

Microsoft®

EXAM 70-640

Covers Windows
Server 2008

R2

Configuring Windows Server® 2008 Active Directory®



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SECOND EDITION

Training Kit

Exam 70-640: Windows Server 2008 Active Directory, Configuring (2nd Edition)

OBJECTIVE	LOCATION IN BOOK
CONFIGURING DOMAIN NAME SYSTEM (DNS) FOR ACTIVE DIRECTORY	
Configure zones.	Chapter 9, Lesson 1
Configure DNS server settings.	Chapter 9, Lesson 2
Configure zone transfers and replication.	Chapter 9, Lesson 2
CONFIGURING THE ACTIVE DIRECTORY INFRASTRUCTURE	
Configure a forest or a domain.	Chapter 1, Lessons 1, 2 Chapter 10, Lessons 1, 2 Chapter 12, Lessons 1, 2
Configure trusts.	Chapter 12, Lesson 2
Configure sites.	Chapter 11, Lessons 1, 2
Configure Active Directory replications.	Chapter 8, Lesson 3 Chapter 10, Lesson 3 Chapter 11, Lesson 3
Configure the global catalog.	Chapter 11, Lesson 2
Configure operations masters.	Chapter 10, Lesson 2
CONFIGURING ADDITIONAL ACTIVE DIRECTORY SERVER ROLES	
Configure Active Directory Lightweight Directory Service (AD LDS).	Chapter 14, Lessons 1, 2
Configure Active Directory Rights management Service (AD RMS).	Chapter 16, Lessons 1, 2
Configure the read-only domain controller (RODC).	Chapter 8, Lesson 3
Configure Active Directory Federation Services (AD FS).	Chapter 17, Lessons 1, 2
CREATING AND MAINTAINING ACTIVE DIRECTORY OBJECTS	
Automate creation of Active Directory accounts.	Chapter 3, Lessons 1, 2 Chapter 4, Lessons 1, 2 Chapter 5, Lessons 1, 2
Maintain Active Directory accounts.	Chapter 2, Lessons 1, 2, 3 Chapter 3, Lessons 1, 2, 3 Chapter 4, Lessons 1, 2, 3 Chapter 5, Lessons 1, 2, 3 Chapter 8, Lesson 4
Create and apply Group Policy objects (GPOs).	Chapter 6, Lessons 1, 2, 3
Configure GPO templates.	Chapter 6, Lessons 1, 2, 3 Chapter 7, Lessons 1, 2, 3
Configure software deployment GPOs.	Chapter 7, Lesson 3
Configure account policies.	Chapter 8, Lesson 1
Configure audit policy by using GPOs.	Chapter 7, Lesson 4 Chapter 8, Lesson 2
MAINTAINING THE ACTIVE DIRECTORY ENVIRONMENT	
Configure backup and recovery.	Chapter 13, Lesson 2
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CONFIGURING ACTIVE DIRECTORY CERTIFICATE SERVICES	
Install Active Directory Certificate Services.	Chapter 15, Lesson 1
Configure CA server settings.	Chapter 15, Lesson 2
Manage certificate templates.	Chapter 15, Lesson 2
Manage enrollments.	Chapter 15, Lesson 2
Manage certificate revocations	Chapter 15, Lesson 2

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Self-Paced Training Kit (Exam 70-640): Configuring Windows Server® 2008 Active Directory® (2nd Edition)

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Introduction

This training kit is designed for IT professionals who support or plan to support Microsoft Active Directory (AD) on Windows Server 2008 R2 and who also plan to take the 70-640 examination. It is assumed that you have a solid foundation-level understanding of Microsoft Windows client and server operating systems and common Internet technologies. The exam, and this book, assume that you have at least one year of experience administering AD technologies.

NOTE WINDOWS SERVER 2008 CERTIFICATION

Exam 70-640 is one of three required exams for MCSA: Windows Server 2008 certification. For a limited time, it is also valid for the MCTS certification, which will be retired. Please visit the Microsoft Learning website for the most current information about Microsoft certifications: <http://www.microsoft.com/learning/>

The material covered in this training kit and on exam 70-640 builds on your understanding and experience to help you implement AD technologies in distributed environments, which can include complex network services and multiple locations and domain controllers. The topics in this training kit cover what you need to know for the exam, as described on the Skills Measured tab for the exam, which is available at <http://www.microsoft.com/learning/en/us/exam.aspx?ID=70-640&locale=en-us#tab2>.

By using this training kit, you will learn how to do the following:

- Deploy Active Directory Domain Services, Active Directory Lightweight Directory Services, Active Directory Certificate Services, Active Directory Federation Services, and Active Directory Rights Management Services in a forest or domain.
- Upgrade existing domain controllers, domains, and forests to Windows Server 2008 R2.
- Efficiently administer and automate the administration of users, groups, and computers.
- Manage the configuration and security of a domain by using Group Policy, fine-grained password policies, directory services auditing, and the Security Configuration Wizard.
- Implement effective name resolution with the domain name system (DNS) on Windows Server 2008 R2.
- Plan, configure, and support the replication of Active Directory data within and between sites.
- Add, remove, maintain, and back up domain controllers.
- Enable authentication between domains and forests.
- Implement new capabilities and functionality offered by Windows Server 2008 R2.

Refer to the objective mapping page in the front of this book to see where in the book each exam objective is covered.

System Requirements

Practice exercises are a valuable component of this training kit. They allow you to experience important skills directly, reinforce material discussed in lessons, and even introduce new concepts.

Each lesson and practice describes the requirements for exercises. Although many lessons require only one computer, configured as a domain controller for a sample domain named contoso.com, some lessons require additional computers acting as a second domain controller in the domain, as a domain controller in another domain in the same forest, as a domain controller in another forest, or as a server performing other roles.

The chapters that cover AD DS (Chapters 1–13) require, at most, three machines running simultaneously. Chapters covering other Active Directory roles require up to four machines running simultaneously to provide a comprehensive experience with the technology.

Chapter 1, “Creating an Active Directory Domain,” includes setup instructions for the first domain controller in the contoso.com domain, which is used throughout this training kit. Lessons that require additional computers provide guidance regarding the configuration of those computers.

Hardware Requirements

You can perform exercises on physical computers. Each computer must meet the minimum hardware requirements for Windows Server 2008 R2, published at <http://www.microsoft.com/windowsserver2008/en/us/system-requirements.aspx>. Windows Server 2008 R2 can run comfortably with 512 megabytes (MB) of memory in small test environments such as the sample contoso.com domain. However, when you begin to work with other AD technologies, such as AD Rights Management Services, AD Certificate Services, or AD Federation Services, your computers should be configured with at least 1024 MB of RAM. Although Windows Server 2008 R2 Standard edition is sufficient for most chapters, later chapters require the Enterprise edition, and we recommend installing that edition when setting up servers for Chapters 14 through 17.

To minimize the time and expense of configuring the several computers required for this training kit, it’s recommended that you create virtual machines by using Hyper-V—a feature of Windows Server 2008 and Windows Server 2008 R2—or other virtualization software, such as VMware Workstation or Oracle VirtualBox. Note that although the book calls for a number of machines, you never use more than four machines together at the same time. Refer to the documentation of your selected virtualization platform for hardware and software requirements, for instructions regarding host setup and configuration, and for procedures to create virtual machines for Windows Server 2008 R2.

If you choose to use virtualization software, you can run more than one virtual machine on a host computer. Each virtual machine must be assigned at least 512 MB or 1024 MB of RAM as required and must meet the minimum processor and disk space requirements for Windows

Server 2008 R2. The host computer must have sufficient RAM for each virtual machine that you will run simultaneously on the host. If you plan to run all virtual machines on a single host, the host must have at least 4.0 GB of RAM. For example, one of the most complex configurations you will need is two domain controllers, each using 512 MB of RAM, and two member servers, each using 1024 MB of RAM. On a host computer with 4 GB of RAM, this would leave 1 GB for the host. Note that each time you run a machine with the Enterprise edition of Windows Server 2008 R2, you should assign 1024 MB of RAM to it.

If you encounter performance bottlenecks while running multiple virtual machines on a single physical host, consider running virtual machines on more than one physical host.

Ensure that all machines—virtual or physical—that you use for exercises can network with each other. It is highly recommended that the environment be totally disconnected from your production environment. Refer to the documentation of your virtualization platform for network configuration procedures.

We recommend that you preserve each of the virtual machines you create until you have completed the training kit. After each chapter, create a backup of the virtual machines used in that chapter so that you can reuse them, as required in later exercises.

Finally, you must have a physical computer with a CD-ROM drive with which to read the companion media.

Software Requirements

Windows Server 2008 R2 with SP1 is required to perform the practice exercises in this training kit.

You can download evaluation versions of the product from the TechNet Evaluation Center at <http://technet.microsoft.com/evalcenter>. If you use evaluation versions of the software, pay attention to the expiration date of the product. The evaluation version of Windows Server 2008 R2 with SP1, for example, can be used for up to 60 days before it expires, but it can be rearmed up to three times, giving you up to 180 days to use the evaluation.

If you have a TechNet or an MSDN subscription, you can download the products from the subscriber downloads center. These versions do not expire. If you are not a TechNet or MSDN subscriber, it is recommended that you subscribe so that you can access benefits such as product downloads.

If you will install Windows Server 2008 R2 on a physical computer, you need software that allows you to burn the .iso file that you download to a DVD, and you need hardware that supports DVD recording.

To use the companion media, you need a web browser such as Internet Explorer 8, and an application that can display PDF files, such as Adobe Acrobat, which can be downloaded from <http://www.adobe.com>.

Using the Companion CD

A companion CD is included with this training kit. The companion CD contains the following:

- **Practice Tests** You can reinforce your understanding of the topics covered in this training kit by using electronic practice tests that you customize to meet your needs. You can run a practice test that is generated from the pool of Lesson Review questions in this book. Alternatively, you can practice for the 70-640 certification exam by using tests created from a pool of over 200 realistic exam questions, which give you many practice exams to ensure that you are prepared.
- **Links to References** The CD includes links to references given in this book. Use these links to go directly to references that supplement the text.
- **An eBook** An electronic version (eBook) of this book is included for when you do not want to carry the printed book with you.

How to Install the Practice Tests

To install the practice test software from the companion CD to your hard disk, perform the following steps:

1. Insert the companion CD into your CD drive and accept the license agreement. A CD menu appears.

NOTE IF THE CD MENU DOES NOT APPEAR

If the CD menu or the license agreement does not appear, AutoRun might be disabled on your computer. Refer to the Readme.txt file on the CD for alternate installation instructions.

2. Click Practice Tests and follow the instructions on the screen.

How to Use the Practice Tests

To start the practice test software, follow these steps:

1. Click Start, click All Programs, and then click Microsoft Press Training Kit Exam Prep. A window appears that shows all the Microsoft Press training kit exam prep suites installed on your computer.
2. Double-click the lesson review or practice test you want to use.

NOTE LESSON REVIEWS VS. PRACTICE TESTS

Select the (70-640) TS: Windows Server 2008 Active Directory, Configuring lesson review to use the questions from the “Lesson Review” sections of this book. Select the (70-640) TS: Windows Server 2008 Active Directory, Configuring practice test to use a pool of 200 questions similar to those that appear on the 70-640 certification exam.

Lesson Review Options

When you start a lesson review, the Custom Mode dialog box appears so that you can configure your test. You can click OK to accept the defaults, or you can customize the number of questions you want, how the practice test software works, which exam objectives you want the questions to relate to, and whether you want your lesson review to be timed. If you are retaking a test, you can select whether you want to see all the questions again or only the questions you missed or did not answer.

After you click OK, your lesson review starts.

- To take the test, answer the questions and use the Next and Previous buttons to move from question to question.
- After you answer an individual question, if you want to see which answers are correct—along with an explanation of each correct answer—click Explanation.
- If you prefer to wait until the end of the test to see how you did, answer all the questions and then click Score Test. You will see a summary of the exam objectives you chose and the percentage of questions you got right overall and per objective. You can print a copy of your test, review your answers, or retake the test.

Practice Test Options

When you start a practice test, you choose whether to take the test in Certification Mode, Study Mode, or Custom Mode:

- **Certification Mode** Closely resembles the experience of taking a certification exam. The test has a set number of questions. It is timed, and you cannot pause and restart the timer.
- **Study Mode** Creates an untimed test during which you can review the correct answers and the explanations after you answer each question.
- **Custom Mode** Gives you full control over the test options so that you can customize them as you like.

In all modes, the user interface when you are taking the test is basically the same but with different options enabled or disabled depending on the mode. The main options are discussed in the previous section, “Lesson Review Options.”

When you review your answer to an individual practice test question, a “References” section is provided that lists where in the training kit you can find the information that relates to that question and provides links to other sources of information. After you click Test Results to score your entire practice test, you can click the Learning Plan tab to see a list of references for every objective.

How to Uninstall the Practice Tests

To uninstall the practice test software for a training kit, use the Programs And Features option in Windows Control Panel.

NOTE COMPANION CONTENT FOR DIGITAL BOOK READERS

If you bought a digital edition of this book, you can enjoy select content from the print edition’s companion CD. Visit <http://go.microsoft.com/FWLink/?LinkId=218370> to get your downloadable content.

Acknowledgments

The authors’ names appear on the cover of a book, but we are only part of a much larger team. Jeff Koch gave us the opportunity to update the first edition of this training kit and guided it through the business. Karen Szall and Rosemary Caperton, with whom we worked closely, were a dream team as always! And each of the editors did a phenomenal job of adding value to this training kit. Kurt Meyer, our technical reviewer, was extremely helpful and thorough. We are very grateful to the entire team and to everyone’s efforts at making this training kit an indispensable resource to the community. We look forward to working with each of you again in the future!

Support & Feedback

The following sections provide information on errata, book support, feedback, and contact information.

Errata

We've made every effort to ensure the accuracy of this book and its companion content. Any errors that have been reported since this book was published are listed on our Microsoft Press site:

<http://go.microsoft.com/fwlink/?LinkId=219768>

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Preparing for the Exam

Microsoft certification exams are a great way to build your resume and let the world know about your level of expertise. Certification exams validate your on-the-job experience and product knowledge. While there is no substitution for on-the-job experience, preparation through study and hands-on practice can help you prepare for the exam. We recommend that you round out your exam preparation plan by using a combination of available study materials and courses. For example, you might use the Training Kit and another study guide for your "at home" preparation, and take a Microsoft Official Curriculum course for the classroom experience. Choose the combination that you think works best for you.

Managing Groups

Although users and computers, and even services, change over time, business roles and rules tend to remain more stable. Your business probably has a finance role, which requires certain capabilities in the enterprise. The user or users who perform that role will change, but the role will remain. For that reason, it is not practical to manage an enterprise by assigning rights and permissions to individual user, computer, or service identities. Management tasks should be associated with groups. In this training kit, you will learn to use groups to identify administrative and user roles, to filter Group Policy, to assign unique password policies, to assign rights and permissions, and more. To prepare you for those tasks, this lesson demonstrates how to create, modify, delete, and support group objects in an Active Directory Domain Services (AD DS) domain.

Exam objectives in this chapter:

- Automate creation of Active Directory accounts.
- Maintain Active Directory accounts.

Lessons in this chapter:

- Lesson 1: Managing an Enterprise with Groups **151**
- Lesson 2: Automating the Creation and Management of Groups **175**
- Lesson 3: Administering Groups in an Enterprise **186**

Before You Begin

This chapter applies Windows PowerShell, Csvde.exe, and Ldifde.exe to the task of automating computer account creation. Read Lesson 1, “Automating the Creation of User Accounts,” and Lesson 2, “Administering with Windows PowerShell and Active Directory Administrative Center,” of Chapter 3, “Administering User Accounts,” prior to reading this chapter.

In addition, to perform exercises in this chapter, you must have created a domain controller named SERVER01 in a domain named contoso.com. See Chapter 1, “Creating an Active Directory Domain,” for detailed steps of this task.



REAL WORLD

Dan Holme

Efficient and effective group management is a tremendous enabler for security, consistency, and productivity in an IT environment. As a consultant, I spend a lot of time with clients, aligning technology with their business needs. In the case of Microsoft Windows technologies, this entails defining and implementing business roles and rules so that administration can be defined, documented, and automated. And that process often requires improving clients' group management knowledge, technologies, and processes. Many IT professionals have come into Windows Server 2008 R2 Active Directory with practices developed in previous versions of Windows that do not take advantage of groups as fully as possible. In fact, I've seen so much wasted productivity and decreased security due to poor group management that I dedicated two chapters of my book, *Windows Administration Resource Kit: Productivity Solutions for IT Professionals* (Microsoft Press, 2008), to improving and automating group management. In this lesson, you learn what you need to know for the certification exam, and I share with you a few of the tips and best practices that you'll need to make the most of groups in a production environment. I highly recommend reading the resource kit for more information, guidance, and fantastic tools related to group management.

Lesson 1: Managing an Enterprise with Groups

You are certainly familiar with the purpose of groups: to collect items and manage them as a single entity. The implementation of group management in Active Directory is not intuitive; Active Directory is designed to support large, distributed environments, so it includes seven types of groups: two types of domain groups with three scopes each, plus local security groups. In this lesson, you learn the purpose of each of these groups, as well as how to align your business requirements with the potentially complex options that Active Directory provides.

After this lesson, you will be able to:

- Understand the role of groups in managing an enterprise.
- Define group naming conventions.
- Create groups by using the Active Directory Users And Computers snap-in.
- Understand, manage, and convert group type and scope.
- Identify group membership and nesting possibilities.
- Manage group membership.
- Develop a group management strategy.

Estimated lesson time: 45 minutes

Understanding the Importance of Groups

Groups are an important class of object because they collect users, computers, and other groups to create a single point of management.

The most straightforward and common use of a group is to grant permissions to a shared folder. A security group is a security principal with a security identifier (SID) and a *member* attribute that identifies members—users, computers, and other groups. If a group has Read access to a folder, for example, any of the group's members can read the folder. You do not have to grant Read access to each individual member—you can manage access to the folder simply by adding and removing members of the group.

Challenges of Managing Without Groups

- Imagine that all of the 100 users in the sales department require Read-level access to a shared folder called Sales on a server. Assigning permissions to each user individually is not a manageable solution. When new salespeople are hired, you must add the new accounts to the access control list (ACL) of the folder. When accounts are deleted, you must remove the permissions from the ACL to avoid an Account Unknown entry on the

ACL (as shown in Figure 4-1), which results from a SID on the ACL that refers to an account that cannot be resolved.

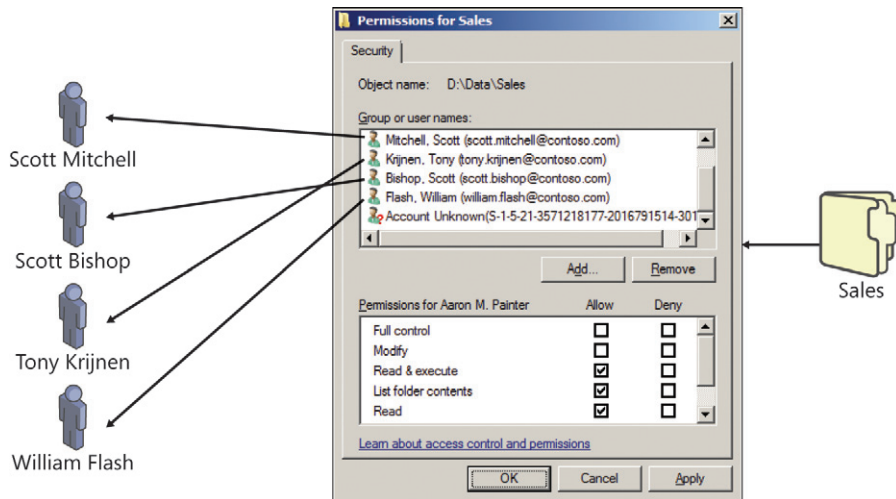


FIGURE 4-1 Access management without groups

- Imagine now that all of the 100 users in the sales department require Read access to three shared folders on three different servers; the management difficulty just increased significantly. How many permissions would you have to apply just to configure access to three folders on three different servers for 100 users? 300!

When you manage permissions by adding and removing identities to and from an ACL, it becomes difficult to answer the question, “Who can read the Sales folder?” To answer the question, you must reverse engineer the ACL. And, in the broader example, if the Sales folders are distributed across three servers, you would have to evaluate three separate ACLs to answer the question.

Groups Add Manageability

The example presented in the previous section may seem extreme, because you have no doubt learned that although assigning permissions to a resource for an individual identity—user or computer—is possible, the best practice is to assign a single permission to a group and then manage access to the resource simply by changing the membership of the group.

So, to continue the example, you could create a group called Sales and assign the group Allow Read permission on the Sales folder. This implementation is shown in Figure 4-2.

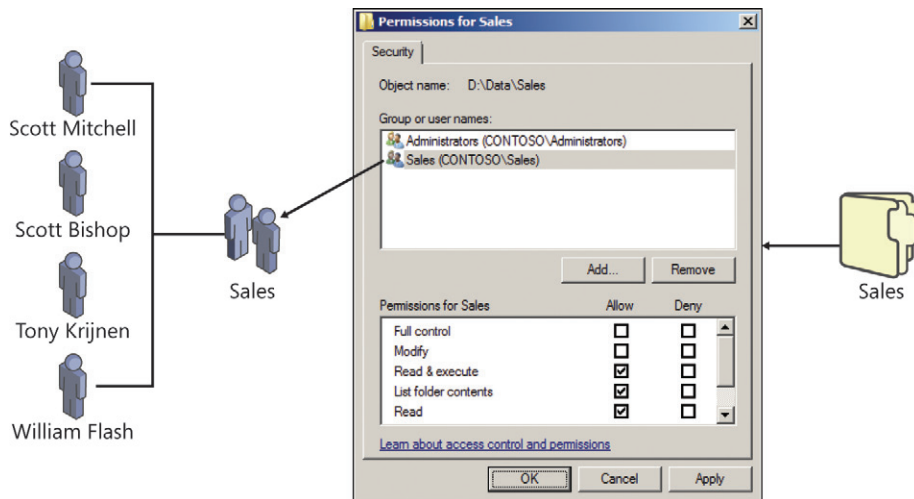


FIGURE 4-2 Assigning Allow Read permission to a group; groups add manageability

You now have a single point of management. The Sales group effectively manages access to the shared folder. You can add new sales users to the group, and they will gain access to the shared folder. When you delete an account, it is automatically deleted from the group, so you will not have irresolvable SIDs on your ACL. It is also easier to answer the question, “Who can read the Sales folder?” You can simply enumerate the membership of the Sales group. The Sales group has become the focus of access management tasks.

There’s an extra benefit: Your ACL remains stable because the Sales group has Allow Read permission, so your backups will be easier. When you change the ACL of a folder, the ACL propagates to all child files and folders, setting the Archive flag and thereby requiring a backup of all files, even if the contents of the files have not changed.

Groups Add Scalability

If the sales users require Read access to three folders on three separate servers, you could assign the Sales group Allow Read permission on each of the three folders. After you assign the three permissions, the Sales group provides a single point of management for resource access, as shown in Figure 4-3.

The Sales group effectively manages access to all three shared folders. You can add new sales users to the group, and they will gain access to the three shared folders on the three servers. When you delete an account, it is automatically deleted from the group, so you will not have irresolvable SIDs on your ACLs.

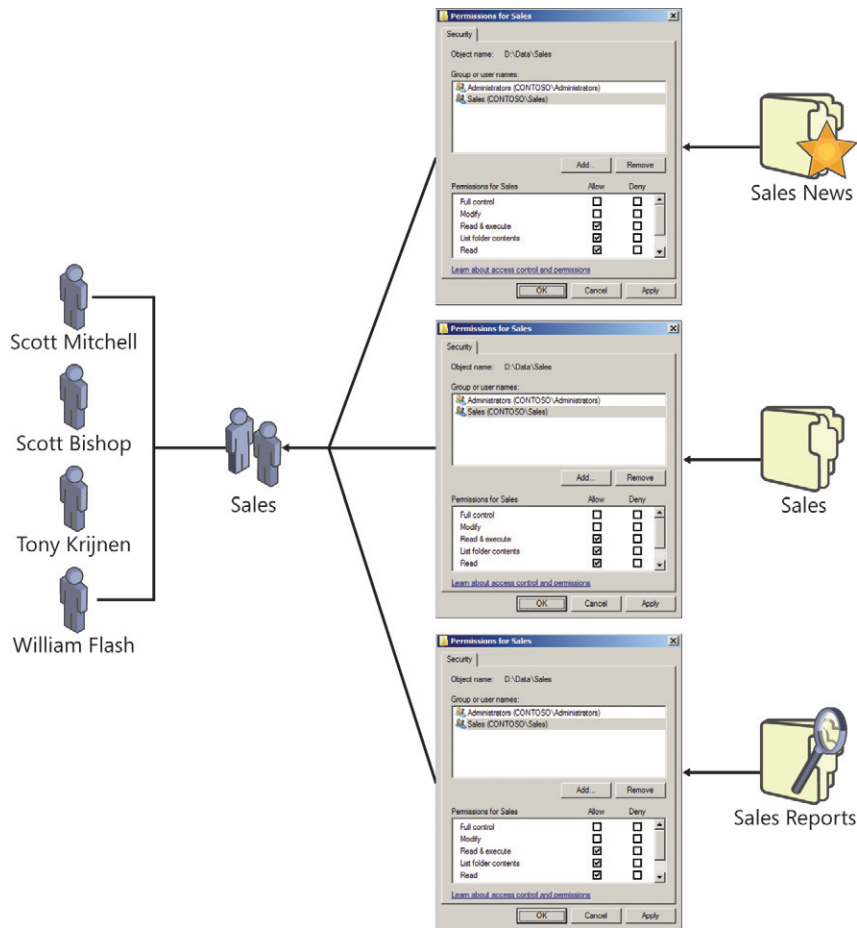


FIGURE 4-3 Assigning Allow Read permission on three folders; groups add scalability

One Type of Group Is Not Enough

Imagine now that it is not only salespeople who require Read access to the folders. The executives, the marketing department employees, and the sales consultant hired by your organization also require Read permission to the same folders.

You could add those groups to the ACL of the folders, granting each of them Allow Read permission, but soon you would have an ACL with multiple permissions, this time assigning the Allow Read permission to multiple groups instead of multiple users. This is shown in Figure 4-4.

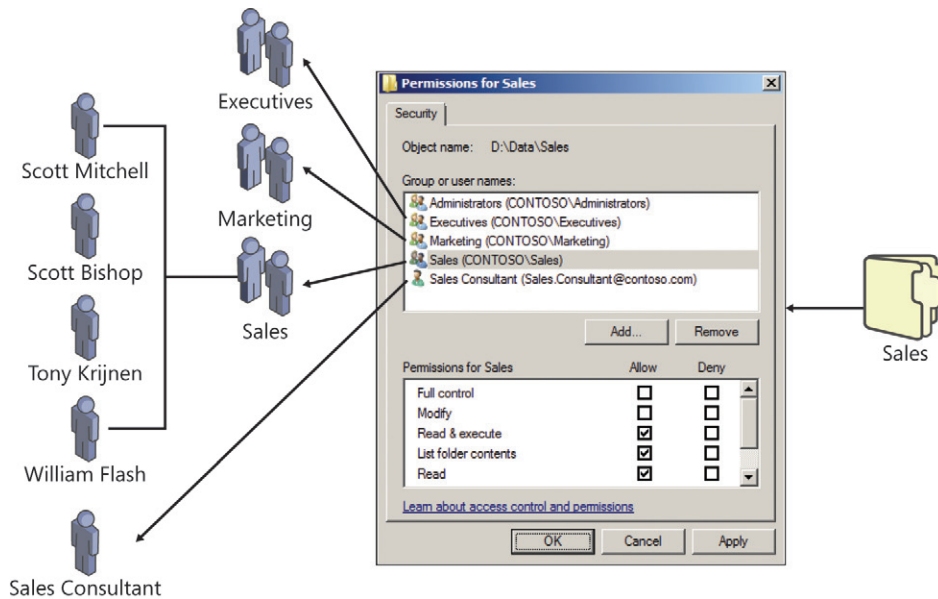


FIGURE 4-4 One kind of group is not enough to efficiently manage permissions

To give the three groups and one user permission to the three folders on the three servers, you would have to add 12 permissions! The next group that required access would require three more changes to grant permissions to the ACLs of the three shared folders.

What if eight users who are not salespeople, marketing employees, or executives have a business need for Read access to the three folders? Do you add their individual user accounts to the ACLs? If so, that's 24 more permissions to add and manage!

You can see that using only one type of group—a role group that defines the business roles of users—quickly becomes an ineffective way of enabling management of access to the three folders. If the management rule suggests that three roles and nine additional users require access to the resource, you are assigning a total of 36 permissions on ACLs. It becomes very difficult to maintain compliance and to audit. Even simple questions such as, "Can you tell me every user who can read the Sales folders?" become difficult to answer.

Role-Based Management: Role Groups and Rule Groups

The solution is to recognize that you must address two management tasks to effectively manage this scenario: You must manage the users as collections, based on their business roles, and, separately, you must manage access to the three folders.

The three folders are also a collection of items: They are a single resource—a collection of Sales folders—that just happens to be distributed across three folders on three servers. And you are trying to manage Read access to that resource. You need a single point of management with which to manage access to the resource.

This requires another group—a group that represents Read access to the three folders on the three servers. Imagine that you create a group called ACL_Sales Folders_Read. This group will be assigned the Allow Read permission on the three folders. The Sales, Marketing, and Executives groups, along with the individual users, will all be members of the ACL_Sales Folders_Read group. You assign only three permissions: one on each folder, granting Read access to the ACL_Sales Folders_Read group. This is shown in Figure 4-5.

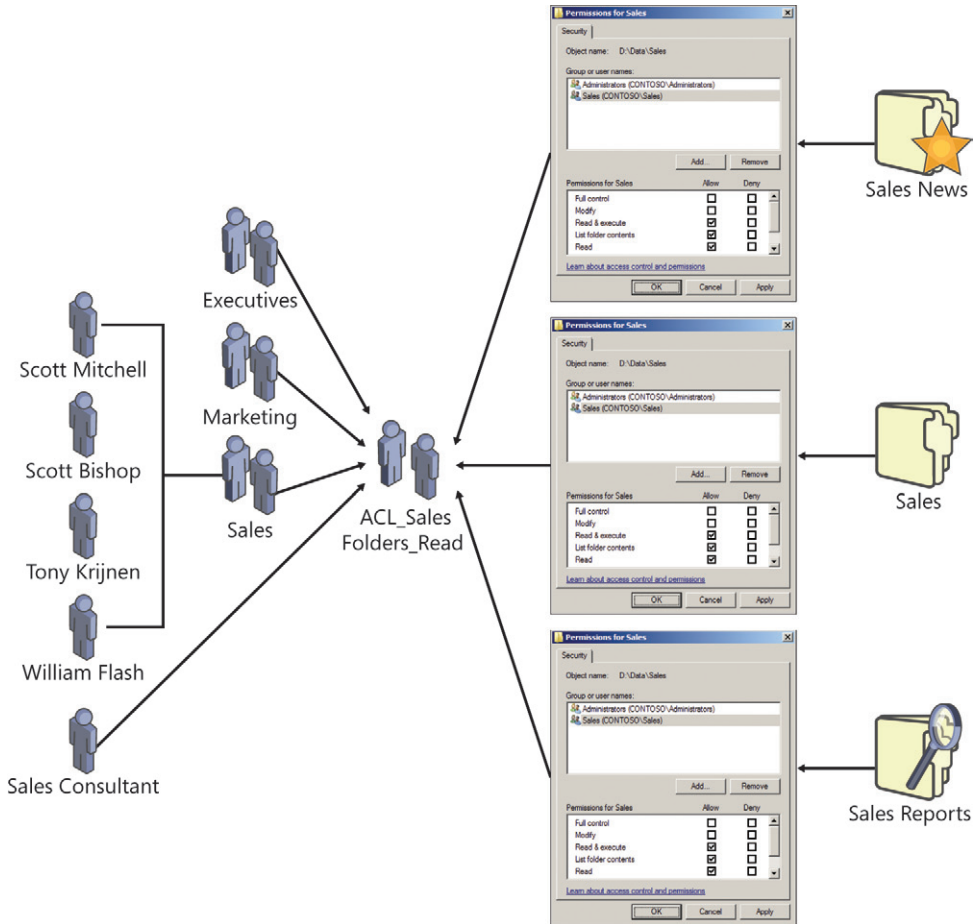


FIGURE 4-5 Role-based management uses role groups and rule groups to efficiently manage access to folders

The ACL_Sales Folders_Read group becomes the focus of access management. As additional groups or users require access to the folders, you add them to that group. It also becomes much easier to report who has access to the folders. Instead of having to examine the ACLs on each of the three folders, you simply examine the membership of the ACL_Sales Folders_Read group.

To effectively manage even a slightly complex enterprise, you need groups that perform two distinct purposes:

- **Groups that define roles** These groups, referred to as *role groups*, contain users, computers, and other role groups based on common business characteristics such as location and job type.
- **Groups that define management rules** These groups, referred to as *rule groups*, define how an enterprise resource is managed.

This approach to managing the enterprise with groups is called *role-based management*. You define roles of users based on business characteristics (for example, department or division affiliation such as sales, marketing, and executives), and you define management rules (for example, the rule that manages which roles and individuals can access the three folders).

You can achieve both management tasks by using groups in a directory. Roles are represented by groups that contain users, computers, and other roles. That's right, roles can include other roles—for example, a Managers role might include the Sales Managers, Finance Managers, and Production Managers roles. Management rules, such as the rule that defines and manages Read access to the three folders, are represented by groups as well. Rule groups contain roles and, occasionally, individual users or computers such as the sales consultant and eight other users in the example.

The key takeaway is that groups serve two distinct purposes: one group defines the role, and another defines how a resource is managed.

To achieve manageability of an enterprise of any size or complexity, you must manage groups effectively and have an infrastructure of groups that provide single points of management for roles and rules. That means, technically, that you will need groups that can include as members users, computers, other groups, and, possibly, security principals from other domains.

For more information about role-based management, see *Windows Administration Resource Kit: Productivity Solutions for IT Professionals*.

Defining Group Naming Conventions

To create a group by using the Active Directory Users And Computers snap-in, simply right-click the organizational unit (OU) in which you want to create a group, point to New, and then click Group. The New Object – Group dialog box, shown in Figure 4-6, lets you specify fundamental properties of the new group.

The following name properties can be configured here:

- **Group name** *cn* attribute of group object; must be unique only within OU
- **Group name (Pre-Windows 2000)** *sAMAccountName* attribute of group; unique in domain

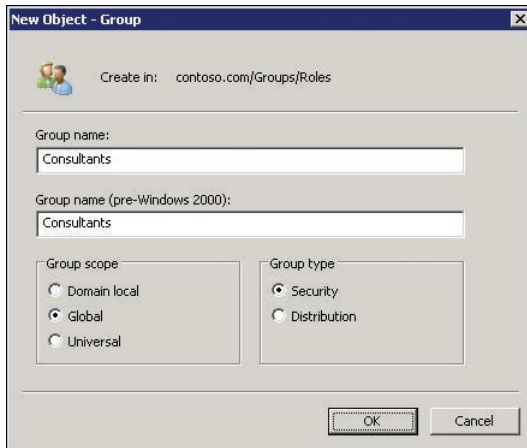


FIGURE 4-6 The New Object – Group dialog box

The first properties you must configure are the group's names. A group, like a user or computer, has several names. The first, shown in the Group Name box in Figure 4-6, is used by Windows 2000 and later systems to identify the object—it becomes the *cn* and *name* attributes of the object. The second, the pre-Windows 2000 name, is the *sAMAccountName* attribute, used to identify the group to some applications and devices such as network attached storage (NAS) devices running non-Microsoft operating systems. The *cn* and *name* attributes must be unique only within the container—the OU—in which the group exists. The *sAMAccountName* must be unique in the entire domain. Technically, the *sAMAccountName* could be a different value than the *cn* and *name*, but this is highly discouraged. Choose a name that is unique in the domain, and use it in both name boxes in the New Object – Group dialog box.

BEST PRACTICE GROUP NAMES

Use the same name (unique in the domain) for both group name properties.

The following naming conventions are recommended:

- **Role groups.** Simple, unique name, such as Sales or Consultants
- **Management groups.** For example, ACL_Sales Folders_Read
 - **Prefix** This identifies the management purpose of group, such as ACL for groups managing access permissions to shared resources.
 - **Resource identifier** This is a unique identifier for what is being managed.
 - **Suffix** For resource access groups, this is the type of access the group manages.
 - **Delimiter** This should be a consistently used marker separating prefix, identifier, and suffix, such as an underscore (_). Do not use the delimiter elsewhere in the name—use it only as a delimiter.

The name you choose should help you manage the group and your enterprise on a day-to-day basis. It is recommended to follow a naming convention that identifies the type of group and the purpose of the group.

The example in the previous section used a group name, `ACL_Sales Folders_Read`. Let's examine how the recommendations listed earlier apply to the group name.

- **Prefix** The prefix identifies the management purpose of the group. In this case, it is a group used to manage access permissions to a folder. It is used on access control lists, so the prefix `ACL` is used.
- **Resource identifier** The main part of the name uniquely identifies the resource that is being managed with the group—in this example, `Sales Folders`.
- **Suffix** The suffix further defines what is being managed by the group. In the case of resource access management groups, the suffix defines the level of access provided to members of the group. In our example, that is `Read`.
- **Delimiter** A delimiter—in this case, an underscore—is used to separate parts of the name. Note that the delimiter is not used between the words *Sales* and *Folder*. Spaces are acceptable in group names—you just need to enclose such group names in quotes when you refer to them in commands or scripts. You can create scripts that use the delimiter to deconstruct group names to facilitate auditing and reporting.

Remember that role groups that define user roles are often used by non-technical users. For example, you might email-enable the Sales group so that it can be used as an email distribution list. Therefore, your naming convention for role groups should be simple and straightforward. In other words, do not use prefixes, suffixes, or delimiters when naming role groups—just use a descriptive user-friendly name.

For more information about managing groups effectively, see *Windows Administration Resource Kit: Productivity Solutions for IT Professionals*.

Understanding Group Types

There are two types of groups: security and distribution. When you create a group, you select the group type in the New Object – Group dialog box.

Distribution groups are used primarily by email applications. These groups are not security enabled so they cannot be given permission to resources. Sending a message to a distribution group sends the message to all members of the group.

Security groups are security principals with SIDs. These groups can therefore be used in permission entries in ACLs to control security for resource access. Security groups can also be used as distribution groups by email applications. If a group will be used to manage security, it must be a security group.

Because security groups can be used for both resource access and email distribution, many organizations use only security groups. However, if a group will be used only for email distribution, you should create the group as a distribution group. Otherwise, the group is

assigned a SID and the SID is added to the user's security access token, which can lead to unnecessary bloat of the security token.

Understanding Group Scope

Groups have members: users, computers, and other groups; groups can be members of other groups, and groups can be referred to by ACLs, Group Policy object (GPO) filters, and other management components. *Group scope* affects each of these characteristics of a group: what it can contain, what it can belong to, and where it can be used. There are four group scopes: local, domain local, global, and universal.

The characteristics that define each scope fall into these categories:

- **Replication** Where is the group defined and to what systems is the group replicated?
- **Membership** What types of security principals can the group contain as members? Can the group include security principals from trusted domains? In Chapter 12, "Managing Multiple Domains and Forests," you learn about trust relationships, or *trusts*. A trust allows a domain to refer to another domain for user authentication, to include security principals from the other domain as group members, and to assign permissions to security principals in the other domain. The terminology used can be confusing. If Domain A trusts Domain B, then Domain A is the *trusting* domain and Domain B is the *trusted* domain. Domain A accepts the credentials of users in Domain B. It forwards requests by Domain B users to authenticate to a domain controller in Domain B because it *trusts* the identity store and authentication service of Domain B. Domain A can add Domain B's security principals to groups and ACLs in Domain A. See Chapter 12 for more detail.
- **Availability** Where can the group be used? Is the group available to add to another group? Is the group available to add to an ACL?

Keep these broad characteristics in mind as you explore the details of each group scope.



EXAM TIP

In the context of group membership, remember that if Domain A trusts Domain B, Domain B is *trusted*, and its users and global groups can be members of domain local groups in Domain A. Additionally, Domain B's users and global groups can be assigned permissions to resources in Domain A.

Local Groups

Local groups are truly local—defined on and available to a single computer. Local groups are created in the security accounts manager (SAM) database of a domain member computer—both workstations and servers have local groups.

Local groups have the following characteristics:

- **Replication** A local group is defined only in the local SAM database of a domain member server. The group and its membership are not replicated to any other system.
- **Membership** A local group can include as members:
 - Any security principals from the domain: users, computers, global groups, or domain local groups
 - Users, computers, and global groups from any domain in the forest
 - Users, computers, and global groups from any trusted domain
 - Universal groups defined in any domain in the forest
- **Availability** A local group has only computer-wide scope. It can be used in ACLs on the local computer only. A local group cannot be a member of any other group.

BEST PRACTICE DO NOT MANAGE WITH LOCAL GROUPS

In a workgroup, you use local groups to manage security of resources on a system. In a domain, however, managing the local groups of individual computers becomes unwieldy and is, for the most part, unnecessary. It is not recommended to create custom local groups on domain members. In fact, the Users and Administrators local groups are the only local groups that you should be concerned with managing in a domain environment.

Domain Local Groups

Domain local groups are used primarily to manage permissions to resources. For example, the ACL_Sales Folder_Read group discussed earlier in the lesson would be created as a domain local group. Domain local groups have the following characteristics:

- **Replication** A domain local group is defined in the domain naming context. The group object and its membership (the *member* attribute) are replicated to every domain controller in the domain.
- **Membership** A domain local group can include as members:
 - Any security principals from the domain: users, computers, global groups, or other domain local groups
 - Users, computers, and global groups from any domain in the forest
 - Users, computers, and global groups from any trusted domain
 - Universal groups defined in any domain in the forest
- **Availability** A domain local group can be added to ACLs on any resource on any domain member. Additionally, a domain local group can be a member of other domain local groups or even computer local groups.

The membership capabilities of a domain local group are identical to those of local groups, but the replication and availability of the domain local group make it useful across the entire domain.

BEST PRACTICE MANAGE ACCESS TO RESOURCES WITH DOMAIN LOCAL GROUPS

Domain local groups are well suited for defining business management rules, such as resource access rules, because the group can be applied anywhere in the domain, and it can include members of any type within the domain as well as members from trusted domains. For example, a domain local security group named `ACL_Sales Folders_Read` might be used to manage Read access to a collection of folders that contain sales information on one or more servers.

Global Groups

Global groups are used primarily to define collections of domain objects based on business roles. Role groups, such as the Sales and Marketing groups mentioned earlier, as well as roles of computers such as a Sales Laptops group, would be created as global groups. Global groups have the following characteristics:

- **Replication** A global group is defined in the domain naming context. The group object, including the *member* attribute, is replicated to all domain controllers in the domain.
- **Membership** A global group can include as members users, computers, and other global groups in the same domain only.
- **Availability** A global group is available for use by all domain members as well as by all other domains in the forest and all trusting external domains. A global group can be a member of any domain local or universal group in the domain or in the forest. It can also be a member of any domain local group in a trusting domain. Finally, a global group can be added to ACLs in the domain, in the forest, or in trusting domains.

As you can see, global groups have the most limited membership (only users, computers, and global groups from the same domain) but the broadest availability across the domain, the forest, and trusting domains.

BEST PRACTICE DEFINE ROLES WITH GLOBAL GROUPS

Global groups are well suited to defining roles, because roles are generally collections of objects from the same directory. For example, global security groups named `Consultants` and `Sales` might be used to define users who are consultants and salespeople, respectively.

Universal Groups

Universal groups have the following characteristics:

- **Replication** A universal group is defined in a single domain in the forest but is replicated to the global catalog. You will learn more about the global catalog in Chapter 12. Objects in the global catalog are readily accessible across the forest.
- **Membership** A universal group can include as members users, global groups, and other universal groups from any domain in the forest.
- **Availability** A universal group can be a member of a universal group or domain local group anywhere in the forest. Additionally, a universal group can be used to manage resources—for example, to assign permissions—anywhere in the forest and in trusting forests.

Universal groups are useful in multidomain forests. They let you define roles, or manage resources, that span more than one domain.

The best way to understand universal groups is through an example. Trey Research has a forest with three domains: Americas, Asia, and Europe. Each domain has user accounts and a global group called Regional Managers that includes the managers of that domain's region. Remember that global groups can contain only users from the same domain. A universal group called Trey Research Regional Managers is created, and the three Regional Managers groups are added as members. The Trey Research Regional Managers group therefore defines a role for the entire forest. As users are added to any one of the Regional Managers groups, they will, through group nesting, be members of the Trey Research Regional Managers group.

Trey Research is planning to release a new product that requires collaboration across its regions. Resources related to the project are stored on file servers in each domain. To define who has the ability to modify files related to the new product, a universal group is created called *ACL_New Product_Modify*. That group is assigned the Allow Modify permission to the shared folders on each of the file servers in each of the domains. The Trey Research Regional Managers group is made a member of the *ACL_New Product_Modify* group, as are various global groups and a handful of users from each of the regions.

BEST PRACTICE MANAGE ROLES AND RULES ACROSS DOMAINS IN A FOREST WITH UNIVERSAL GROUPS

As you can see from the example in this section, universal groups can help you represent and consolidate roles that span domains in a forest and define rules that can be applied across the forest.

Summarizing Group Membership Possibilities

For both the certification examinations and day-to-day administration, it is important that you are completely familiar with the membership characteristics of each group scope.

Table 4-1 summarizes the objects that can be members of each group scope.

TABLE 4-1 Group Scope and Members

GROUP SCOPE	MEMBERS FROM THE SAME DOMAIN	MEMBERS FROM ANOTHER DOMAIN IN THE SAME FOREST	MEMBERS FROM A TRUSTED EXTERNAL DOMAIN
Local	Users	Users	Users
	Computers	Computers	Computers
	Global groups	Global groups	Global
	Universal groups	Universal groups	groups
	Domain local groups		
	Local users defined on the same computer as the local group		
Domain Local	Users	Users	Users
	Computers	Computers	Computers
	Global groups	Global groups	Global
	Universal groups	Universal groups	groups
	Domain local groups		
Universal	Users	Users	N/A
	Computers	Computers	
	Global groups	Global groups	
	Universal groups	Universal groups	
Global	Users	N/A	N/A
	Computers		
	Global groups		



Quick Check

- Which types of objects can be members of a global group in a domain?

Quick Check Answer

- Global groups can contain only users, computers, and other global groups from the same domain.

Converting Group Scope and Type

If, after creating a group, you determine that you need to modify the group's scope or type, you can do so. Open the Properties dialog box of an existing group and, on the General tab, shown in Figure 4-7, you see the existing scope and type. At least one more scope and type are available for selection.

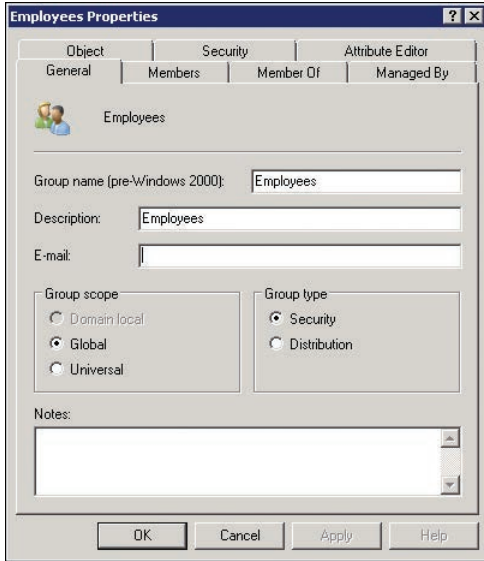


FIGURE 4-7 The General tab of a group's Properties dialog box

You can convert the group type at any time by changing the selection in the Group Type section of the General tab. Be cautious, however. When you convert a group from security to distribution, any resources to which the group had been assigned permission will no longer be accessible in the same way. After the group becomes a distribution group, users who log on to the domain will no longer include the group's SID in their security access tokens.

You can change the group scope in the following ways:

- Global to universal
- Domain local to universal
- Universal to global
- Universal to domain local

The only scope changes that you cannot make directly are from global to domain local or domain local to global. However, you can make these changes indirectly by first converting to universal scope, then converting to the desired scope. So all scope changes are possible.

Remember, however, that a group's scope determines the types of objects that can be members of the group. If a group already contains members or is a member of another group that would violate the new scope, you would be prevented from changing scope. For example, if a global group is a member of another global group, you cannot change the first group to universal scope, because a universal group cannot be a member of a global group. An explanatory error message, such as that shown in Figure 4-8, appears. You must correct the group's membership conflicts before you can change the group's scope.

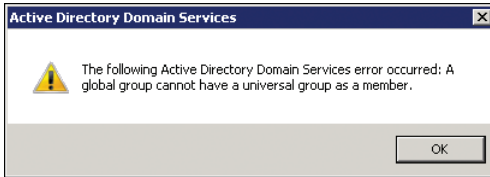


FIGURE 4-8 The error produced when a group's membership will not allow a change of scope

The `DSMod` command, introduced in Chapter 3, can be used to change group type and scope by using the following syntax:

```
dsmod group GroupDN -secgrp { yes | no } -scope { l | g | u }
```

The *GroupDN* is the distinguished name of the group to modify. The following two parameters affect group scope and type:

- `-secgrp { yes | no }` specifies group type: security (*yes*) or distribution (*no*).
- `-scope { l | g | u }` determines the group scope: domain local (*l*), global (*g*), or universal (*u*).

Managing Group Membership

You can add or remove members of a group by using one of several methods.

The Members Tab

You can open the group's Properties dialog box and click the Members tab. To manage group membership using the group's Members tab:

1. Open the group's Properties dialog box.
2. Click the Members tab.
3. To remove a member, simply select the member and click Remove.
4. To add a member, click Add. The Select Users, Contacts, Computers, Or Groups dialog box appears, as shown in Figure 4-9.

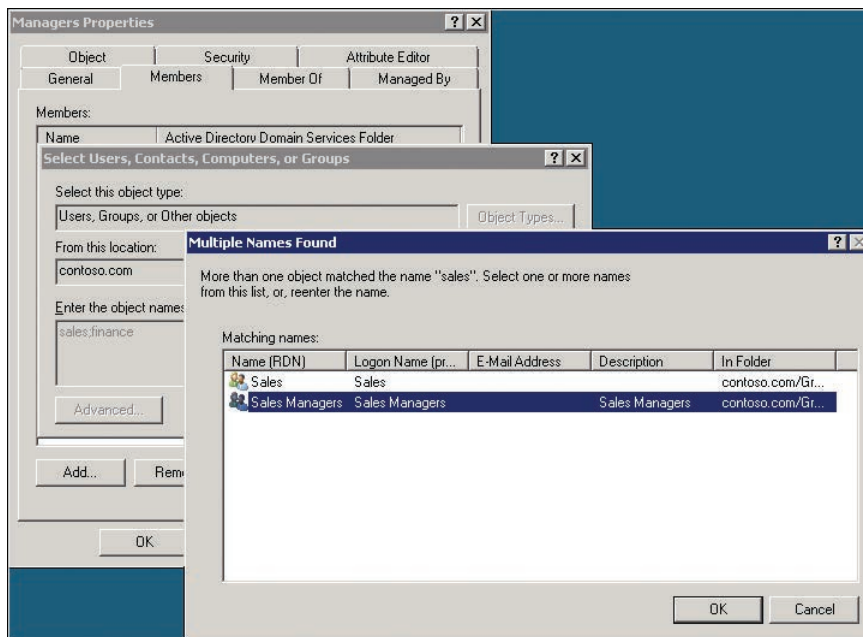


FIGURE 4-9 Adding a member to a group

There are several tips worth mentioning about this process:

- In the Select dialog box, in the Enter The Object Names box, you can type multiple accounts separated by semicolons. For example, in Figure 4-9, both *sales* and *finance* are entered, separated by a semicolon.
- You can type partial names of accounts—you do not need to type the full name. Windows searches Active Directory for accounts that begin with the name you entered. If there is only one match, Windows selects it automatically. If multiple accounts match, the Multiple Names Found dialog box appears, in which you can select the object you want. This shortcut—typing partial names—can save time when adding members to groups and can help when you don't remember the exact name of a member.
- By default, Windows searches only for users and groups that match the names you enter in the Select dialog box. If you want to add computers to a group, you must click Object Types and select Computers.
- By default, Windows searches only domain accounts. If you want to search local accounts, click Locations in the Select dialog box.
- If you cannot find the member you want to add, click Advanced in the Select dialog box. A more powerful query window appears, giving you more options for searching Active Directory.

The Member Of Tab

To manage group membership using the member object's Member Of tab:

1. Open the properties of the member object, and then click its Member Of tab.
2. To remove the object from a group, select the group and then click Remove.
3. To add the object to a group, click Add and select the group.

The Add To A Group Command

To manage group membership using the Add To A Group command:

1. Right-click one or more selected objects in the Active Directory Users And Computers details pane.
2. Click Add To A Group.
3. Use the Select dialog box to specify the group.

The *Member* and *MemberOf* Attributes

When you add a member to a group, you change the group's *member* attribute. The *member* attribute is a multivalued attribute. Each member is a value represented by the distinguished name (DN) of the member. If the member is moved or renamed, Active Directory automatically updates the *member* attributes of groups that include the member.

When you add a member to a group, the member's *memberOf* attribute is also updated, indirectly. The *memberOf* attribute is a special type of attribute called a *backlink*. It is updated by Active Directory when a forward link attribute, such as *member*, refers to the object.

When you add a member to a group, you are always changing the group's *member* attribute. Therefore, when you use the Member Of tab of an object to add to a group, you are actually changing the group's *member* attribute, and Active Directory updates the member's *memberOf* attribute automatically.

Helping Membership Changes Take Effect Quickly

When you add a user to a group, the membership does not take effect immediately. Group membership is evaluated at logon for a user (at startup for a computer). Therefore, a user must log off and log on before the membership change becomes a part of the user's token.

Additionally, there can be a delay while the group membership change replicates. Replication is discussed in Chapter 11, "Managing Sites and Active Directory Replication." This is particularly true if your enterprise has more than one Active Directory site. You can facilitate the speed with which a change affects a user by making the change on a domain controller in the user's site. Right-click the domain in the Active Directory Users And Computers snap-in and choose Change Domain Controller.

Developing a Group Management Strategy

Adding groups to other groups—a process called *nesting*—can create a hierarchy of groups that support your business roles and management rules. Now that you have learned the business purposes and technical characteristics of groups, it is time to align the two in a strategy for group management.

Earlier in this lesson, you learned which types of objects *can* be members of each group scope. Now it is time to identify which types of objects *should* be members of each group scope. This leads to the best practice for group nesting, known as *IGDLA*:

- **I**dentities (user and computer accounts) are members of
- **G**lobal groups that represent business roles. Those role groups (global groups) are members of
- **D**omain **L**ocal groups that represent management rules—for example, managing who has Read permission to a specific collection of folders. These rule groups (domain local groups) are granted
- **A**ccess to resources. In the case of a shared folder, for example, access is granted by adding the domain local group to the folder's ACL, with a permission that provides the appropriate level of access.

A multidomain forest also contains universal groups that fit in between global and domain local groups. Global groups from multiple domains are members of a single universal group. That universal group is a member of domain local groups in multiple domains. You can remember the nesting as *IGUDLA*.

NOTE IGDLA VS. UGDLA

Some texts abbreviate the group nesting strategy as *UGDLA*: *U*ser*s* go into *G*lobal groups, which go into *D*omain *L*ocal groups, which are given *A*ccess to resources. This text, and others, changes the abbreviation to *IGDLA*. Although users are members of groups, so are computers. For example, to deploy software to a collection of computers, you can make them members of a group that is used as a deployment target by your software distribution tools. Therefore, *identities* is more accurate than *users*. In addition, the change allows *U* to be used for *Universal* groups in multidomain forest group nesting.

This best practice for implementing group nesting translates well even in multidomain scenarios. Consider Figure 4-10.

Figure 4-10 represents a group implementation that reflects not only the technical view of group management best practices (IGDLA) but also the business view of role-based, rule-based management.

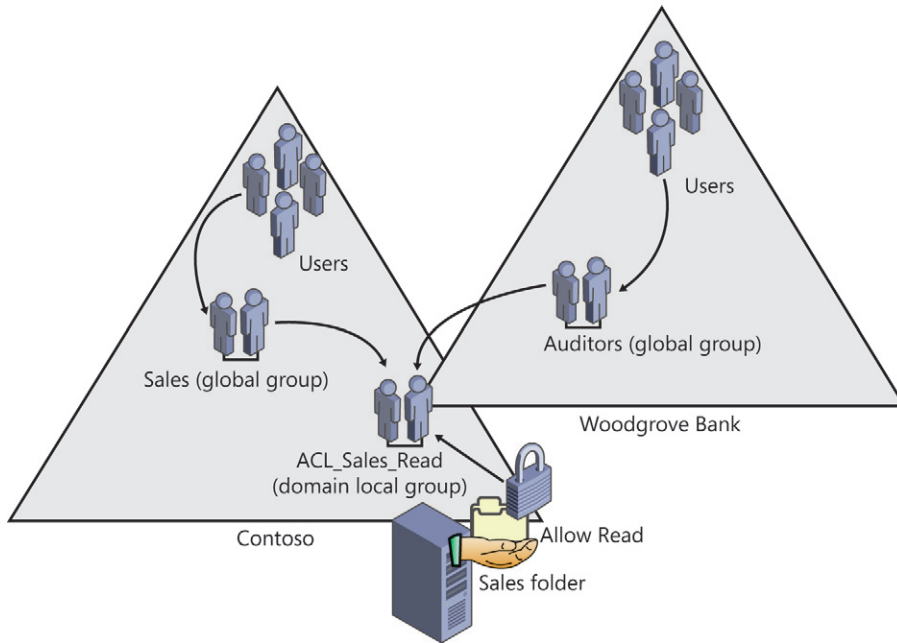


FIGURE 4-10 A group management implementation

Consider the following scenario. The sales force at Contoso, Ltd., has just completed their fiscal year. Sales files from the previous year are in a folder called Sales. The sales force needs Read access to the Sales folder. Additionally, a team of auditors from Woodgrove Bank, a potential investor, requires Read access to the Sales folder to perform an audit. The steps to implement the security required by this scenario are as follows:

1. Assign users with common job responsibilities or other business characteristics to role groups implemented as global security groups.

This happens separately in each domain. Salespeople at Contoso are added to a Sales role group. Auditors at Woodgrove Bank are added to an Auditors role group.

2. Create a group to represent the business rule regarding who can access the Sales folder with Read permission.

This is implemented in the domain that is managing the business rule. In this case, the business rule is Read-level access to the Sales folder, and the Contoso domain (in which the Sales folder resides) manages the access. The resource access management rule group is created as a domain local group, ACL_Sales Folders_Read.

3. Add the role groups to the resource access management rule group ACL_Sales Folders_Read to represent the management rule.

The role groups you add can come from any domain in the forest or from a trusted domain such as Woodgrove Bank. Global groups from trusted external domains, or from any domain in the same forest, can be members of a domain local group.

4. Assign to the rule group the permission that implements the required level of access.
In this case, grant the Allow Read permission to the domain local group ACL_Sales Folders_Read.

This strategy results in single points of management, reducing the management burden. One point of management defines who is in Sales, and one defines who is an Auditor. Those roles, of course, are likely to have a variety of permissions to resources beyond simply the Contoso domain's Sales folder. Another single point of management determines who has Read access to the Sales folder. And, of course, the Sales folder might not just be a single folder on a single server: It could be a collection of folders across multiple servers, each of which assigns Allow Read permission to the single domain local group.

NOTE ROLE-BASED MANAGEMENT

Role-based management is a concept used throughout information technology and information protection, and it can be attained with out-of-the-box capabilities of Active Directory. IGDLA is the implementation of role-based management using Active Directory groups.

PRACTICE Creating and Managing Groups

In this practice, you create groups, experiment with group membership, and convert group type and scope. Before performing the exercises in this practice, you must create the following objects in the contoso.com domain:

- A first-level OU named Groups
- A first-level OU named User Accounts
- User objects in the User Accounts OU for David Jones, Jeff Ford, and Tony Krijnen

EXERCISE 1 Create Groups

In this exercise, you create groups of different scopes and types.

1. Log on to SERVER01 as Administrator. Open the Active Directory Users And Computers snap-in and click the Groups OU in the tree pane.
If the Sales group already exists, delete the group.
2. Right-click the Groups OU, point to New, and then click Group.
3. In the Group Name box, type **Sales**.
4. Select the Global group scope and Security group type. Click OK.
5. Right-click the Sales group and choose Properties.
6. On the Members tab, click Add. Type **Jeff; Tony** and click OK. Click OK to close the Properties dialog box.

7. Repeat steps 2–4 to create two global security groups named Marketing and Consultants.
8. Repeat steps 2–4 to create a domain local security group named ACL_Sales Folder_Read.
9. Open the properties of the ACL_Sales Folder_Read group.
10. On the Members tab, click Add. Type **Sales;Marketing;Consultants** and click OK.
11. Click Add. Type **David** and click OK. Click OK to close the Properties dialog box.
12. Open the Properties dialog box of the Marketing group.
13. On the Members tab, click Add.
14. Type **ACL_Sales Folder_Read** and click OK.
You are unable to add a domain local group to a global group.
15. Close all open dialog boxes.
16. Create a folder named Sales on the C drive.
17. Right-click the Sales folder, click Properties, and then click the Security tab.
18. Click Edit, and then click Add.
19. Click Advanced, and then click Find Now.
Notice that by using a prefix for group names, such as the **ACL_** prefix for resource access groups, you can find them quickly, grouped together at the top of the list.
20. Close all open dialog boxes.
21. Switch to Active Directory Users And Computers, right-click the Groups OU, click New, and then click Group.
22. In the Group Name box, type **Employees**.
23. Select the Domain Local group scope and the Distribution group type. Click OK.

EXERCISE 2 Convert Group Type and Scope

In this exercise, you learn how to convert group type and scope.

1. Right-click the Employees group and choose Properties.
2. Change the group type to Security. Click Apply.
Consider: Can you change the group scope from Domain Local to Global? How?
3. Change the group scope to Universal. Click Apply.
4. Change the group scope to Global. Click Apply.
5. Click OK to close the Properties dialog box.

Lesson Summary

- There are two types of groups: security and distribution. Security groups can be assigned permissions and can be mail-enabled. Distribution groups are used primarily as email distribution lists—they cannot be assigned permissions to resources.
- In addition to local groups, which are maintained only in the local SAM database of a domain member server, there are three domain group scopes: global, domain local, and universal.
- The group scope affects the group's replication, the types of objects that can be members of the group, and the group's availability to be a member of another group or to be used for management tasks such as assigning permissions.
- You can convert group type and scope after creating the group.
- An enterprise group management strategy involves defining user roles as global security groups, and then creating groups that enable you to manage rules. For example, to manage access to a resource at a particular level, such as Read, you create a domain local security group, and then assign that group Read permission to the resource. The result is that user and computer identities become members of global groups, which are then nested into domain local groups, which are given access to resources. This group nesting strategy is abbreviated as *IGDLA*.

Lesson Review

You can use the following questions to test your knowledge of the information in Lesson 1, "Managing an Enterprise with Groups." The questions are also available on the companion CD if you prefer to review them in electronic form.

NOTE ANSWERS

Answers to these questions and explanations of why each answer choice is right or wrong are located in the "Answers" section at the end of the book.

1. A new project requires that users in your domain and in the domain of a partner organization have access to a shared folder on your file server. Which type of group should you create to manage the access to the shared folder?
 - A. Universal security group
 - B. Domain local security group
 - C. Global security group
 - D. Domain local distribution group

2. Your domain includes a global distribution group named Company Update. It has been used to send company news by email to its members. You have decided to allow all members to contribute to the newsletter by creating a shared folder on a file server. What must you do to allow group members access to the shared folder?
- A. Change the group scope to domain local
 - B. Change the group scope to universal
 - C. Add the group to the Domain Users group
 - D. Use DSMod with the *-secgrp yes* parameter
3. You have created a global security group in the contoso.com domain named Corporate Managers. Which members can be added to the group? (Choose all that apply.)
- A. Sales Managers, a global group in the fabrikam.com domain, a trusted domain of a partner company
 - B. Sales Managers, a global group in the tailspintoys.com domain, a domain in the contoso.com forest
 - C. Linda Mitchell, a user in the tailspintoys.com domain, a domain in the contoso.com forest
 - D. Jeff Ford, a user in the fabrikam.com domain, a trusted domain of a partner company
 - E. Mike Danseglio, a user in the contoso.com domain
 - F. Sales Executives, a global group in the contoso.com domain
 - G. Sales Directors, a domain local group in the contoso.com domain
 - H. European Sales Managers, a universal group in the contoso.com forest

Lesson 2: Automating the Creation and Management of Groups

In Lesson 1 you learned the steps for creating groups, choosing group scope and type, and configuring group membership, using the Active Directory Users And Computers snap-in. When you need to create more than one group at a time, or when you want to automate group creation, you must use other tools. Chapter 3 introduced you to command-line and automation tools, including CSVDE, LDIFDE, DSAdd, and Windows PowerShell. These tools can also be used to automate the creation and management of group objects. In this lesson, you'll learn how to manage the life cycle of group objects, from beginning to end, by using command-line and automation tools.

After this lesson, you will be able to:

- Create groups with DSAdd, CSVDE, and LDIFDE.
- Manage group membership with DSMod, LDIFDE, and Windows PowerShell.
- Enumerate group membership with DSGet.
- Move and delete groups with DSMove and DSRm.
- Copy group membership.

Estimated lesson time: 45 minutes

Creating Groups with DSAdd

The DSAdd command, introduced in Chapter 3, lets you add objects to Active Directory. To add a group, type the following command:

```
dsadd group GroupDN
```

where *GroupDN* is the distinguished name (DN) of the group, such as "CN=Finance Managers, OU=Groups,DC=contoso,DC=com." Be certain to surround the DN with quotes if the DN includes spaces.

For example, to create a new global security group named Marketing in the Groups OU of the contoso.com domain, the command would be:

```
dsadd group "CN=Marketing,OU=Groups,DC=contoso,DC=com" -samid Marketing -secgrp  
yes -scope g
```

You can also provide the *GroupDN* parameter in one of the following ways:

- By piping a list of DNs from another command such as DSQuery.
- By typing each DN on the command line, separated by spaces.

- By leaving the DN parameter empty, at which point you can type the DNs one at a time at the keyboard console of the command prompt. Press Enter after each DN. After the last DN, press Ctrl+Z, and then press Enter.

Each of these three options allows you to generate multiple groups simultaneously with DSAdd. You can also use the DSAdd command with more than one *GroupDN* on the command line, each separated by a space, to generate multiple groups.

The DSAdd command can also configure attributes of the groups you create with the following optional parameters:

- **-secgrp { yes | no }** Specifies group type: security (*yes*) or distribution (*no*).
- **-scope { l | g | u }** Determines the group scope: domain local (*l*), global (*g*), or universal (*u*).
- **-samid *Name*** Specifies the *sAMAccountName* of the group. If not specified, the name of the group from its DN is used. It is recommended that the *sAMAccountName* and the group name be the same, so you do not need to include this parameter when using DSAdd.
- **-desc *Description*** Configures the group's description.
- **-members *MemberDN*** Adds members to the group. Members are specified by their DNs in a space-separated list.
- **-member of *GroupDN ...*** Makes the new group a member of one or more existing groups. The groups are specified by their DNs in a space-separated list.

Importing Groups with CSVDE

Chapter 3 also introduced you to Comma-Separated Values Data Exchange (CSVDE), which imports data from comma-separated values (.csv) files. It also exports data to a .csv file. The following example shows a .csv file that will create a group, Marketing, and populate the group with two initial members, Linda Mitchell and Scott Mitchell.

```
objectClass,sAMAccountName,DN,member
group,Marketing,"CN=Marketing,OU=Groups,DC=contoso,DC=com",
"CN=Linda Mitchell,OU=User Accounts,DC=contoso,DC=com;
CN=Scott Mitchell,OU=User Accounts,DC=contoso,DC=com"
```

The .csv file is two lines. The first line contains the attribute names, and the second line contains the values for the new group, *Marketing*. The second line is wrapped for presentation in this text.

Take note of the use of quotation marks in the preceding example. Quotation marks are required when an attribute includes a comma; without quotation marks, the comma would be interpreted as a delimiter. The DN of the group includes commas, so it must be surrounded by quotation marks. In the case of a multivalued attribute such as *member*, each value is separated by a semicolon—there are two values in *member* in the example. The entire *member* attribute is surrounded by quotation marks, not each individual value of the *member* attribute.

You can import this file into Active Directory by using the command:

```
csvde -i -f "filename" [-k]
```

The *-i* parameter specifies import mode. Without it, CSVDE uses export mode. The *-f* parameter precedes the filename, and the *-k* parameter ensures that processing continues even if errors are encountered, such as if the object already exists or the member cannot be found.



EXAM TIP

CSVDE can be used to create objects, but not to modify existing objects. You cannot use CSVDE to import members to existing groups.

Importing Groups with LDIFDE

LDAP Data Interchange Format Data Exchange (LDIFDE), as you learned in Chapter 3, is a tool that imports and exports files in the Lightweight Directory Access Protocol Data Interchange Format (LDIF) format. LDIF files are text files within which operations are specified by a block of lines separated by a blank line. Each operation begins with the DN of the object that is the target of the operation. The next line, *changeType*, specifies the type of operation: *add*, *modify*, or *delete*.

The following LDIF file creates two groups, Finance and Research, in the Groups OU of the contoso.com domain:

```
DN: CN=Finance,OU=Groups,DC=contoso,DC=com
changeType: add
CN: Finance
description: Finance Users
objectClass: group
sAMAccountName: Finance
```

```
DN: CN=Research,OU=Groups,DC=contoso,DC=com
changeType: add
CN: Research
description: Research Users
objectClass: group
sAMAccountName: Research
```

Convention would suggest saving the file with an *.ldf* extension—for example, *Groups.ldf*. To import the groups into the directory, issue the *Ldifde.exe* command, as shown here:

```
ldifde -i -f groups.ldf -k
```

The *-i* parameter specifies import mode. Without it, LDIFDE uses export mode. The *-f* parameter precedes the filename, and the *-k* parameter ensures that processing continues even if errors are encountered, such as if the object already exists.

Modifying Group Membership with LDIFDE

LDIFDE can also be used to modify existing objects in Active Directory, using LDIF operations with a *changeType* of *modify*. To add two members to the Finance group, the LDIF file would be:

```
dn: CN=Finance,OU=Groups,DC=contoso,DC=com
changeType: modify
add: member
member: CN=April Stewart,OU=User Accounts,dc=contoso,dc=com
member: CN=Mike Fitzmaurice,OU=User Accounts,dc=contoso,dc=com
-
```

The *changeType* is set to *modify*, and then the change operation is specified: *add* objects to the *member* attribute. Each new member is then listed on a separate line that begins with the *member* attribute name. The change operation is terminated with a line containing a single dash. Changing the third line to the following would remove the two specified members from the group:

```
delete: member
```

Retrieving Group Membership with DSGet

The DSMod and DSGet commands discussed in Chapter 3 are particularly helpful for managing the membership of groups. There is no option in the Active Directory Users And Computers snap-in to list all the members of a group including nested members. You can see only direct members of a group on the group's Members tab. Similarly, there is no way to list all the groups to which a user or computer belongs, including nested groups. You can see only direct membership on the user's or computer's Member Of tab.

The DSGet command lets you retrieve a complete list of a group's membership, including nested members, with the following syntax:

```
dsget group "GroupDN" -members [-expand]
```

The *-expand* parameter performs the magic of expanding nested groups' members.

Similarly, the DSGet command can be used to retrieve a complete list of groups to which a user or computer belongs, again by using the *-expand* parameter in the following commands:

```
dsget user "UserDN" -memberof [-expand]
dsget computer "ComputerDN" -memberof [-expand]
```

The *-memberof* parameter returns the value of the user's or computer's *memberOf* attribute, showing the groups to which the object directly belongs. When you add the *-expand* parameter, those groups are searched recursively, producing an exhaustive list of all groups to which the object belongs in the domain.

Changing Group Membership with DSMod

The DSMod command was applied in Lesson 1 to modify the scope and type of a group. The command's basic syntax is:

```
dsmod group "GroupDN" [options]
```

You can use options such as *-samid* and *-desc* to modify the *sAMAccountName* and *description* attributes of the group. Most useful, however, are the options that allow you to modify a group's membership:

- **-addmbr "Member DN"** Adds members to the group
- **-rmmbr "Member DN"** Removes members from the group

As with all DS commands, *Member DN* is the distinguished name of another Active Directory object, surrounded by quotes if the DN includes spaces. Multiple *Member DN* entries can be included, separated by spaces. For example, to add Mike Danseglio to the Research group, the DSMod command would be:

```
dsmod group "CN=Research,OU=Groups,DC=contoso,DC=com"  
-addmbr "CN=Mike Danseglio,OU=User Accounts,DC=contoso,DC=com"
```

Copying Group Membership

You can use DSGet in combination with DSMod to copy group membership. In the following example, the DSGet command is used to get information about all the members of the Sales group, and then, by piping that list to DSMod, add those users to the Marketing group:

```
dsget group "CN=Sales,OU=Groups,DC=contoso,DC=com" -members |  
dsmod group "CN=Marketing,OU=Groups,DC=contoso,DC=com" -addmbr
```

Notice the use of piping. The "output" of DSGet (distinguished names of members of the first group) is piped, using the pipe symbol ("`|`"), to act as the input for the DNs that are omitted after the *-addmbr* parameter.

Similarly, the DSGet and DSMod commands can work together to copy the group membership of one object, such as a user, to another object:

```
dsget user "Source User DN" -memberof | dsmod group -addmbr "Target User DN"
```

Moving and Renaming Groups with DSMove

You can move and rename groups in Active Directory Users And Computers by right-clicking the group and then clicking the Move or the Rename command.

The DSMove command, also discussed in Chapter 3, enables you to move or rename an object within a domain. You cannot use it to move objects between domains. Its basic syntax is:

```
dsmove ObjectDN [-newname NewName] [-newparent TargetOUDN]
```

The object is specified by using its distinguished name in the *ObjectDN* parameter. To rename the object, specify its new common name as the value of the *-newname* parameter. To move an object to a new location, specify the distinguished name of the target container as the value of the *-newparent* parameter.

For example, to change the name of the Marketing group to Public Relations, type:

```
dsmove "CN=Marketing,OU=Groups,DC=contoso,DC=com" -newname "Public Relations"
```

To then move that renamed group to the Marketing OU, type:

```
dsmove "CN=Public Relations,OU=Groups,DC=contoso,DC=com" -newparent  
"OU=Marketing,DC=contoso,DC=com"
```

NOTE YOU'RE NOT LIMITED TO THE COMMAND LINE

You can also move or rename a group in the Active Directory Users And Computers snap-in by right-clicking the group and choosing Move or Rename from the context menu.

Deleting Groups with DSRm

DSRm can be used to delete a group or any other Active Directory object. The basic syntax of DSRm is:

```
dsrm ObjectDN ... [-subtree [-exclude]] [-noprompt] [-c]
```

The object is specified by its distinguished name in the *ObjectDN* parameter. You are prompted to confirm the deletion of each object unless you specify the *-noprompt* parameter. The *-c* parameter puts DSRm into continuous operation mode, in which errors are reported, but the command keeps processing additional objects. Without the *-c* switch, processing halts on the first error.

The *-subtree* parameter causes DSRm to delete the object and all child objects. The *-subtree -exclude* option deletes all child objects, but not the object itself.

To delete the Public Relations group, type:

```
dsrm "CN=Public Relations,OU=Marketing,DC=contoso,DC=com"
```

You can also delete a group in the Active Directory Users And Computers snap-in by right-clicking the group and choosing the Delete command.

NOTE KNOW THE IMPACT BEFORE DELETING A GROUP

When you delete a group, you are removing a point of management in your organization. Be certain that you have evaluated the environment to verify that no permissions or other resources rely on the group. Deleting a group is a serious action with potentially significant consequences. When you delete a group, you remove its SID. Re-creating the group with the same name does not restore permissions, because the new group's SID is different from that of the original group.

It is recommended that, before you delete a group, you record its membership and remove all members for a period of time to determine whether the members lose access to any resources. If anything goes wrong, simply re-add the members. If the test succeeds, delete the group.

Managing Groups with Windows PowerShell

Windows PowerShell makes it easy to manage groups. The following cmdlets work with Active Directory group objects:

- **New-ADGroup** Creates a group.
- **Remove-ADGroup** Deletes a group.
- **Get-ADGroup** Retrieves an object reference to a group.
- **Set-ADGroup** Configures properties of a group.
- **Add-ADGroupMember** Adds a member to a group.
- **Remove-ADGroupMember** Removes a member from a group.
- **Get-ADGroupMember** Enumerates the members of a group. The *-recursive* parameter enumerates members of nested groups.

As you learned in Chapter 3, you can use the *Get-Help* cmdlet to learn more about these cmdlets. You use Windows PowerShell to create groups in the Practice for this lesson.

PRACTICE Automating the Creation and Management of Groups

In this practice, you use DS commands, CSVDE, LDIFDE, and Windows PowerShell to perform group management tasks. Before performing the exercises in this practice, you need to create the following objects in the contoso.com domain:

- A first-level OU named Groups
- A first-level OU named User Accounts
- User objects in the User Accounts OU for Linda Mitchell, Scott Mitchell, Jeff Ford, Mike Fitzmaurice, Mike Danseglio, April Stewart, and Tony Krijnen

In addition, *delete* any groups with the following names: Finance, Accounting.

EXERCISE 1 Manage Groups with Windows PowerShell

In this exercise, you use Windows PowerShell to create a group.

1. Log on to SERVER01 as Administrator.
2. Open Active Directory Module For Windows PowerShell. Type the following command on one line:

```
New-ADGroup -Path "OU=Groups,DC=contoso,DC=com" -Name "PowerShell Experts"
-sAMAccountName "PowerShell Experts" -GroupCategory Security -GroupScope Global
```

3. Open the Active Directory Users And Computers snap-in. Select the Groups OU and confirm that the PowerShell Experts group was created.
4. Switch to Windows PowerShell. Type the following command on one line:

```
Add-ADGroupMember -Identity "PowerShell Experts"
-Members "CN=Mike Danseglio,OU=User Accounts,DC=contoso,DC=com"
```

5. Type the following command:

```
Get-ADGroupMember -Identity "PowerShell Experts"
```

6. Type the following command:

```
Get-Command *ADGroup*
```

EXERCISE 2 Create a Group with DSAdd

In this exercise, you use DSAdd to create a group. DSAdd can create a group, and even populate its membership, with a single command.

1. Type the following command on one line. Then press Enter.

```
dsadd group "CN=Finance,OU=Groups,DC=contoso,DC=com" -samid Finance -secgrp
yes -scope g
```

2. Open the Active Directory Users And Computers snap-in and confirm that the group was created successfully. If the Active Directory Users And Computers snap-in was open prior to performing step 2, refresh the view.

EXERCISE 3 Import Groups with CSVDE

1. Open Notepad and type the following two lines. Note that the second line is wrapped for readability in this text.

```
objectClass,sAMAccountName,DN,member

group,Accounting,"CN=Accounting,OU=Groups,DC=contoso,DC=com",
"CN=Linda Mitchell,OU=User Accounts,DC=contoso,DC=com;
CN=Scott Mitchell,OU=User Accounts,DC=contoso,DC=com"
```

2. Save the file to your Documents folder with the name **"Importgroups.csv"** (including the quotes so that Notepad doesn't add a .txt extension).
 3. Open Command Prompt, and type the following command:
- ```
csvde -i -f "%userprofile%\documents\importgroups.csv"
```
4. Switch to the Active Directory Users And Computers snap-in, refresh the view of the Groups OU, and check to confirm that the group was created successfully.

## EXERCISE 4 Modify Group Membership with LDIFDE

CSVDE cannot modify the membership of existing groups, but LDIFDE can. In this exercise, you use LDIFDE to modify the group membership of the Accounting group you imported in Exercise 3, "Import Groups with CSVDE."

1. Open Notepad and type the following lines:

```
dn: CN=Accounting,OU=Groups,DC=contoso,DC=com
changetype: modify
add: member
member: CN=April Stewart,OU=User Accounts,dc=contoso,dc=com
member: CN=Mike Fitzmaurice,OU=User Accounts,dc=contoso,dc=com
-

dn: CN= Accounting,OU=Groups,DC=contoso,DC=com
changetype: modify
delete: member
member: CN=Linda Mitchell,OU=User Accounts,dc=contoso,dc=com
-
```

Be sure to include the dashes after each block and the blank line between the two blocks.

2. Save the file to your Documents folder as "**MembershipChange.ldf**" (including the quotes so that Notepad doesn't add a .txt extension).
3. Switch to Command Prompt.
4. Type the following command and press Enter:  

```
ldifde -i -f "%userprofile%\documents\membershipchange.ldf"
```
5. Using the Active Directory Users And Computers snap-in, confirm that the membership of the Accounting group changed according to the instructions of the LDIF file. It should now include April Stewart, Mike Fitzmaurice, and Scott Mitchell.

## EXERCISE 5 Modify Group Membership with DSMod

In this exercise, you add a user and a group to the Finance group, using the DSMod command.

1. Switch to Command Prompt.
2. Type the following command on one line to change the membership of the Finance group:

```
dsmod group "CN=Finance,OU=Groups,DC=contoso,DC=com"
-addmbr "CN=Tony Krijnen,OU=User Accounts,DC=contoso,DC=com"
"CN=Accounting,OU=Groups,DC=contoso,DC=com"
```

3. In the Active Directory Users And Computers snap-in, confirm that the membership of the Finance group consists of Tony Krijnen and the Accounting group.

## EXERCISE 6 Confirm Group Membership with DSGet and Windows PowerShell

Evaluating effective group membership is difficult with the Active Directory Users And Computers snap-in but easy with the DSGet command in Windows PowerShell. In this exercise, you look at both the full membership of a group and the group memberships of a user.

1. Switch to Command Prompt.
2. List the direct members of the Accounting group by typing the following command and then pressing Enter:

```
dsget group "CN=Accounting,OU=Groups,DC=contoso,DC=com" -members
```

3. List the direct members of the Finance group by typing the following command and then pressing Enter:

```
dsget group "CN=Finance,OU=Groups,DC=contoso,DC=com" -members
```

4. List the full list of members of the Finance group by typing the following command and then pressing Enter:

```
dsget group "CN=Finance,OU=Groups,DC=contoso,DC=com" -members -expand
```

5. List the direct group membership of Scott Mitchell by typing the following command and then pressing Enter:

```
dsget user "CN=Scott Mitchell,OU=User Accounts,DC=contoso,DC=com" -memberof
```

6. List the full group membership of Scott Mitchell by typing the following command and then pressing Enter:

```
dsget user "CN=Scott Mitchell,OU=User Accounts,DC=contoso,DC=com" -memberof
-expand
```

7. Switch to Active Directory Module For Windows PowerShell, type the following command, and then press Enter:

```
Get-ADGroupMember "Finance" -recursive | Select sAMAccountName
```

*Select* is an alias for the *Select-Object* cmdlet, which takes the objects in the pipeline and selects one or more properties of the objects. Used here, it makes the output of the *Get-ADGroupMember* cmdlet more readable. Try it without the pipe and the *Select* cmdlet to see the difference.

## Lesson Summary

- You can create groups with DSAdd, CSVDE, LDIFDE, and Windows PowerShell.
- LDIFDE, DSMOD, and Windows PowerShell can modify the membership of existing groups.
- The DSGet command and Windows PowerShell can list the full membership of a group, including nested groups.

## Lesson Review

You can use the following questions to test your knowledge of the information in Lesson 2, "Automating the Creation and Management of Groups." The questions are also available on the companion CD if you prefer to review them in electronic form.

### **NOTE ANSWERS**

Answers to these questions and explanations of why each answer choice is right or wrong are located in the "Answers" section at the end of the book.

1. Which of the following can be used to remove members from a group? (Choose all that apply.)
  - A. Remove-Item
  - B. DSRm
  - C. DSMod
  - D. LDIFDE
  - E. CSVDE
2. You are using DSMod to add a domain local group named GroupA to a global group named GroupB. You are receiving errors. Which command will solve the problem so that you can add GroupA to GroupB? (Choose all that apply.)
  - A. Dsrn.exe
  - B. Dsmode.exe
  - C. Dsquery.exe
  - D. Dsget.exe
3. Your management has asked you to produce a list of all users who belong to the Special Project group, including those users belonging to groups nested into Special Project. Which of the following can you use? (Choose all that apply.)
  - A. *Get-ADGroupMember*
  - B. Dsquery.exe
  - C. LDIFDE
  - D. Dsget.exe



## Lesson 3: Administering Groups in an Enterprise

---

Lessons 1 and 2 prepared you to perform daily administrative tasks related to groups in Active Directory. You learned to create, modify, and delete groups, using a variety of tools and procedures. This lesson rounds out your exploration of groups by preparing you to take advantage of useful group attributes for documenting groups, delegate the management of group membership to specific administrative teams or individuals, and break away from reliance on some of the Active Directory and Windows default groups.

### After this lesson, you will be able to:

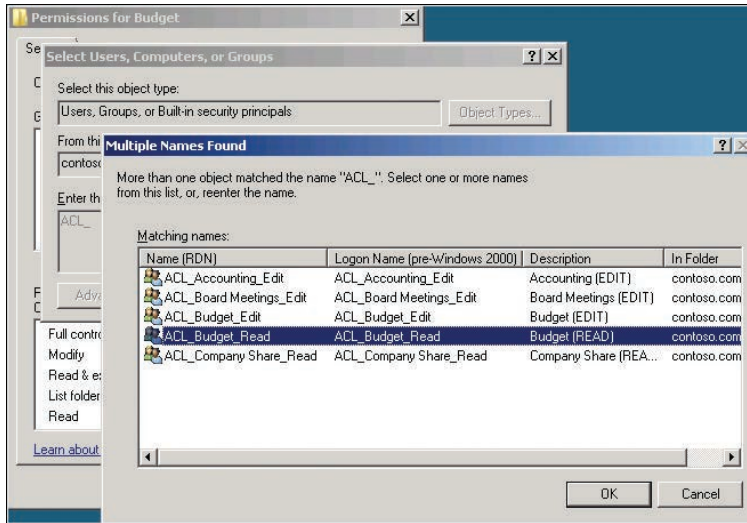
- Document the purpose of a group by using the group's attributes.
- Protect a group from accidental deletion.
- Delegate group membership management using the Managed By tab.
- Create a shadow group.
- Understand default (Builtin) groups.
- Assign permissions to special identities.

**Estimated lesson time: 45 minutes**

## Best Practices for Group Attributes

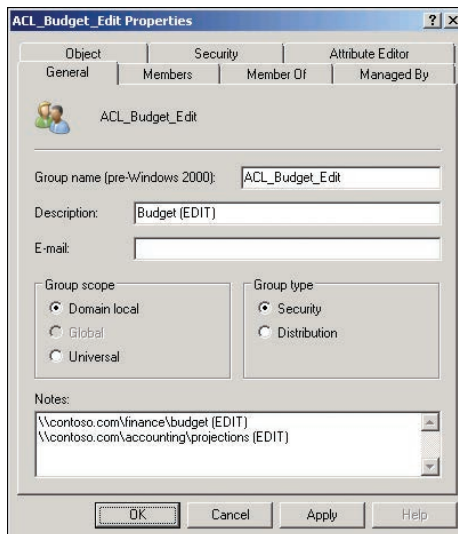
Creating a group in Active Directory is easy. It is not so easy to make sure that the group is used correctly over time. You can facilitate the correct management and use of a group by documenting its purpose to help administrators understand how and when to use the group. The following best practices which, although unlikely to be addressed by the certification exam, will prove immensely useful to your enterprise group administration:

- **Establish and adhere to a strict naming convention** Lesson 1 addressed a suggested naming convention. In the context of ongoing group administration, establishing and following group naming standards increases administrative productivity. Using prefixes to indicate the purpose of a group, and using a consistent delimiter between the prefix and the descriptive part of the group names, can help locate the correct group for a particular purpose. For example, the prefix APP can be used to designate groups that are used to manage applications, and the prefix ACL can be used for groups that are assigned permissions on ACLs. With such prefixes, it becomes easier to locate and interpret the purpose of groups named APP\_Accounting versus ACL\_Accounting\_Read. The former is used to manage the deployment of the accounting software, and the latter provides read access to the accounting folder. Prefixes also help group the names of groups in the user interface. Figure 4-11 shows an example. When attempting to locate a group to use when assigning permissions to a folder, you can type the prefix ACL\_ in the Select dialog box and click OK. A Multiple Names Found dialog box appears, showing only the ACL\_ groups in the directory, thereby ensuring that permissions will be assigned to a group that is designed to manage resource access.



**FIGURE 4-11** Selecting a group by using a group prefix to filter the correct type of group

- **Summarize a group's purpose with its description attribute** Use the *description* attribute of a group to summarize the group's purpose. Because the Description column is enabled by default in the details pane of the Active Directory Users And Computers snap-in, the group's purpose can be highly visible to administrators.
- **Detail a group's purpose in its Notes** When you open a group's Properties dialog box, the Notes text box is visible at the bottom of the General tab. This text box can be used to document the group's purpose. For example, you can list the folders to which a group has been given permission, as shown in Figure 4-12.



**FIGURE 4-12** A group's Properties dialog box, showing the Notes box used to provide details of the group's purpose

## Protecting Groups from Accidental Deletion

Protect yourself from the potentially devastating results of deleting a group by protecting each group you create from deletion. Windows Server 2008 R2 makes it easy to protect any object from accidental deletion.

To protect an object, follow these steps:

1. In the Active Directory Users And Computers snap-in, click the View menu and make sure that Advanced Features is selected.
2. Open the Properties dialog box for a group.
3. On the Object tab, select the Protect Object From Accidental Deletion check box.
4. Click OK.

This is one of the few places in Windows in which you must click OK instead of Apply. Clicking Apply does not modify the ACL based on your selection.

The Protect Object From Accidental Deletion option applies an access control entry (ACE) to the ACL of the object that explicitly denies the Everyone group both the Delete permission and the Delete Subtree permission. If you really do want to delete the group, you can return to the Object tab of the Properties dialog box and clear the Protect Object From Accidental Deletion check box.

Deleting a group has a significant impact on administrators and, potentially, on security. Consider a group used to manage access to resources. If the group is deleted, access to that resource is changed. Either users who should have access to the resource are suddenly prevented access, creating a denial-of-service scenario, or inappropriate access to the resource becomes possible if you had used the group to deny access to a resource with a Deny permission.

Additionally, if you re-create the group, the new group object will have a new security identifier (SID), which will not match the SIDs on ACLs of resources. So you must instead perform object recovery to reanimate the deleted group before the tombstone interval is reached. When a group has been deleted for the tombstone interval—180 days by default—the group and its SID are permanently deleted from Active Directory.

When you reanimate a tombstoned object, you must re-create most of its attributes, including, importantly, the *member* attribute of group objects. This means you must rebuild the group membership after restoring the deleted object. Alternately, you can perform an authoritative restore or turn to your Active Directory snapshots to recover both the group and its membership.

Finally, Windows Server 2008 R2 introduces the Active Directory Recycle Bin, which lets you recover a deleted object in its entirety, reducing or eliminating the impact of accidentally deleting an object. Authoritative restore, snapshots, and the Active Directory Recycle Bin are discussed in Chapter 13, "Directory Business Continuity."

Recovering a deleted group is a skill you should hope to use only in worst-case scenarios, not in day-to-day operations of a production environment. Protect yourself from the potentially devastating results of group object deletion by protecting each group you create.

## Delegating the Management of Group Membership

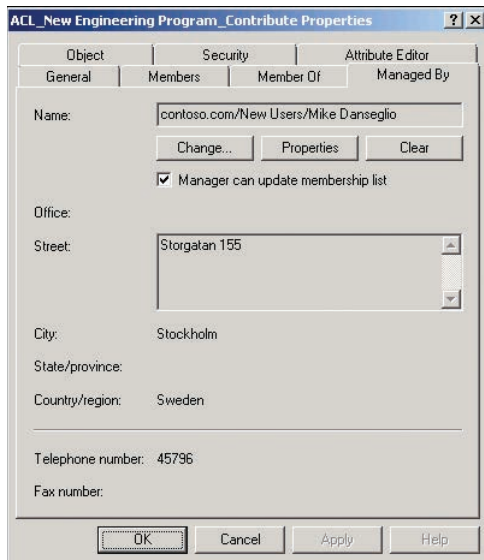
After creating a group, you might want to delegate the management of the group's membership to a team or an individual who has the business responsibility for the resource that the group manages.

For example, let's assume that your finance manager is responsible for creating next year's budget. You create a shared folder for the budget and assign Write permission to a group named ACL\_Budget\_Edit. If someone needs access to the budget folder, he or she contacts the help desk to enter a request, the help desk contacts the finance manager for business approval, and then the help desk adds the user to the ACL\_Budget\_Edit group. You can improve the responsiveness and accountability of the process by allowing the finance manager to change the group's membership. Then users needing access can request it directly from the finance manager, removing the intermediate step of contacting the help desk.

To delegate the management of a group's membership, you must assign to the finance manager the Allow Write Member permission for the group. The *member* attribute is the multivalued attribute that is the group's membership.

## Delegating Membership Management with the Managed By Tab

The easiest way to delegate membership management of a single group is to use the Managed By tab of a group object's Properties dialog box, shown in Figure 4-13.



**FIGURE 4-13** The Managed By tab of a group's Properties dialog box

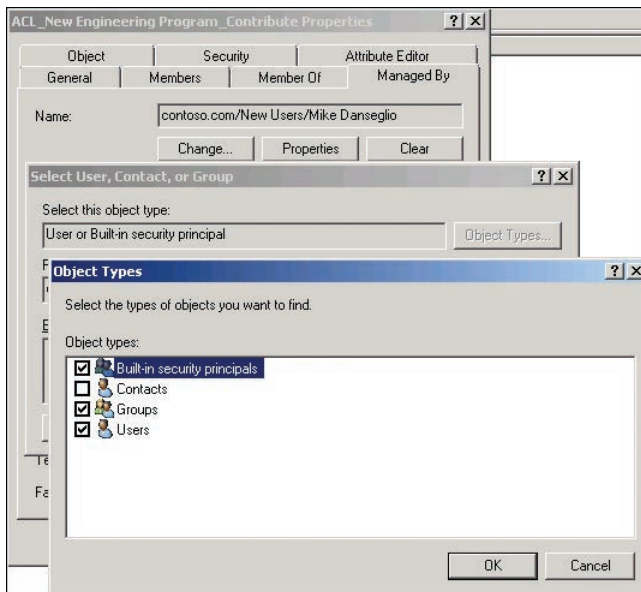
The Managed By tab serves two purposes. First, it provides contact information related to the manager of a group. You can use this information to contact the business owner of a group to obtain approval prior to adding a user to the group.

The second purpose served by the Managed By tab is to manage the delegation of the *member* attribute. Note the Manager Can Update Membership List check box shown in Figure 4-13. When this check box is selected, the user or group shown in the Name box is given the Allow Write Member permission. If you change or clear the manager, the appropriate change is made to the group's ACL.

#### **NOTE** CLICK OK

This is another of the strange and rare places in which you must actually click OK to implement the change. Clicking Apply does not change the ACL on the group.

It is not quite so easy to insert a group onto the Managed By tab of another group. When you click Change, the Select User, Contact, Or Group dialog box appears. If you enter the name of a group and click OK, an error occurs. That's because this dialog box is not configured to accept groups as valid object types, even though *Group* is in the name of the dialog box itself. To work around this odd limitation, click Object Types, and then select the check box next to Groups, as shown in Figure 4-14. Click OK to close both the Object Types and Select dialog boxes. Be sure to select the Manager Can Update Membership List check box if you want to assign the Write Member permission to the group. When a group is used on the Managed By tab, no contact information is visible because groups do not maintain contact-related attributes.



**FIGURE 4-14** Selecting a group for the Managed By tab

After you have delegated group membership management, users do not require Active Directory Users And Computers to modify the membership of the group. A user can simply use the Search Active Directory capability of Windows clients to find the group, and then change its membership.

To find a group:

1. Click Start, and then click Network.
2. Click the Search Active Directory button on the toolbar.
3. Type the name of the group and click Find Now.

## Delegating Membership Management Using Advanced Security Settings

You can use the Advanced Security Settings dialog box to assign the Allow Write Member permission directly. You can assign the permission for an individual group or for all the groups in an OU.

To delegate the management of membership for an individual group, perform the following steps:

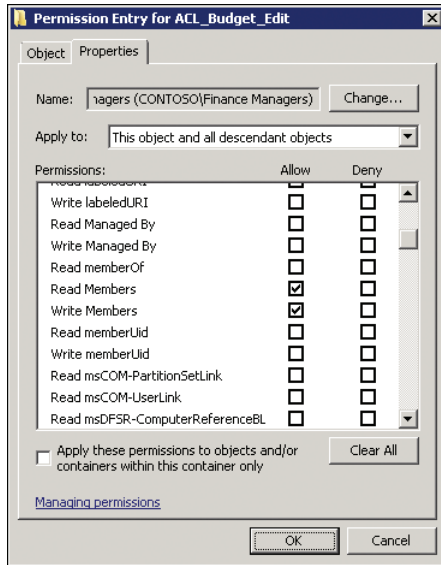
1. In the Active Directory Users And Computers snap-in, click the View menu and make sure Advanced Features is selected.
2. Right-click the group's name and choose Properties.
3. On the Security tab, click Advanced.
4. In the Advanced Security Settings dialog box, click Add.  
If the Add button is not visible, click Edit, and then click Add.
5. In the Select Users, Contacts, Service Account, Or Group dialog box, enter the name for the group to which you want to grant permission, or click Browse to search for the group. When you are finished, click OK.

The Permission Entry dialog box appears.

6. On the Properties tab, in the Apply To list, choose This Object And All Descendant Objects.
7. In the Permissions list, select the Allow check boxes for the Read Members and Write Members permissions.

By default, all users have the Read Members permission, so that permission is not required. However, role-based access control is best implemented by assigning all the permissions required to achieve the desired capability, rather than relying on permissions assigned indirectly.

Figure 4-15 shows the resulting Permission Entry dialog box.



**FIGURE 4-15** The Permission Entry dialog box showing the delegation of group membership management for a group

8. Click OK to close each of the security dialog boxes.

To delegate the ability to manage membership for all groups in an OU, perform the following steps:

1. In the Active Directory Users And Computers snap-in, click the View menu and make sure Advanced Features is selected.
2. Right-click the OU and then choose Properties.
3. On the Security tab, click Advanced.
4. In the Advanced Security Settings dialog box, click Add.

If the Add button is not visible, click Edit, and then click Add.

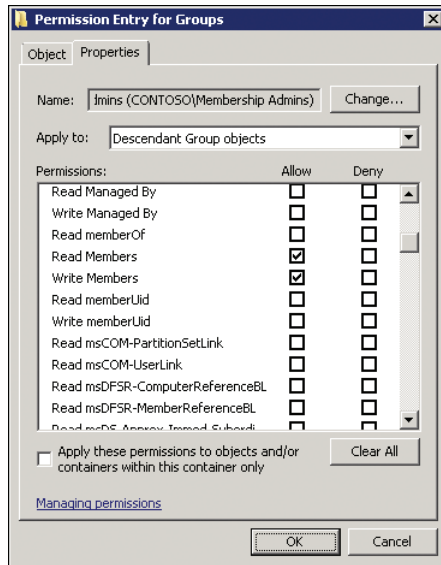
5. In the Select dialog box, enter the name for the group to which you want to grant permission, or click Browse to search for the group. When you are finished browsing, click OK.

The Permission Entry dialog box appears.

6. On the Properties tab, in the Apply To list, choose Descendant Group Objects.
7. In the Permissions list, select the Allow check boxes for the Read Members and Write Members permissions.

By default, all users have the Read Members permission, so that permission is not required. However, role-based access control is best implemented by assigning all the permissions required to achieve the desired capability, rather than relying on permissions assigned indirectly.

Figure 4-16 shows the resulting Permission Entry dialog box.



**FIGURE 4-16** The Permission Entry dialog box showing the delegation of group membership management for all groups in the Groups OU

8. Click OK to close each of the security dialog boxes.

## Understanding Shadow Groups

Most management of an enterprise is implemented with groups. Groups are assigned permission to resources. Groups can be used to filter the scope of Group Policy objects. Groups are assigned fine-grained password policies. Groups can be used as collections for configuration management tools such as Microsoft System Center Configuration Manager. The list goes on. OUs, however, are not used as frequently to manage the enterprise, and in some cases, they cannot be used. For instance, OUs cannot be assigned permissions to resources, nor can they be assigned fine-grained password policies (discussed in Chapter 8, “Improving the Security of Authentication in an AD DS Domain”). Instead, the primary purpose of an OU is to provide a scope of management for the delegation of administrative permissions for the objects in that OU. In other words, an OU of users enables you to delegate to your help desk the ability to reset passwords for all users in the OU. OUs are administrative containers.

The reason for this separation of purpose between OUs and groups is that OUs do not provide the same flexibility as groups. A user or computer (or other object) can exist only within the context of a single OU, whereas a security principal can belong to many groups. Therefore, groups are used for aligning identities with the capabilities required by those identities.



Sometimes, you might want to manage using an OU when it is not possible. For example, you might want to give all users in an OU access to a folder. Or you might want to assign a unique password policy to users in an OU. You cannot do so directly, but you can achieve your goal by creating what is called a *shadow group*. A shadow group is a group that contains the same users as an OU. More accurately, a shadow group contains users that meet a certain criterion.

The easiest way to create a shadow group is to create the group, and then, in the OU containing the users, press Ctrl+A to select all users. Right-click any selected user and choose Add To Group. Type the name of the group and click OK.



#### EXAM TIP

On the 70-640 exam, be prepared to see the term *shadow group* in use. Know that it means a group that contains, as members, the users in an OU.

Unfortunately, Windows does not yet provide a way to maintain the membership of a shadow group dynamically. When you add or remove a user in an OU, you must also add or remove the user in the shadow group.

#### MORE INFO MAINTAINING SHADOW GROUPS DYNAMICALLY

See *Windows Administration Resource Kit: Productivity Solutions for IT Professionals* for scripts that help maintain shadow groups dynamically.

## Default Groups

Several groups are created automatically on a server running Windows Server 2008 R2. These are called *default local groups*, and they include well-known groups such as Administrators, Backup Operators, and Remote Desktop Users. Additional groups are created in a domain, in both the Builtin and Users containers, including Domain Admins, Enterprise Admins, and Schema Admins. The following list provides a summary of capabilities of the subset of default groups that have significant permissions and user rights related to the management of Active Directory:

- **Enterprise Admins (Users container of the forest root domain)** This group is a member of the Administrators group in every domain in the forest, giving it complete access to the configuration of all domain controllers. It also owns the Configuration partition of the directory and has full control of the domain naming context in all forest domains.
- **Schema Admins (Users container of the forest root domain)** This group owns and has full control of the Active Directory schema.
- **Administrators (Builtin container of each domain)** This group has complete control over all domain controllers and data in the domain naming context. It can change the membership of all other administrative groups in the domain, and the Administrators

group in the forest root domain can change the membership of Enterprise Admins, Schema Admins, and Domain Admins. The Administrators group in the forest root domain is arguably the most powerful service administration group in the forest.

- **Domain Admins (Users container of each domain)** This group is added to the Administrators group of its domain. Therefore, it inherits all the capabilities of the Administrators group. It is also, by default, added to the local Administrators group of each domain member computer, giving Domain Admins ownership of all domain computers.
- **Server Operators (Builtin container of each domain)** This group can perform maintenance tasks on domain controllers. It has the right to log on locally, start and stop services, perform backup and restore operations, format disks, create or delete shares, and shut down domain controllers. By default, this group has no members.
- **Account Operators (Builtin container of each domain)** This group can create, modify, and delete accounts for users, groups, and computers located in any organizational unit in the domain (except the Domain Controllers OU), as well as in the Users and Computers containers. Account Operators cannot modify accounts that are members of the Administrators or Domain Admins groups, nor can they modify those groups. Account Operators can also log on locally to domain controllers. By default, this group has no members.
- **Backup Operators (Builtin container of each domain)** This group can perform backup and restore operations on domain controllers as well as log on locally and shut down domain controllers. By default, this group has no members.
- **Print Operators (Builtin container of each domain)** This group can maintain print queues on domain controllers. It can also log on locally and shut down domain controllers.

The default groups that provide administrative privileges should be managed carefully because they typically have broader privileges than are necessary for most delegated environments and because they often apply protection to their members.

The Account Operators group is a perfect example. If you examine its capabilities in the preceding list, you see that its rights are very broad, indeed. It can even log on locally to a domain controller. In very small enterprises, such rights are probably appropriate for one or two individuals who might be domain administrators anyway. In enterprises of any size, the rights and permissions granted to Account Operators are usually far too broad.

Additionally, the Account Operators group is, like the other administrative groups listed previously, a *protected group*. Protected groups are defined by the operating system and cannot be unprotected. Members of a protected group become protected. The result of protection is that the permissions (ACLs) of members are modified so that they no longer inherit permissions from their OU but, rather, receive a copy of an ACL that is quite restrictive. For example, if Jeff Ford is added to the Account Operators group, his account becomes protected and the help desk, which can reset all other user passwords in the User Accounts OU, cannot reset Jeff Ford's password.

#### **MORE INFO PROTECTED ACCOUNTS**

For more information about protected accounts, see Knowledge Base article 817433 at <http://support.microsoft.com/?kbid=817433> and Knowledge Base article 840001 at <http://support.microsoft.com/kb/840001>. If you want to search the Internet for resources, use the keyword *adminSDHolder*.

For these reasons—overdelegation and protection—strive to avoid adding users to the groups listed previously that do not have members by default: Account Operators, Backup Operators, Server Operators, and Print Operators. Instead, create custom groups to which you assign permissions and user rights that achieve your business and administrative requirements.

For example, if Scott Mitchell needs to perform backup operations on a domain controller, but he should not be able to perform restore operations that could lead to database rollback or corruption and he should not be able to shut down a domain controller, don't put Scott in the Backup Operators group. Instead, create a group, assign it only the Backup Files And Directories user right, and then add Scott as a member.

#### **MORE INFO DEFAULT GROUP CAPABILITIES INFORMATION**

There is an exhaustive reference to the default groups in a domain and the default local groups on Microsoft TechNet. If you are not familiar with the default groups and their capabilities, you should prepare for the examination by reading about them. The default local and domain groups reference is at <http://technet.microsoft.com/en-us/library/dd728026%28WS.10%29.aspx>.

## Special Identities

Windows and Active Directory also support *special identities*, groups for which membership is controlled by the operating system. You cannot view the groups in any list (in the Active Directory Users And Computers snap-in, for example), you cannot view or modify the membership of these special identities, and you cannot add them to other groups. You can, however, use these groups to assign rights and permissions. The most important special identities, often referred to as *groups* for convenience, are described in the following list:

- **Anonymous Logon** Represents connections to a computer and its resources that are made without supplying a user name and password. In versions of Windows earlier than Windows Server 2003, this group was a member of the Everyone group. In Windows Server 2003 and later versions, this group is no longer a default member of the Everyone group.

- **Authenticated Users** Represents identities that have been authenticated. This group does not include Guest, even if the Guest account has a password.
- **Everyone** Includes Authenticated Users and Guest. On computers running versions of Windows earlier than Windows Server 2003, this group includes Anonymous Logon.
- **Interactive** Represents users accessing a resource while logged on locally to the computer hosting the resource, as opposed to accessing the resource over the network. When a user accesses any given resource on a computer to which the user is logged on locally, the user is automatically added to the Interactive group for that resource. Interactive also includes users logged on through a remote desktop connection.
- **Network** Represents users accessing a resource over the network, as opposed to users who are logged on locally at the computer hosting the resource. When a user accesses any given resource over the network, the user is automatically added to the Network group for that resource.

The importance of these special identities is that they enable you to provide access to resources based on the type of authentication or connection rather than on the user account. For example, you could create a folder on a system that allows users to view its contents when logged on locally to the system but does not allow the same users to view the contents from a mapped drive over the network. This is achieved by assigning permissions to the Interactive special identity.

## **PRACTICE** Administering Groups in an Enterprise

In this practice, you perform best-practices group management tasks to improve the administration of groups in the contoso.com domain. To perform the exercises in this practice, you need to have the following objects in the contoso.com domain:

- A first-level OU named Groups.
- A global security group named Finance in the Groups OU.
- A first-level OU named User Accounts.
- A user account named Mike Danseglio in the User Accounts OU. Populate the user account with sample contact information: address, phone, and email. Reset the password of the account so that you know it. Make sure the account is enabled and that the user is *not* required to change the password at the next logon.

In this and other practices in this training kit, you will log on to the domain controller with user accounts that are not a member of Domain Administrators or the domain's Administrators group. Therefore, you must give all user accounts the right to log on locally to the domain controllers in your practice environment. Follow the steps in the article, "Grant a Member the Right to Logon Locally," at [http://technet.microsoft.com/en-us/library/ee957044\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/ee957044(WS.10).aspx) to grant the Allow Logon Locally right to the Administrators and Domain Users groups. If you will use Remote Desktop Services to connect to the domain controller—rather than logging on locally—grant the Allow Logon Through Remote Desktop Services right. This is for the practice environment only. In a production environment, you should not grant users the right to log on to domain controllers.

### EXERCISE 1 Create a Well-Documented Group

In this exercise, you create a group to manage access to the Budget folder, and you follow the best-practices guidelines presented in this lesson.

1. Log on to SERVER01 as Administrator and open the Active Directory Users And Computers snap-in.
2. Select the Groups OU in the console tree.
3. Right-click the Groups OU, point to New, and click Group.
4. In the Group Name box, type **ACL\_Budget\_Edit**.
5. Select Domain Local in the Group Scope section and Security in the Group Type section, and then click OK.
6. Click the View menu and ensure that Advanced Features is selected.
7. Right-click the ACL\_Budget\_Edit group and choose Properties.
8. On the Object tab, select the Protect Object From Accidental Deletion check box and click OK.
9. Open the group's Properties again.
10. In the Description box, type **BUDGET (EDIT)**.
11. In the Notes box, type the following paths to represent the folders that have permissions assigned to this group:  
    \\server23\data\$\finance\budget  
    \\server32\data\$\finance\revenue projections
12. Click OK.

### EXERCISE 2 Delegate Management of Group Membership

In this exercise, you give Mike Danseglio the ability to manage the membership of the ACL\_Budget\_Edit group.

1. Open the Properties dialog box of the ACL\_Budget\_Edit group.
2. On the Managed By tab, click Change.
3. Type the user name for Mike Danseglio, **mike.danseglio**, and then click OK.
4. Select the Manager Can Update Membership List check box. Click OK.

### EXERCISE 3 Validate the Delegation of Membership Management

In this exercise, you test the delegation you performed in Exercise 2, "Delegate Management of Group Membership," by modifying the membership of the group as Mike Danseglio.

1. Open Command Prompt and type the following command: **runas/user:mike .danseglio cmd.exe**.
2. When prompted, enter the password for Mike Danseglio.

A new command prompt window appears, running as Mike Danseglio.

3. Type the following command on one line, and then press Enter:

```
dsmod group "CN=ACL_Budget_Edit,OU=Groups,DC=contoso,DC=com"
-addmbr "CN=Finance,OU=Groups,DC=contoso,DC=com"
```

4. Close both Command Prompt windows.
5. In the Active Directory Users And Computers snap-in, examine the membership of the ACL\_Budget\_Edit group and confirm that the Finance group was added successfully.

## Lesson Summary

- Use the Description and Notes text boxes in a group's Properties dialog box to document the purpose of the group.
- The Managed By tab lets you specify a user or group that is responsible for a group. You can also select the Manager Can Update Membership List check box to delegate membership management to the user or group indicated on the Managed By tab.
- To delegate the management of group membership, grant the Allow Write Members permission.
- Use the Protect Object From Accidental Deletion check box to prevent the potential security and management problems created when a group is accidentally deleted.
- Windows Server 2008 R2 and Active Directory contain default groups with significant permissions and user rights. You should not add users to the default domain groups that do not already have members (Account Operators, Backup Operators, Print Operators, and Server Operators), and you should seriously restrict membership in other service administration groups (Enterprise Admins, Domain Admins, Schema Admins, and Administrators).
- Special identities such as Authenticated Users, Everyone, Interactive, and Network can be used to assign rights and permissions. Their membership is determined dynamically by the operating system and cannot be viewed or modified.

## Lesson Review

You can use the following questions to test your knowledge of the information in Lesson 3, "Administering Groups in an Enterprise." The questions are also available on the companion CD if you prefer to review them in electronic form.

### **NOTE ANSWERS**

Answers to these questions and explanations of why each answer choice is right or wrong are located in the "Answers" section at the end of the book.

- 1.** Your company is conducting a meeting for a special project. The data is particularly confidential. The team is meeting in a conference room, and you have configured a folder on the conference room computer that grants permission to the team members. The folder is a subfolder of a shared folder to which all employees have access. You want to ensure that team members access the data only while logged on to the computer in the conference room, not from other computers in the enterprise. What must you do?
  - A.** Assign the Allow Read permission to the Interactive group.
  - B.** Assign the Allow Read permission to the team group.
  - C.** Assign the Deny Traverse Folders permission to the team group.
  - D.** Assign the Deny Full Control permission to the Network group.
- 2.** You want to allow a user named Mike Danseglio to add and remove users in a group called Special Project. Where can you configure this permission?
  - A.** The Members tab of the group
  - B.** The Security tab of Mike Danseglio's user object
  - C.** The Member Of tab of Mike Danseglio's user object
  - D.** The Managed By tab of the group
- 3.** Which of the following groups can shut down a domain controller? (Choose all that apply.)
  - A.** Account Operators
  - B.** Print Operators
  - C.** Backup Operators
  - D.** Server Operators
  - E.** Interactive

## Chapter Review

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To further practice and reinforce the skills you learned in this chapter, you can perform the following tasks:

- Review the chapter summary.
- Review the list of key terms introduced in this chapter.
- Complete the case scenario. This scenario sets up a real-world situation involving the topics of this chapter and asks you to create a solution.
- Complete the suggested practices.
- Take a practice test.

## Chapter Summary

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- Group scopes (global, universal, domain local, and local) define group characteristics related to membership, replication, and availability of the group.
- In an enterprise, role-based management suggests that groups should be viewed as either defining a role or defining a business rule. Role groups are generally implemented as global groups, and rules are defined by using domain local groups.
- A group's *member* attribute is a multivalued attribute containing the DNs of the group's members. Each member's *memberOf* attribute is automatically updated to reflect changes in membership. When you add a user to a group, you are always changing the group's *member* attribute. The *memberOf* attribute, which is read-only, is called a backlink.
- You can delegate the management of group membership by assigning the Allow Write Members permission, which grants write permission to the *member* attribute.
- You can use Directory Services tools such as DSQuery, DSGet, and DSMod to list, create, and modify groups and their membership.
- CSVDE and LDIFDE can import and export groups. Additionally, LDIFDE can modify the membership of existing groups.
- The DSAdd, DSMove, and DSRm commands can add, move, and delete groups, respectively.

## Key Terms

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The following terms were introduced in this chapter. Do you know what they mean?

- backlink
- shadow group
- special identities



## Case Scenario

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In the following case scenario, you apply what you've learned about administering groups in an enterprise. You can find answers to these questions in the "Answers" section at the end of this book.

### Case Scenario: Implementing a Group Strategy

You are an administrator at Trey Research. A new product development initiative called Sliced Bread is underway, and there is confidential information about the project in shared folders on three servers in three different sites. Users in Research, Marketing, and Finance need access to the project data. Additionally, the CEO and her assistant need access. Of these, only Marketing and Research require Write access. Several interns are currently working in the Marketing department, and you want to prevent them from gaining access. Finally, a team of auditors from Woodgrove Bank, an investor in Trey Research, need Read access as well. You have a trust relationship configured so that the Trey Research domain trusts the Woodgrove Bank domain.

1. What types and scopes of groups do you create to represent the user roles in Trey Research? What type and scope of group do you ask administrators at Woodgrove Bank to create to represent the auditors' role?
2. What types and scopes of groups do you create to manage Read and Write access to the Sliced Bread folders?
3. Describe the nesting of users and groups you implement to achieve the security required by this project.

## Suggested Practices

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To help you successfully master the exam objectives presented in this chapter, complete the following tasks.

### Automate Group Membership and Shadow Groups

In this practice, you create a shadow group to reflect the user accounts in the User Accounts OU. You apply the DSQuery and DSMod commands to keep the membership up to date.

To perform this practice, you must have the following objects in the contoso.com domain:

- A first-level OU named Groups
- An OU named User Accounts
- Several sample user accounts in the User Accounts OU

Also, perform the following practices.

- **Practice 1** In the Groups OU, create a global security group named All Users. Then click the User Accounts OU in the tree pane of the Active Directory Users And

Computers snap-in. Click any user in the details pane and press Ctrl+A to select all. Right-click any selected user and choose Add To Group. Add the users to the All Users group. Examine the Members tab of the All Users group to confirm that all users were added successfully.

- **Practice 2** Open Command Prompt. Delete the All Users group you created in Practice 1. Type the following two commands to create the All Users shadow group:

```
dsadd group "CN=All Users,OU=Groups,DC=contoso,DC=com" -secgrp yes -scope g
dsquery user "OU=User Accounts,DC=contoso,DC=com" |
 dsmod group "CN=Users,OU=Groups,DC=contoso,DC=com" -addmbr
```

- **Practice 3** In a command prompt, type the following two commands to remove all members of the group and repopulate it with the current users in the User Accounts OU:

```
dsget group "CN=All Users,OU=Groups,DC=contoso,DC=com" -members |
 dsmod group "CN=All Users,OU=Groups,DC=contoso,DC=com" -rmmbr
dsquery user "OU=User Accounts,DC=contoso,DC=com" |
 dsmod group "CN=All Users,OU=Groups,DC=contoso,DC=com" -addmbr
```

## Take a Practice Test

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The practice tests on this book's companion CD offer many options. For example, you can test yourself on just one exam objective, or you can test yourself on all the 70-640 certification exam content. You can set up the test so that it closely simulates the experience of taking a certification exam, or you can set it up in study mode so that you can look at the correct answers and explanations after you answer each question.

### **MORE INFO** PRACTICE TESTS

For details about all the practice test options available, see the "How to Use the Practice Tests" section in this book's Introduction.



# Improving the Security of Authentication in an AD DS Domain

When a user logs on to an Active Directory Domain Services (AD DS) domain, she enters her user name and password, and the client uses those credentials to *authenticate* the user—to validate the user’s identity against her Active Directory account. In Chapter 3, “Administering User Accounts,” you learned how to create and manage user accounts and their properties, including their passwords. In this chapter, you will explore the domain-side components of authentication, including the policies that specify password requirements and the auditing of authentication-related activities. You will also discover three new options to improve the security of accounts and authentication: managed service accounts’ password settings objects (PSOs, better known as fine-grained password policy); and read-only domain controllers (RODCs).

## Exam objectives in this chapter:

- Maintain Active Directory accounts.
- Configure account policies.
- Configure audit policy by using GPOs.
- Configure Active Directory replication.
- Configure the read-only domain controller (RODC).

## Lessons in this chapter:

- Lesson 1: Configuring Password and Lockout Policies **392**
- Lesson 2: Auditing Authentication **404**
- Lesson 3: Configuring Read-Only Domain Controllers **410**
- Lesson 4: Managing Service Accounts **425**

## Before You Begin

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To complete the lessons in this chapter, you must have installed a domain controller named SERVER01 in the contoso.com domain.



### **REAL WORLD**

Dan Holme

**A**s I work with clients to implement AD DS, I must constantly balance the need to maintain high levels of security with the need to continue conducting the client's business. With versions of Microsoft Windows prior to Windows Server 2008, I constantly encountered three scenarios in which this balance was particularly difficult to reach.

The first relates to the security of user accounts with high levels of privilege within the enterprise. Such accounts are especially attractive to hackers, so they should be locked down with particularly lengthy and complex passwords. In earlier versions of Windows, only one password policy could be applied to all accounts in the domain. Therefore, I either had to apply the highly restrictive password policy to all users in the domain, which was never a palatable solution, or ask administrators to follow the more restrictive policy but with no way to require compliance. Windows Server 2008 introduced fine-grained password policies that can be used to apply more or less restrictive password policies beyond the requirements for groups or users in a domain.

Branch offices were also problematic because I had to balance the need for quick and reliable user authentication at the branch office against the desire to centralize control over the physical security of domain controllers. Placing a domain controller in a branch office would clearly improve performance for users in the office but would also typically expose the domain controller to lower levels of security than those maintained at the data center. Coming to the rescue once again, Windows Server 2008 and Windows Server 2008 R2 can act as a read-only domain controller, authenticating users and the branch office without storing all domain user credentials, thus reducing the risk to the enterprise in the event of a stolen branch office domain controller.

Another significant challenge is the management of service accounts. Services such as backup, antivirus, Microsoft SQL Server, and IIS application pools run in the context of a user account. When you change the password of a service account, you must configure the service with the new password as well. Managing service accounts was so problematic that many organizations simply configured service accounts with non-expiring passwords, which is a very poor practice from a security perspective. Windows Server 2008 R2 addresses this scenario with a new feature: managed service accounts.

If you have worked with Active Directory for any period of time, you already appreciate the value of fine-grained password policies, read-only domain controllers, and managed service accounts. If you are new to Active Directory, you are lucky to be able to work with these much-anticipated features.

# Lesson 1: Configuring Password and Lockout Policies

By default in a Windows Server 2008 R2 domain, users are required to change their password every 42 days, and a password must be at least seven characters long and meet complexity requirements, including the use of three of four character types: uppercase, lowercase, numeric, and non-alphanumeric. Three password policies—maximum password age, password length, and password complexity—are among the first policies encountered by administrators and users alike in an Active Directory domain. Rarely do these default settings align precisely with the password security requirements of an organization. Your organization might require passwords to be changed more or less frequently or to be longer. In this lesson, you learn how to implement your enterprise's password and lockout policies by modifying the Default Domain Policy Group Policy object (GPO).

As you know, there are exceptions to every rule, and you likely have exceptions to your password policies. To enhance the security of your domain, you can enforce more restrictive password requirements for accounts assigned to administrators, for accounts used by services such as Microsoft SQL Server, or for a backup utility. In versions of Windows prior to Windows Server 2008, this was not possible; a single password policy applied to all accounts in the domain. In this lesson, you learn to configure fine-grained password policies, a feature of Windows Server 2008 and Windows Server 2008 R2 that lets you assign different password policies to users and groups in your domain.

## After this lesson, you will be able to:

- Implement your domain password and account lockout policy.
- Configure and assign fine-grained password policies.

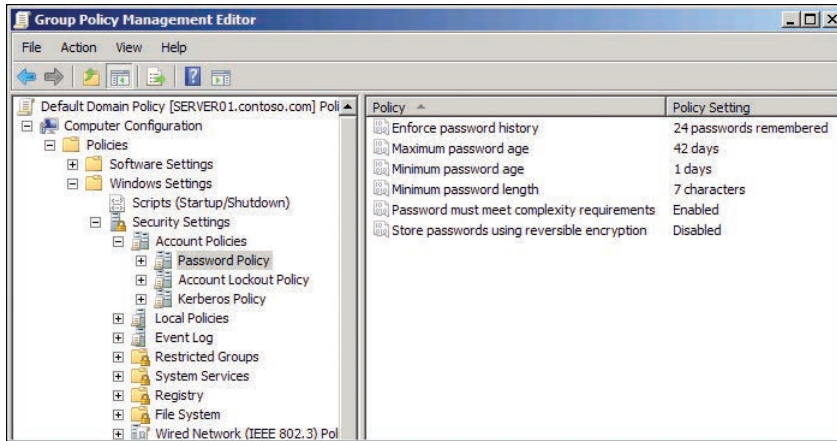
**Estimated lesson time: 45 minutes**

## Understanding Password Policies

Your domain's password policy is configured by a GPO scoped to the domain. Within the GPO, in the Computer Configuration\Policies\Windows Settings\Security Settings\Account Policies>Password Policy node, you can configure the policy settings that determine password requirements. The Password Policy node is shown in Figure 8-1.

You can understand the effects of the policies by considering the life cycle of a user password. A user is required to change his or her password within the number of days specified by the Maximum Password Age policy setting. When the user enters a new password, the length of the new password is compared to the number of characters in the Minimum Password Length policy. If the Password Must Meet Complexity Requirements policy is enabled, the password must contain at least three of four character types:

- Uppercase—for example, A to Z
- Lowercase—for example, a to z



**FIGURE 8-1** The Password Policy node of a GPO

- Numeric—0 to 9
- Nonalphanumeric—symbols such as !, #, %, or &

If the new password meets the requirements, Active Directory puts the password through a mathematical algorithm that produces a representation of the password called the *hash code*. The hash code is unique; no two passwords can create the same hash code. The algorithm used to create the hash code is called a *one-way function*. You cannot put the hash code through a reverse function to derive the password. The fact that it is a hash code, and not the password itself, that is stored in Active Directory helps to increase the security of the user account.

Occasionally, applications require the ability to read a user's password. This is not possible because, by default, only the hash code is stored in Active Directory. To support such applications, you can enable the Store Passwords Using Reversible Encryption policy. This policy is not enabled by default, but if you enable the policy, user passwords are stored in an encrypted form that can be decrypted by the application. Reversible encryption significantly reduces the security of your domain, so it is disabled by default, and you should strive to eliminate applications that require direct access to passwords.

Additionally, Active Directory can check a cache of the user's previous hash codes to make sure that the new password is not the same as the user's previous passwords. The number of previous passwords against which a new password is evaluated is determined by the Enforce Password History policy. By default, Windows maintains the previous 24 hash codes.

If a user is determined to reuse her password when the password expiration period occurs, she could simply change her password 25 times to work around the password history. To prevent that from happening, the Minimum Password Age policy specifies an amount of time that must pass between password changes. By default, it is one day. Therefore, the determined user would have to change her password once a day for 25 days to reuse a password. This type of deterrent is generally successful at discouraging such behavior.

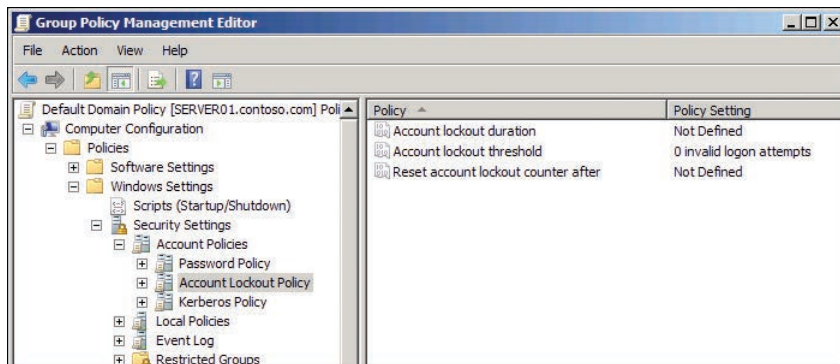


These policy settings—history, minimum age, and maximum age—affect users changing their passwords. The settings do not affect administrators using the Reset Password command to change another user’s password.

## Understanding Account Lockout Policies

An intruder can gain access to the resources in your domain by determining a valid user name and password. User names are relatively easy to identify because most organizations create user names from an employee’s email address, initials, combinations of first and last names, or employee IDs. After a user name is known, the intruder might determine the correct password by guessing or by repeatedly logging on with combinations of characters or words until the logon is successful.

This type of attack, called *brute force*, can be thwarted by limiting the number of incorrect logons allowed. That is exactly what account lockout policies achieve. Account lockout policies are located in the node of the GPO directly below Password Policy. The Account Lockout Policy node is shown in Figure 8-2.



**FIGURE 8-2** The Account Lockout Policy node of a GPO

Three settings are related to account lockout. The first of these settings, Account Lockout Threshold, determines the number of invalid logon attempts permitted within a time specified by the second of these settings, Reset Account Lockout Counter After. If an attack results in more unsuccessful logons within that time frame, the user account is locked out. When an account is locked out, Active Directory denies logon to that account, even if the correct password is specified.

An administrator can unlock a locked user account by following the procedure you learned in Chapter 3. You can also configure Active Directory to automatically unlock the account after a delay specified by a third setting, the Account Lockout Duration policy setting.

# Configuring the Domain Password and Lockout Policy

Active Directory supports one set of password and lockout policies for a domain. These policies are configured in a GPO that is scoped to the domain. A new domain contains a GPO called Default Domain Policy that is linked to the domain and includes the default policy settings for password, account lockout, and Kerberos policies, shown in Figures 8-1 and 8-2. You can change the settings by editing the Default Domain Policy.

## **PRACTICE IT**

You can practice configuring a domain's password and lockout policies in Exercise 1, "Configure the Domain's Password and Lockout Policies," in the practice for this lesson.

## **BEST PRACTICE DO NOT OVERLOAD THE DEFAULT DOMAIN POLICY GPO**

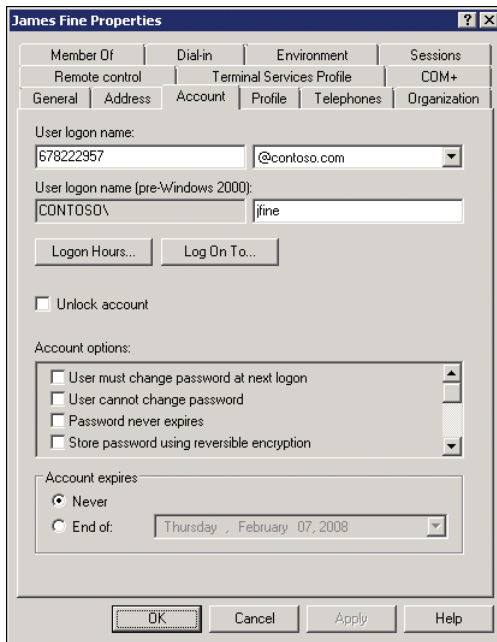
The best practice is to edit the Default Domain Policy GPO to specify the password policy settings for your organization. You should also use the Default Domain Policy GPO to specify account lockout policies and Kerberos policies. Do not use the Default Domain Policy GPO to deploy any other custom policy settings. In other words, use the Default Domain Policy GPO to define the password, account lockout, and Kerberos policies for the domain, and nothing else. Additionally, do not define password, account lockout, or Kerberos policies for the domain in any other GPO.

## **NOTE ACCOUNT SETTINGS OVERRIDE POLICIES**

The password settings configured in the Default Domain Policy affect all user accounts in the domain. The settings can be overridden, however, by the password-related properties of the individual user accounts. On the Account tab of a user's Properties dialog box, shown in Figure 8-3, you can specify settings such as Password Never Expires or Store Password Using Reversible Encryption. For example, if five users have an application that requires direct access to their passwords, you can configure the accounts for those users to store their passwords using reversible encryption.

# Fine-Grained Password and Lockout Policy

You can also override the domain password and lockout policy by using a feature introduced in Windows Server 2008 called *fine-grained password and lockout policy*, often shortened to simply *fine-grained password policy*. Fine-grained password policy enables you to configure a policy that applies to one or more groups or users in your domain.



**FIGURE 8-3** Password-related properties of a user account

Fine-grained password policy is a highly anticipated addition to Active Directory. There are several scenarios for which fine-grained password policy can be used to increase the security of your domain. Accounts used by administrators are delegated privileges to modify objects in Active Directory; therefore, if an intruder compromises an administrator's account, more damage can be done to the domain than could be done with the account of a standard user. For that reason, you should consider implementing stricter password requirements for administrative accounts. For example, you might require greater password length and more frequent password changes.

To use fine-grained password policy, your domain must be at the Windows Server 2008 domain functional level or higher, which means that all of your domain controllers in the domain are running Windows Server 2008 or later and the domain functional level has been raised to Windows Server 2008 or higher. Domain functional level is described in Chapter 12, "Managing Multiple Domains and Forests."

To confirm and modify the domain functional level:

1. Open Active Directory Domains And Trusts.
2. In the console tree, expand Active Directory Domains And Trusts, and then expand the tree until you can see the domain.
3. Right-click the domain and choose Raise Domain Functional Level.

Other account types that require special treatment in a domain are those used by services and Internet Information Services (IIS) application pools. A service performs its tasks with credentials that must be authenticated with a user name and password just like those of a human user. However, most services are not capable of changing their own password, so administrators configure service accounts with the Password Never Expires option enabled. When an account's password will not be changed, you should make sure the password is difficult to compromise. You can use fine-grained password policies to specify an extremely long minimum password length and no password expiration. Better yet, you can use a new feature of Windows Server 2008 R2—managed service accounts—for which passwords are automatically changed. Managed service accounts are discussed in Lesson 4 of this chapter.

## Understanding Password Settings Objects

The settings managed by fine-grained password policy are identical to those in the Password Policy and Accounts Policy nodes of a GPO. However, fine-grained password policies are not implemented as part of Group Policy, nor are they applied as part of a GPO. Instead, a separate class of object in Active Directory maintains the settings for fine-grained password policy: the *password settings object* (PSO).



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### EXAM TIP

There can be one, and only one, authoritative set of password and lockout policy settings that applies to all users in a domain. Those settings are configured in the Default Domain Policy GPO. Fine-grained password policies, which apply to individual groups or users in the domain, are implemented using PSOs.

---

You can manage most Active Directory objects with user-friendly graphical user interface (GUI) tools such as the Active Directory Users And Computers snap-in. You manage PSOs, however, with low-level tools, including Active Directory Service Interface Editor (ADSI Edit).

### MORE INFO PASSWORD POLICY BASIC

Although it will not be addressed on the 70-640 exam, it is highly recommended that you use Password Policy Basic by Specops Software to manage fine-grained password policy. You can download the free GUI tool from <http://www.specopssoft.com>.

You can create one or more PSOs in your domain. Each PSO contains a complete set of password and lockout policy settings. A PSO is applied by linking the PSO to one or more global security groups or users. For example, to configure a strict password policy for administrative accounts, create a global security group, add the service user accounts as members, and link a PSO to the group. Applying fine-grained password policies to a group in this manner is more manageable than applying the policies to each individual user account. If you create a new service account, you simply add it to the group and the account becomes managed by the PSO.

## PSO Precedence and Resultant PSO

A PSO can be linked to more than one group or user, an individual group or user can have more than one PSO linked to it, and a user can belong to multiple groups. So which fine-grained password and lockout policy settings apply to a user? One and only one PSO determines the password and lockout settings for a user—this PSO is called the *resultant PSO*. Each PSO has an attribute that determines the precedence of the PSO. The precedence value is any number greater than 0, where the number 1 indicates the highest precedence. If multiple PSOs apply to a user, the PSO with the highest precedence (closest to 1) takes effect. Active Directory exposes the resultant PSO in a user object attribute, *msDS-ResultantPSO*, so you can readily identify the PSO that will affect a user. PSOs contain all password and lockout settings, so there is no inheritance or merging of settings. The resultant PSO is the authoritative PSO. The rules that determine precedence, and thus the resultant PSO, are as follows:

- If multiple PSOs apply to groups to which the user belongs, the PSO with the highest precedence wins.
- If one or more PSOs are linked directly to the user, PSOs linked to groups are ignored, regardless of their precedence. The user-linked PSO with highest precedence wins.
- If one or more PSOs have the same precedence value, Active Directory must make a choice. It picks the PSO with the lowest globally unique identifier (GUID). GUIDs are like serial numbers for Active Directory objects—no two objects have the same GUID. GUIDs have no particular meaning—they are just identifiers—so picking the PSO with the lowest GUID is, in effect, an arbitrary decision. You should configure PSOs with unique, specific precedence values so that you avoid this scenario.

To view the *msDS-ResultantPSO* attribute of a user:

1. Ensure that Advanced Features is enabled on the View menu.
2. Open the properties of the user account.
3. On the Attribute Editor tab, click Filter and ensure that Constructed is selected.  
The attribute you locate in the next step is a *constructed* attribute, meaning that the resultant PSO is not a hard-coded attribute of a user; rather, it is calculated by examining the PSOs linked to a user in real time.
4. Locate the *msDS-ResultantPSO* attribute.

### **PRACTICE IT**

**You will examine the *msDS-ResultantPSO* attribute in the practice at the end of this lesson.**

## PSOs and OUs

PSOs can be linked to global security groups or users. PSOs cannot be linked to organizational units (OUs). If you want to apply password and lockout policies to users in an OU, you must create a global security group that includes all of the users in the OU. This type of group is called a *shadow group*—its membership shadows, or mimics, the membership of an OU.

### Quick Check

- You want to require that administrators maintain a password of at least 15 characters and change the password every 45 days. The administrators' user accounts are in an OU called Admins. You do not want to apply the restrictive password policy to all domain users. What do you do?

### Quick Check Answer

- Create a global security group that contains all users in the Admins OU. Create a PSO that configures the password policies, and then link the PSO to the group.

Shadow groups are conceptual, not technical objects. You simply create a group and add the users that belong to the OU. If you change the membership of the OU, you must also change the membership of the group.

### **MORE INFO** SHADOW GROUPS

Additional information about PSOs and shadow groups is available at [http://technet.microsoft.com/en-us/library/cc770842\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc770842(WS.10).aspx).

### **MORE INFO** MAINTAINING SHADOW GROUP MEMBERSHIP WITH SCRIPTS

You can use scripts to maintain the membership of shadow groups dynamically so that they always reflect the users in OUs. You can find example scripts in *Windows Administration Resource Kit: Productivity Solutions for IT Professionals* by Dan Holme (Microsoft Press, 2008).

## **PRACTICE** Configuring Password and Lockout Policies

In this practice, you use Group Policy to configure the domain-wide password and lockout policies for contoso.com. You then secure administrative accounts by configuring more restrictive, fine-grained password and lockout policies.

### **EXERCISE 1** Configure the Domain's Password and Lockout Policies

In this exercise, you modify the Default Domain Policy GPO to implement a password and lockout policy for users in the contoso.com domain.

1. Log on to SERVER01 as Administrator.
2. Open Group Policy Management from the Administrative Tools program group.
3. Expand Forest, Domains, and contoso.com.
4. Right-click Default Domain Policy underneath the contoso.com domain and choose Edit.

5. You might be prompted with a reminder that you are changing the settings of a GPO. If so, click OK.  
The Group Policy Management Editor appears.
6. Expand Computer Configuration, Policies, Windows Settings, Security Settings, and Account Policies, and then click Password Policy.
7. Double-click the following policy settings in the console details pane and configure the settings indicated:
  - Maximum Password Age: 90 Days
  - Minimum Password Length: 10 characters
8. Select Account Lockout Policy in the console tree.
9. Double-click the Account Lockout Threshold policy setting and configure it for 5 Invalid Logon Attempts. Then click OK.
10. In the Suggested Value Changes dialog box, click OK.  
The values for Account Lockout Duration and Reset Account Lockout Counter After are automatically set to 30 minutes.
11. Close the Group Policy Management Editor window.

## EXERCISE 2 Create a Password Settings Object

In this exercise, you create a PSO that applies a restrictive, fine-grained password policy to users in the Domain Admins group.

Before you proceed with this exercise, open Active Directory Users And Computers and confirm that the Domain Admins group is in the Users container. If it is not, move it to the Users container.

1. Open ADSI Edit from the Administrative Tools program group.
2. Right-click ADSI Edit and choose Connect To.
3. In the Name box, type **contoso.com**. Click OK.
4. Click and then expand contoso.com, and then click DC=contoso,DC=com.
5. Expand DC=contoso,DC=com and click CN=System.
6. Expand CN=System and click CN=Password Settings Container.

All PSOs are created and stored in the Password Settings Container (PSC).

7. Right-click the PSC, point to New, and then choose Object.

The Create Object dialog box prompts you to select the type of object to create. There is only one choice: msDS-PasswordSettings—the technical name for the object class referred to as a PSO.

8. Click Next.

You are prompted for the value for each attribute of a PSO. The attributes are similar to those found in the GPO you examined in Exercise 1.

9. Configure each attribute as indicated in the following list. Click Next after each attribute.
- cn: **My Domain Admins PSO**. This is the friendly name of the PSO.
  - msDS-PasswordSettingsPrecedence: **1**. This PSO has the highest possible precedence because its value is the closest to 1.
  - msDS-PasswordReversibleEncryptionEnabled: **False**. The password is not stored using reversible encryption.
  - msDS-PasswordHistoryLength: **30**. The user cannot reuse any of the last 30 passwords.
  - msDS-PasswordComplexityEnabled: **True**. Password complexity rules are enforced.
  - msDS-MinimumPasswordLength: **15**. Passwords must be at least 15 characters long.
  - msDS-MinimumPasswordAge: **1:00:00:00**. A user cannot change his or her password within one day of a previous change. The format is d:hh:mm:ss (days, hours, minutes, seconds).
  - MaximumPasswordAge: **45:00:00:00**. The password must be changed every 45 days.
  - msDS-LockoutThreshold: **5**. Five invalid logons within the time frame specified by msDS-LockoutObservationWindow (the next attribute) will result in account lockout.
  - msDS-LockoutObservationWindow: **0:01:00:00**. A given number of invalid logons (specified by the previous attribute) within one hour will result in account lockout.
  - msDS-LockoutDuration: **1:00:00:00**. An account, if locked out, will remain locked for one day or until it is unlocked manually. A value of zero will result in the account remaining locked out until an administrator unlocks it.

The attributes listed are required. After clicking Next on the *msDS-LockoutDuration* attribute page, you can configure optional attributes.

10. Click More Attributes.
11. In the Select A Property To View list, select msDS-PSOAppliesTo.
12. In the Edit Attributes box, type the following:  
**CN=Domain Admins,CN=Users,DC=contoso,DC=com**
13. Click Add, click OK, and then click Finish.

### EXERCISE 3 Identify the Resultant PSO for a User

In this exercise, you identify the PSO that controls the password and lockout policies for an individual user.

1. Open the Active Directory Users And Computers snap-in.
2. Click the View menu and make sure that Advanced Features is selected.
3. Expand the contoso.com domain and click the Users container in the console tree.
4. Right-click the Administrator account and choose Properties.



5. On the Attribute Editor tab, click Filter and make sure that Constructed is selected.  
The attribute you will locate in the next step is a *constructed* attribute, meaning that the resultant PSO is not a hard-coded attribute of a user; rather, it is calculated by examining the PSOs linked to a user in real time.
6. In the Attributes list, locate *msDS-ResultantPSO*.
7. Identify the PSO that affects the user.

The My Domain Admins PSO that you created in Exercise 2, “Create a Password Settings Object,” is the resultant PSO for the Administrator account.

#### **EXERCISE 4 Delete a PSO**

In this exercise, you delete the PSO you created in Exercise 2 so that its settings do not affect you in later exercises.

1. Repeat steps 1–6 of Exercise 2 to select the Password Settings Container in ADSI Edit.
2. In the console details pane, select CN=My Domain Admins PSO.
3. Press Delete.
4. Click Yes.

## **Lesson Summary**

- Password policy settings determine when a password can or must be changed and what the requirements of the new password are.
- Account lockout settings cause Active Directory to lock out a user account if a specified number of invalid logons occurs within a specified period of time. Lockout helps prevent intruders from repeatedly attempting to log on to a user account in an effort to guess the user’s password.
- A domain can have only one set of password and lockout policies that affect all users in the domain. These policies are defined using Group Policy. You can modify the default settings in the Default Domain Policy GPO to configure the policies for your organization.
- Windows Server 2008 R2 gives you the option to specify different password and lockout policies for global security groups and users in your domain. Fine-grained password policies are deployed not with Group Policy but with password settings objects.
- If more than one PSO applies to a user or to groups to which a user belongs, a single PSO, called the resultant PSO, determines the effective password and lockout policies for the user. The PSO with the highest precedence (precedence value closest to 1) prevails. If one or more PSOs are linked directly to the user rather than indirectly to groups, group-linked PSOs are not evaluated to determine the resultant PSO, and the user-linked PSO with the highest precedence prevails.

## Lesson Review

You can use the following questions to test your knowledge of the information in Lesson 1, “Configuring Password and Lockout Policies.” The questions are also available on the companion CD if you prefer to review them in electronic form.

### **NOTE ANSWERS**

**Answers to these questions and explanations of why each answer choice is right or wrong are located in the “Answers” section at the end of the book.**

1. You are an administrator at Tailspin Toys. Your Active Directory domain includes an OU called Service Accounts that contains all user accounts. Because you have configured service accounts with passwords that never expire, you want to apply a password policy that requires passwords of at least 40 characters. Which of the following steps should you perform? (Choose all that apply. Each correct answer is part of the solution.)
  - A. Set the Minimum Password Length policy in the Default Domain Policy GPO.
  - B. Link a PSO to the Service Accounts OU.
  - C. Create a group called Service Accounts.
  - D. Link a PSO to the Service Accounts group.
  - E. Add all service accounts as members of the Service Accounts group.
2. You want to configure account lockout policy so that a locked account will not be unlocked automatically. Rather, you want to require an administrator to unlock the account. Which configuration change should you make?
  - A. Configure the Account Lockout Duration policy setting to 100.
  - B. Configure the Account Lockout Duration policy setting to 1.
  - C. Configure the Account Lockout Threshold to 0.
  - D. Configure the Account Lockout Duration policy setting to 0.
3. As you evaluate the password settings objects in your domain, you discover a PSO named PSO1 with a precedence value of 1 that is linked to a group named Help Desk. Another PSO, named PSO2, with a precedence value of 99, is linked to a group named Support. Mike Danseglio is a member of both the Help Desk and Support groups. You discover that two other PSOs are linked directly to Mike. PSO3 has a precedence value of 50, and PSO4 has a precedence value of 200. Which PSO is the resultant PSO for Mike?
  - A. PSO1
  - B. PSO2
  - C. PSO3
  - D. PSO4

## Lesson 2: Auditing Authentication

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In Chapter 7, “Managing Enterprise Security and Configuration with Group Policy Settings,” you learned to configure auditing for several types of activities, including access to folders and changes to directory service objects. Windows Server 2008 R2 also allows you to audit the logon activity of users in a domain. By auditing successful logons, you can look for instances in which an account is being used at unusual times or in unexpected locations, which might indicate that an intruder is logging on to the account. Auditing failed logons can reveal attempts by intruders to compromise an account. In this lesson, you learn to configure auditing of logon authentication.

**After this lesson, you will be able to:**

- Configure auditing of authentication-related activity.
- Distinguish between account logon and logon events.
- Identify authentication-related events in the Security log.

**Estimated lesson time: 30 minutes**

### Account Logon and Logon Events

This lesson examines two specific policy settings: Audit Account Logon Events and Audit Logon Events. It is important that you understand the difference between these two similarly named policy settings.

When a user logs on to any computer in the domain using a domain user account, a domain controller authenticates the attempt to log on to the domain account. This generates an account logon event on the domain controller.

The computer to which the user logs on—for example, the user’s laptop—generates a logon event. The computer did not authenticate the user against his or her account—it passed the account to a domain controller for validation. The computer did, however, allow the user to log on interactively to the computer. Therefore, the event is a logon event.

When the user connects to a folder on a server in the domain, that server authorizes the user for a type of logon called a *network logon*. Again, the server does not authenticate the user—it relies on the ticket given to the user by the domain controller. However, the connection by the user generates a logon event on the server.



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#### **EXAM TIP**

Be certain that you can distinguish between *account logon events* and *logon events*. The simplest way to remember the difference is that an account logon event occurs where the account lives: on the domain controller that authenticates the user. A logon event occurs on the computer to which the user logs on interactively. It also occurs on the file server to which the user connects using a network logon.

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# Configuring Authentication-Related Audit Policies

Account logon and logon events can be audited by Windows Server 2008 R2. The settings that manage auditing are located in a GPO in the Computer Configuration\Policies\Windows Settings\Security Settings\Local Policies\Audit Policy node. The Audit Policy node and the two settings detailed in the previous section are shown in Figure 8-4.

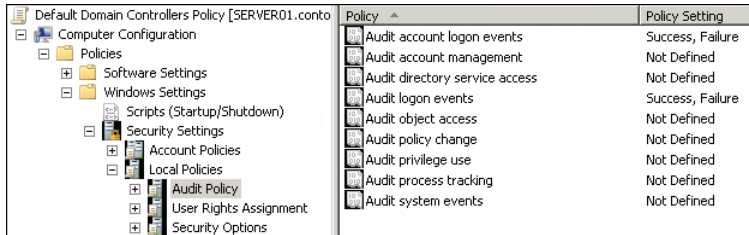


FIGURE 8-4 Authentication-related policy settings

To configure an audit policy, double-click the policy, and its properties dialog box appears. The Audit Account Logon Events Properties dialog box is shown in Figure 8-5.

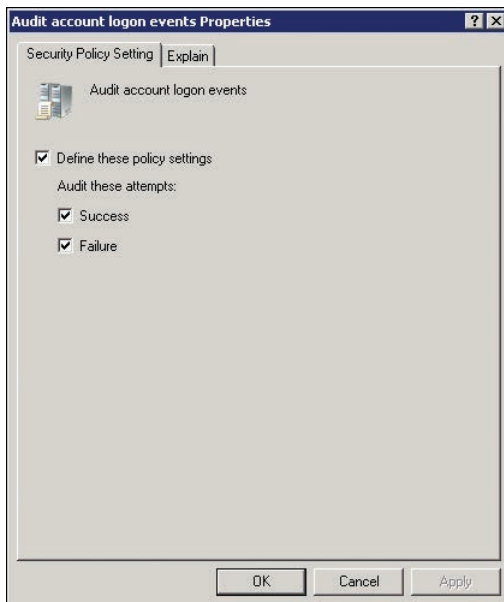


FIGURE 8-5 The Audit Account Logon Events Properties dialog box

The policy setting can be configured to one of the following four states:

- **Not defined** If the Define These Policy Settings check box is cleared, the policy setting is not defined. In this case, the server audits events based on its default settings or on the settings specified in another GPO.

- **Defined for no auditing** If the Define These Policy Settings check box is selected, but the Success and Failure check boxes are cleared, the server will not audit these events.
- **Audit successful events** If the Define These Policy Settings check box is selected, and the Success check box is selected, the server will log successful events in its Security log.
- **Audit failed events** If the Define These Policy Settings check box is selected, and the Failure check box is selected, the server will log unsuccessful events in its Security log.

A server's audit behavior is determined by the settings that are applied as the resultant set of policy. In Windows Server 2008 R2, the default setting is to audit successful account logon events and successful logon events. So both types of events are, if successful, entered in the server's Security log. If you want to audit failures or turn off auditing, you must define the appropriate setting in the audit policy.

## Scoping Audit Policies

As with all policy settings, you should scope settings so that they affect the correct systems. For example, if you want to audit attempts by users to connect to remote desktop servers in your enterprise, you can configure logon event auditing in a GPO linked to the OU that contains your remote desktop servers. If, on the other hand, you want to audit logons by users to desktops in your human resources department, you can configure logon event auditing in a GPO linked to the OU containing human resources computer objects. Remember that domain users logging on to a client computer or connecting to a server will generate a logon event—not an account logon event—on that system.

Only domain controllers generate account logon events for domain users. Remember that an account logon event occurs on the domain controller that authenticates a domain user, regardless of where that user logs on. If you want to audit logons to domain accounts, you should scope account logon event auditing to affect only domain controllers. In fact, the Default Domain Controllers GPO that is created when you install your first domain controller is an ideal GPO in which to configure account logon audit policies.

### Quick Check

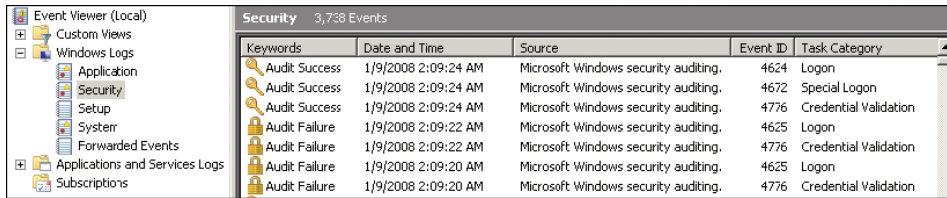
- You are concerned that an intruder is attempting to gain access to your network by guessing a user's password. You want to identify the times at which the intruder is trying to log on. What type of event should you audit? Should you configure the policy setting in the Default Domain Policy or in the Default Domain Controllers Policy?

### Quick Check Answer

- Enable auditing of failed account logon events (not logon events) in the Default Domain Controllers GPO. Only domain controllers generate account logon events related to the authentication of domain users. The Default Domain Controllers GPO is scoped correctly to apply only to domain controllers.

## Viewing Logon Events

Account logon and logon events, if audited, appear in the Security log of the system that generated the event. Figure 8-6 shows an example. So if you are auditing logons to computers in the human resources department, the events are entered in each computer's Security log. Similarly, if you are auditing unsuccessful account logons to identify potential intrusion attempts, the events are entered in each domain controller's Security log. This means, by default, that you will need to examine the Security logs of all domain controllers to get a complete picture of account logon events in your domain.



| Keywords       | Date and Time       | Source                               | Event ID | Task Category         |
|----------------|---------------------|--------------------------------------|----------|-----------------------|
| Audit: Success | 1/9/2008 2:09:24 AM | Microsoft Windows security auditing, | 4624     | Logon                 |
| Audit: Success | 1/9/2008 2:09:24 AM | Microsoft Windows security auditing, | 4672     | Special Logon         |
| Audit: Success | 1/9/2008 2:09:24 AM | Microsoft Windows security auditing, | 4776     | Credential Validation |
| Audit: Failure | 1/9/2008 2:09:22 AM | Microsoft Windows security auditing, | 4625     | Logon                 |
| Audit: Failure | 1/9/2008 2:09:22 AM | Microsoft Windows security auditing, | 4776     | Credential Validation |
| Audit: Failure | 1/9/2008 2:09:20 AM | Microsoft Windows security auditing, | 4625     | Logon                 |
| Audit: Failure | 1/9/2008 2:09:20 AM | Microsoft Windows security auditing, | 4776     | Credential Validation |

**FIGURE 8-6** Authentication events in the Security log

As you can imagine, in a complex environment with multiple domain controllers and many users, auditing account logons or logons can generate a tremendous number of events. If there are too many events, it can be difficult to identify problematic events worthy of closer investigation. You should balance the amount of logging you perform with the security requirements of your business and the resources you have available to analyze logged events.

### **PRACTICE** Auditing Authentication

In this practice, you use Group Policy to enable auditing of logon activity by users in the contoso.com domain. You then generate logon events and view the resulting entries in the event logs.

#### **EXERCISE 1** Configure Auditing of Account Logon Events

In this exercise, you modify the Default Domain Controllers Policy GPO to implement auditing of both successful and failed logons by users in the domain.

1. Open Group Policy Management from the Administrative Tools program group.
2. Expand Forest, Domains, Contoso.com, and Domain Controllers.
3. Right-click Default Domain Controllers Policy and choose Edit.  
Group Policy Management Editor appears.
4. Expand Computer Configuration, Policies, Windows Settings, Security Settings, and Local Policies, and then click Audit Policy.
5. Double-click Audit Account Logon Events.
6. Select the Define These Policy Settings check box.

7. Select both the Success and Failure check boxes. Click OK.
8. Double-click Audit Logon Events.
9. Select the Define These Policy Settings check box.
10. Select both the Success and Failure check boxes. Click OK.
11. Close Group Policy Management Editor.
12. Open Command Prompt and type **gpupdate.exe /force**.

This command causes SERVER01 to update its policies, at which time the new auditing settings take effect.

### **EXERCISE 2   Generate Account Logon Events**

In this exercise, you generate account logon events by logging on with both incorrect and correct passwords.

1. Log off of SERVER01.
2. Attempt to log on as Administrator with an incorrect password. Repeat this step once or twice.
3. Log on to SERVER01 with the correct password.

### **EXERCISE 3   Examine Account Logon Events**

In this exercise, you view the events generated by the logon activities in Exercise 2.

1. Open Event Viewer from the Administrative Tools program group.
2. Expand Windows Logs, and then click Security.
3. Identify the failed and successful events.

## **Lesson Summary**

- Account logon events occur on a domain controller as it authenticates users logging on anywhere in the domain.
- Logon events occur on systems to which users log on—for example, to their individual desktops and laptops. Logon events are also generated in response to a network logon—for example, when a user connects to a file server.
- By default, Windows Server 2008 R2 systems audit successful account logon and logon events.
- To examine account logon events in your domain, you must look at the individual event logs from each domain controller.

## **Lesson Review**

You can use the following questions to test your knowledge of the information in Lesson 2, “Auditing Authentication.” The questions are also available on the companion CD if you prefer to review them in electronic form.

## **NOTE ANSWERS**

**Answers to these questions and explanations of why each answer choice is right or wrong are located in the “Answers” section at the end of the book.**

- 1.** You want to obtain a log that will help you isolate the times of day that failed logons are causing a user’s account to be locked out. Which policy should you configure?
  - A.** Define the Audit Account Logon Events policy setting for Success events in the Default Domain Policy GPO.
  - B.** Define the Audit Account Logon Events policy setting for Failure events in the Default Domain Policy GPO.
  - C.** Define the Audit Logon Events policy setting for Success events in the Default Domain Policy GPO.
  - D.** Define the Audit Logon Events policy setting for Failure events in the Default Domain Policy GPO.
- 2.** You want to keep track of when users log on to computers in the human resources department of Adventure Works. Which of the following methods will allow you to obtain this information?
  - A.** Configure the policy setting to audit successful account logon events in the Default Domain Controllers GPO. Examine the event log of the first domain controller you installed in the domain.
  - B.** Configure the policy setting to audit successful logon events in a GPO linked to the OU containing user accounts for employees in the human resources department. Examine the event logs of each computer in the human resources department.
  - C.** Configure the policy setting to audit successful logon events in a GPO linked to the OU containing computer accounts in the human resources department. Examine the event logs of each computer in the human resources department.
  - D.** Configure the policy setting to audit successful account logon events in a GPO linked to the OU containing computer accounts in the human resources department. Examine the event logs of each domain controller.



## Lesson 3: Configuring Read-Only Domain Controllers

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Branch offices present a unique challenge to an enterprise's IT staff: If a branch office is separated from the hub site by a wide area network (WAN) link, should you place a domain controller (DC) in the branch office? In previous versions of Windows, the answer to this question was not a simple one. Windows Server 2008, however, introduced a new type of domain controller—the read-only domain controller (RODC)—that made the question easier to answer. In this lesson, you explore the issues related to branch office authentication and domain controller placement, and you learn how to implement and support a branch-office RODC.

**After this lesson, you will be able to:**

- Identify the business requirements for RODCs.
- Install an RODC.
- Configure password replication policy.
- Monitor the caching of credentials on an RODC.

**Estimated lesson time: 60 minutes**

### Authentication and Domain Controller Placement in a Branch Office

Consider a scenario in which an enterprise is characterized by a hub site and several branch offices. The branch offices connect to the hub site over WAN links that might be congested, expensive, slow, or unreliable. Users in the branch office must be authenticated by Active Directory to access resources in the domain. Should a DC be placed in the branch office?

In branch office scenarios, many of the services provided by IT are centralized in a hub site that is carefully maintained by the IT staff. In larger organizations, the hub site may include a robust datacenter. Branch offices, however, are often smaller sites at which no datacenter exists. In fact, many branch offices have no significant IT presence other than a small handful of servers. There may be no physically secure facility to house branch office servers. There may be few, if any, local IT staff to support the servers.

If a DC is not placed in the branch office, authentication and service ticket activities are directed to the hub site over the WAN link. Authentication occurs when a user first logs on to his computer in the morning. *Service tickets* are a component of the Kerberos authentication mechanism used by AD DS domains. You can think of a service ticket as a key issued by the domain controller to a user. The key allows the user to connect to a service such as the file and print services on a file server. When a user first tries to access a specific service, the user's client requests a service ticket from the domain controller. Because users typically connect to multiple services during a workday, service ticket activity happens regularly. Authentication and service ticket activity over the WAN link between a branch office and a hub site can result in slow or unreliable performance.

If a DC is placed in the branch office, authentication is much more efficient but there are several potentially significant risks. A DC maintains a copy of all attributes of all objects in its domain, including secrets such as information related to user passwords. If a DC is accessed or stolen, it becomes possible for a determined expert to identify valid user names and passwords, at which point the entire domain is compromised. At a minimum, you must reset the passwords of every user account in the domain. Because the security of servers at branch offices is often less than ideal, a branch office DC poses a considerable security risk.

A second concern is that changes to the Active Directory database on a branch office DC replicate to the hub site and to all other DCs in the environment. Therefore, corruption to the branch office DC poses a risk to the integrity of the enterprise directory service. For example, if a branch office administrator performs a restore of the DC from an outdated backup, there can be significant repercussions for the entire domain.

The third concern relates to administration. A branch office domain controller might require maintenance—for example, a new device driver. To perform maintenance on a standard domain controller, you must log on as a member of the Administrators group on the domain controller, which means you are effectively an administrator of the domain. It might not be appropriate to grant that level of capability to a support team at a branch office.

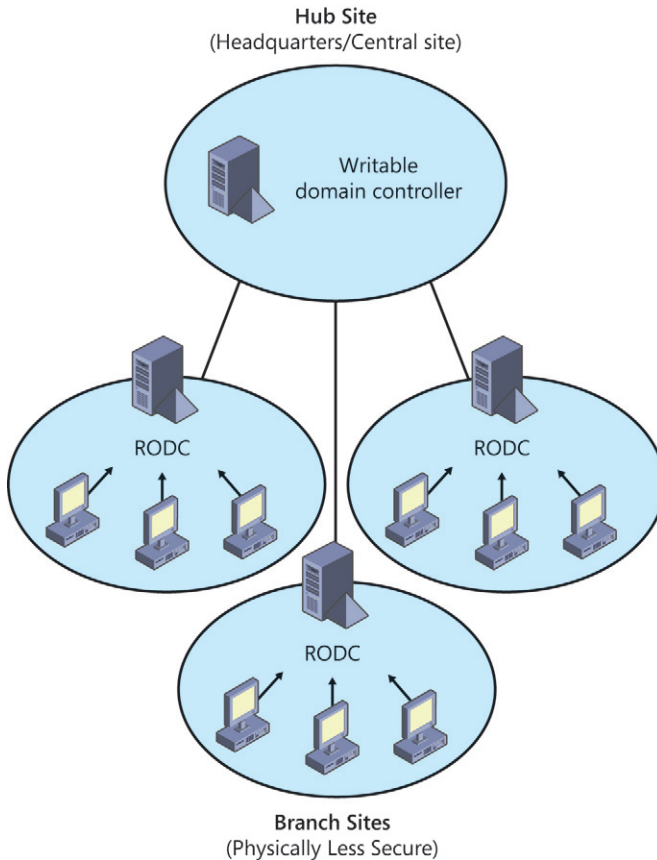
## Read-Only Domain Controllers

These concerns—security, directory service integrity, and administration—left many enterprises with a difficult choice to make, and there was no best practice answer. Windows Server 2008 introduced the RODC, which is designed specifically to address the branch office scenario. An RODC is a domain controller, typically placed in the branch office, that maintains a copy of all objects in the domain and all attributes except for secrets such as password-related properties. When a user in the branch office logs on, the RODC receives the request and forwards it to a domain controller in the hub site for authentication.

You can configure a password replication policy (PRP) for the RODC that specifies user accounts the RODC is allowed to cache. If the user logging on is included in the PRP, the RODC caches that user's credentials, so the next time authentication is requested the RODC can perform the task locally. As users who are included in the PRP log on, the RODC builds its cache of credentials so that it can perform authentication locally for those users. These concepts are illustrated in Figure 8-7.

Because the RODC maintains only a subset of user credentials, if the RODC is compromised or stolen, the effect of the security exposure is limited. Only the user accounts that had been cached on the RODC must have their passwords changed. Writable domain controllers maintain a list of all cached credentials on individual RODCs. When you delete the account of the stolen or compromised RODC from Active Directory, you have the option to reset the passwords of all user accounts that were cached on the RODC. The RODC replicates changes to Active Directory from DCs in the hub site. Replication is one way, from a writable domain controller to the RODC. No changes to the RODC are replicated to any other domain controller. This eliminates the exposure of the directory service to corruption resulting from

changes made to a compromised branch office DC. Finally, RODCs, unlike writable DCs, have some local groups, most notably a local Administrators group. You can give one or more local support personnel the ability to maintain an RODC fully, without granting them the equivalence of domain administrators.



**FIGURE 8-7** A branch office scenario supported by RODCs

## Deploying an RODC

The high-level steps to install an RODC are as follows:

- Ensure that the forest functional level is Windows Server 2003 or higher.
- If the forest has any DCs running Microsoft Windows Server 2003, run ADPrep /RODCPrep.
- Ensure that at least one writable DC is running Windows Server 2008 or Windows Server 2008 R2.
- Install the RODC.

Each of these steps is detailed in the following sections.

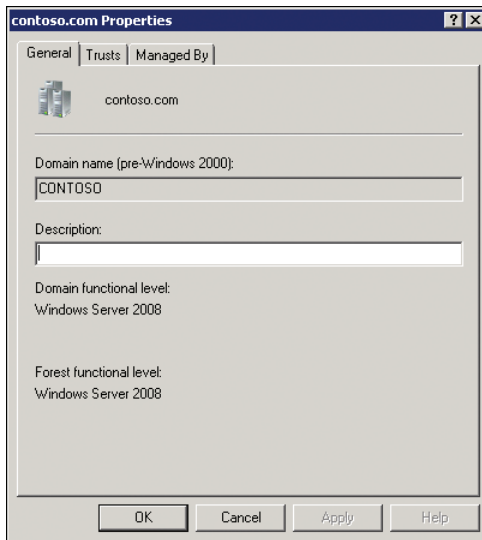
## Verifying and Configuring Forest Functional Level of Windows Server 2003 or Higher

Functional levels enable features unique to specific versions of Windows and are, therefore, dependent on the versions of Windows running on domain controllers. If all domain controllers are Windows Server 2003 or later, the domain functional level can be set to Windows Server 2003. If all domains are at Windows Server 2003 domain functional level, the forest functional level can be set to Windows Server 2003. Domain and forest functional levels are discussed in detail in Chapter 12.

RODCs require that the forest functional level is Windows Server 2003 or higher. That means that all domain controllers in the entire forest are running Windows Server 2003 or later.

To determine the functional level of your forest:

1. Open Active Directory Domains And Trusts.
2. In the console tree, right-click the root node, Active Directory Domains And Trusts [Server Name], and then click Properties..
3. Verify the forest functional level, as shown in Figure 8-8.



**FIGURE 8-8** The forest Properties dialog box

Any user can verify the forest functional level in this way. No special administrative credentials are required to view the forest functional level.

If the forest functional level is not at least Windows Server 2003, examine the properties of each domain to identify any domains for which the domain functional level is not at least Windows Server 2003. If you find such a domain, you must ensure that all domain controllers in the domain are running Windows Server 2003. Then, in Active Directory Domains And Trusts, right-click the domain and choose Raise Domain Functional Level. After

you have raised each domain functional level to at least Windows Server 2003, right-click the root node of the Active Directory Domains And Trusts snap-in and choose Raise Forest Functional Level. In the Select An Available Forest Functional Level drop-down list, choose Windows Server 2003 and click Raise. You must be an administrator of a domain to raise the domain's functional level. To raise the forest functional level, you must be either a member of the Domain Admins group in the forest root domain or a member of the Enterprise Admins group.

## Running ADPrep /RODCPrep

If you are upgrading an existing forest to include domain controllers running Windows Server 2008 or Windows Server 2008 R2, you must run ADPrep /RODCPrep. This command configures permissions so that RODCs can replicate DNS application directory partitions. DNS application directory partitions are discussed in Chapter 9, "Integrating Domain Name System with AD DS." If you are creating a new Active Directory forest that will have only domain controllers running Windows Server 2008 or Windows Server 2008 R2, you do not need to run ADPrep /RODCPrep.

The command is found in the \support\adprep folder of the Windows Server 2008 or Windows Server 2008 R2 installation DVD. Copy the folder to the domain controller acting as the schema master. The schema master role is discussed in Chapter 10, "Administering Domain Controllers." Log on to the schema master as a member of the Enterprise Admins group, open Command Prompt, change directories to the ADPrep folder, and type **adprep /rodcprep**.

Before running ADPrep /RODCPrep, you must run ADPrep /ForestPrep and ADPrep /DomainPrep. See Chapter 10 for more information about preparing a Windows Server 2003 domain and forest for the first Windows Server 2008 or Windows Server 2008 R2 domain controller.

## Placing a Writable Windows Server 2008 or Windows Server 2008 R2 Domain Controller

An RODC must replicate domain updates from a writable domain controller running Windows Server 2008 or Windows Server 2008 R2. It is critical that an RODC can establish a replication connection with a writable Windows Server 2008 or Windows Server 2008 R2 domain controller. Ideally, the writable domain controller should be in the closest site—the hub site. In Chapter 11, "Managing Sites and Active Directory Replication," you learn about Active Directory replication, sites, and site links. If you want the RODC to act as a DNS server, the writable Windows Server 2008 or Windows Server 2008 R2 domain controller must also host the DNS domain zone.

## ✓ Quick Check

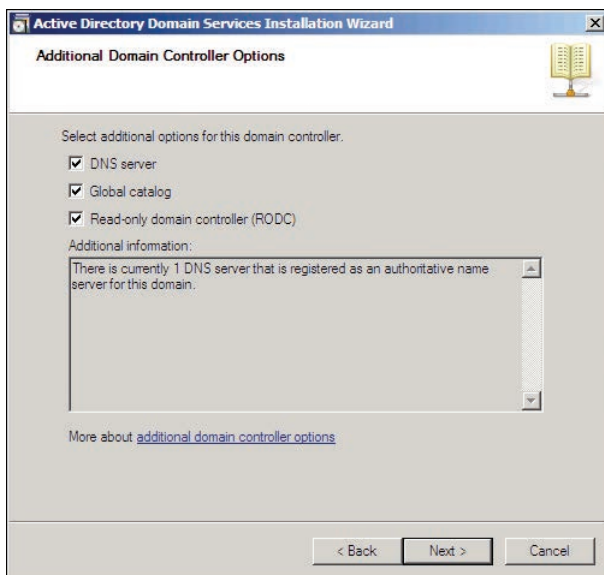
- Your domain consists of a central site and four branch offices. The central site has two domain controllers. Each branch office site has one domain controller. All domain controllers run Windows Server 2003. Your company decides to open a fifth branch office, and you want to configure it with a new Windows Server 2008 R2 RODC. What must you do before introducing the first RODC into your domain?

## Quick Check Answer

- You must first ensure that the forest functional level is Windows Server 2003. Then you must upgrade one of the existing domain controllers to Windows Server 2008 or Windows Server 2008 R2 so that there is one writable Windows Server 2008 domain controller. You must run ADPrep /DomainPrep and ADPrep /ForestPrep to prepare the domain and forest for the first Windows 2008 or Windows Server 2008 R2 domain controller, as you will learn in Chapter 10. You must also run ADPrep /RODCPrep from the Windows Server 2008 R2 installation DVD.

## Installing an RODC

After completing the preparatory steps, you can install an RODC. An RODC can be either a full or Server Core installation of Windows Server 2008 or Windows Server 2008 R2. With a full installation of Windows Server 2008 or Windows Server 2008 R2, you can use the Active Directory Domain Services Installation Wizard to create an RODC. Simply select Read-Only Domain Controller (RODC) on the Additional Domain Controller Options page of the wizard, as shown in Figure 8-9.



**FIGURE 8-9** Creating an RODC with the Active Directory Domain Services Installation Wizard

## **PRACTICE IT**

**Exercise 1, “Install an RODC,” in the practice at the end of this lesson walks you through the use of the Active Directory Domain Services Installation Wizard to create an RODC.**

Alternately, you can use the `dcpromo.exe` command with the `/unattend` switch to create the RODC. On a Server Core installation of Windows Server 2008 or Windows Server 2008 R2, you must use the `DCPromo /unattend` command.

It is also possible to delegate the installation of the RODC, which allows a user who is not a domain administrator to create the RODC by adding a new server in the branch office and running `Dcpromo.exe`. To delegate the installation of an RODC, pre-create the computer account for the RODC in the Domain Controllers OU and specify the credentials that will be used to add the RODC to the domain. That user can then promote a server running Windows Server 2008 or Windows Server 2008 R2 as an RODC, using the prestaged RODC account. The server must be a member of a workgroup—not of the domain—when creating an RODC by using delegated installation.

## **MORE INFO OPTIONS FOR INSTALLING AN RODC**

For details regarding other options for installing an RODC, including delegated installation, see “Step-by-Step Guide for Read-only Domain Controllers” at <http://technet2.microsoft.com/windowsserver2008/en/library/ea8d253e-0646-490c-93d3-b78c5e1d9db71033.aspx?mfr=true>.

## **Password Replication Policy**

Password Replication Policy (PRP) determines which users’ credentials can be cached on a specific RODC. If PRP allows an RODC to cache a user’s credentials, authentication and service ticket activities of that user can be processed by the RODC. If a user’s credentials cannot be cached on an RODC, authentication and service ticket activities are referred by the RODC to a writable domain controller.

An RODC’s PRP is determined by two multivalued attributes of the RODC’s computer account. These attributes are commonly known as the *Allowed List* and the *Denied List*. If a user’s account is on the Allowed List, the user’s credentials are cached. You can include groups on the Allowed List, in which case all users who belong to the group can have their credentials cached on the RODC. If the user is on both the Allowed List and the Denied List, the user’s credentials will not be cached—the Denied List takes precedence.

## **Configuring Domain-Wide Password Replication Policy**

To facilitate the management of PRP, Windows Server 2008 R2 creates two domain local security groups in the Users container of Active Directory. The first group, Allowed RODC Password Replication Group, is added to the Allowed List of each new RODC. By default, the group has no members. Therefore, by default, a new RODC will not cache any user’s

credentials. If you have users whose credentials you want to be cached by all domain RODCs, add those users to the Allowed RODC Password Replication Group.

The second group is named Denied RODC Password Replication Group. It is added to the Denied List of each new RODC. If you have users whose credentials you want to ensure are never cached by domain RODCs, add those users to the Denied RODC Password Replication Group. By default, this group contains groups for security-sensitive accounts including Domain Admins, Enterprise Admins, and Group Policy Creator Owners.

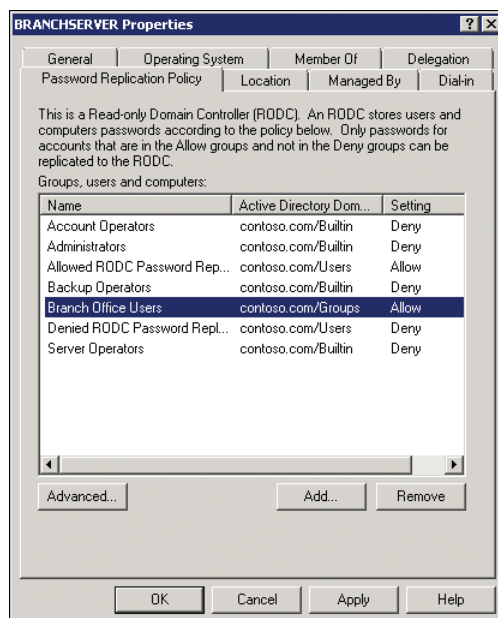
#### **NOTE COMPUTERS ARE PEOPLE, TOO**

**Remember that it is not only users that generate authentication and service ticket activity. Computers in a branch office also require such activity. To improve performance of systems in a branch office, allow the branch RODC to cache appropriate computer credentials as well.**

## Configuring RODC-Specific Password Replication Policy

The two groups described in the previous section provide a method to manage PRP on all RODCs. However, to best support a branch office scenario, you must allow the RODC in each branch office to cache credentials of users and computers in that specific location. Therefore, you must configure the Allowed List and the Denied List of each RODC.

To configure an RODC's PRP, open the properties of the RODC's computer account in the Domain Controllers OU. On the Password Replication Policy tab, shown in Figure 8-10, you can view the current PRP settings and add or remove users or groups from the PRP.

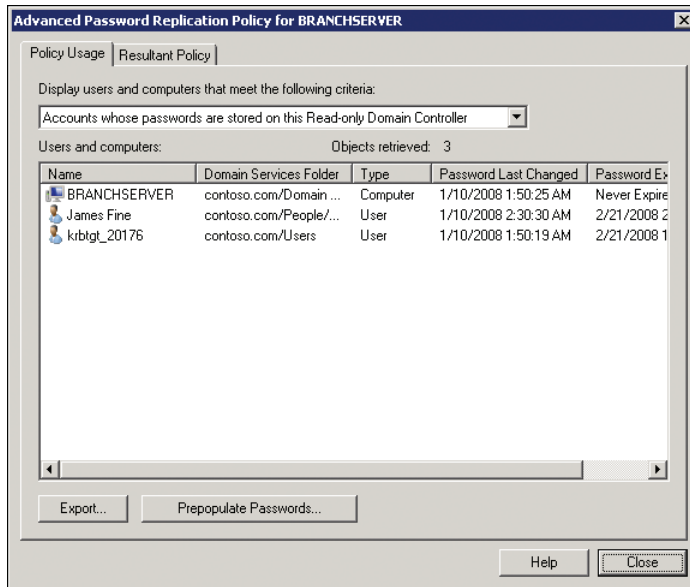


**FIGURE 8-10** The Password Replication Policy tab of an RODC



## Administering RODC Credentials Caching

When you click the Advanced button on the Password Replication Policy tab shown in Figure 8-10, an Advanced Password Replication Policy dialog box appears. An example is shown in Figure 8-11.



**FIGURE 8-11** The Advanced Password Replication Policy dialog box

In the drop-down list at the top of the Policy Usage tab, you can select one of two reports for the RODC:

- **Accounts Whose Passwords Are Stored On This Read-Only Domain Controller** Displays the list of user and computer credentials that are currently cached on the RODC. Use this list to determine whether credentials are being cached that you do not want cached on the RODC. Then modify the PRP accordingly.
- **Accounts That Have Been Authenticated To This Read-Only Domain Controller** Displays the list of user and computer credentials that have been referred to a writable domain controller for authentication or service ticket processing. Use this list to identify users or computers that are attempting to authenticate with the RODC. If any of these accounts are not being cached, consider adding them to the PRP.

In the same dialog box, you can use the Resultant Policy tab to evaluate the effective caching policy for an individual user or computer. Click Add to select a user or computer account for evaluation.

Under normal circumstances, if a user or computer is on the Allowed List of an RODC, the account credentials can be cached on the RODC but will not be cached until the authentication or service ticket events cause the RODC to replicate the credentials from a writable domain controller. However, you can also use the Advanced Password Replication

Policy dialog box to prepopulate user and computer credentials in the RODC cache. This ensures that authentication and service ticket activity will be processed locally by the RODC even when the user or computer is authenticating for the first time. To prepopulate credentials, click Prepopulate Passwords and select the appropriate users and computers.

## Administrative Role Separation

RODCs in branch offices can require maintenance such as an updated device driver. Additionally, small branch offices might combine the RODC role with the file server role on a single system, in which case it is important to be able to back up the system. RODCs support local administration through a feature called *administrative role separation*. Each RODC maintains a local database of groups for specific administrative purposes. You can add domain user accounts to these local roles to enable support of a specific RODC.

You can configure administrative role separation by using the `Dsmgmt.exe` command. To add a user to the Administrators role on an RODC, follow these steps:

1. Open Command Prompt on the RODC.
2. Type **dsmgmt** and press Enter.
3. Type **local roles** and press Enter.

At the Local Roles prompt, you can type **?** and press Enter for a list of commands.

You can also type **list roles** and press Enter for a list of local roles.

4. Type **add *username* administrators**, where *username* is the pre-Windows 2000 logon name of a domain user, and press Enter.

You can repeat this process to add other users to the various local roles on an RODC.

### **MORE INFO** IMPROVING AUTHENTICATION AND SECURITY

RODCs are a valuable new feature for improving authentication and security in branch offices. Be sure to read the detailed documentation at <http://technet2.microsoft.com/windowsserver2008/en/library/ea8d253e-0646-490c-93d3-b78c5e1d9db71033.mspx>.

## **PRACTICE** Configuring Read-Only Domain Controllers

In this practice, you implement read-only domain controllers in a simulation of a branch office scenario. You install an RODC, configure password replication policy, monitor credential caching, and prepopulate credentials on the RODC. To perform this practice, you must complete the following preparatory tasks:

- Install a second server running a full installation of Windows Server 2008 R2. Name the server BRANCHSERVER. Do not join the computer to the domain. Set the server's IP configuration as follows:
  - IP Address: 10.0.0.12
  - Subnet Mask: 255.255.255.0

- Default Gateway: 10.0.0.1
- DNS Server: 10.0.0.11 (the address of SERVER01)
- Create the following Active Directory objects:
  - A global security group named Branch Office Users
  - A user named James Fine, who is a member of Branch Office Users
  - A user named Adam Carter, who is a member of Branch Office Users
  - A user named Mike Danseglio, who is *not* a member of Branch Office Users

In this and other practices in this training kit, you will log on to the domain controller with user accounts that are not a member of Domain Administrators or the domain's Administrators group. Therefore, you must give all user accounts the right to log on locally to the domain controllers in your practice environment. Follow the steps in the article, "Grant a Member the Right to Logon Locally," at [http://technet.microsoft.com/en-us/library/ee957044\(Ws.10\).aspx](http://technet.microsoft.com/en-us/library/ee957044(Ws.10).aspx) to grant the Allow Logon Locally right to the Administrators and Domain Users groups. If you will use Remote Desktop Services to connect to the domain controller—rather than logging on locally—grant the Allow Logon Through Remote Desktop Services right. Reboot the server or otherwise refresh Group Policy. This is for the practice environment only. In a production environment, you should not grant users the right to log on to domain controllers.

### EXERCISE 1 Install an RODC

In this exercise, you configure the BRANCHSERVER server as an RODC in the contoso.com domain.

1. Log on to BRANCHSERVER as Administrator.
2. Click Start, and then click Run.
3. Type **dcpromo** and click OK.

A window appears, informing you that the Active Directory Domain Services binaries are being installed. When installation is complete, the Active Directory Domain Services Installation Wizard appears.

4. On the first page of the wizard, click Next.
5. On the Operating System Compatibility page, click Next.
6. On the Choose A Deployment Configuration page, click Existing Forest, and then click Add A Domain Controller To An Existing Domain. Click Next.
7. On the Network Credentials page, type **contoso.com**.
8. Click Set.
9. In the User Name box, type **CONTOSO\Administrator**.
10. In the Password box, type the password for the domain's Administrator account. Click OK, and then click Next.
11. On the Select A Domain page, select contoso.com and click Next.

12. On the Select A Site page, select Default-First-Site-Name and click Next.  
In a production environment, you would select the site for the branch office in which the RODC is being installed. Sites are discussed in Chapter 11.
13. On the Additional Domain Controller Options page, select Read-Only Domain Controller (RODC). Also ensure that DNS Server and Global Catalog are selected. Then click Next.
14. On the Delegation Of RODC Installation And Administration page, click Next.
15. On the Location For Database, Log Files, And SYSVOL page, click Next.
16. On the Directory Services Restore Mode Administrator Password page, type a password in the Password and Confirm Password boxes, and then click Next.
17. On the Summary page, click Next.
18. In the progress window, select the Reboot On Completion check box.

### EXERCISE 2 Configure Password Replication Policy

In this exercise, you configure PRP at the domain level and for an individual RODC. PRP determines whether the credentials of a user or computer are cached on an RODC.

1. Log on to SERVER01 as Administrator.
2. Open the Active Directory Users And Computers snap-in, expand the domain, and select the Users container.
3. Examine the default membership of the Allowed RODC Password Replication Group.
4. Open the properties of the Denied RODC Password Replication Group.
5. Add the DNSAdmins group as a member of the Denied RODC Password Replication Group. Click OK to close the group Properties dialog box.
6. Select the Domain Controllers OU.
7. Open the properties of BRANCHSERVER.
8. On the Password Replication Policy tab, identify the PRP settings for the two groups: Allowed RODC Password Replication Group and Denied RODC Password Replication Group.
9. Click Add.
10. Select Allow Passwords For The Account To Replicate To This RODC and click OK.
11. In the Select Users, Computers, Or Groups dialog box, type **Branch Office Users** and click OK, and then click OK again.

### EXERCISE 3 Monitor Credential Caching

In this exercise, you simulate the logon of several users to the branch office server and evaluate the credentials caching of the server.

1. Log on to BRANCHSERVER as James Fine, and then log off.
2. Log on to BRANCHSERVER as Mike Danseglio, and then log off.

3. Log on to SERVER01 as Administrator and open the Active Directory Users And Computers snap-in.
4. Open the properties of BRANCHSERVER in the Domain Controllers OU.
5. On the Password Replication Policy tab, click Advanced.
6. On the Policy Usage tab, in the Display Users And Computers That Meet The Following Criteria drop-down list, select Accounts Whose Passwords Are Stored On This Read-Only Domain Controller.
7. Locate the entry for James Fine.  
Because you had configured the PRP to allow caching of credentials for users in the Branch Office Users group, James Fine's credentials were cached when he logged on in step 1. Mike Danseglio's credentials are not cached.
8. In the drop-down list, select Accounts That Have Been Authenticated To This Read-Only Domain Controller.
9. Locate the entries for James Fine and Mike Danseglio.
10. Click Close, and then click OK.

#### EXERCISE 4 Prepopulate Credentials Caching

In this exercise, you prepopulate the cache of the RODC with the credentials of a user.

1. Log on to SERVER01 as Administrator and open the Active Directory Users And Computers snap-in.
2. Open the properties of BRANCHSERVER in the Domain Controllers OU.
3. On the Password Replication Policy tab, click Advanced.
4. Click Prepopulate Passwords.
5. Type **Adam Carter** and click OK.
6. Click Yes to confirm that you want to send the credentials to the RODC. A dialog box informs you that the action was successful. Click OK.
7. On the Policy Usage tab, select Accounts Whose Passwords Are Stored On This Read-Only Domain Controller.
8. Locate the entry for Adam Carter.  
Adam's credentials are now cached on the RODC.
9. Click Close, and then click OK.

## Lesson Summary

- RODCs contain a read-only copy of the Active Directory database.
- An RODC replicates updates to the domain from a writable domain controller using inbound-only replication.

- Password replication policy defines whether the credentials of the user or computer are cached on an RODC. The Allowed RODC Password Replication Group and Denied RODC Password Replication Group are in the Allowed List and Denied List, respectively, in each new RODC. You can, therefore, use the two groups to manage a domain-wide password replication policy. You can further configure the individual PRP of each domain controller.
- An RODC can be supported by configuring administrator role separation to allow one or more users to perform administrative tasks without granting those users permissions to other domain controllers or to the domain. The DSMgmt command implements administrator role separation.
- An RODC requires a Windows Server 2008 or Windows Server 2008 R2 writable domain controller in the same domain. Additionally, the forest functional level must be at least Windows Server 2003, and the ADPrep /RODCPrep command must be run prior to installing the first RODC.

## Lesson Review

You can use the following questions to test your knowledge of the information in Lesson 3, “Configuring Read-Only Domain Controllers.” The questions are also available on the companion CD if you prefer to review them in electronic form.

### **NOTE ANSWERS**

**Answers to these questions and explanations of why each answer choice is right or wrong are located in the “Answers” section at the end of the book.**

1. Your domain consists of five domain controllers, one of which is running Windows Server 2008 R2. All other DCs are running Windows Server 2003. What must you do before installing a read-only domain controller?
  - A. Upgrade all domain controllers to Windows Server 2008.
  - B. Run ADPrep /RODCPrep.
  - C. Run DSMgmt.
  - D. Run DCPromo /unattend.
2. During a recent burglary at a branch office of Tailspin Toys, the branch office RODC was stolen. Where can you find out which users’ credentials were stored on the RODC?
  - A. The Policy Usage tab
  - B. The membership of the Allowed RODC Password Replication Group
  - C. The membership of the Denied RODC Password Replication Group
  - D. The Resultant Policy tab
3. Next week, five users are relocating to 1 of the 10 overseas branch offices of Litware, Inc. Each branch office contains an RODC. You want to ensure that when the users

log on for the first time in the branch office, they do not experience problems authenticating over the WAN link to the data center. Which steps should you perform? (Choose all that apply. Each correct answer is part of the solution.)

- A.** Add the five users to the Allowed RODC Password Replication Group.
- B.** Add the five users to the Password Replication Policy tab of the branch office RODC.
- C.** Add the five users to the Log On Locally security policy of the Default Domain Controllers Policy GPO.
- D.** Click Prepopulate Passwords.

## Lesson 4: Managing Service Accounts

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Services, like users, must log on. A service is configured with a user name and password of an account with which it logs on. The rights, permissions, and privileges assigned to the account allow the service to access the resources it requires. Because service account credentials are registered in the Service Control Manager (SCM) of a machine on which a service runs, managing and securing service accounts often requires that you make changes not only to Active Directory, but to the SCM of one or more machines as well.

In Lesson 1, you learned to use fine-grained password policies to configure password requirements for service accounts. Windows Server 2008 R2 introduces a new feature, *managed service accounts*, which reduces the burden of password management for service accounts.

**After this lesson, you will be able to:**

- Configure managed accounts.

**Estimated lesson time: 30 minutes**

### Understanding Managed Accounts

Services require access to resources, so they need rights, permissions, and privileges—at a minimum, the right to log on to a system. To be assigned access, a service must have an account—an identity with a user name and password—with which a system can authenticate the service when the service starts. The service is assigned the account in the SCM, which you manage by using the Services console in the Administrative Tools folder or one of several other tools, including the Sc.exe command and Windows PowerShell.

When a service runs on a single computer, an administrator can configure the service to run as Local Service, Network Service, or Local System. These three accounts are built in to Windows. They are simple to configure and use, but they are typically shared among multiple services and cannot be managed on a domain level.

You can centralize the management of service accounts by creating a domain account. After you create a domain account for a service, you can assign the account to the service on more than one system. For example, an enterprise backup service can be configured to run on multiple servers under a single domain account. You can create a unique account for each service to isolate the privileges for the services.

However, when you need to change the password of a domain service account, you must update the SCM on each computer on which the service is assigned the account. This management burden has led too many organizations to configure service accounts with non-expiring passwords, which is certainly not a security best practice. Other organizations have built or acquired custom scripts or tools to manage service account passwords in the enterprise.



Windows Server 2008 R2 reduces the management burden of service accounts with a new object class—the *managed service account*. The managed service account is a domain account that is associated with a service on a single computer, and one or more services on that computer can use the managed service account as a logon identity. The computer automatically changes the password of each managed service account on the computer, every 30 days by default.

Another burden associated with service accounts is the management of service principal names (SPNs). SPNs are a critical component of Kerberos authentication. Managed service accounts ensure that if the name of a computer is changed, SPNs associated with services running on the computer are changed in the domain. In addition, SPN management can be delegated to other administrators.

## Requirements for Managed Service Accounts

Managed service accounts require minimal changes to your domain. You must prepare your schema for managed service accounts. Run **adprep /forestprep** at the forest level, and then run **adprep /domainprep** in each domain where you want to use managed service accounts. For more information about ADPrep, see Chapter 10 and visit [http://technet.microsoft.com/en-us/library/cc731728\(Ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc731728(Ws.10).aspx).

You use Windows PowerShell to administer managed service accounts. Therefore, at least one domain controller must support administration of Active Directory with Windows PowerShell by running one of the following:

- Windows Server 2008 R2
- Windows Server 2008 with the Active Directory Management Gateway Service
- Windows Server 2003 R2 with the Active Directory Management Gateway Service
- Windows Server 2003 with the Active Directory Management Gateway Service

Other domain controllers can be running Windows Server 2003 or later. If the domain functional level is Windows Server 2008 R2, you can take advantage of automatic password management of managed service accounts and simplified SPN management. If the domain functional level is lower than Windows Server 2008 R2, automatic password management of managed service accounts is available, but SPNs must be managed manually.

To create and configure managed accounts in Active Directory, you must use Windows PowerShell on a computer running Windows 7 or Windows Server 2008 R2. In other words, your administrative workstation must be running Windows 7 or Windows Server 2008 R2. You must ensure that the Active Directory Module For Windows PowerShell is installed on the computer. You can install the feature by using the Add Features link in Server Manager if the computer is running Windows Server 2008 R2, or the Turn Windows Features On Or Off link in Control Panel if the computer is running Windows 7. In Remote Server Administration Tools, Role Administration Tools, AD DS And AD LDS Tools group, you will find the Active Directory Module For Windows PowerShell feature.

Finally, each computer that uses a managed account—any computer on which services are associated with managed accounts—must be running Windows Server 2008 R2 or Windows 7 and must have the Active Directory Module For Windows PowerShell installed. Earlier versions of Windows cannot assign a managed account to a service.

## Creating and Configuring a Managed Service Account

To create and configure managed service accounts in the domain, you use Windows PowerShell cmdlets. There is no UI support for correctly creating and configuring managed service accounts. The *New-ADServiceAccount* cmdlet creates a managed service account.

The following example creates a managed service account:

```
New-ADServiceAccount SRV_APP01 -Enabled $true -Path "CN=Managed Service Accounts,
DC=contoso,DC=com"
```

The *-Path* parameter specifies the Managed Service Accounts container—a new container in Active Directory. You can specify a custom container or OU. You can also use the *-ServicePrincipalNames* parameter to specify SPNs for the account.

The *sAMAccountName* attribute of the managed service account is the name specified by the *New-ADServiceAccount* cmdlet, followed by a dollar sign (\$). For example, the *sAMAccountName* of the managed service account created in the preceding example is *SRV\_APP01\$*.

### **NOTE USE AN ACCOUNT NAME OF FEWER THAN 15 CHARACTERS**

**When you create a managed service account, specify a short account name of fewer than 15 characters. The dollar sign suffix will lengthen the name; the resulting *sAMAccountName* must be 15 characters or less. Although you can create a managed service account with a longer name in Active Directory, you will be unable to install or use the managed account on a computer.**

To configure properties of the account, you can use the *Set-ADServiceAccount* cmdlet or the Attribute Editor tab of the Active Directory Users And Computers snap-in. The *Get-ADServiceAccount* cmdlet returns an object reference to a managed service account. To delete a managed service account, use the *Remove-ADServiceAccount* cmdlet.

## Installing and Using a Managed Service Account

The *Install-ADServiceAccount* cmdlet installs the managed service account on a computer so that you can assign the account to one or more services on the computer. For example, the following command installs the managed service account named *SRV\_APP01* on the local computer:

```
Install-ADServiceAccount -Identity SRV_APP01
```

After you have installed the managed service account, you can configure a service to use the account as its logon identity. In the Services console, open the properties of a service and click the Log On tab. Select This Account, then click Browse. Type the name of the managed service account, and then click OK. On the Log On tab, confirm that the name appears with a dollar sign (\$). The account will be given the Log On As Service right (*SeServiceLogonRight*).

If you move a service to another computer and you want to use the same managed service account on the target system, you must first use the *Uninstall-ADServiceAccount* cmdlet to remove the managed service account from the current computer. Then repeat the same procedures described in the previous example on the target computer: Use the *Install-ADServiceAccount* cmdlet and then configure the service to use the managed service account.

You must be a local administrator on the computer to install a managed service account and configure the logon identity of a service. You must also have rights to modify the managed service account in Active Directory to install or uninstall a managed service account on a computer.

## Managing Delegation and Passwords

You can delegate permissions to configure a managed service account in Active Directory. There is no cmdlet in Windows PowerShell to do so. You must use the DSACLs command, which was introduced in Chapter 2, “Administering Active Directory Domain Services.” The following command delegates to the user named *ServiceAdmin* the permissions needed to manage a service account named *SRV\_APP01*.

```
dsacls "CN=SRV_APP01,CN=Managed Service Accounts,DC=contoso,DC=com"
/G "CONTOSO\ServiceAdmin:SDRCLCRPLOCA" "CONTOSO\ServiceAdmin:WP;Logon Information"
"CONTOSO\ServiceAdmin:WP;Description" "CONTOSO\ServiceAdmin:WP;DisplayName"
"CONTOSO\ServiceAdmin:WP;Account Restrictions"
"CONTOSO\ServiceAdmin:WS;Validated write to DNS host name"
"CONTOSO\ServiceAdmin:WS;Validated write to service principal name"
```

A managed service account is a unique object class, *msDS-ManagedServiceAccount*, that inherits from the *computer* object class. Managed service accounts, like computers, do not observe domain or fine-grained password policies. Instead, like computers, a managed service account establishes a complex, cryptographically random, 240-character password and changes that password when the computer changes its password—every 30 days by default. A managed service account cannot be locked out and cannot perform interactive logons.

Under normal circumstances, you will not need to worry about changing the password of a managed service account; however, there may be scenarios in which you want to force a reset of the password. You can use the *Reset-ADServiceAccountPassword* cmdlet to do so.

## **MORE INFO** MANAGED SERVICE ACCOUNTS

The following articles provide additional details regarding managed service accounts: “Managed Service Accounts Frequently Asked Questions (FAQ)” at [http://technet.microsoft.com/en-us/library/ff641729\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/ff641729(WS.10).aspx), and “Service Accounts Step-by-Step Guide” at [http://technet.microsoft.com/en-us/library/dd548356\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/dd548356(WS.10).aspx).

## Limitations of Managed Service Accounts

Managed service accounts are an important new feature of Windows Server 2008 R2, but here are some important restrictions and caveats related to their use:

- A component must support managed service accounts. Generally speaking, services that you add to a computer, and that are listed in the Services console, can be configured to use a managed service account, as can IIS application pools. You cannot use managed service accounts for identities of applications or non-Windows services. Furthermore, a component must support managed service accounts, and not all services do. For example, Microsoft SQL Server does not support managed service accounts, despite vague and contradictory information in some online resources including Microsoft TechNet. This notable exception is true for versions of SQL Server up to SQL Server 2008 R2. This limitation might be removed in future versions of SQL Server.
- Each managed service account can be used on only one computer. Services on multiple computers cannot use a single managed service account. Therefore, you cannot use managed service accounts for load balanced and clustered services. For example, you should not use managed service accounts as identities for Microsoft SharePoint Server, because a SharePoint farm can be more than one computer. Similarly, a managed service account cannot be used for a service in a cluster, because a cluster contains more than one computer.
- A computer can have more than one managed service account. For example, if you have five services running on a computer, those five services can share a single managed service account or can use five separate managed service accounts.

## **PRACTICE** Managing Service Accounts

---

In this practice, you create a managed service account for an IIS application pool.

### **EXERCISE 1** Add the Internet Information Services Role

In this exercise, you add the Internet Information Services (IIS) role and verify that the default website is created.

1. Log on to SERVER01 as Administrator.
2. Open Server Manager.

3. In the Roles Summary section, click Add Roles.  
You might need to scroll down to see the Roles Summary section.
4. In the Add Roles Wizard, on the Before You Begin page, click Next.
5. On the Select Server Roles page, select the Web Server (IIS) check box, and then click Next.
6. On the Web Server (IIS) page, click Next.
7. On the Select Role Services page, click Next.
8. On the Confirm Installation Selections page, click Install.  
The Web Server (IIS) role and its default services are installed.
9. On the Installation Results page, click Close.
10. Open Internet Explorer.  
If the Set Up Windows Internet Explorer 8 dialog box opens, click Next. On the Turn On Suggested Sites page, click No, Don't Turn On, and then click Next. On the Choose Your Settings page, click Use Express Settings, and then click Finish.
11. Browse to <http://server01.contoso.com>.  
The IIS7 page opens. This is the default page of the default web application that is created when you install IIS. Leave Internet Explorer running.

## EXERCISE 2 Create a Managed Service Account

In this exercise, you create a managed service account.

1. Open the Active Directory Users And Computers snap-in. Click the View menu and ensure that the Advanced Features option is selected.
2. Expand contoso.com and click the Managed Service Accounts OU. Note that the OU is currently empty.
3. Open Active Directory Module For Windows PowerShell from the Administrative Tools program group.
4. Type the following command:

```
New-ADServiceAccount SRV_APP01 -Enabled $true -Path "CN=Managed Service Accounts,
DC=contoso,DC=com"
```

5. Type the following command:

```
Get-ADServiceAccount -Identity SRV_APP01
```

6. Type the following command:

```
Set-ADServiceAccount -Identity SRV_APP01 -Description "Application Pool 01
on SERVER01"
```

Question: What is the value of the *sAMAccountName* attribute for this account?

Answer: SRV\_APP01\$

7. Switch to Active Directory Users And Computers.
8. Click the Managed Service Accounts container and confirm that the SRV\_APP01 account exists.

You might have to refresh the view.

Question: What is displayed in the Type column for the account?

Answer: msDS-ManagedServiceAccount

9. Right-click SRV\_APP01 and choose Properties.
10. Observe the limited number of tabs in the Properties dialog box, and then close it.

### EXERCISE 3 Configure a Service to Use a Managed Service Account

In this exercise, you configure the default application pool of IIS to use the managed service account.

1. Switch to Active Directory Module For Windows PowerShell.
2. Type the following command:  

```
Install-ADServiceAccount -Identity SRV_APP01
```
3. Switch to Server Manager.
4. In the console tree, expand Roles, expand Web Server (IIS), and then click Internet Information Services (IIS) Manager.
5. In the Connections panel, expand SERVER01, and then click Application Pools.
6. In the Application Pools panel, right-click DefaultAppPool and choose Advanced Settings.
7. In the Advanced Settings dialog box, in the Process Model section, click Identity, and then click the browse button.  
The browse button is the button that appears next to the current identity. The button's label is an ellipsis (...).
8. In the Application Pool Identity dialog box, select Custom Account.
9. Click Set.
10. In the Set Credentials dialog box, type **CONTOSO\SRV\_APP01\$**.
11. Leave the Password and Confirm Password boxes blank.
12. Click OK to close each of the three open dialog boxes.
13. Right-click DefaultAppPool and choose Stop.
14. Switch to Internet Explorer and refresh the page, or browse back to *http://server01.contoso.com*.  
The Service Unavailable page appears. IIS cannot serve the page to the browser, because the application pool that hosts the web server process for the site is stopped.
15. Switch to Server Manager.
16. Right-click DefaultAppPool and choose Start.

17. Switch to Internet Explorer and refresh the page.  
The default IIS 7 page appears.
18. Open Task Manager.
19. On the Processes tab, click the User Name column to sort by the identity used by each process.
20. Locate the process that is running with the SRV\_APP01\$ identity.  
W3WP.exe is the worker process thread that is supporting the IIS site.

## Lesson Summary

- You can create a managed service account in Active Directory, install the account on a computer, and then configure a service running on the computer to use the managed service account as the logon identity for the service.
- You use Windows PowerShell to create, install, and configure managed service accounts.
- A computer automatically changes the password of managed service accounts installed on the computer.
- If the domain functional level is Windows Server 2008 R2, SPNs associated with the managed service account are automatically changed if the name of the computer is changed.

## Lesson Review

You can use the following questions to test your knowledge of the information in Lesson 4, "Managing Service Accounts." The questions are also available on the companion CD if you prefer to review them in electronic form.

### **NOTE ANSWERS**

**Answers to these questions and explanations of why each answer choice is right or wrong are located in the "Answers" section at the end of the book.**

1. You have been asked to create a new managed account and configure a service on SERVER02 to use the account. What tools must you use? (Choose all that apply. Each correct answer is part of the solution.)
  - A. Active Directory Users And Computers
  - B. Windows PowerShell
  - C. Regedit
  - D. Services.msc

- 2.** You have been asked to create the first managed account in your domain and configure a service on SERVER02 to use the account. SERVER02 is a member server running Windows Server 2003. The domain has a mix of Windows Server 2003 and Windows Server 2008 domain controllers. Which of the following statements are true? (Choose all that apply.)
- A.** You must upgrade SERVER02 to Windows Server 2008 R2.
  - B.** You must raise the domain functional level to Windows Server 2008 R2.
  - C.** You must upgrade the forest functional level to Windows Server 2008 R2.
  - D.** You must run `adprep /forestprep`.
  - E.** You must run `adprep /domainprep`.



## Chapter Review

---

To further practice and reinforce the skills you learned in this chapter, you can perform the following tasks:

- Review the chapter summary.
- Review the list of key terms introduced in this chapter.
- Complete the case scenarios. These scenarios set up real-world situations involving the topics of this chapter and ask you to create a solution.
- Complete the suggested practices.
- Take a practice test.

## Chapter Summary

---

- Windows Server 2008 R2 allows you to specify password and account lockout settings for the entire domain by modifying the Default Domain Policy GPO. You can then use fine-grained password and lockout policies contained in password settings objects (PSOs) to configure specific policies for groups or individual users.
- When a domain user logs on to a computer in a domain, the computer generates a logon event, and the domain generates an account logon event. These events can be audited to monitor authentication activity. By default, Windows Server 2008 R2 audits successful account logon and logon events.
- Read-only domain controllers (RODCs) provide valuable support for branch office scenarios by authenticating users in the branch office. RODCs reduce the security risk associated with placing a domain controller in a less secure site. You can configure which credentials an RODC will cache. You can also delegate administration of the RODC without granting permissions to other domain controllers or to the domain.
- A managed service account can be used as the logon identity for a service running on a computer. The computer automatically changes the password of the managed service account.

## Key Terms

---

Use these key terms to understand better the concepts covered in this chapter.

- managed service account
- password replication policy (PRP)
- password settings object (PSO)
- read-only domain controller (RODC)
- resultant PSO

## Case Scenarios

---

In the following case scenarios, you apply what you've learned about fine-grained password policies and RODCs. You can find answers to these questions in the "Answers" section at the end of this book.

### Case Scenario 1: Increasing the Security of Administrative Accounts

You are an administrator at Contoso, Ltd., which recently won a contract to deliver an important and secret new product. The contract requires that you increase the security of your Active Directory domain. You must ensure that accounts used by domain administrators are at least 25 characters long and are changed every 30 days. You believe it would not be reasonable to enforce such strict requirements on all users, so you wish to limit the scope of the new password requirements to only domain administrators. Additionally, your contract requires that you monitor attempts by potential intruders to gain access to the network by using an administrative account.

1. Your domain currently contains four Windows Server 2003 domain controllers and eight Windows Server 2008 domain controllers. What must you do before you can implement fine-grained password policies that meet the requirements of the new contract?
2. Which tool do you use to configure fine-grained password and lockout policies?
3. You return from a vacation and discover that other administrators have created several new PSOs with precedence values ranging from 10 through 50. You want to ensure that the PSO you created for domain administrators has the highest precedence so that it always takes effect for those users. What value should you assign to the precedence of your PSO?
4. How should you configure the domain to monitor attempts by potential intruders to gain access to the network by using an administrative account? Which GPO should you modify? Which settings should you define?

### Case Scenario 2: Increasing the Security and Reliability of Branch Office Authentication

You are an administrator at Contoso, Ltd. You maintain the domain's directory service on four domain controllers at a data center in your main site. The domain controllers run Windows Server 2003. Contoso has decided to open a new office overseas. Initially, the office will have 10 salespeople. You are concerned about the speed, expense, and reliability of the connection from the branch office to the data center, so you decide to place a read-only domain controller in the branch office.

1. What must you do to your existing domain controllers and to functional levels before you can install an RODC?

2. Because of customs regulations, you decide to ask one of the employees in the branch office to purchase a server locally. Can you allow the employee to create an RODC without giving the user domain administrative credentials?
3. You want the same user to be able to log on to the RODC to perform regular maintenance. Which command should you use to configure administrator role separation?

## Suggested Practices

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To help you successfully master the exam objectives presented in this chapter, complete the following tasks.

### Configure Multiple Password Settings Objects

In this practice, you experience the effects of PSO precedence by creating several PSOs that apply to a single user and evaluating the resultant PSO for that user.

To perform this practice, create the following objects in the contoso.com domain:

- A global security group named **Human Resources**
- A global security group named **Secure Users**
- A user account named **James Fine** that is a member of both the Human Resources and Secure Users groups
- **Practice 1** Create a PSO named **PSO1** that is linked to the Human Resources group. Give *PSO1* a precedence value of 10. You can use any valid settings for the other attributes of the PSO. Create a second PSO named **PSO2** and give it a precedence value of 5. You can use any valid settings for the other attributes of the PSO. Use the steps in Exercise 2, “Create a Password Settings Object,” of Lesson 1 as a reference if necessary.
- **Practice 2** Identify the PSO that affects James Fine. Use the steps in Exercise 3, “Identify the Resultant PSO for a User,” of Lesson 1 as a guide to evaluating resultant PSOs. Which PSO applies to James Fine?
- **Practice 3** Create a PSO named **PSO3** that is linked to James Fine’s user account. Give *PSO3* a precedence value of 20. You can use any valid settings for the other attributes of the PSO. Use the steps in Exercise 2 of Lesson 1 as a reference if needed. Use the steps in Exercise 3 of Lesson 1 as a guide to evaluating resultant PSO. Identify the PSO that affects James Fine.

### Recover from a Stolen Read-Only Domain Controller

In this practice, you learn how to recover if an RODC is stolen or compromised, by simulating the loss of the server named BRANCHSERVER. To perform this practice, you must have completed the practice in Lesson 3, “Configuring Read-Only Domain Controllers.”

When an RODC is stolen or compromised, any user credentials that had been cached on the RODC should be considered suspect and should be reset. Therefore, you must identify the credentials that had been cached on the RODC and reset the passwords of each account.

- **Practice 1** Determine the user and computer accounts that had been cached on BRANCHSERVER by examining the Policy Usage tab of the BRANCHSERVER Advanced Password Replication Policy dialog box. Use the steps in Exercise 3, “Monitor Credential Caching,” of Lesson 3 if you require reminders for how to identify accounts whose passwords were stored on the RODC. Export the list to a file on your desktop.
- **Practice 2** Open the Active Directory Users And Computers snap-in and, in the Domain Controllers OU, select BRANCHSERVER. Press Delete and click Yes. Examine the options you have for automatically resetting user and computer passwords.

## Take a Practice Test

---

The practice tests on this book’s companion CD offer many options. For example, you can test yourself on just one exam objective, or you can test yourself on all the 70-640 certification exam content. You can set up the test so that it closely simulates the experience of taking a certification exam, or you can set it up in study mode so that you can look at the correct answers and explanations after you answer each question.

### **MORE INFO PRACTICE TESTS**

For details about all the practice test options available, see the “How to Use the Practice Tests” section in this book’s Introduction.



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