

ArcGIS® 9

ArcSDE® Database Servers Tutorial



Copyright © 2004–2008 ESRI
All rights reserved.
Printed in the United States of America.

The information contained in this document is the exclusive property of ESRI. This work is protected under United States copyright law and other international copyright treaties and conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or by any information storage or retrieval system, except as expressly permitted in writing by ESRI. All requests should be sent to Attention: Contracts Manager, ESRI, 380 New York Street, Redlands, CA 92373-8100, USA.

The information contained in this document is subject to change without notice.

DATA CREDITS

Creating and adding geodatabases exercise data: National Transportation Atlas, U. S. Bureau Transportation Statistics, National Atlas of the United States and the United States Geological Survey

Adding data exercise data: United States Geological Survey (USGS) - Geographic Names Information System, Smithsonian Institution, Global Volcanism Program, National Atlas of the United States and the United States Geological Survey

CONTRIBUTING WRITERS

Kimberly Peter

U.S. GOVERNMENT RESTRICTED/LIMITED RIGHTS

Any software, documentation, and/or data delivered hereunder is subject to the terms of the License Agreement. In no event shall the U.S. Government acquire greater than RESTRICTED/LIMITED RIGHTS. At a minimum, use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in FAR §52.227-14 Alternates I, II, and III (JUN 1987); FAR §52.227-19 (JUN 1987) and/or FAR §12.211/12.212 (Commercial Technical Data/Computer Software); and DFARS §252.227-7015 (NOV 1995) (Technical Data) and/or DFARS §227.7202 (Computer Software), as applicable. Contractor/Manufacturer is ESRI, 380 New York Street, Redlands, CA 92373-8100, USA.

ESRI, ArcView, the ESRI globe logo, ArcGIS, ArcMap, ArcCatalog, ArcEditor, ArcInfo, the ArcGIS logo, Geography Network, ArcSDE, SDE, Spatial Database Engine, GIS by ESRI, and www.esri.com are trademarks, registered trademarks, or service marks of ESRI in the United States, the European Community, or certain other jurisdictions.

Other companies and products mentioned herein are trademarks or registered trademarks of their respective trademark owners.

ArcSDE Database Servers Tutorial

IN THIS TUTORIAL:

- **Exercise 1: Adding and connecting to a database server**
- **Exercise 2: Adding users**
- **Exercise 3: Creating and adding geodatabases**
- **Exercise 4: Administering user permissions**
- **Exercise 5: Adding data**
- **Exercise 6: Administering database servers and geodatabases**

ArcSDE database servers are used to store, access, and administer ArcSDE Personal and Workgroup geodatabases.

ArcSDE Personal geodatabases can be created with ArcGIS Desktop at the ArcEditor or ArcInfo license levels. ArcSDE Workgroup geodatabases are licensed with ArcGIS Server Workgroup Edition. Both provide you with ArcSDE geodatabase functionality, such as versioned editing, archiving, and replication. They differ from ArcSDE Enterprise geodatabases in maximum size, number of connections, administration, and customization.

Database servers are instances of SQL Server 2005 Express with Advanced Services. The SQL Server Express installation is included on the ArcGIS Desktop and ArcGIS Server Workgroup install media.

To get you started using ArcSDE database servers, this tutorial will:

- Show you how to add a database server and connect to it.
- Demonstrate how to add users and administer their permissions.
- Show you how to create geodatabases and add data to them.
- Illustrate how to accomplish various maintenance tasks.

You will need two to four hours of focused time to complete the tutorial. However, the tutorial is designed so you can perform the exercises one at a time if you want.

Exercise 1: Adding and connecting to a database server

For this tutorial, you will need to install ArcGIS Desktop (ArcEditor or ArcInfo license level) and SQL Server 2005 Express, enabled to use ArcSDE Personal geodatabases, on your PC. You most likely already have ArcGIS Desktop installed, but if not, please follow the installation instructions provided with ArcGIS to complete this. You will also need to install an instance of SQL Server Express enabled for ArcSDE Personal geodatabases with which to work. This instance is your database server. If you need to install this, please follow the instructions in the ArcSDE Personal installation guide included with the Desktop media.

If you are not the person who installed SQL Server Express on your PC and enabled ArcSDE Personal, be sure the user who did has added you to the database server as an ArcSDE database server administrator so you can perform the tasks in this tutorial.

Start ArcCatalog

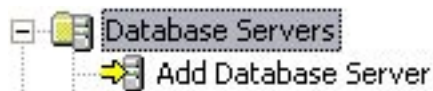
You connect to and administer ArcSDE database servers from ArcCatalog. Therefore, before you can complete the tasks in the next two exercises, you must start ArcCatalog.

1. Click the Start button on the Windows task bar.
2. Point to Programs.
3. Point to ArcGIS.
4. Click ArcCatalog. The ArcCatalog window appears.

Add a database server

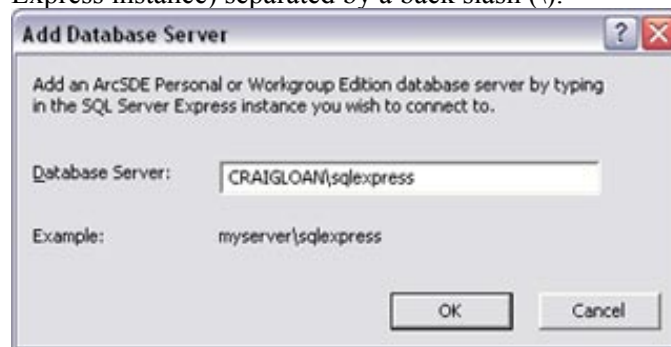
On the left of the ArcCatalog window, you see the Catalog tree. One of the folders in the Catalog tree is called

Database Servers. Double-click the Database Servers folder to open it.



To add your database server to the Catalog tree:

1. Double-click Add Database Server.
2. In the Add Database Server dialog box, type the server name (the name of the computer on which the SQL Server Express instance resides) and the name of the database server (the name of the SQL Server Express instance) separated by a back slash (\).



3. Click OK.

After you add your database server to the Catalog tree, you will notice a database server icon with the name of your database server was added to the Database Servers folder.

(If the icon did not appear, try refreshing the Catalog tree by pressing F5 on your keyboard.)

Disconnect from a database server

To disconnect from a database server, right-click the database server and click Disconnect.

When you are not connected to a database server, there will be a red X on the database server icon.



Connect to a database server

To reconnect to the database server, either double-click it or right-click it and click Connect.

When the connection is established, the red X will disappear from the database server icon.

Exercise 2: Adding users

Database servers use Windows-authenticated users and groups. This means to add more users to your database server, the users or groups must exist on your network or the machine where SQL Server Express is installed. In most cases, the users you want to add will already be on the network. However, for this exercise, we will add users to your computer then to the database server.

The ArcSDE database server administrator

The ArcSDE database server administrator is responsible for maintaining the database server, creating and maintaining geodatabases, and adding and administering other database server user accounts.

Users who are Windows administrators on the computer where SQL Server Express is installed are automatically database server administrators (except on Windows Vista operating systems). Therefore, if you installed SQL Server Express on your PC, it means you are a Windows administrator on your computer and you are automatically the database server administrator. You will notice, though, your user name will not appear in the database server Permission dialog box.

Conversely, if someone else performed the installation for you or you installed on Windows Vista, your login will have been added to the database server during installation. In that case, you will be able to see your user name in the database server Permissions dialog box.

To see this, start ArcCatalog if you closed it after the last exercise. In the Catalog tree, right-click the database server, and click Permissions.



Depending on whether or not your login was added during installation, you will find your user name in the Database Server Users list.

Close the Permissions dialog box by clicking Cancel then minimize ArcCatalog.

Adding users to the computer

In many cases, you will have other users accessing the database server. To do so, these users must be added to the database server. For this exercise, you will first add the logins to your computer.

1. Click the Start button on the Windows task bar.
2. Open Computer Management from administrative tools.
3. Expand Local Users and Groups in the System Tools.
4. Right-click the Users folder and click New User.
5. Type Leon in the User name field.

6. Type Leon in the Password field, and type it again in the Confirm password field.
7. Uncheck User must change password at next logon.

8. Click Create. The fields will clear but the dialog box will remain open.
9. Type Tess in the User name field.
10. Type Tess in the Password and Confirm password fields.
11. Uncheck User must change password at next logon.
12. Click Create and click Close.

You now have two new users on your computer: Leon and Tess. Next, you will add these users to your database server.

If Leon and Tess were going to perform the same type of tasks and have the same privileges in the geodatabases on the database server, you could set up a Windows group and

add them to it. However, for this tutorial, Leon and Tess will have different privileges, so you will just use their Windows logins.

Adding users to the database server

Now that you have created Windows logins for two new users, you can add them to the database server.

1. Restore ArcCatalog.
2. In the Catalog tree, right-click the database server and click Permissions.
3. Click Add User.
4. Type Leon in the Enter the object name to select field.
5. Click Check Names. Leon prefaced by your computer name should appear in the field.

If this were a network user, the name would be prefaced with the name of the network.

6. Click OK
7. Leon should appear in the Database Server Users list.
8. Repeat steps 3 through 6, but this time add Tess.

In Exercise 4, you will alter the users' permissions. For now, you can click OK and close the Permissions dialog box.

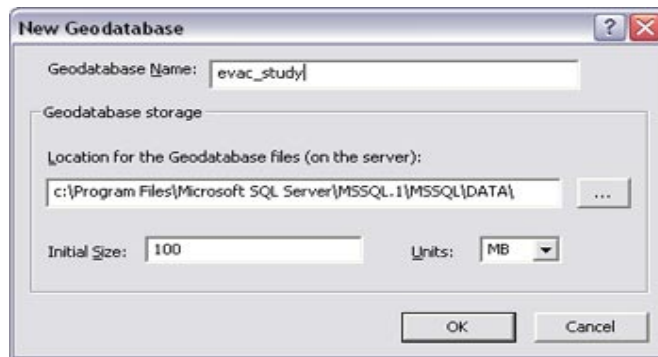
Exercise 3: Creating and adding geodatabases

The database server administrator creates the geodatabases on the database server. He or she can also attach existing geodatabases to the database server.

In this exercise, you will create a new geodatabase called `evac_study` on your database server. You will also attach an existing `traffic_study` geodatabase.

Creating a new geodatabase

1. Start ArcCatalog.
2. Connect to the database server by double-clicking it in the Catalog tree.
3. Right-click the database server, and click New Geodatabase.
4. Type `evac_study` in the Geodatabase name field.
5. In the Geodatabase storage section of the New Geodatabase dialog box, you can specify the location where the new geodatabase will be stored by typing the path in the Geodatabase file field or browsing to the location. In this case, you will use the default location.



6. You can specify the initial size of the geodatabase in megabytes (MB) or gigabytes (GB). For this geodatabase, use the default size of 100 MB.
7. Click OK.

The New Geodatabase popup dialog will appear indicating the new geodatabase is being created.



When it closes, you will see the `evac_study` geodatabase listed under the database server in the ArcCatalog tree.

At present, the `evac_study` geodatabase does not contain any data. You will add data to it in Exercise 5.

Attaching an existing geodatabase

A convenient way to move data between groups is to detach the geodatabase from one database server and attach it to another. For example, a subcontractor might create GIS data that needs to be given to the contractor for additional processing.

Detaching a geodatabase removes all reference to the geodatabase from the database server. Attaching a geodatabase registers the SQL Server data files with the ArcSDE database server instance.

Note: Only an ArcSDE database server administrator can detach or attach a geodatabase.

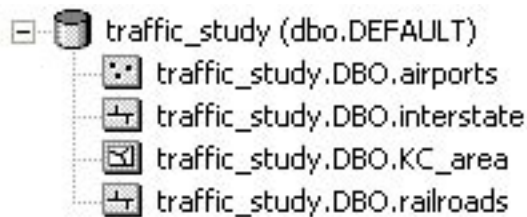
A geodatabase called `traffic_study` was installed on your hard drive when you installed the tutorial data. This geodatabase contains some of the data you might use to create a network dataset and perform a traffic analysis of the Kansas City area. You will attach the `traffic_study` geodatabase to your database server.

1. In the Catalog tree, right-click the database server.
2. Click Attach.
3. In the Attach Geodatabase dialog box, click the ellipsis button (...).
4. Browse to the `C:\ArcGIS\ArcTutor\DatabaseServers` folder, select the `traffic_study.mdf` file, and click OK.
5. The Geodatabase name field is populated automatically with the geodatabase name—`traffic_study`.
6. Click OK.

The `traffic_study` geodatabase should now be listed under the database server in the Catalog tree.

As indicated, this geodatabase already contains data. You can view the contents of the geodatabase by expanding it.

The geodatabase should contain four feature classes: `interstate`, `airports`, `railroads`, and `KC_area`.



Exercise 4: Administering user permissions

User permissions can be set at the database server level, at the geodatabase level, and at the dataset level.

You were using the database server level Permission dialog box when you added Leon and Tess in Exercise 2. From here, the database server administrator can add and remove users and grant Server administrator privileges.

Since neither Tess nor Leon will be database server administrators, no permissions were assigned to them when they were added. Now that there are geodatabases on the database server, though, you can administer Tess and Leon's geodatabase-level permissions.

When permissions are granted at the geodatabase level, they apply to the entire geodatabase. For instance, if you grant read/write geodatabase permissions to a user, that user will have read/write access to all data in that geodatabase.

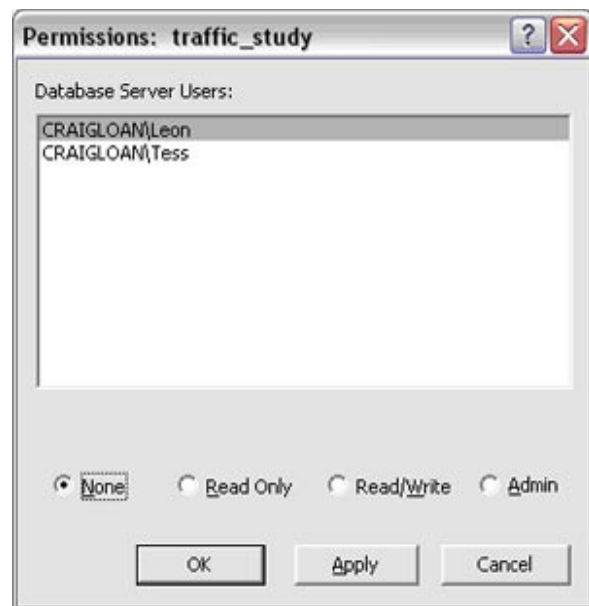
Default geodatabase permissions

When you created the evac_study and added the traffic_study geodatabases to the database server in the last exercise, the database server users were automatically added as users to these two geodatabases. To see this:

1. Right-click the traffic_study geodatabase, point to Administration, and click Permissions. This opens the geodatabase-level Permissions dialog box.

In the Database Server Users list, you will see the logins you added to the database server in Exercise 2.

2. Select the user Leon. By default, new users who are not database server administrators have geodatabase-wide permissions of None.



Types of geodatabase permissions

At the bottom of the geodatabase Permissions dialog box, you can see the different types of geodatabase-wide permissions available.

None indicates the user has no specific permissions on the geodatabase. If a user with a permission of None logs into the database server, he or she can see the geodatabase but is not able to perform any actions on the geodatabase.

When a user with Read Only permission logs into the database server, he or she is able to see the geodatabase and the data stored in it. This user can query the database and

use the data in ArcMap but cannot edit the data.

Users granted Read/Write geodatabase-wide permissions not only can view and query the data, they also can edit all data in the geodatabase

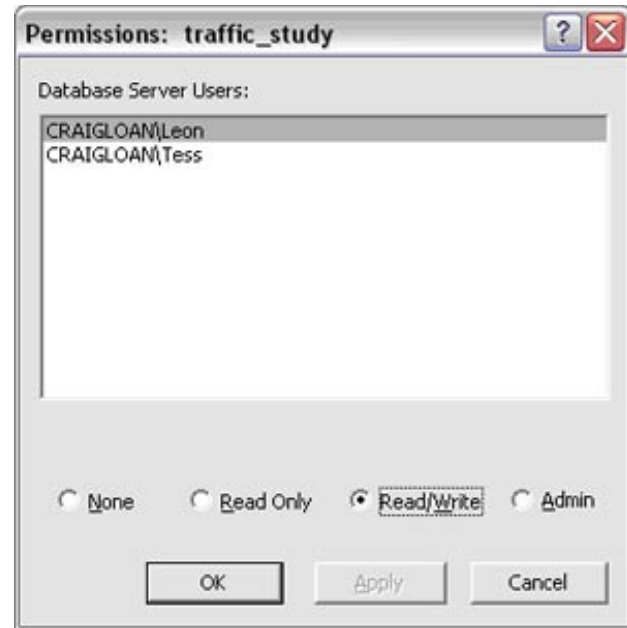
When a user is granted Admin privileges on a geodatabase, that user has read/write privileges plus he or she is able to perform geodatabase maintenance tasks, such as database compression and rebuilding indexes on that geodatabase only. A geodatabase Admin user can also administer the rights of existing users on that geodatabase.

The user's Admin privileges apply only to the geodatabase on which they are granted. The user does not have database server-level administrative privileges and, therefore, cannot perform database server-level administrative tasks, such as adding users or attaching, detaching, restoring, or creating a geodatabase.

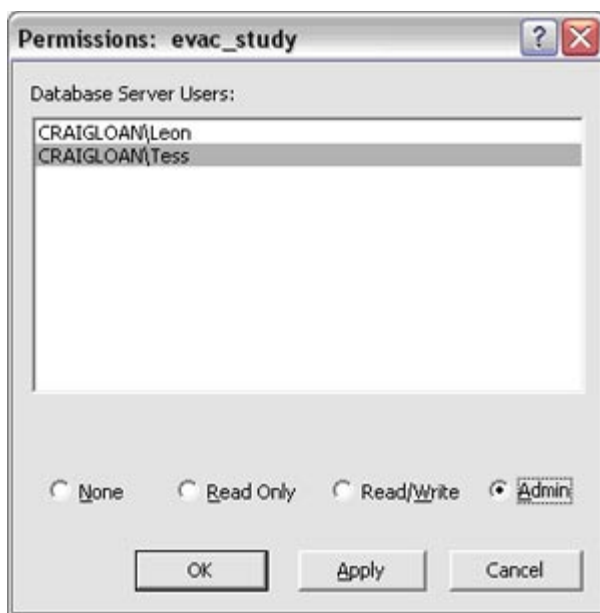
Granting geodatabase-wide permissions

Leon needs to be able to edit all the data in the traffic_study and evac_study geodatabases. Initially, Tess will be administering the evac_study geodatabase, but will only view the data on the traffic_study geodatabase. As database server administrator, you will grant the proper permissions to each user.

1. Right-click the traffic_study geodatabase, point to Administration, and click Permissions.
2. Select Leon from the Database Server Users list and click Read/Write.



3. Select Tess in the Database Server Users list and click Read Only.
4. Click OK.
5. Right-click the evac_study geodatabase, point to Administration, and click Permissions.
6. Select Leon from the Database Server Users list and click Read/Write.
7. Select Tess from the Database Server Users list and click Admin.



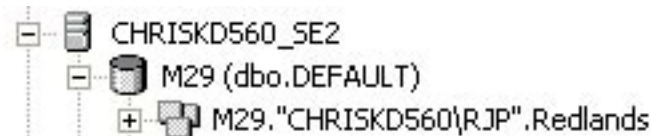
8. Click OK.

Dataset permissions

Datasets, such as tables, feature classes, and raster datasets, are owned (are stored in the database schema of) the user who creates them. The schema name is incorporated into the name of the dataset in ArcCatalog, as shown below:



Database server administrators use the DBO schema, so data they create show DBO in the dataset name. Other users' schemas correspond to their user names. Here, user RJP owns the feature dataset Redlands.



Only the owner of a dataset can alter other user's permissions on that dataset. In the preceding example, RJP is the only one who can alter user permissions on feature dataset Redlands. In the previous example, the database server administrator can alter permissions on the feature classes parks and schools.

You will see a demonstration of dataset-level permissions and user schemas in the next section.

Types of dataset permissions

There are three types of permission that can be granted on a dataset: None, Read Only, and Read/Write.

Once you altered Leon and Tess's geodatabase-wide permissions on the traffic_study geodatabase, those permissions applied to the datasets in that geodatabase. For example, Leon was granted read/write geodatabase-wide permissions on the traffic_study geodatabase so he has read/write access to all data in traffic_study. You cannot alter his dataset-level permissions for any data in this geodatabase because he already has the highest level of permission possible. To see this:

1. Expand the traffic_study geodatabase.
2. Right-click the KC_area feature class and click Permissions. This opens the dataset-level Permissions

dialog box.

3. Select Leon from the Database Server Users list.

You will see all the permission options are inactive and a note saying the user has higher-level permissions is displayed.

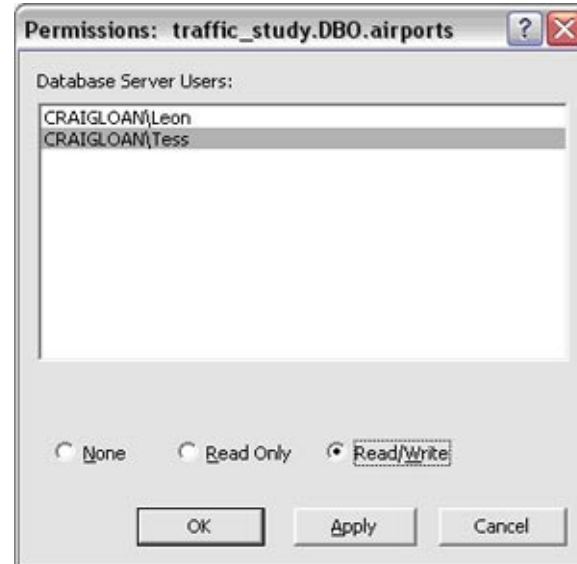


Altering dataset permissions

Tess has Read Only geodatabase-wide permissions on the traffic_study geodatabase. Therefore, her dataset-level permissions are also Read Only. Since there is a higher level of permission that can be granted (Read/Write), you can alter her permissions on individual datasets.

Since all the datasets in the traffic_study geodatabase are owned by DBO, you can change Tess' permissions on any of the feature classes in that geodatabase. To do so:

1. Expand the traffic_study geodatabase.
2. Right-click the airports feature class and click Permissions. This opens the dataset-level Permissions dialog box.
3. Select Tess from the Database Server Users list.
4. Click Read/Write.



5. Click OK.

Tess now has read/write access to the airports feature class. Her permissions on the other datasets in the traffic_study geodatabase remain read only.

In the next exercise, you will add data to the evac_study geodatabase as DBO and another user. Once data is present, you can administer Tess and Leon's dataset-level permissions on that geodatabase as well.

Exercise 5: Adding data

As you have seen, when you create a new geodatabase, there is no data in it. You must add data to new geodatabases by either creating new datasets, importing data, or copying data from another geodatabase and pasting it into your new geodatabase.

In this exercise, you will import data from legacy data formats (shapefiles and personal geodatabases) and copy data from a file geodatabase and paste it into your new geodatabase.

Importing data

You will create a feature dataset in your `evac_study` geodatabase then populate it by importing data.

First, create a feature dataset in the DBO schema. Next, import data from a personal geodatabase to the feature dataset.

1. In ArcCatalog, right-click the `evac_study` geodatabase, point to New, and click Feature Dataset.
2. Type `pop_centers` in the Name field and click Next.
3. You will import the geographic coordinate system of the data to be imported to the feature dataset, so click Import.
4. Browse to the `buildings.mdb` file in the ArcTutor folder on your hard drive.
`C:\ArcGIS\ArcTutor\DatabaseServers\buildings.mdb`.
5. Click the `hospitals` feature class and click Add, then click Next.
6. Make sure None is selected on the Vertical coordinate system screen and click Next.

7. Accept the default settings and click Finish.
8. There should now be a feature dataset in your `evac_study` geodatabase. Right-click this feature dataset in the Catalog tree, point to import, and click Feature Class (multiple).
9. Click the open folder button and browse to the `buildings.mdb` personal geodatabase.
10. While holding down the Shift key, click the first feature class in the geodatabase (`churches`) and the last feature class in the geodatabase (`schools`) and click Add.
11. Click OK.

The Feature Class to Geodatabase (multiple) popup dialog box will appear indicating the feature classes are being imported. A message will appear in the message box on this popup dialog box when the import has completed successfully. When this message appears, click Close.

Importing data as a Read/Write user

To see how data is stored for different users, you will start ArcCatalog as Leon and import a feature class from a shapefile.

Starting ArcCatalog as Leon

1. Click the Start button on the Windows task bar.
2. Point to All Programs, point to ArcGIS, right-click ArcCatalog, and click Run as.
3. In the Run As dialog box, click The following user:.
4. Click in the User name field, delete the user name but keep the computer name.

5. Type Leon after the back slash (\).
6. Type Leon in the Password field. The screen should now look like this:



7. Click OK.
8. When the ArcCatalog window opens, you will need to add the ArcSDE database server because Leon has not added it to his Catalog yet. For instructions on how to do this, refer back to Exercise 1.

Importing a feature class

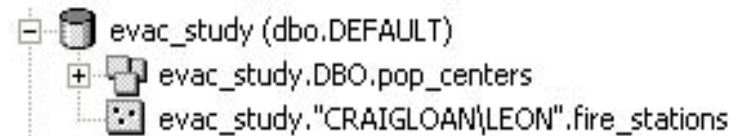
1. Expand the database server in the Catalog tree.
2. Right-click the evac_study geodatabase, point to import, and click Feature Class (single).
3. Browse to the DatabaseServers folder in the ArcTutor directory. For example:

C:\ArcGIS\ArcTutor\DatabaseServers

4. Click the fire_stations.shp file and click Add.
5. Type fire_stations in the Output Feature Class field. You will import all the attributes of the shapefile with the same names, so there is no need to create an expression or a field map.
6. Click OK.

A popup message box will appear to indicate the progress of the import. When the message box indicates the import was successful, click Close.

You now have a feature class named fire_stations in your evac_study geodatabase. Notice that the full name of the feature class includes Leon's user name.



Close ArcCatalog and restart it as yourself. (Click Start > All Programs > ArcGIS > ArcCatalog.)

In the Catalog tree, right-click the fire_stations feature class in the evac_study geodatabase. Notice that the Permissions menu item is not available. Since you don't own the fire_stations feature class, you can't alter user permissions on it.

Copying data from another source

Instead of using the import tool, you could copy and paste data from one geodatabase to another.

1. In ArcCatalog, navigate to the DatabaseServers folder in the ArcTutor directory.

C:\ArcGIS\ArcTutor\DatabaseServers

2. Expand the file geodatabase hazards.gdb.
3. Open the natural dataset and examine which feature classes are present.
4. Right-click the natural dataset and click Copy.
5. Right-click your evac_study geodatabase and click Paste.
5. A Data Transfer dialog box will appear. Be sure all the feature classes in the natural feature dataset are present and click OK.
6. Now copy the haz_waste feature class. Right-click the haz_waste feature class in the hazards.gdb and click Copy.
7. Right-click your evac_study geodatabase and click Paste.

Your evac_study geodatabase should now contain a fire_station and a haz_waste feature class.

Exercise 6: Administering database servers and geodatabases

There are a number of administrative tasks that you will perform on a database server and ArcSDE Personal or Workgroup geodatabases. Some of these tasks were explained in previous exercises. This exercise will cover the other administrative tasks done by a database server administrator or a geodatabase administrator

Tasks that are performed only by a database server administrator include:

- Stopping, pausing, resuming, or starting a database server
- Adding new geodatabases (covered in Exercise 3)
- Adding users to the database server and administering database server permissions (covered in Exercise 2)
- Detaching a geodatabase from a database server
- Attaching a geodatabase to a database server (covered in Exercise 3)
- Restoring a geodatabase to a database server

Tasks that either a database server administrator or a geodatabase administrator can perform include:

- Creating a database back up
- Compressing a geodatabase
- Updating geodatabase statistics
- Updating indexes on a geodatabase
- Shrinking a geodatabase
- Administering user geodatabase and dataset permissions (covered in Exercise 4)

Stopping/starting and pausing/resuming a database server

A database server is a SQL Server Express instance. You can stop the instance, which will disconnect any users currently connected to the database server and prevent new connections from being made, and then you can restart the instance, which will allow users to reconnect to the database server. You can also pause a database server. This allows current connections to remain, but prevents new connections from being made. You would resume a database server that has been paused.

Note: You must be a Windows Administrator to start/stop or pause/resume a SQL Server Express instance.

Before you can make any changes to the state of the database server, you must disconnect from it.

- Right-click the database server and click Disconnect.

To stop the database server:

- Right-click the database server and click Stop. If any connected user tries to do anything on the database server or if another user tries to connect at this time, he or she will receive an error message.

To restart a stopped database server:

- Right-click the database server and click Start.

To pause a database server:

- Right-click the database server and click Pause. Users already connected will be able to continue working with whichever geodatabases they had been working. Users trying to make a new connection to the database server,

including accessing another geodatabase on the database server, will receive an error message.

To resume a paused database server:

- Right-click the database server and click Resume.

Compressing a geodatabase

After making a number of versions and versioned edits to a geodatabase, you will need to compress it to remove unneeded states.

The traffic_study geodatabase includes a number of version states that need to be removed.

1. Right-click the traffic_study geodatabase, point to Administration, and click Compress Database.
2. When the Confirm Compress popup message appears, click Yes.

To see when a compress operation was last run on the geodatabase, right-click the geodatabase and click Properties. On the Administration tab, the date of the last compress operation and the status of the geodatabase are listed under the Compress section.

Updating database statistics

After loading the feature classes to the evac_study geodatabase and after compressing the traffic_study geodatabase, you should update the database statistics so the SQL Server optimizer can respond to queries in the most efficient manner possible.

1. Right-click the evac_study geodatabase, point to Administration, and click Geodatabase Maintenance.
2. Click Analyze and click OK.



3. Repeat steps 1 and 2, this time on the traffic_study geodatabase.

Updating indexes

Indexes can become less efficient after a large number of changes are made to a database.

Update the indexes of the evac_study geodatabase.

1. Right-click the evac_study geodatabase, point to Administration, and click Geodatabase Maintenance.
2. Click Rebuild all indexes and click OK.

Detaching a geodatabase

To transfer data, you can detach the geodatabase from one database server and attach it to another. Detaching a geodatabase removes all reference to the geodatabase from the database server; it does not delete the geodatabase. The

geodatabase files (the .mdf and .ldf files) still exist in the location where they were created.

Only an ArcSDE database server administrator can detach a geodatabase from a database server.

To detach the traffic_study geodatabase, right-click it, point to Administration, and click Detach. When the Confirm Detach popup message appears, click Yes.

Note: Since a detach operation is a logical not physical separation of the geodatabase from the database server, the geodatabase files can be found in the location in which the geodatabase was created.

If you forget the location of the geodatabase on disk, you can check the Geodatabase Properties dialog box before you detach it. The path to the geodatabase is shown in the Location field on the Administration tab.

Creating geodatabase backup files and restoring geodatabases

Geodatabase backup files can be created by either a geodatabase administrator or a database server administrator. However, to restore a geodatabase, you must be a database server administrator. This is because restoring a geodatabase adds a geodatabase to the database server, similar to creating a new geodatabase or attaching a geodatabase.

Geodatabase backups should be created after changes are made in the geodatabase. That way, if the geodatabase gets corrupted or accidentally deleted, you won't lose all your edits.

To demonstrate that a geodatabase administrator can make a geodatabase backup, open ArcCatalog as Tess and make a backup of your evac_study geodatabase.

1. Click the Start button, point to Programs, then point to ArcGIS, right-click ArcCatalog, and click Run as.
2. Click The following user.
3. In the User name field, delete the user name and type Tess.
4. Type Tess in the Password field and click OK.
This will connect you to ArcCatalog as the user Tess, who, as you will recall, is a geodatabase administrator on the evac_study geodatabase.
5. Since this is the first time you've connected as Tess, you'll need to add the database server to the Catalog tree. See exercise 1 for steps on how to do this.
6. In the Catalog tree, right-click the evac_study geodatabase, point to Administration, and click Backup.
7. Type evacbu1 in the Backup name field.
8. You could back up the geodatabase to the default location but, instead, back up the geodatabase to your tutorial folder, DBSTutorial. Type the path to your DBSTutorial folder in the Backup to folder field. For example, type c:\DBSTutorial and click OK.
9. In the description field, type first backup of evac_study geodatabase.
- 10 Click OK.

This has created an image of the geodatabase and its contents as they were at the time of the backup. If subsequent edits are made to the geodatabase, another backup file should be made.

To see when the last backup image was created, you can check the geodatabase properties. Right-click the geodatabase, click Properties, and open the Administration

tab. The date the last backup file was created is shown in the Backup section.

The backup images that are created are full copies of the database. When you run subsequent backups, you can create a new backup file or overwrite the old one.

As mentioned, only a database server administrator can restore a geodatabase, so close ArcCatalog and restart it as you normally would (logged in as yourself).

1. Click Start, point to Programs, point to ArcGIS, and click ArcCatalog.
2. In the Catalog tree, right-click the database server, and click Restore.
3. Click the ellipse button next to the Backup file field to browse to the location of the backup file Tess created, \DBSTutorial\evacbu1.bak, and click OK.
4. The Restore to folder will be populated automatically with the location from which the geodatabase backup file was created. You will restore to the same place.
5. The name of the Geodatabase to restore will also be populated automatically.

Note: You cannot rename the geodatabase when you restore it, so the Geodatabase to restore field is not updatable.

6. Click OK.

Shrinking a geodatabase

There will not be too many circumstances for which you will need to shrink a geodatabase. There are even instances when doing so may be detrimental because a shrink operation can increase index fragmentation in the geodatabase.

However, it is possible that as data is deleted and added to the geodatabase, the data files within it may break into increasingly smaller, scattered fragments, causing performance degradation.

If you find yourself getting close to the size limit of your geodatabase, you could shrink the geodatabase and possibly gain some extra storage space. Shrinking the geodatabase rearranges how the database is stored on disk, reducing the size of the data files. To shrink the evac_study geodatabase:

1. Right-click the evac_study geodatabase, point to Administration, and click Geodatabase Maintenance.
2. Click Shrink geodatabase and click OK.

Note: If you find that the geodatabase size increases to its preshrunk state shortly after you shrink it, that means the space that you shrunk is required for regular operations and the shrink operation was not needed.

To see the size of the geodatabase, check the Administration tab of the Geodatabase Properties dialog box. The current geodatabase size is shown in the General section.

Upgrading a geodatabase

When you install a new release of ArcGIS Desktop, you may want to upgrade your existing geodatabases. If you have installed the direct connect drivers for your Desktop client that allow you to connect to earlier releases of the geodatabase, you do not have to upgrade to access the data in older geodatabases; however, you may want to upgrade the geodatabase to take advantage of the latest geodatabase functionality.

Note: You must be a Server administrator or geodatabase administrator to upgrade a geodatabase.

To simulate an upgrade, you need to attach an older geodatabase. Follow the attach instructions from Exercise 3. This time, however, you will attach the geodatabase OLD.

Once you have attached OLD, you will upgrade it.

1. Double-click the OLD geodatabase. If you do not have the direct connect drivers necessary to connect to a 9.2 geodatabase, a dialog box will open asking you to upgrade the ArcSDE system tables. Click Yes on this dialog box to proceed. If you have the 9.2 direct connect drivers, you do not have to complete this step.
2. Right-click the OLD geodatabase and click Properties.
3. On the General tab, click Upgrade Geodatabase. After the geodatabase is upgraded to match the ArcGIS Desktop release, the Upgrade Geodatabase button will become inactive.
4. Click OK to close the Database Properties dialog box.
5. Right-click the database server and click Disconnect. To reconnect, double-click the database server.

Note: If you have the drivers that allow your client to connect to an older geodatabase, you do not have to upgrade the geodatabase. However, if you do not upgrade the geodatabase, you will not be able to utilize new functionality introduced at the current release of ArcGIS.