10 parts, each part focusing on core Exchange Server 2010 areas, with several chapters making up each part:

- **Part I: Microsoft Exchange Server 2010 Overview**—This part provides an introduction to Exchange Server 2010, not only from the perspective of a general technology overview, but also to note what is truly new in Exchange Server 2010 that made it compelling enough for organizations to implement the technology in beta

in a production environment. This part also covers best practices of planning, prototype testing, and migration techniques.

- **Part II: Planning and Designing an Exchange Server 2010 Environment—** This part covers the design of an underlying Windows Server 2003/2008 and Active Directory environment in addition to the Exchange Server 2010 unified communications environment. Because organizations of varying sizes have different needs and requirements, as appropriate, this part addresses core Exchange Server 2010 design plans and concepts appropriate for most organizations, and specific attention is given to enterprise-level design and planning considerations for some of the largest Exchange Server implementations in the world. This part also covers the integration of Exchange 2010 in a non-Windows environment as well as tips, tricks, and best practices for getting a Windows Server 2003/2008 Active Directory, DNS, and domain structure properly planned and architected.
- **Part III: Implementing Exchange Server 2010 Services—**This part covers the core implementation of Exchange Server 2010 as well as the new Edge Services role that has been added to the Exchange Server organizational structure to provide protection against viruses and spam. In addition, this section has a chapter on the Exchange Management Script based on PowerShell, the Microsoft scripting solution that is the basis of the configuration, administration, and operations of Exchange Server 2010.
- **Part IV: Securing an Exchange Server 2010 Environment—**Security is on everyone's mind these days, and it was absolutely critical to have several chapters that covered security. The chapters in this part of the book include client-level, server-level, and transport-level security that is at the backbone of security for a network environment. A dedicated chapter on email encryption was necessary to cover the use of certificate-based encryption technologies to enable an organization the ability to provide person-to-person encrypted message communications. In addition, chapters on Microsoft ISA Server 2006 enhancing security at the edge and a chapter on enterprise policy environment addressing regulatory compliance security enhancements added to Exchange Server 2010 round out this extensive part on security.
- **Part V: Migrations and Coexistence with Exchange Server 2010—**This part is dedicated to migrations, client access servers (CASs), and Hub Transport servers. This part provides a chapter specifically on migrating from Windows 2003 Server to Windows Server 2008 for organizations that want to migrate to a base Windows 2008 environment during their migration to Exchange Server 2010. And, of course, this part includes a chapter on migrating from Exchange Server 2003 and Exchange Server 2007 to the new Exchange Server 2010 unified communications environment. Because Microsoft does not provide migrations from Exchange Server 5.5 or Exchange Server 2000 to Exchange Server 2010, nor does it provide in-place upgrades to Exchange Server 2010, there are fewer options to choose from, which means that the method you are left with needs to be planned, tested, and executed with the utmost care to minimize, if not eliminate, any interruption to users. This part of the book includes a chapter that covers the planning and implementation of

the CAS role and the Hub Transport role, two updated roles to Exchange Server 2010 that are critical to the Exchange Server 2010 organizational environment.

- **Part VI: Exchange Server 2010 Administration and Management**—In this part, five chapters focus on the administration and management of an Exchange Server 2010 environment. The administration and management of mailboxes, distribution lists, sites, and administration have been greatly enhanced in Exchange Server 2010. Although you can continue to perform many of the tasks the way you did in the past, because of significant changes in replication, background transaction processing, secured communications, integrated mobile communications, and changes in Windows Server 2003 Active Directory, there are better ways to work with Exchange Server 2010. These chapters drill down into specialty areas helpful to administrators of varying levels of responsibility.
- **Part VII: Unified Communications in an Exchange Server 2010 Environment**—This section has been completely updated for Exchange Server 2010 with the revised Unified Messaging role, new mobility functionality, and tight integration with SharePoint 2007/2010. As previously mentioned in this introduction, Exchange Server 2010 not only improves voice mail to Exchange Server, but also the addition of voice integration takes Exchange Server 2010 far beyond just an email and calendaring solution. This addition takes Exchange Server into an area where communication is conducted on personal computers, mobile handheld devices, and from remote kiosks and terminal systems. The chapters in this part of the book highlight all the enhanced technologies and integration capabilities that make Exchange Server 2010 the core foundation to the future of an organization's communications infrastructure.
- **Part VIII: Client Access to Exchange Server 2010**—This part of the book focuses on the enhancements to the Outlook Web App client, various Outlook client capabilities, and Outlook for non-Windows systems. Outlook Web App is no longer just a simple browser client, but one that can effectively be a full primary user client to Exchange Server, including access to network file shares, an entry point to SharePoint shares, and a remote voice mail collection point. In addition, Outlook Web App now has full functionality for non-Windows users, such as users who access Exchange Outlook Web App from an Apple Mac computer. Being that Exchange Server 2010 now includes voice and mobile communications as a major component of the Exchange Server environment, client access as well as the distribution, management, and support of the client becomes even more important.
- **Part IX: Data Protection and Disaster Recovery of Exchange Server 2010**—As organizations implement Exchange Server 2010 and make it their central store for email, calendars, contacts, voice and fax communications, and mobile communications, it is no longer an option to set up and support an environment where downtime is even a possibility. This part of the book covers the new continuous backup technologies built in to Exchange Server 2010 intended to keep Exchange Server 2010 operating in a nonstop environment. Additional chapters in this part address backing up and restoring Exchange Server data, along with the recovery of an Exchange Server 2010 environment in the event of a disaster.

- **Part X: Optimizing Exchange Server 2010 Environments—**This last part of the book addresses optimization in terms of server and Exchange Server 2010 organizational environment optimization, optimization of the new Database Availability Group (DAG) storage and replication system, and system optimization that goes far beyond the basics. Rather than simply tuning an Exchange server with the appropriate amount of RAM and disk space, Exchange Server 2010 takes on a whole new area of load balancing data storage across distributed storage subsystems in which information is managed and replicated as an integral part of Exchange Server 2010.

The real-world experience we have had in working with Exchange Server 2010 and our commitment to writing this book based on years of field experience in early adopter Exchange Server 2010 environments enable us to relay to you information that we hope will be valuable in your successful planning, implementation, and migration to an Exchange Server 2010 environment.

CHAPTER 3

Understanding Core Exchange Server 2010 Design Plans

IN THIS CHAPTER

- Planning for Exchange Server 2010
- Understanding AD Design Concepts for Exchange Server 2010
- Determining Exchange Server 2010 Placement
- Configuring Exchange Server 2010 for Maximum Performance and Reliability
- Securing and Maintaining an Exchange Server 2010 Implementation

The fundamental capabilities of Microsoft Exchange Server 2010 are impressive. Improvements to security, reliability, and scalability enhance an already road-tested and stable Exchange Server platform. Along with these impressive credentials comes an equally impressive design task. Proper design of an Exchange Server 2010 platform will do more than practically anything to reduce headaches and support calls in the future. Many complexities of Exchange Server might seem daunting, but with a full understanding of the fundamental components and improvements, the task of designing the Exchange Server 2010 environment becomes manageable.

This chapter focuses specifically on the Exchange Server 2010 components required for design. Key decision-making factors influencing design are presented and tied into overall strategy. All critical pieces of information required to design Exchange Server 2010 implementations are outlined and explained. Enterprise Exchange Server design and planning concepts are expanded in Chapter 4, "Architecting an Enterprise-Level Exchange Server Environment."

Planning for Exchange Server 2010

Designing Exchange Server used to be a fairly simple task. When an organization needed email and the decision was made to go with Exchange Server, the only real decision to make was how many Exchange servers were needed. Primarily, organizations really needed only email and eschewed any "bells and whistles."

Exchange Server 2010, on the other hand, takes messaging to a whole new level. No longer do organizations require only an email system, but high level of system availability and resilience and other messaging and unified communications functionality. After the productivity capabilities of an enterprise email platform have been demonstrated, the need for more productivity improvements arises. Consequently, it is wise to understand the integral design components of Exchange Server before beginning a design project.

Outlining Significant Changes in Exchange Server 2010

Exchange Server 2010 is the evolution of a product that has consistently been improving over the years from its roots. Since the Exchange 5.x days, Microsoft has released dramatic improvements with Exchange 2000 Server and later Exchange Server 2003. Microsoft then followed upon the success of Exchange Server 2003 with some major architectural changes with Exchange Server 2007. This latest version, Exchange Server 2010, uses a similar architecture to Exchange Server 2007 but adds, extends, and perfects elements of Exchange Server design.

The major areas of improvement in Exchange Server 2010 include many of the concepts and technologies introduced in Exchange Server 2007 but expand upon them and include additional improvements. Key areas improved upon in Exchange Server 2010 architecture include the following:

- **Database Availability Groups (DAGs)—**The Exchange Server 2007 concept of Clustered Continuous Replication (CCR) has been greatly improved and replaced with a concept called Database Availability Groups (DAGs), which allow a copy of an Exchange Server mailbox database to exist in up to 16 locations within an Exchange Server organization. Because Continuous Replication is no longer limited to two servers, there is no longer any need for concepts such as Standby Continuous Replication (SCR) or Local Continuous Replication (LCR) because they are all superseded by DAG technology.
- **Transport and access improvements—**All client access is now funneled through the Client Access server (CAS) role in an organization, which allows for improvements in client access and limited end-user disruption during mailbox moves and maintenance. In addition, Exchange Server 2010 guards against lost emails due to hardware failures by keeping "shadow copies" of mail data on Hub and Edge Transport servers that can be re-sent in the event of loss.
- **Integrated archiving capabilities—**Exchange Server 2010 provides users and administrators the ability to archive messages for the purpose of cleaning up a mailbox of old messages, as well as for legal reasons for applying a retention policy on key messages. In addition, a second archive mailbox can be associated with a user's primary mailbox, allowing seamless access to the archived messages from OWA or full Outlook. Users can simply drag and drop messages into their archive folder, or a policy or rule can be set to have messages automatically moved to the archive folder.
- **"Access anywhere" improvements—**Microsoft has focused a great deal of Exchange Server 2010 development time on new access methods for Exchange Server, including an enhanced Outlook Web App (OWA) that works with a variety of Microsoft and third-party browsers, Microsoft ActiveSync improvements, improved

Outlook Voice Access (OVA), unified messaging support, and Outlook Anywhere enhancements. Having these multiple access methods greatly increases the design flexibility of Exchange Server because end users can access email via multiple methods.

- **Protection and compliance enhancements**—Exchange Server 2010 now includes a variety of antispam, antivirus, and compliance mechanisms to protect the integrity of messaging data. Exchange Server 2010 also includes the capability to establish a second, integrated archive mailbox for users that is made available through all traditional access mechanisms, including OWA. This allows for older archived items to be available to users without the mail actually being stored in the individual's mailbox, enabling an organization to do better storage management and content management of mail messages throughout the enterprise.
- **Admin tools improvements and Exchange PowerShell scripting**—Introduced as the primary management tool for Exchange Server 2007, Exchange Server 2010 improves upon PowerShell capabilities and adds additional PowerShell applets and functions. Indeed, the graphical user interface (GUI) itself sits on top of the scripting engine and simply fires scripts based on the task that an administrator chooses in the GUI. This allows for an unprecedented level of control.

It is important to incorporate the concepts of these improvements into any Exchange Server design project because their principles often drive the design process.

Reviewing Exchange Server and Operating System Requirements

Exchange Server 2010 has some specific requirements, both hardware and software, that must be taken into account when designing. These requirements fall into several categories:

- Hardware
- Operating system
- Active Directory
- Exchange Server version

Each requirement must be addressed before Exchange Server 2010 can be deployed.

Reviewing Hardware Requirements

It is important to design Exchange Server hardware to scale out to the user load, which is expected for up to 3 years from the date of implementation. This helps retain the value of the investment put into Exchange Server. Specific hardware configuration advice is offered in later sections of this book.

Reviewing Operating System (OS) Requirements

Exchange Server 2010 is optimized for installation on Windows Server 2008 (Service Pack 2 or later) or Windows Server 2008 R2. The increases in security and the fundamental changes to Internet Information Services (IIS) in Windows Server 2008 provide the basis for many of the improvements in Exchange Server 2010. The specific compatibility

matrix, which indicates compatibility between Exchange Server versions and operating systems, is illustrated in Table 3.1.

TABLE 3.1 Exchange Server Version Compatibility

Version	Win NT 4.0	Windows 2000	Windows 2003	Windows 2003 R2	Windows 2008	Windows 2008 R2
Exchange Server 5.5	Yes	Yes	No	No	No	No
Exchange 2000 Server	No	Yes	No	No	No	No
Exchange Server 2003	No	Yes	Yes	Yes	No	No
Exchange Server 2007	No	No	Yes*	Yes*	Yes*	Yes*
Exchange Server 2010	No	No	No	No	Yes*	Yes*

**64-bit editions only supported*

Understanding Active Directory (AD) Requirements

Exchange Server originally maintained its own directory. With the advent of Exchange 2000 Server, however, the directory for Exchange Server was moved to the Microsoft Active Directory, the enterprise directory system for Windows. This gave greater flexibility and consolidated directories but at the same time increased the complexity and dependencies for Exchange Server. Exchange Server 2010 uses the same model but requires specific AD functional levels and domain controller specifics to run properly.

Exchange Server 2010, while requiring an AD forest in all deployment scenarios, has certain flexibility when it comes to the type of AD it uses. It is possible to deploy Exchange Server in the following scenarios:

- **Single forest**—The simplest and most traditional design for Exchange Server is one where Exchange Server is installed within the same forest used for user accounts. This design also has the least amount of complexity and synchronization concerns to worry about.
- **Resource forest**—The Resource forest model in Exchange Server 2010 involves the deployment of a dedicated forest exclusively used for Exchange Server itself, and the only user accounts within it are those that serve as a placeholder for a mailbox. These user accounts are not logged onto by the end users, but rather the end users are given access to them across cross-forest trusts from their particular user forest to the Exchange Server forest. More information on this deployment model can be found in Chapter 4.
- **Multiple forests**—Different multiple forest models for Exchange Server are presently available, but they do require a greater degree of administration and synchroniza-

tion. In these models, different Exchange Server organizations live in different forests across an organization. These different Exchange Server organizations are periodically synchronized to maintain a common Global Address List (GAL). More information on this deployment model can also be found in Chapter 4.

It is important to determine which design model will be chosen before proceeding with an Exchange Server deployment because it is complex and expensive to change the AD structure of Exchange Server after it has been deployed.

Outlining Exchange Server Version Requirements

As with previous versions of Exchange Server, there are separate Enterprise and Standard versions of the Exchange Server 2010 product. The Standard Edition supports all Exchange Server 2010 functionality with the exception of the fact that it is limited to no more than five databases on a single server.

NOTE

Unlike previous versions of the software, Microsoft provides only a single set of media for Exchange Server 2010. When installed, server version can be set by simply inputting a licensed key. A server can be upgraded from the Trial version to Standard/Enterprise or from Standard to Enterprise. It cannot, however, be downgraded.

Scaling Exchange Server 2010

Exchange 2000 originally provided the basis for servers that could easily scale out to thousands of users in a single site, if necessary. Exchange Server 2003 further improved the situation by introducing Messaging Application Programming Interface (MAPI) compression and RPC over HTTP. Exchange Server 2007 and its 64-bit architecture allowed for even further scalability and reduced IO levels. Finally, Exchange Server 2010 and the separation of client traffic to load-balanced Client Access Servers enable the client tier to be much more scalable than with previous versions.

Site consolidation concepts enable organizations that might have previously deployed Exchange servers in remote locations to have those clients access their mailboxes across wide area network (WAN) links or dial-up connections by using the enhanced Outlook 2007/2010 or OWA clients. This solves the problem that previously existed of having to deploy Exchange servers and global catalog (GC) servers in remote locations, with only a handful of users, and greatly reduces the infrastructure costs of setting up Exchange Server.

Having Exchange Server 2010 Coexist with an Existing Network Infrastructure

In a design scenario, it is necessary to identify any systems that require access to email data or services. For example, it might be necessary to enable a third-party monitoring application to relay mail off the Simple Mail Transfer Protocol (SMTP) engine of Exchange Server so that alerts can be sent. Identifying these needs during the design portion of a project is subsequently important.

Identifying Third-Party Product Functionality

Microsoft built specific hooks into Exchange Server 2010 to enable third-party applications to improve upon the built-in functionality provided by the system. For example, built-in support for antivirus scanning, backups, and unified messaging exist right out of the box, although functionality is limited without the addition of third-party software. The most common additions to Exchange Server implementation are the following:

- Antivirus
- Backup
- Phone/PBX integration
- Fax software

Understanding AD Design Concepts for Exchange Server 2010

After all objectives, dependencies, and requirements have been mapped out, the process of designing the Exchange Server 2010 environment can begin. Decisions should be made in the following key areas:

- AD design
- Exchange server placement
- Global catalog placement
- Client access methods

Understanding the AD Forest

Because Exchange Server 2010 relies on the Windows Server 2008 AD for its directory, it is therefore important to include AD in the design plans. In many situations, an AD implementation, whether based on Windows 2000 Server, Windows Server 2003, or Windows Server 2008, AD already exists in the organization. In these cases, it is necessary only to plan for the inclusion of Exchange Server into the forest.

NOTE

Exchange Server 2010 has several key requirements for AD. First, all domains and the forest must be at Windows Server 2003 functional levels or higher. Second, it requires that at least one domain controller in each site that includes Exchange Server be at least Windows Server 2003 SP2 or Windows Server 2008.

If an AD structure is not already in place, a new AD forest must be established. Designing the AD forest infrastructure can be complex, and can require nearly as much thought into

design as the actual Exchange Server configuration itself. Therefore, it is important to fully understand the concepts behind AD before beginning an Exchange Server 2010 design.

In short, a single "instance" of AD consists of a single AD forest. A forest is composed of AD trees, which are contiguous domain namespaces in the forest. Each tree is composed of one or more domains, as illustrated in Figure 3.1.

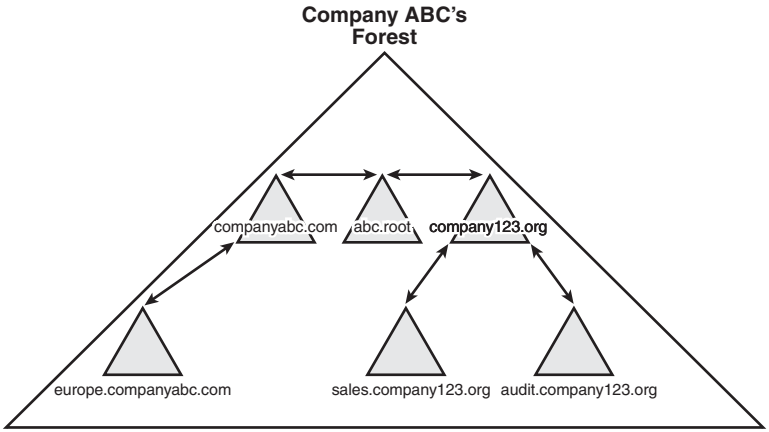

FIGURE 3.1 Multitree forest design.

Certain cases exist for using more than one AD forest in an organization:

- **Political limitations**—Some organizations have specific political reasons that force the creation of multiple AD forests. For example, if a merged corporate entity requires separate divisions to maintain completely separate information technology (IT) infrastructures, more than one forest is necessary.
- **Security concerns**—Although the AD domain serves as a de facto security boundary, the "ultimate" security boundary is effectively the forest. In other words, it is possible for user accounts in a domain in a forest to hack into domains within the same forest. Although these types of vulnerabilities are not common and are difficult to do, highly security-conscious organizations should implement separate AD forests.
- **Application functionality**—A single AD forest shares a common directory schema, which is the underlying structure of the directory and must be unique across the entire forest. In some cases, separate branches of an organization require that certain applications, which need extensions to the schema, be installed. This might not be possible or might conflict with the schema requirements of other branches. These cases might require the creation of a separate forest.
- **Exchange-specific functionality (resource forest)**—In certain circumstances, it might be necessary to install Exchange Server 2010 into a separate forest, to enable Exchange Server to reside in a separate schema and forest instance. An example of this type of setup is an organization with two existing AD forests that creates a third

forest specifically for Exchange Server and uses cross-forest trusts to assign mailbox permissions.

The simplest designs often work the best. The same principle applies to AD design. The designer should start with the assumption that a simple forest and domain structure will work for the environment. However, when factors such as those previously described create constraints, multiple forests can be established to satisfy the requirements of the constraints.

Understanding the AD Domain Structure

After the AD forest structure has been chosen, the domain structure can be laid out. As with the forest structure, it is often wise to consider a single domain model for the Exchange Server 2010 directory. In fact, if deploying Exchange Server is the only consideration, this is often the best choice.

There is one major exception to the single domain model: the placeholder domain model. The placeholder domain model has an isolated domain serving as the root domain in the forest. The user domain, which contains all production user accounts, would be located in a separate domain in the forest, as illustrated in Figure 3.2.

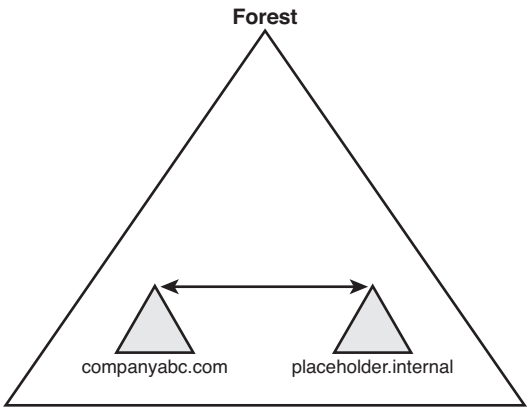

FIGURE 3.2 The placeholder domain model.

The placeholder domain structure increases security in the forest by segregating high-level schema-access accounts into a completely separate domain from the regular user domain. Access to the placeholder domain can be audited and restricted to maintain tighter control on the critical schema. The downside to this model, however, is the fact that the additional domain requires a separate set of domain controllers, which increases the infrastructure costs of the environment. In general, this makes this domain model less desirable for smaller organizations because the trade-off between increased cost and less security is too great. Larger organizations can consider the increased security provided by this model, however.

Reviewing AD Infrastructure Components

Several key components of AD must be installed within an organization to ensure proper Exchange Server 2010 and AD functionality. In smaller environments, many of these components can be installed on a single machine, but all need to be located within an environment to ensure server functionality.

Outlining the Domain Name System (DNS) Impact on Exchange Server 2010 Design

In addition to being tightly integrated with AD, Exchange Server 2010 is joined with the Domain Name System (DNS). DNS serves as the lookup agent for Exchange Server 2010, AD, and most new Microsoft applications and services. DNS translates common names into computer-recognizable IP addresses. For example, the name `www.cco.com` translates into the IP address of `12.155.166.151`. AD and Exchange Server 2010 require that at least one DNS server be made available so that name resolution properly occurs.

Given the dependency that both Exchange Server 2010 and AD have on DNS, it is an extremely important design element. For an in-depth look at DNS and its role in Exchange Server 2010, see Chapter 6, "Understanding Network Services and Active Directory Domain Controller Placement for Exchange Server 2010."

Reviewing DNS Namespace Considerations for Exchange Server

Given Exchange Server 2010's dependency on DNS, a common DNS namespace must be chosen for the AD structure to reside in. In multiple tree domain models, this could be composed of several DNS trees, but in small organization environments, this normally means choosing a single DNS namespace for the AD domain.

There is a great deal of confusion between the DNS namespace in which AD resides and the email DNS namespace in which mail is delivered. Although they are often the same, in many cases there are differences between the two namespaces. For example, CompanyABC's AD structure is composed of a single domain named `abc.internal`, and the email domain to which mail is delivered is `companyabc.com`. The separate namespace, in this case, was created to reduce the security vulnerability of maintaining the same DNS namespace both internally and externally (published to the Internet).

For simplicity, CompanyABC could have chosen `companyabc.com` as its AD namespace. This choice increases the simplicity of the environment by making the AD logon user principal name (UPN) and the email address the same. For example, the user Pete Handley is `pete@companyabc.com` for logon, and `pete@companyabc.com` for email. This option is the choice for many organizations because the need for user simplicity often trumps the higher security.

Optimally Locating Global Catalog Servers

Because all Exchange Server directory lookups use AD, it is vital that the essential AD global catalog information is made available to each Exchange server in the organization. For many small offices with a single site, this simply means that it is important to have a full global catalog server available in the main site.

The global catalog is an index of the AD database that contains a partial copy of its contents. All objects within the AD tree are referenced within the global catalog, which

enables users to search for objects located in other domains. Every attribute of each object is not replicated to the global catalogs, only those attributes that are commonly used in search operations, such as first name and last name. Exchange Server 2010 uses the global catalog for the email-based lookups of names, email addresses, and other mail-related attributes.

NOTE

Exchange Server 2010 cannot make use of Windows Server 2008 Read Only Domain Controllers (RODCs) or Read Only Global Catalog (ROGC) servers, so be sure to plan for full GCs and DCs for Exchange Server.

Because full global catalog replication can consume more bandwidth than standard domain controller replication, it is important to design a site structure to reflect the available WAN link capacity. If a sufficient amount of capacity is available, a full global catalog server can be deployed. If, however, capacity is limited, universal group membership caching can be enabled to reduce the bandwidth load.

Understanding Multiple Forests Design Concepts Using Microsoft Forefront Identity Manager (FIM)

Forefront Identity Manager (FIM) enables out-of-the-box replication of objects between two separate AD forests. This concept becomes important for organizations with multiple Exchange Server implementations that want a common Global Address List for the company. Previous iterations of FIM required an in-depth knowledge of scripting to be able to synchronize objects between two forests. FIM, on the other hand, includes built-in scripts that can establish replication between two Exchange Server 2010 AD forests, making integration between forests easier.

Determining Exchange Server 2010 Placement

Previous versions of Exchange Server essentially forced many organizations into deploying servers in sites with greater than a dozen or so users. With the concept of site consolidation in Exchange Server 2010, however, smaller numbers of Exchange servers can service clients in multiple locations, even if they are separated by slow WAN links. For small and medium-sized organizations, this essentially means that a small handful of servers is required, depending on availability needs. Larger organizations require a larger number of Exchange servers, depending on the number of sites and users. In addition, Exchange Server 2010 introduces new server role concepts, which should be understood so that the right server can be deployed in the right location.

Understanding Exchange Server 2010 Server Roles

Exchange Server 2010 firmed up the server role concept outlined with Exchange Server 2007. Before Exchange Server 2007/2010, server functionality was loosely termed, such as referring to an Exchange server as an OWA or front-end server, bridgehead server, or a

mailbox or back-end server. In reality, there was no set terminology that was used for Exchange server roles. Exchange Server 2010, on the other hand, distinctly defines specific roles that a server can hold. Multiple roles can reside on a single server, or multiple servers can have the same role. By standardizing on these roles, it becomes easier to design an Exchange Server environment by designating specific roles for servers in specific locations.

The server roles included in Exchange Server 2010 include the following:

- **Client access server (CAS)—**The CAS role allows for client connections via nonstandard methods such as Outlook Web App (OWA), Exchange ActiveSync, Post Office Protocol 3 (POP3), and Internet Message Access Protocol (IMAP). Exchange Server 2010 also forces MAPI traffic and effectively all client traffic through the CAS layer. CAS servers are the replacement for Exchange 2000/2003 front-end servers and can be load balanced for redundancy purposes. As with the other server roles, the CAS role can coexist with other roles for smaller organizations with a single server, for example.
- **Edge Transport server—**The Edge Transport server role was introduced with Exchange Server 2007, and consists of a standalone server that typically resides in the demilitarized zone (DMZ) of a firewall. This server filters inbound SMTP mail traffic from the Internet for viruses and spam, and then forwards it to internal Hub Transport servers. Edge Transport servers keep a local AD Application Mode (ADAM) instance that is synchronized with the internal AD structure via a mechanism called EdgeSync. This helps to reduce the surface attack area of Exchange Server. The Edge Transport role can only exist by itself on a server, it cannot be combined with other roles.
- **Hub Transport server—**The Hub Transport server role acts as a mail bridgehead for mail sent between servers in one AD site and mail sent to other AD sites. There needs to be at least one Hub Transport server within an AD site that contains a server with the mailbox role, but there can also be multiple Hub Transport servers to provide for redundancy and load balancing. HT roles are also responsible for message compliance and rules. The HT role can be combined with other roles on a server, and is often combined with the CAS role.
- **Mailbox server—**The mailbox server role is intuitive; it acts as the storehouse for mail data in users' mailboxes and down-level public folders if required. All connections to the mailbox servers are proxied through the CAS servers.
- **Unified Messaging server—**The Unified Messaging server role allows a user's Inbox to be used for voice messaging and fax capabilities.

Any or all of these roles can be installed on a single server or on multiple servers. For smaller organizations, a single server holding all Exchange Server roles is sufficient. For larger organizations, a more complex configuration might be required. For more information on designing large and complex Exchange Server implementations, see Chapter 4.

Understanding Environment Sizing Considerations

In some cases with very small organizations, the number of users is small enough to warrant the installation of all AD and Exchange Server 2010 components on a single server. This scenario is possible, as long as all necessary components—DNS, a global catalog domain controller, and Exchange Server 2010—are installed on the same hardware. In general, however, it is best to separate AD and Exchange Server onto separate hardware wherever possible.

Identifying Client Access Points

At its core, Exchange Server 2010 essentially acts as a storehouse for mailbox data. Access to the mail within the mailboxes can take place through multiple means, some of which might be required by specific services or applications in the environment. A good understanding of what these services are and if and how your design should support them is warranted.

Outlining MAPI Client Access with Outlook 2007

The "heavy" client of Outlook, Outlook 2007, has gone through a significant number of changes, both to the look and feel of the application, and to the back-end mail functionality. The look and feel has been streamlined based on Microsoft research and customer feedback. The latest Outlook client, Outlook 2010, uses the Office ribbon introduced with Office 2007 to improve the client experience. Outlook connects with Exchange servers via CAS servers, improving the scalability of the environment.

In addition to MAPI compression, Outlook 2010/2007 expands upon the Outlook 2003 ability to run in cached mode, which automatically detects slow connections between client and server and adjusts Outlook functionality to match the speed of the link. When a slow link is detected, Outlook can be configured to download only email header information. When emails are opened, the entire email is downloaded, including attachments if necessary. This drastically reduces the amount of bits across the wire that is sent because only those emails that are required are sent across the connection.

The Outlook 2010/2007 client is the most effective and full-functioning client for users who are physically located close to an Exchange server. With the enhancements in cached mode functionality, however, Outlook 2010/2007 can also be effectively used in remote locations. When making the decision about which client to deploy as part of a design, you should keep these concepts in mind.

Accessing Exchange Server with Outlook Web App (OWA)

The Outlook Web App (OWA) client in Exchange Server 2010 has been enhanced and optimized for performance and usability. There is now very little difference between the full function client and OWA. With this in mind, OWA is now an even more efficient client for remote access to the Exchange server. The one major piece of functionality that OWA does not have, but the full Outlook 2007 client does, is offline mail access support. If this is required, the full client should be deployed.

Using Exchange ActiveSync (EAS)

Exchange ActiveSync (EAS) support in Exchange Server 2010 allows a mobile client, such as a Pocket PC device or mobile phone, to synchronize with the Exchange server, allowing

for access to email from a handheld device. EAS also supports Direct Push technology, which allows for instantaneous email delivery to supported handheld devices such as Windows Mobile 5.0/6.x or other third-party ActiveSync enabled devices.

Understanding the Simple Mail Transport Protocol (SMTP)

The Simple Mail Transfer Protocol (SMTP) is an industry-standard protocol that is widely used across the Internet for mail delivery. SMTP is built in to Exchange servers and is used by Exchange Server systems for relaying mail messages from one system to another, which is similar to the way that mail is relayed across SMTP servers on the Internet. Exchange Server is dependent on SMTP for mail delivery and uses it for internal and external mail access.

By default, Exchange Server 2010 uses DNS to route messages destined for the Internet out of the Exchange Server topology. If, however, a user wants to forward messages to a smarthost before they are transmitted to the Internet, an SMTP connector can be manually set up to enable mail relay out of the Exchange Server system. SMTP connectors also reduce the risk and load on an Exchange server by off-loading the DNS lookup tasks to the SMTP smarthost. SMTP connectors can be specifically designed in an environment for this type of functionality.

Using Outlook Anywhere (Previously Known as RPC over HTTP)

One very effective and improved client access method to Exchange Server 2010 is known as Outlook Anywhere. This technology was previously referred to as RPC over HTTP(s) or Outlook over HTTP(s). This technology enables standard Outlook 2010/2007/2003 access across firewalls. The Outlook client encapsulates Outlook RPC packets into HTTP or HTTPS packets and sends them across standard web ports (80 and 443), where they are then extracted by the Exchange Server 2010 system. This technology enables Outlook to communicate using its standard RPC protocol, but across firewalls and routers that normally do not allow RPC traffic. The potential uses of this protocol are significant because many situations do not require the use of cumbersome VPN clients.

Configuring Exchange Server 2010 for Maximum Performance and Reliability

After decisions have been made about AD design, Exchange server placement, and client access, optimization of the Exchange server itself helps ensure efficiency, reliability, and security for the messaging platform.

Designing an Optimal Operating System Configuration for Exchange Server

As previously mentioned, Exchange Server 2010 only operates on the Windows Server 2008 (Service Pack 2 or later) or Windows Server 2008 R2 operating systems. The enhancements to the operating system, especially in regard to security, make Windows Server 2008 the optimal choice for Exchange Server. The Standard Edition of Windows Server 2008 is sufficient for any Exchange Server installation.

NOTE

Contrary to popular misconception, the Enterprise Edition of Exchange Server can be installed on the Standard Edition of the operating system, and vice versa. Although there has been a lot of confusion on this concept, both versions of Exchange Server were designed to interoperate with either version of Windows.

Configuring Disk Options for Performance

The single most important design element that improves the efficiency and speed of Exchange Server is the separation of the Exchange Server database and the Exchange Server logs onto a separate hard drive volume. Because of the inherent differences in the type of hard drive operations performed (logs perform primarily write operations, databases primarily read), separating these elements onto separate volumes dramatically increases server performance. Figure 3.3 illustrates some examples of how the database and log volumes can be configured.

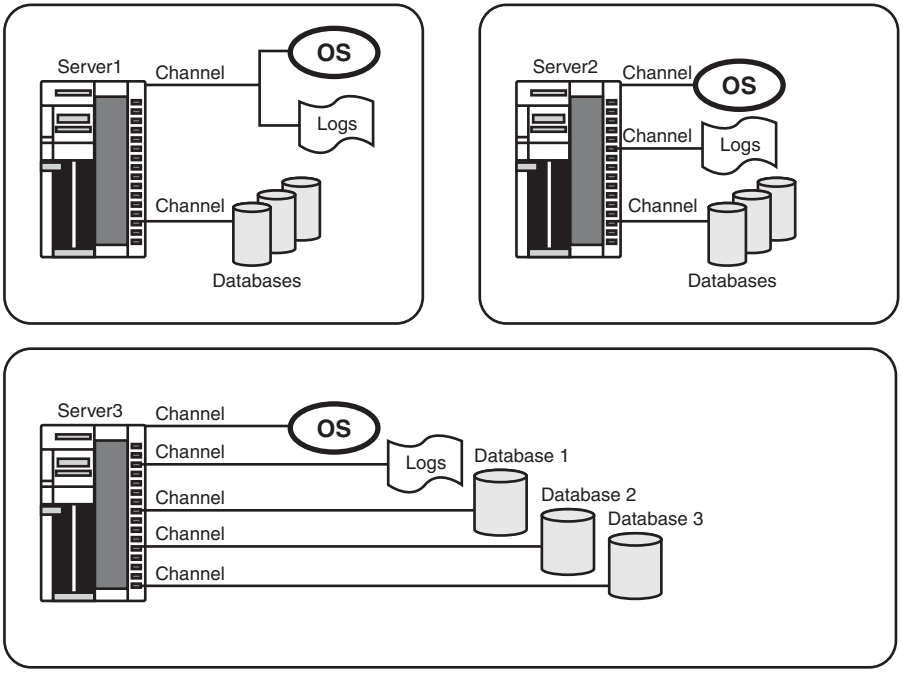

FIGURE 3.3 Database and log volume configuration.

On Server1, the OS and logs are located on the same mirrored C:\ volume and the database is located on a separate RAID-5 drive set. With Server2, the configuration is taken up a notch, with the OS only on C:\, the logs on D:\, and the database on the RAID-5 E:\ volume. Finally, Server3 is configured in the optimal configuration, with separate volumes

for each database and a volume for the log files. The more advanced a configuration, the more detailed and complex the drive configuration can get. However, the most important factor that must be remembered is to separate the Exchange Server database from the logs wherever possible.

NOTE

With the use of Database Availability Groups (DAGs) in Exchange Server 2010, the performance of the disk infrastructure has become less of a concern. DAGs enable an organization's mailboxes to be spread across multiple servers and to exist in multiple locations (up to 16), which reduces the need for expensive SAN disks and enables Exchange Server to be installed on DAS or SATA disk.

Working with Multiple Exchange Server Databases

Exchange Server 2010 Database Availability Groups (DAGs) allow for multiple databases to be installed across multiple servers and to have multiple versions of those databases in more than one location. This allows for the creation of multiple large databases that reside on cheaper disks, which in turn allows for larger mailbox sizes. It also has the following advantages:

- **Reduce database restore time**—Multiple databases (rather than a smaller number of larger databases) take less time to restore from tape. This concept can be helpful if there is a group of users who require quicker recovery time (such as management). All mailboxes for this group could then be placed in a separate database to provide quicker recovery time in the event of a server or database failure.
- **Provide for separate mailbox limit policies**—Each database can be configured with different mailbox storage limits. For example, the standard user database could have a 200-MB limit on mailboxes, and the management database could have a 500-MB limit.
- **Mitigate risk by distributing user load**—By distributing user load across multiple databases, the risk of losing all user mail connectivity is reduced. For example, if a single database failed that contained all users, no one would be able to mail. If those users were divided across three databases, however, only one third of those users would be unable to mail in the event of a database failure.

Monitoring Design Concepts with System Center Operations Manager 2007 R2

The enhancements to Exchange Server 2010 do not stop with the improvements to the product itself. New functionality has been added to the Exchange Management Pack for System Center Operations Manager that enables OpsMgr to monitor Exchange servers for critical events and performance data. The OpsMgr Management Pack is preconfigured to monitor for Exchange Server-specific information and to enable administrators to proactively monitor Exchange servers. For more information on using OpsMgr to monitor Exchange Server 2010, see Chapter 20, "Using Operations Manager to Monitor Exchange Server 2010."

Securing and Maintaining an Exchange Server 2010 Implementation

One of the greatest advantages of Exchange Server 2010 is its emphasis on security. Along with Windows Server 2008, Exchange Server 2010 was developed during and after the Microsoft Trustworthy Computing initiative, which effectively put a greater emphasis on security over new features in the products. In Exchange Server 2010, this means that the OS and the application were designed with services "Secure by Default."

With Secure by Default, all nonessential functionality in Exchange Server must be turned on if needed. This is a complete change from the previous Microsoft model, which had all services, add-ons, and options turned on and running at all times, presenting much larger security vulnerabilities than was necessary. Designing security effectively becomes much easier in Exchange Server 2010 because it now becomes necessary only to identify components to turn on, as opposed to identifying everything that needs to be turned off.

In addition to being secure by default, Exchange Server 2010 server roles are built in to templates used by the Security Configuration Wizard (SCW), which was introduced in Service Pack 1 for Windows Server 2003. Using the SCW against Exchange Server helps to reduce the surface attack area of a server.

Patching the Operating System Using Windows Server Update Services

Although Windows Server 2008 presents a much smaller target for hackers, viruses, and exploits by virtue of the Secure by Default concept, it is still important to keep the OS up to date against critical security patches and updates. Currently, two approaches can be used to automate the installation of server patches. The first method involves configuring the Windows Server 2008 Automatic Updates client to download patches from Microsoft and install them on a schedule. The second option is to set up an internal server to coordinate patch distribution and management. The solution that Microsoft supplies for this functionality is known as Windows Server Update Services (WSUS).

WSUS enables a centralized server to hold copies of OS patches for distribution to clients on a preset schedule. WSUS can be used to automate the distribution of patches to Exchange Server 2010 servers, so that the OS components will remain secure between service packs. WSUS might not be necessary in smaller environments, but can be considered in medium-sized to large organizations that want greater control over their patch management strategy.

Summary

Exchange Server 2010 offers a broad range of functionality and improvements to messaging and is well suited for organizations of any size. With proper thought for the major design topics, a robust and reliable Exchange Server email solution can be put into place that will perfectly complement the needs of any organization.

When Exchange Server design concepts have been fully understood, the task of designing the Exchange Server 2010 infrastructure can take place.

Best Practices

The following are best practices from this chapter:

- Use Database Availability Groups (DAGs) to distribute multiple copies of all mailboxes to multiple locations, taking advantage of HA and DR capabilities that are built into Exchange Server 2010.
- Separate the Exchange Server log and database files onto separate physical volumes whenever possible, but also be cognizant of the fact that Exchange Server can be installed on slower, cheaper disks when using DAGs.
- Plan for a Windows Server 2003 functional forest and at least one Windows Server 2003 SP2 or Windows Server 2008 domain controller in each site that will run Exchange Server.
- Integrate an antivirus and backup strategy into Exchange Server design.
- Keep a local copy of a full global catalog close to any Exchange servers.
- Keep the OS and Exchange Server up to date through service packs and software patches, either manually or via Windows Server Update Services.
- Keep the AD design simple, with a single forest and single domain, unless a specific need exists to create more complexity.
- Identify the client access methods that will be supported and match them with the appropriate Exchange Server 2010 technology.
- Monitor DNS functionality closely in the environment on the AD domain controllers.

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