Database Servers Tutorial

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A quick tour of the database servers tutorial

Within ArcGIS software, the term database servers refers to instances of Microsoft SQL Server Express that have been enabled to store geodatabases.

You create geodatabases and perform other administrative tasks for database servers through the Database Servers node in the Catalog window or ArcCatalog. Performing the administration of the database server and its geodatabases through ArcGIS Desktop means there is no extra software or database administration expertise required for you to create and use these types of ArcSDE geodatabases.

To get started using database servers, this tutorial will show you how to use ArcGIS Desktop to do the following:

- Add a database server and create new geodatabases.
- Add users to the database server and grant permissions.
- Load data into the geodatabases.
- Make edits to data in a geodatabase on a database server.
- Perform administrative tasks, such as making a backup of and upgrading a geodatabase.

Getting started

To complete the tasks in this tutorial, you must install ArcGIS Desktop, Microsoft SQL Server Express, and the tutorial data. You must also create additional logins on your computer to complete some of the tasks.

Software installation

For this tutorial, you must install ArcGIS Desktop (ArcEditor or ArcInfo license level), SQL Server Express, and the ArcTutor data for this tutorial on your computer. Use the ArcSDE for SQL Server Express Installation wizard provided on the ArcGIS Desktop installation media to install an instance of SQL Server Express and enable it to create ArcSDE geodatabases. To complete the installation, follow the instructions in the ArcSDE for SQL Server Express installation guide, which is also included with the ArcGIS Desktop media.

You most likely already have ArcGIS Desktop installed, but if not, follow the instructions in the ArcGIS Desktop installation guide to complete this. If the ArcTutor data has not been installed, you need to install it using the ArcTutor executable provided on the ArcGIS Desktop media.

As with all software installations on Windows operating systems, you must be an administrator on the computer to install SQL Server Express, ArcGIS Desktop, and the tutorial data. If you do not have administrative rights to the computer you are going to use for this tutorial, have your systems administrator install the software. Be sure the system administrator adds your login to the database server as an ArcSDE database server administrator when he or she enables the SQL Server Express instance to store geodatabases.

The ArcSDE database server administrator is responsible for maintaining the database server, creating and maintaining geodatabases, and adding and administering their database server user accounts. This tutorial shows you how to perform these tasks; therefore, without database server administrator permissions, you could not complete this tutorial.

Additional logins

Database servers exclusively use Windows-authenticated logins for authentication. This tutorial requires three Windows logins: your login and two others.

If you are an administrator on your computer, you can create local Windows logins and use those. If you are not an administrator, have your systems administrator either add two users to your computer or provide you with two network logins to use.

You will use these logins to learn how to do the following:

- Add other users to your database server and grant them permission to the geodatabase and the data it holds.

- Assess what the different levels of permission allow or prevent users from doing so you can decide what sort of permissions you should grant to other users.

- Use the database server and its contents as a nonadministrative user. Therefore, if you connect to a colleague's database server on which you have restricted permission, you will know how to use it.

The creation of additional logins will be explained in Exercise 4: Add users and administer their permissions. You will use the two additional logins in Exercise 5 Make nonversioned edits as a ReadWrite user, Exercise 7: Connect as a geodatabase administrator, and Exercise 8: Make versioned edits as a ReadWrite user.

Exercise 1: Add a database server to the Catalog tree and create a geodatabase

Once you have all of the software and tutorial data installed, connect to the database server and create a geodatabase.

You connect to and administer database servers from the Catalog tree. Therefore, open ArcMap and open a Catalog window.

Starting ArcMap and opening the Catalog window

Steps:

1. Start ArcMap by clicking **Start** > **All Programs** > **ArcGIS** > **ArcMap 10.**
2. Click **Blank Map** under **New Maps** on the *ArcMap - Getting Started* dialog box and click **OK**.
3. Click the **Catalog Window** button ⬚ on the Standard toolbar.

The *Catalog* window opens.

Adding a database server

One of the folders in the Catalog tree is called Database Servers. This is where you add a connection to the database server.

Steps:

1. Expand the Database Servers node in the Catalog tree.
2. Double-click **Add Database Server**.
3. On the *Add Database Server* dialog box, provide the name of the ArcSDE database server. This is in the form <server_name>\<instance_name>, where the server name is the name of the server on which SQL Server Express is installed and the instance name is the name of the SQL Server Express instance.
   For example, if a database server is named SOPHIE\SQLEXPRESS, SOPHIE is the server name and SQLEXPRESS is the instance name.

   If you are unsure of the name to use, contact the administrator of the database server for this information.
4. Click **OK**.

A new database server connection appears under the Database Servers node of the Catalog tree.

Creating a geodatabase

The database server administrator creates the geodatabases on the database server. Since you are the database server administrator, you will create a geodatabase. Name the geodatabase Osokopf.

Steps:

1. In the Catalog tree, right-click the database server on which you want to create a new geodatabase.

2. Click **New Geodatabase**.

3. Type `Osokopf` in the **Geodatabase name** text box.
    The name must begin with a letter, cannot contain spaces or special characters (such as #, @, or *), and have a maximum length of 31 characters when combined with your server name.

4. If you want to change the database file location, specify the new location in the **Geodatabase file** text box by clicking the ellipsis button (...) and browsing to the location.

    The location you use to store the geodatabase file must be on the same computer as the SQL Server Express instance. In this case, use the default location.

5. You can specify the initial size of the geodatabase in megabytes (MB) or gigabytes (GB). For this geodatabase, change the initial size by typing `30` in the **Initial Size** text box and choosing MB from the **Units** drop-down menu.
    When determining the initial size of the database, you should take into account the size of the data you plan to load into it and the amount of editing you anticipate doing. If you make the initial size too small, the database will grow to accommodate the data. However, increasing the database file size uses extra resources, which could slow down database performance. If you make it too large, you needlessly use up storage space on your computer. Since you will only be loading a small amount of data and doing a few edits for this tutorial, 30 MB will suffice.

6. Click **OK**.

A progress bar is displayed while the database file and geodatabase schema are created. When complete, the new geodatabase appears in the Catalog tree.

💡 **Tip:** If you get an error message indicating the server library could not be loaded, you need to confirm that the correct SQL Server instance was enabled to store geodatabases when the SQL Server Express instance was set up.

You logged in to the computer where ArcGIS Desktop is installed using a login that is a server administrator in the database server. In the Catalog window in ArcMap, you added a connection to the database server and created a geodatabase on the database server. You will load data into this geodatabase in the next exercise, Exercise 2: Load data into a geodatabase and update statistics.

Exercise 2: Load data into a geodatabase and update statistics

When you create a geodatabase, as you did in Exercise 1: Add a database server to the Catalog tree and create a geodatabase, there is no data in it. You must add data to new geodatabases either by creating new datasets, importing data, or copying data from one geodatabase and pasting it into another.

In this exercise, you will create a feature dataset, then import data from a personal geodatabase to populate it. You will also copy data from a file geodatabase and paste it into your new geodatabase. After the data is loaded, you will update the database statistics.

You are currently a server administrator in the database server you are using for these exercises. Observe that data you create when you are logged in as a server administrator is owned by dbo.

The dbo group in SQL Server is basically equivalent to a sysadmin user, which confers the highest level of control over the SQL Server instance and its contents.

Being part of the dbo group also means that all the data you create is stored in the dbo schema in the database. As a result, all users who connect as a database server administrator own and can modify the data in the dbo schema. Keep this in mind when deciding to grant server-level administrative access to other logins.

Creating a feature dataset

First, create an empty feature dataset to store data.

Steps:

1. In the Catalog tree, right-click the Osokopf geodatabase, point to **New**, then click **Feature Dataset**.

2. Type `parks` in the **Name** text box.

3. Click **Next**.

4. The geographic coordinate system of your feature dataset must match that of the data you are going to import. For that reason, import the coordinate system from the source data. To do this, click **Import** on the second dialog box.

5. Browse to the community.mdb file in the ArcTutor DatabaseServers folder on your hard drive. The default location for the ArcTutor data is C:\ArcGIS\ArcTutor\DatabaseServers. If the ArcTutor data was installed or copied to a different location, navigate there.
   If you do not have a connection to the ArcTutor directory in your Catalog tree, click the **Connect To Folder** button in the Catalog window, browse to the DatabaseServers folder in the ArcTutor folder, and click **OK**.

6. Click the park_areas feature class and click **Add**.
   This adds the coordinate system to your feature dataset.

7. Click **Next**.

8. Make sure **None** is selected for the vertical coordinate system and click **Next**.

9. Accept the default tolerance settings and click **Finish**.
    There is now a feature dataset named parks in your Osokopf geodatabase.

Adding data to a feature dataset

You will now add data to the parks feature dataset.

Steps:

1. Right-click the parks feature dataset in the Catalog tree, point to **Import**, then click **Feature Class (multiple)**.

2. Click the open folder button and browse to the community.mdb personal geodatabase. The community geodatabase was installed with the tutorial data; therefore, browse to the location where you installed the database server tutorial data.

3. While holding down the SHIFT key, click the first feature class in the geodatabase (park_areas) and the last feature class in the geodatabase (water_bodies).

4. Click **Add**.

    All the feature classes are now listed in the **Input Features** list on the *Feature Class To Geodatabase (multiple)* tool.

5. Click **OK**.

6. A progress bar appears at the bottom of the ArcMap interface. When the tool finishes running, a pop-up appears in the lower right corner of your screen. Click it to open the Results window and confirm the tool ran successfully.

The parks feature dataset should now contain the feature classes park_areas, trees, and water_bodies.

Copying data from another geodatabase

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

Steps:

1. In the Catalog window, navigate to the DatabaseServers folder in the ArcTutor directory.
    C:\ArcGIS\ArcTutor\DatabaseServers

2. Expand the file geodatabase areas.gdb.

3. Open the boundaries feature dataset and examine which feature classes are present.

4. Right-click the boundaries feature dataset and click **Copy**.

5. Right-click the Osokopf geodatabase and click **Paste**.
    The *Data Transfer* dialog box appears.

6. Be sure all the feature classes in the boundaries feature dataset are present in the *Data Transfer* dialog box and click **OK**.

Your Osokopf geodatabase now contains the boundaries and parks feature datasets.

Updating database statistics

After changes are made in the geodatabase, database statistics should be updated to ensure the query optimizer has the most up-to-date statistics. You should update database statistics after new data is loaded or a large number of edits are made to existing datasets.

Database statistics can be updated by either the geodatabase administrator or the database server administrator. Since you are already logged in as the database server administrator, you can update the statistics.

Steps:

1. Right-click the Osokopf geodatabase, point to **Administration**, then click **Geodatabase Maintenance**.

2. Choose **Analyze** to update the database statistics and click **OK**.

You have added data to your geodatabase by creating a feature dataset and importing feature classes to it and by copying a feature dataset from another geodatabase. You then updated the statistics in the geodatabase to reflect the existence of this new data.

Exercise 3: Attach, create a backup of, and upgrade a geodatabase

It is possible to move geodatabases by detaching them from one database server, copying them to a new location, and attaching them to a different database server. This could be useful for such things as delivering data to a consultant or client; setting up a new database server on a new computer and moving your geodatabases; or moving data through different stages of a project, with each stage being completed by a different person or department in your organization.

For this exercise, assume a consultant has done the initial data creation for you and has sent you the database file so you can attach it to your database server and edit it. In this case, the consultant used an older release of ArcGIS to create the geodatabase. Therefore, after you attach the geodatabase, you will make a backup of it, then upgrade it.

Attaching an existing geodatabase

You will attach a geodatabase, buildings, to your database server. This geodatabase contains data for different types of buildings on Osokopf Island.

There are two different versions of the buildings geodatabase: one for SQL Server 2005 Express and one for SQL Server 2008 Express. Be sure to attach the correct version of the geodatabase to your instance of SQL Server Express.

Steps:

1. Start ArcMap, open the Catalog window, then expand the Database Servers node in the Catalog tree.

2. In the Catalog tree, right-click the database server and click **Attach**.

3. In the *Attach Geodatabase* dialog box, click the ellipsis button (...).

4. Browse to the DatabaseServers tutorial folder (C:\ArcGIS\ArcTutor\DatabaseServers).

5. Choose the database file.
    - If you are using SQL Server 2005 Express, choose buildings05.mdf and click **OK**.
    - If you are using SQL Server 2008 Express, choose buildings08.mdf and click **OK**.

6. Click **OK** on the *Attach Geodatabase* dialog box.

The buildings geodatabase is now listed under the database server in the Catalog tree.

As indicated, the buildings geodatabase already contains data. However, this geodatabase is an older release. Therefore, before you work with the data, create a backup of the geodatabase, then upgrade it.

Making a backup of the new geodatabase

Before you upgrade the geodatabase or make any edits to it, you should create a backup of it. That way, if you decide you need the geodatabase back in its original state, you will have a backup file.

Steps:

1. In the *Catalog* window, right-click the buildings geodatabase, point to **Administration**, then click **Backup**.

2. Type `buildings_bu1` in the **Backup name** text box.

3. You could back up the geodatabase to the default location but, instead, back up the geodatabase to your tutorial folder, DatabaseServers. Type the path in the **Backup to folder** text box.
   For example, type `c:\ArcGIS\ArcTutor\DatabaseServers`.

4. In the **Description** text box, type `Initial state of buildings geodatabase`.

5. Click **OK**.

This has created an image of the geodatabase and its contents as they were at the time of the backup. 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.

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. Or if erroneous edits are made, you can go back to the state of the data as it existed at the last backup.

Upgrading the buildings geodatabase

This geodatabase was created with ArcGIS Desktop 9.3.1. If you are performing this tutorial using an ArcGIS Desktop 9.3 or 9.3.1 client, you do not have to upgrade.

If you are connecting with an ArcGIS Desktop 10 or later release client, perform the following steps:

Steps:

1. Right-click the buildings geodatabase in the *Catalog* window and click **Properties**.

2. Click the **General** tab of the *Geodatabase Properties* dialog box.

3. Click the **Upgrade Geodatabase** button to open the Geodatabase Upgrade geoprocessing tool.

   The **Input geodatabase** text box is automatically populated with the geodatabase connection information.

4. Leave both the **Perform Pre-requisite check** and **Upgrade geodatabase** options checked.

5. Click **OK** to start the upgrade.
   The progress window opens. Messages are displayed as the tool performs the checks and the upgrade. If the upgrade fails, review these messages to discover why. A log file is also created in the system TEMP directory. The file is GDBUpgrade<n>.log. The <n> indicates the unique ID of the upgrade operation.

6. When the upgrade completes successfully, close the dialog box.
   Notice that the description under the **Upgrade Status** section of the **General** tab has changed, and the **Upgrade Geodatabase** button is inactive.

Tip: If the status information does not update, close the ***Geodatabase Properties*** dialog box and reopen it.

7. Click **OK** to close the ***Geodatabase Properties*** dialog box.

You have attached a geodatabase to the database server, made a backup copy of it, and upgraded it to the current release. Now you can add users to the database server and grant them permissions.

Exercise 4: Add users and administer their permissions

Your login was added to the database server when it was created in preparation for completing this tutorial.

Often, other users will need to access the database server. To do so, the logins for these users must be added to the database server. Before you can do this, the Windows logins must exist on the computer or the network. Therefore, in this exercise, you will first add the logins to your computer, then add them to the database server.

Complexity:
Beginner
Data Requirement:
ArcGIS Tutorial Data Setup
Goal:
Create Windows logins, add them to the database server, then assign them permissions in the geodatabase and on specific datasets.

> **Note:** As indicated in A quick tour of the database servers tutorial, if you do not have administrative privileges on the computer, you must get your systems administrator to create the users for you.

Adding users to the computer

Users are added through the Windows Computer Management console.

You will create two logins: editor1 and manager1.

Steps:

1. Click the **Start** button on the Windows task bar.
2. Open the Windows Control Panel.
3. From the Control Panel, open the Computer Management console.
4. Expand **Local Users and Groups** in the System Tools.
5. Right-click the Users folder and click **New User.**
6. Type `editor1` in the **User name** text box.
7. Type `editor.1` in both the **Password** and **Confirm password** text boxes.
8. Uncheck **User must change password at next logon**.
9. Click **Create**.
   The text boxes are cleared, but the dialog box remains open.
10. Type `manager1` in the **User name** text box.
11. Type `manager.1` in both the **Password** and **Confirm password** text boxes.
12. Uncheck **User must change password at next logon**.
13. Click **Create** and click **Close**.

You now have two new users on your computer: editor1 and manager1. Next, you will add these users to your database server.

💡 **Tip:**

If both users 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, editor1 and manager1 will have different privileges, so you will just use the 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. Use the database server-level Permissions dialog box to do this.

From the database server-level Permissions dialog box, the database server administrator can add and remove users and grant server administrator privileges. Since neither editor1 nor manager1 will be database server administrators, no permissions will be assigned to them in this set of steps.

Steps:

1. Restore ArcMap.

2. In the *Catalog* window, right-click the database server and click **Permissions**.

3. Click **Add User**.

4. Type editor1 in the **Enter the object name to select** text box.

5. Click **Check Names**.
   Editor1 prefaced by your computer name appears in the field. (If this were a network user, the name would be prefaced with the name of the network.)

6. Click **OK**.

   Editor1 appears in the **Database Server Users** list.

7. Repeat steps 3 through 6 to add manager1 to the database server.

8. Click **OK** to apply your changes and close the *Permissions* dialog box.

Default geodatabase permissions

When you added the editor1 and manager1 users to the database server, both were added to the Osokopf and buildings geodatabases. You can see this by opening the geodatabase-level Permissions dialog box.

Steps:

1. Right-click the buildings geodatabase, point to **Administration**, then click **Permissions**.
   This opens the geodatabase-level *Permissions* dialog box. In the **Database Server Users** list, you will see the logins you just added to the database server.

2. Choose the user editor1.
   Notice that the option **None** is chosen for editor1. This is the default geodatabase-wide permission for new users who are not database server administrators.

   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.

As you can see on the geodatabase *Permissions* dialog box, the other geodatabase-wide permissions available are **Read Only**, **Read/Write**, and **Admin**.

Granting geodatabase-wide permissions

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 (unless the user is granted read/write permissions on specific datasets. Dataset permissions are discussed in the next section).

Users granted read/write geodatabase-wide permissions cannot only view and query the data but can also edit all data in the geodatabase.

When a user is granted administrative 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. A geodatabase administrator can also administer the rights of existing users on that geodatabase.

The user's 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.

Editor1 needs to be able to edit all the data in the buildings and Osokopf geodatabases. Manager1 will be administering the buildings geodatabase but will only view the data in the Osokopf geodatabase. As database server administrator, you will grant the proper permissions to each user.

Steps:

1. Right-click the Osokopf geodatabase, point to **Administration**, then click **Permissions**.

2. Choose editor1 from the **Database Server Users** list, click **Read/Write**, then click **Apply**. This adds editor1 to a role that has read/write permission to the geodatabase. Since this is applied at the geodatabase level, editor 1 now has read/write access to all the data in the Osokopf geodatabase.

3. Choose manager1 from the **Database Server Users** list and click **Admin**. This adds manager1 to a role in the geodatabase that has administrator (db_owner) permissions in the database.

4. Click **OK** to apply the changes and close the *Permissions* dialog box for the Osokopf geodatabase.

5. Right-click the buildings geodatabase, point to **Administration**, then click **Permissions**.

6. Choose editor1 from the **Database Server Users** list, click **Read/Write**, then click **Apply**. Editor1 now also has read/write permissions to all data in the buildings geodatabase.

7. Choose manager1 in the **Database Server Users** list and click **Read Only**. This adds manager1 to a role in the geodatabase that can only view and select all the data in the buildings geodatabase.

8. Click **OK** to apply the changes and close the *Permissions* dialog box for the buildings geodatabase.

Altering dataset permissions

There are three types of permission that can be granted on a dataset: None, Read Only, and Read/Write. Only the owner of a dataset can alter other users' permissions on that dataset.

You can tell who owns a dataset based on the schema name that appears in the fully qualified name of the table, feature class, feature dataset, raster catalog, raster dataset, or mosaic dataset. The schema name of the user who creates the dataset is incorporated into the name of the dataset and enclosed in quotes. For example, if a user with the domain account universe\ghila creates a table (contacts) in the geodatabase proj_work, the fully qualified name of the table is proj_work."universe\ghila".contacts.

Database server administrators use the dbo schema, so data they create has dbo in the dataset name. Any user who is a member of dbo (in other words, any user who is a database server administrator) is considered owner of the datasets in the dbo schema.

When you altered the geodatabase-wide permissions for editor1 and manager1 in the buildings geodatabase, those permissions applied to the datasets in that geodatabase. For example, editor1 was granted read/write geodatabase-wide permissions on the buildings geodatabase so has read/write access to all data in that geodatabase. You cannot alter editor1's dataset-level permissions for any data in this geodatabase because he or she already has the highest level of permission possible. To see this, follow these steps:

Steps:

1. Expand the buildings geodatabase.

2. Right-click the gov_bldgs feature class and click **Permissions**.
   This opens the dataset-level **Permissions** dialog box.

3. Choose editor1 from the **Database Server Users** list.
   All the permission options are inactive, and a note states the user has higher-level permissions.

Manager1 has Read Only geodatabase-wide permissions on the buildings geodatabase. Therefore, manager1 has Read Only dataset-level permissions to all the data. To see this, choose manager1 from the **Database Server Users** list.

Since there is a higher level of permission that can be granted (Read/Write), you can alter manager1's permissions on individual datasets in the buildings geodatabase.

Since all the datasets currently present in the buildings geodatabase are owned by dbo, you can change user permissions on any of the datasets in that geodatabase. To do so, follow these steps:

Steps:

1. Right-click the government feature class and click **Permissions**.

2. Choose manager1 from the **Database Server Users** list.

3. Click **Read/Write**.

4. Click **OK**.

Manager1 now has read/write access to the gov_bldgs feature class. Permissions on the other datasets in the buildings geodatabase remain read only.

To confirm this, do the following:

Steps:

1. Right-click the utilities feature class and click **Permissions**.

2. Choose manager1 from the **Database Server Users** list.
   Notice that manager1 still has read-only permission on this feature class.

3. Click **OK** to close the dataset Permissions dialog box.

Making a backup of your changes

Now that you have added users and altered permissions, create a backup of both the buildings and Osokopf geodatabases. Follow the instructions in exercise 3 to create the backup files in the same location as the first buildings backup, but change the names and descriptions of the backup files.

For example, a second backup of the buildings geodatabase could be called buildings_bu2 and have a description of "Users added and permissions granted." The Osokopf backup could be called osokopf_bu1.

You created Windows logins, added them to a database server, and granted them permissions on two geodatabases. You also altered one of the user's permissions to a dataset. Now the users can edit the data.

Exercise 5: Make nonversioned edits as a read/write user

To see how users with nonadministrative permissions can use the data, you will log in as editor1, import a feature class from a shapefile, then edit a feature class in ArcMap.

Complexity:
Beginner
Data Requirement:
ArcGIS Tutorial Data Setup
Goal:
Log in as a user with read/write permissions in the geodatabase and edit nonversioned data.

Logging in as editor1

Since database servers authenticate users based on the current Windows login, log off the computer and log back in as editor1.

Steps:

1. Click the **Start** button on the Windows task bar and click **Log off**.

2. If prompted, confirm you want to log off by clicking **Log Off** on the *Log Off Windows* dialog box.

3. When the login dialog box appears, change the user name to editor1.

4. Type editor.1 in the **Password** text box.

5. Choose your computer name from the **Log on to** drop-down list and click **OK**.
    You are now logged in to the computer as editor1.

6. Start ArcMap, open the Catalog window, then expand the Database Servers node in the Catalog tree.

7. You must add the ArcSDE database server because editor1 has not added it to his Catalog yet. For instructions on how to do this, refer to Exercise 1: Add a database server to the Catalog tree and create a geodatabase.

Importing data as editor1

Import the streets shapefile to the Osokopf geodatabase.

Steps:

1. Double-click the database server in the Catalog tree to connect to it.

2. Right-click the Osokopf geodatabase, point to **Import**, then click **Feature Class (single)**.

3. Since editor1 has not yet created a folder connection to the tutorial data, create a new connection to the tutorial data under **Folder Connections**.

4. For **Input Features**, browse to the DatabaseServers tutorial directory.

5. Choose osokopf_streets.shp and click **Add**.

6. Type streets in the **Output Feature Class** text box.

7. Click **OK** to run the tool.
    The progress of the tool appears at the bottom of ArcMap. When the feature class has been imported, a pop-up appears in the lower right corner of your screen. You can click it to open messages that were output from the tool.

The Osokopf geodatabase now contains two feature datasets, parks and boundaries, owned by dbo, and the streets stand-alone feature class, owned by editor1.

Making edits to a nonversioned dataset

You will edit the schools feature class. Since you will only be making one small change, which can be completed in a short amount of time, you can use nonversioned editing.

When you make nonversioned edits, the dataset is locked for the duration of your edit session, and the changes you make are committed directly to the database as soon as they are saved.

Setting the edit session for nonversioned editing

First, you must set up ArcMap to perform nonversioned edits.

Steps:

1. Expand the Osokopf geodatabase in the Catalog window.

2. Click the park_areas feature dataset in the Catalog window and drag it into the ArcMap table of contents.

3. Expand the buildings geodatabase in the Catalog tree.

4. Click the schools feature class and drag it into the ArcMap table of contents.

5. If the Editor toolbar is not already open, add it by clicking **Customize** on the Main menu, pointing to **Toolbars**, then clicking **Editor**.

6. Click **Editor** on the Editor toolbar and click **Options** on the drop-down list.
   This opens the *Editing Options* dialog box.

7. Click the **Versioning** tab.

8. Uncheck **Edit a version of the database with the ability to undo and redo** and click **OK**.
   This sets the edit type for this session to allow you to edit nonversioned datasets.

Making and saving the edits

A new school is to be built in Olafville at the northeast corner of Wspolnoty and Sunray. This is across the street from Wspolnoty Park.

First, you will make sure you can select features in the parks feature dataset, then find Wspolnoty Park.

Steps:

1. Click the **List By Selection** button in the table of contents.

2. Be sure park_areas is listed under the **Selectable** heading. If it is not, click the **Click to toggle selectable** icon next to the park_areas layer to make it selectable.

3. Click **Selection** on the Main menu and click **Select By Attributes**.

4. Choose **park_areas** from the **Layer** drop-down menu.

5. Double-click **park_name** to add it to the WHERE clause of the SELECT statement.

6. Click the equals sign (=) to add it to the SELECT statement.

7. Click **Get Unique Values** to get a list of names.

8. Double-click **Wspolnoty Park** in the values list to add it to the SELECT statement.

> 💡 **Tip:** You might need to scroll down the unique values list to find Wspolnoty Park.

9. Click **OK** to make the selection and close the *Select By Attributes* dialog box. Wspolnoty Park is now highlighted on the map.

   If you cannot find the selected park, right-click the parks layer in the table of contents and click **Zoom To Selected Features**. This will zoom all the way in to the park. Click the **Fixed Zoom Out** button on the ArcMap Main toolbar until you can see the area to the east of the park, on the other side of Sunray St.

10. Click **Editor** on the Editor toolbar and click **Start editing** to begin an edit session. Because the schools layer is not listed in the *Create Features* window, the *Start Editing* dialog box opens so you can choose the data source to edit.

11. Choose **schools** for the data source and click **OK**.

12. If the schools layer is not listed in the *Create Features* window, click the **Organize Templates** button.
    The *Organize Feature Templates* dialog box opens.

13. Click **Schools** in the **Layers** list and click **New Template**.
    The **Create New Templates** wizard opens.

14. Be sure the schools layer is checked and click **Finish**.

15. Click **Close** on the *Organize Feature Templates* dialog box

16. Click schools in the list of layers to edit.

17. Click **Rectangle** in the *Construction Tools* window.

18. Draw a rectangle in the area across the street from Wspolnoty Park.
    Normally, you would be more precise when adding features to your GIS. For the purposes of this tutorial, however, just draw a rectangle that fits within the four cross streets.

19. Double-click to complete the rectangle.

20. Click the **Attributes** button on the Editor toolbar.
    The attributes for the new school open.

21. Type `Wspolnoty` in the **Name** row.

22. Click the field next to **School type** and choose **Elementary (K-5)** from the drop-down list.

23. Click **Editor** on the Editor toolbar and click **Stop Editing**.

24. When prompted, click **Yes** to save your edits.

You logged in as a user with read/write permission in the geodatabase, imported a feature class, and edited a feature class in a nonversioned edit session.

Exercise 6: Restore a geodatabase

As a result of soil studies in the area, it was determined unsafe to build the new school across from Wspolnoty Park. To return the schools feature class to its preedited state, restore the buildings geodatabase.

You must be connected as a database server administrator to restore a geodatabase.

Complexity:
    Beginner
Data Requirement:
    ArcGIS Tutorial Data Setup
Goal:
    Connect as a database server administrator and restore a geodatabase to a database server.

Logging in as a database server administrator

Log off of the computer and log back in with your regular Windows login.

Steps:

1. Click the **Start** button on the Windows task bar and click **Log off**.
2. If prompted, confirm you want to log off by clicking **Log Off** on the *Log Off Windows* dialog box.
3. When the login dialog box appears, change the user name to your local or domain login name.
4. Type your password in the **Password** text box.
5. Choose your computer name (if connecting as a local user) or your domain name from the **Log on to** drop-down list.
6. Click **OK**.

Viewing the current state of the buildings geodatabase

To see what the schools feature class looks like now, open it in ArcMap.

Steps:

1. In the Catalog window, expand the buildings geodatabase.
2. Click the schools feature class and drag it into the ArcMap *table of contents*.
3. Click **Selection** on the ArcMap Main menu and click **Select By Attributes**.
4. Choose schools from the **Layers** drop-down list.
5. Double-click **"sch_name"** in the list of attributes.
6. Click the equals sign (=) button.
7. Click **Get Unique Values**.
8. Double-click **"Wspolnoty"**.
9. Click **OK** to make the selection.
   The new school is highlighted.

Restoring the buildings geodatabase

Since the edits to the schools feature class have already been saved to the geodatabase but no other edits have been made since the geodatabase was created, you can restore the geodatabase from the backup file you created at the end of Exercise 4: Add users and administer their permissions.

Before you can restore the geodatabase, you must disconnect from the database server to clear your connection to the buildings geodatabase.

⚠ **Caution:**   You cannot restore a geodatabase if there are any active connections to it. Therefore, if you do not disconnect from the database server, the restore operation will fail.

Steps:

1. Close ArcMap.

2. Start ArcCatalog by clicking **Start** > **All Programs** > **ArcGIS** > **ArcCatalog 10.**

3. Expand the Database Servers node in the Catalog tree.

4. Double-click your database server to connect to it, but do not connect to any of the geodatabases.

5. Right-click the database server and click **Restore**.

6. Click the ellipsis button next to the **Backup file** text box.

7. Browse to the location of your buildings_bu2 backup file.
This should be the DatabaseServers folder in the ArcTutor directory.

8. The **Restore to folder** text box is automatically populated with the current location of the buildings geodatabase. Leave this location; you will restore over the top of the existing geodatabase.

9. Click **OK** to restore the geodatabase.

   You will be prompted to confirm that you are overwriting the geodatabase.

10. Click **Yes** to continue.

📒 **Note:**   If you were connected to the buildings geodatabase, you will receive an error message stating the geodatabase could not be restored because exclusive access could not be obtained. If this happens, close the message, disconnect from the database server, reconnect, and attempt the restore operation again. If it still fails, you may need to close ArcCatalog and reopen it to release the lock on the geodatabase.

Previewing the restored geodatabase

To make sure the geodatabase was restored, preview the schools feature class to make sure the Wspolnoty school is no longer there.

Steps:

1. Expand the buildings geodatabase.

2. Click the schools feature class.

3. Click the **Preview** tab.
   You can see the schools feature class is back to its preedited state.

To return the data to an earlier state, you restored over the top of the buildings geodatabase.

Exercise 7: Connect as a geodatabase administrator, load data, register it as versioned, and create a version

In Exercise 4: Add users and administer their permissions, you granted manager1 administrator permissions to the buildings geodatabase. This allows manager1 to write to the geodatabase and perform certain administrative tasks. You will perform a few of these administrative tasks in Exercise 9: Compress, rebuild indexes, and shrink the geodatabase while logged in as a geodatabase administrator.

In this exercise, you will connect as manager1, import data, register the new data as versioned, and create a public version that editor1 can use to edit the data.

Complexity:
  Beginner
Data Requirement:
  ArcGIS Tutorial Data Setup
Goal:
  Log in as a geodatabase administrator and import a shapefile. Register a feature class as versioned, create a geodatabase version for editing, and assign permissions for the version.

Note: Only the owner of a dataset can register it as versioned.

Logging in as a geodatabase administrator

Log out of the computer and log back in as manager1.

Steps:

1. Click the **Start** button on the Windows task bar and click **Log off**.

2. If prompted, confirm you want to log off by clicking **Log Off** on the *Log Off Windows* dialog box.

3. When the login dialog box appears, change the user name to manager1.

4. Type `manager.1` in the **Password** text box.

5. Choose your computer name from the **Log on to** drop-down list and click **OK**.
    You are now logged in as manager1.

6. Start ArcMap, open the Catalog window, then expand the Database Servers node in the Catalog tree.

7. You must add the ArcSDE database server because manager1 has not added it yet. For instructions on how to do this, refer to Exercise 1: Add a database server to the Catalog tree and create a geodatabase.

Importing data as manager1

Import the railroads shapefile to the Osokopf geodatabase.

Steps:

1. Connect to the database server in the Catalog window.

2. Right-click the Osokopf geodatabase, point to **Import**, then click **Feature Class (single)**.

3. Click the **browse** button to navigate to the data.
    The *Input Features* dialog box opens.

Since this is the first time manager1 has connected to the database servers tutorial data, you must add a folder connection.

4. Click the **Connect To Folder** button on the *Input Features* dialog box.
    The *Connect to Folder* dialog box opens.

5. Navigate to the DatabaseServers tutorial directory and click **OK** to add the folder connection.

6. Choose railroads.shp and click **Add**.

7. Type `railroads` in the **Output Feature Class** text box of the *Feature Class To Feature Class* tool.

8. Click **OK**.

The Osokopf geodatabase now contains two feature datasets owned by the dbo user, one feature class owned by editor1 and one feature class owned by manager1.

Registering the new feature class as versioned

The changes that will be made to the railroads feature class could take the editor a while to complete. For that reason, you will register the feature class as versioned so the editor can perform versioned edits. Versioned editing allows a user to edit a feature class in isolation from the production version of the feature class and, therefore, does not block the feature class from being accessed by other users.

Steps:

1. Right-click the railroads feature class in the *Catalog* window and click **Register as versioned**.
    The *Register As Versioned* dialog box opens.

2. Leave the **Register the selected objects with the option to move edits to base** option unchecked and click **OK**.

Creating a version

When performing versioned edits, you could edit the DEFAULT version of the geodatabase. However, for the purposes of this tutorial, you will create a separate version in which editor1 can perform edits.

💡 **Tip:** For an explanation on geodatabase versions and versioned editing, see A quick tour of versioning and its related topics.

Steps:

1. Right-click the Osokopf geodatabase in the Catalog window and click **Versions**.
    This opens the *Version Manager*.

    Currently, only the DEFAULT version is present. You will create a version from the DEFAULT version.

2. Right-click the DEFAULT version and click **New**.

3. Type `railroadv1` in the **Name** text box.

4. Type a description for the version.

5. Click **Public** from the **Permission** list.

6. Click **OK**.

    This allows editor1 to edit this version. If you instead chose **Protected**, editor1 could see the version but not edit it. If you chose **Private**, editor1 would not even be able to access the version.

There are now two versions showing in the *Version Manager*.

You imported data, registered it as versioned, and created a geodatabase version to which editor1 will connect to edit the data.

Exercise 8: Making versioned edits as a read/write user

To see another way users with nonadministrative permissions can edit the data, you will log in as editor1, edit a feature class in ArcMap, then reconcile and post the edits to the edit version.

Logging in as editor1

Log off the computer and log back in as editor1.

Steps:

1. Click the **Start** button on the Windows task bar and click **Log off**.

2. If prompted, confirm you want to log off by clicking **Log Off** on the *Log Off Windows* dialog box.

3. When the login dialog box appears, change the user name to editor1.

4. Choose your computer name from the **Log on to** drop-down list and click **OK**.
   You are now logged in to the computer as editor1.

5. Start ArcMap, open the Catalog window, then expand the Database Servers node in the Catalog tree.

Connecting to a different version and saving the connection

By default, database server connections are always to the DEFAULT version. To change which version of a geodatabase you are connected to, you will use the *Change Version* dialog box. If you were to close ArcMap, the next time you started ArcMap and connected to the geodatabase through the database server node, you would again be connected to the DEFAULT version.

To save your connection to a specific version, you can save a spatial database connection to this version. This creates a connection file under the Database Connections node in the Catalog tree.

Database connections save the connection properties you assign until you change them. That means the next time you start ArcMap as editor1, you will still have a connection to the version of the geodatabase you want without having to change any settings.

Note: Connections made to geodatabases through the Database Connections node are not used for administration, only for data access.

Steps:

1. Double-click the database server in the *Catalog* window to connect to it.

2. Right-click the Osokopf geodatabase and click **Change Version**.

3. Make sure **Version type** is set to**Transactional**.

4. Choose the railroadv1 version and click **OK**.
   The connection for the Osokopf geodatabase now shows you are connected to railroadv1.

5. To save the connection to this version of the geodatabase, right-click the Osokopf geodatabase and click **Save Connection**.
    This creates a connection file for this version of the geodatabase under the Database Connections node.

6. Expand the Database Connections node in the Catalog window.
    You can see a new connection has been created to the geodatabase. The default connection name is Connection to <machine_name>_<sql_server_express_instance>.

    > 💡 **Tip:** You can change the name of the connection by right-clicking the connection, clicking **Rename**, then typing a new name.

7. Right-click this connection and click **Connection Properties**.
    As you can see, all the connection information has been completed for you. **Server name** is populated, the direct connection information is in the **Service** text box (geodatabases on database servers do not use ArcSDE services, only direct connections can be used), the database name is in the **Database** text box, operating system authentication is chosen for the authentication mode, and the connection is being made to the railroadv1 transactional version of the geodatabase.

8. Close the ***Spatial Database Connection Properties*** dialog box.

Making edits to a versioned dataset

In Exercise 7 Connect as a geodatabase administrator, load data, register it as versioned, and create a version, manager1 imported a feature class, railroads, and registered it as versioned. You are going to edit that feature class in the railroadv1 version.

Preparing to edit

Add the versioned dataset and reference data to ArcMap.

Steps:

1. Expand the new connection to the Osokopf geodatabase.
2. Click and drag the railroad feature class into ArcMap.
3. For reference, add the streets and villages feature classes and the park_areas feature dataset to the map.
4. Expand the buildings geodatabase on the database server and drag the gov_bldgs, schools, and utilities feature classes onto the map for reference as well.

To help orient yourself on the map, you will label the streets feature class.

Steps:

1. Right-click the Streets layer in the ArcMap table of contents and click **Label Features**.
   The names of streets for which a name attribute exist are drawn on the map.

Since the data you will edit is registered as versioned, be sure ArcMap is set to perform versioned edits.

Steps:

1. Click **Editor** on the Editor toolbar and click **Options** on the drop-down list.
   This opens the *Editing Options* dialog box.
2. Click the **Versioning** tab.
3. Be sure the **Edit a version of the database with the ability to undo and redo** box is checked. If not, check it.

   There are other options on this dialog box you can set to control the behavior of a versioned edit session. These include setting which sorts of edits can be considered conflicts, which edits to use during auto-reconciliation, and whether to automatically save edits after auto-reconciliation. For more information on these options, see A quick tour of reconciling a version.
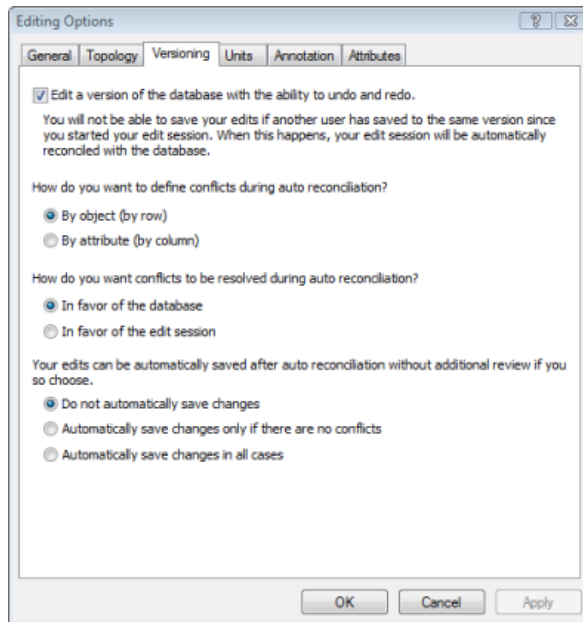
4. You will use the default settings, so click **OK** to close the *Editing Options* dialog box.

Now start an edit session.

Steps:

1. Click **Editor** on the *Editor* toolbar and click **Start Editing**.

2. Choose **Railroads** from the list of layers to edit and click **OK**.

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Performing edits

You will add one new rail line and one side rail to the railroads feature class. You will also extend an existing side rail.

Add a rail line

Steps:

1. Click the **Zoom In** button on the *ArcMap Tools* toolbar.

2. Hold down the mouse button and draw a box around the north-eastern portion of the island.
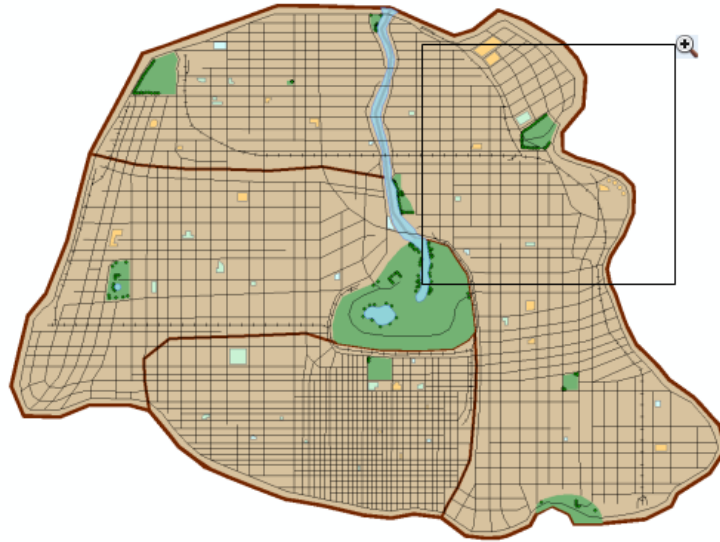
The section of rail line you will add starts at the existing Cross Island line between Serpent and Sandpiper streets, east of Pilot street, and ends at the tip of the existing Centremont East line.

💡 **Tip:** To identify features on the map, click the **Identify** button on the ArcMap Tools toolbar and click a feature. This opens the *Identify* window, which shows the attributes of the feature.

Start line here

End line here
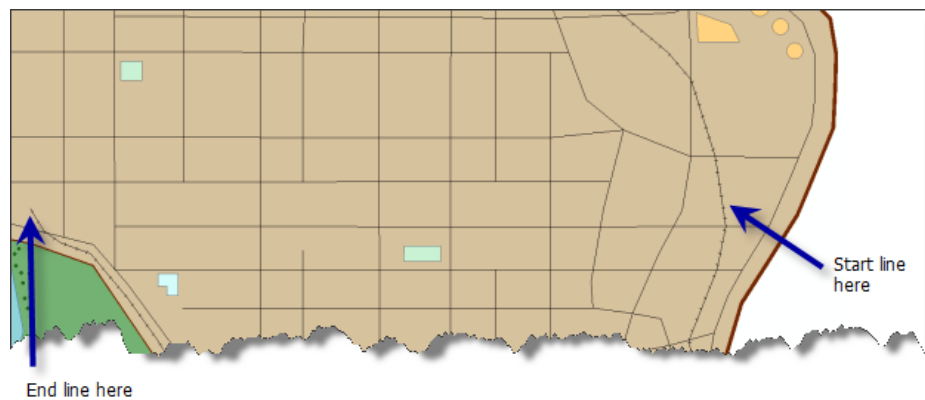
3. Click **Railroads** in the *Create Features* window.

4. Click **Line** under the **Construction Tools**.

5. Pause the pointer on the Cross Island line between Serpent and Sandpiper until you see you are on the edge of the railroad line.
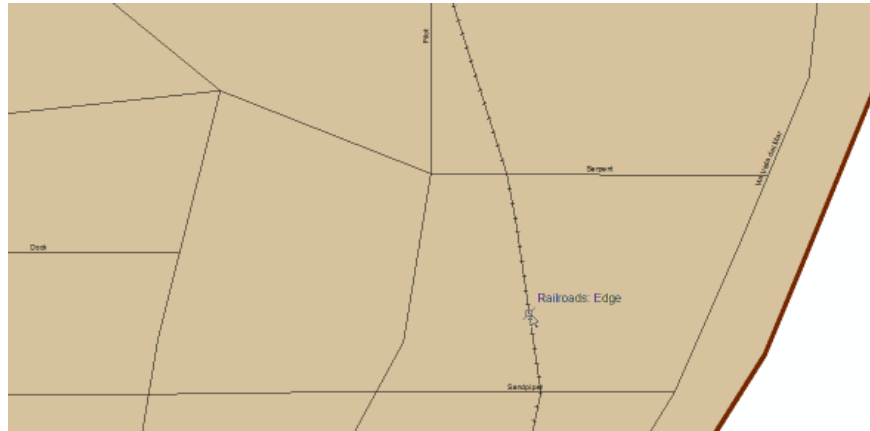
6. Right-click, click **Snap to Feature**, then click **Edge**.
   This snaps the first vertex of the new line to the edge of the Cross Island line.

7. Extend the line between Dock and Sandpiper until you reach the end of the Centremont East line.
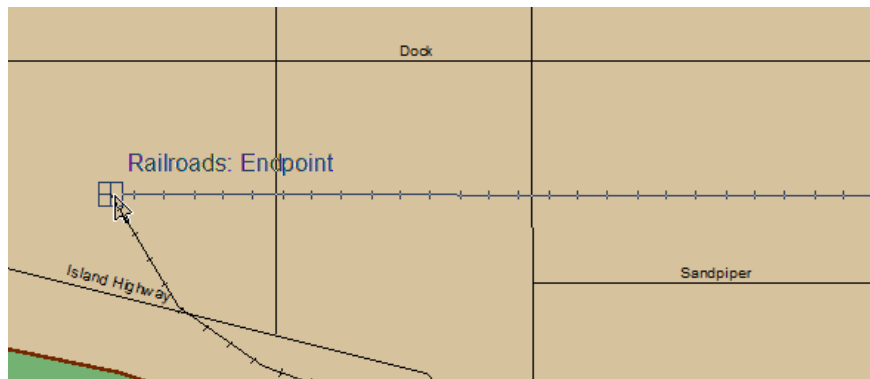
8. Right-click, click **Snap to Feature**, then click **Endpoint** to place an end vertex for your new feature.

9. Right-click and click **Finish Sketch** to add the new feature to the railroads feature class.
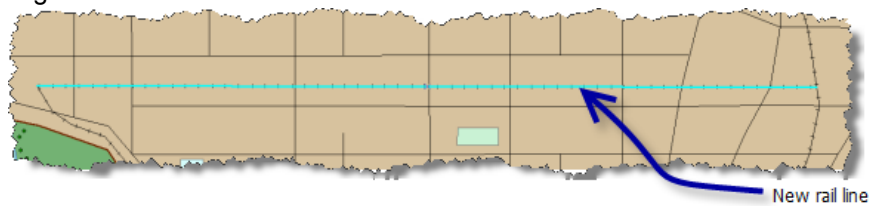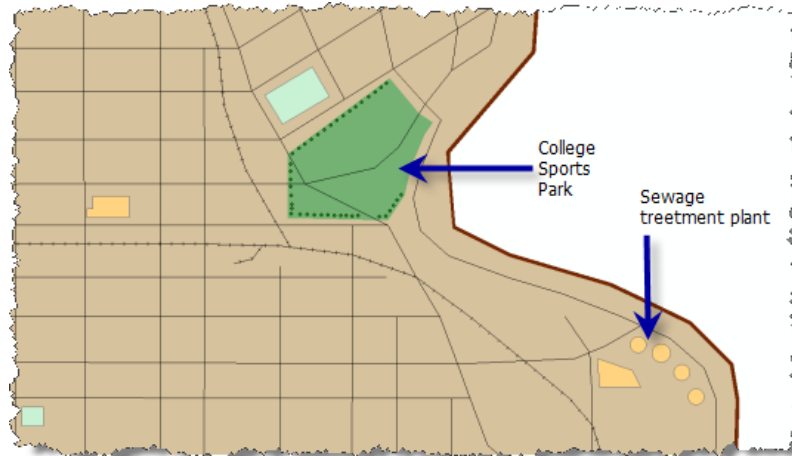

New rail line

10. Click **Editor** on the Editor toolbar and click **Save Edits** to save the changes you have made so far.

11. Click the **Attributes** button on the Editor toolbar.
    The *Attributes* dialog box opens.

12. Click in the field next to **Owner** and type `Oso Rail`.

13. Close the attribute window.

Add a side rail

Change your extent by panning to the area where the next feature will be added.

Steps:

1. Click the **Pan** button 🖑 on the **ArcMap Tools** toolbar.

   Your cursor changes to the pan symbol.

2. Click in the center of the map, hold down the mouse button, and pull the map down until both the College Sports Park and the sewage treatment plant are visible.

You will add a new side rail on the Cross Island line, east of Serpent.
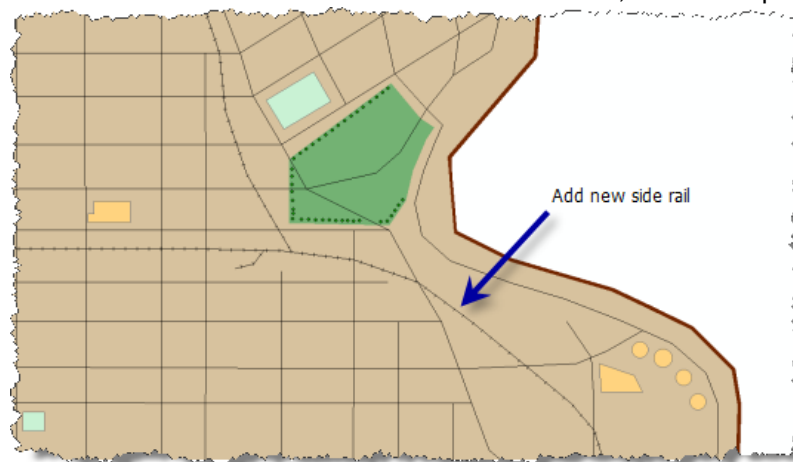
3. Click **railroad** in the **Create Feature** window and click **line**.

4. Pause the pointer on the Cross Island rail line in the location indicated in the previous graphic until you are over the railroad edge.

5. Right-click, click **Snap to Feature**, then click **Edge**.

6. Draw a curved line that tends toward the north-east. Click to add vertices to create the curve.
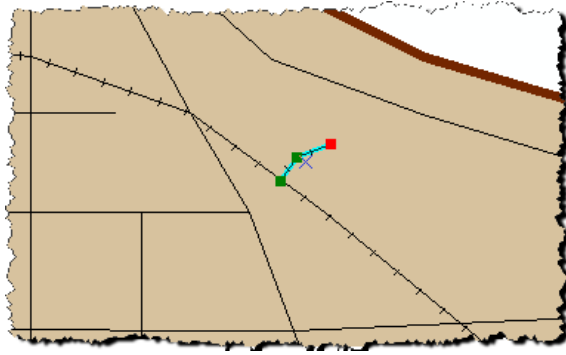
7. Double-click the end vertex to finish the sketch.

> 📒 **Note:** For the purpose of this tutorial, edits do not have to be exact. When you edit your own data, you will be much more precise when adding features.

8. Click the **Attributes** button on the Editor toolbar.

9. Type `Oso Rail` in the field next to **Owner**.

10. Click **Editor** on the Editor toolbar and click **Save Edits** to save the changes you have made so far.

Extend the Cross Island college side rail

The college side rail should be visible in your current extent. If it is not, pan to it.
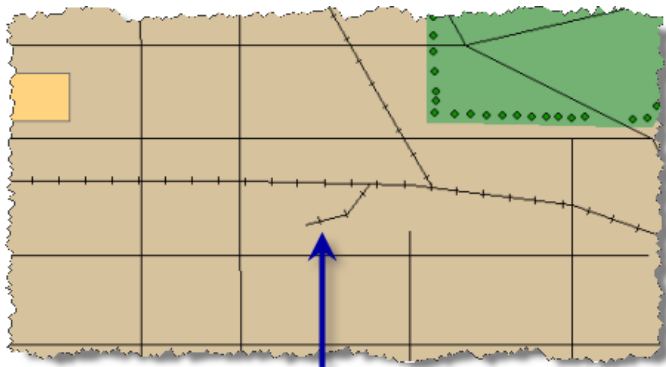

Cross Island college side rail

You are going to extend this line.

Steps:

1. Click the **Edit Tool** button on the *Editor* toolbar.

2. Click the Cross Island college side rail to select it.

3. Click the **Edit Vertices** button on the Editor toolbar.

    The vertices of the college side rail are visible on the map.

4. Right-click the college side rail line just before the end vertex and click **Insert Vertex**.

5. Pause the pointer on the end vertex until handles appear around the vertex.

6. Click and drag the vertex until it is closer to Morris Street.
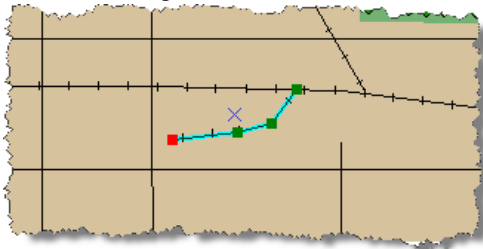
7. Right-click and click **Finish Sketch**.

8. Click **Editor** on the Editor toolbar and click **Save Edits** to save the changes you have made so far.

Reconciling edits and posting changes

You have finished the edits you will do on the railroads feature class. Now you will reconcile and post your edits to the DEFAULT version.

Steps:

1. Open the *Versioning* toolbar if it is not already open. Click **Customize**, point to **Toolbars**, then click **Versioning**. (You may need to scroll down the menu to see **Versioning**.)

2. Click the **Reconcile** button ⬇🗄 on the Versioning toolbar.

   The *Reconcile* dialog box opens.

   The dbo.DEFAULT version is already chosen as the target version, so you do not need to choose a target version. You will also use the default setting for defining conflicts, so leave **By object (by row)** selected. However, you will change how conflicts are resolved.

3. Click **In favor of the Edit Version** on the *Reconcile* dialog box.

4. Click **OK**.

   No other users were editing this data in the DEFAULT version, so no conflicts were detected. This is a common result, especially when you are using geodatabases on a database server. It is uncommon for other users to be editing the same features (rows) in the same feature class as you. If you choose to define conflicts based on attributes (columns), you might be more likely to see conflicts. However, even if conflicts are based on attribute changes, conflicts still only occur if someone is editing the same feature class as you.
   Since you did not encounter any conflicts, you can now post your changes to the DEFAULT version.

5. Click the **Post** button ⬆🗄 on the Versioning toolbar.

   Your edits are moved into the DEFAULT version. Now, anyone who connects to the DEFAULT version can see your changes.

6. Click **Editor** on the Editor toolbar and click **Stop editing**.

You logged in with a login that has read and write access to the geodatabase and performed a set of versioned edits on a feature class. You then reconciled and posted your edits to the DEFAULT version of the geodatabase.

Exercise 9: Compress the Osokopf geodatabase, rebuild indexes, and shrink the geodatabase while logged in as a geodatabase administrator

Compressing the geodatabase removes the states that are no longer referenced by a version and moves rows in the delta tables to the business table. Moving the edits from the delta to the business table means queries on the dataset will take less time because the query only has to look at one table instead of querying three tables. The more records there are in the delta tables, the more important it becomes to move the records from the delta tables to the business table.

Complexity:
  Beginner
Data Requirement:
  ArcGIS Tutorial Data Setup
Goal:
  Log in as a geodatabase administrator, compress a geodatabase, rebuild indexes on the data, and shrink the geodatabase.

Both editing and compressing the geodatabase can fragment indexes, so you should rebuild indexes after a large amount of editing is done and after you compress the geodatabase.

Adding and deleting data from a database can also cause some fragmentation. On rare occasions, you might need to shrink a geodatabase to eliminate some of this fragmentation and reclaim unused space in the database.

In this exercise, you will log in as the Osokopf geodatabase administrator, manager1, delete the unneeded version, compress the geodatabase, and rebuild its indexes. Finally, you will shrink the geodatabase to see if it yields any additional free space on disk.

Connecting as a geodatabase administrator

Log off the computer and log back in using the manager1 login.

Steps:

1. Click the **Start** button on the Windows task bar and click **Log off**.

2. If prompted, confirm you want to log off by clicking **Log Off** on the *Log Off Windows* dialog box.

3. When the login dialog box appears, change the user name to manager1.

4. Type `manager.1` in the **Password** text box.

5. Choose your computer name (if connecting as a local user) or your domain name from the **Log on to** drop-down list.

Deleting the railroadv1 version

Since all edits were reconciled and posted back to the DEFAULT version, the railroadv1 version is no longer needed. Therefore, you can delete it, allowing the geodatabase to fully compress.

Steps:

1. Start ArcMap, open the Catalog window, then expand the Database Servers node in the Catalog tree.

2. Right-click the Osokopf geodatabase and click **Versions**.

3. Right-click the railroadv1 version and click **Delete**.

4. Close the *Version Manager* dialog box.

Compressing the geodatabase

Compress the Osokopf geodatabase to move the edits made to the railroads feature class from the delta tables to the business table and remove unnecessary states from the lineage.

Steps:

1. Right-click the Osokopf geodatabase, point to **Administration**, then click **Compress Database**.
2. When prompted to confirm the compress operation, click **Yes**.

Making sure the compress operation was successful

You can find out if the compress operation was successful and see the last time a compress operation was performed on a geodatabase by checking the geodatabase properties.

Steps:

1. Right-click the Osokopf geodatabase and click **Properties**.
2. Click the **Administration** tab.
3. Review the last compress date/time and status in the Compress section. Be sure the date/time corresponds to when you performed the compress and that the status is successful.
4. Click **OK**.

Rebuilding indexes

Editing the data and compressing the geodatabase can cause indexes to be fragmented and database statistics to be out-of-date. After edits are performed and the geodatabase is compressed, you should rebuild the indexes.

> **Tip:** When you use the **Rebuild all indexes** option on the *Geodatabase Maintenance* dialog box, database statistics also are updated.

Steps:

1. Right-click the Osokopf geodatabase, point to **Administration**, then click **Geodatabase Maintenance**.
2. Choose **Rebuild all indexes**.
3. Click **OK**.

Shrinking a geodatabase

As data is deleted from or added to the geodatabase, data files in the database may break into smaller, discontinuous fragments. In larger databases, this can lead to query performance degradation. This is not as much of an issue in SQL Server Express databases because of their smaller size, but shrinking a SQL

Server Express database can gain you a small amount of extra storage space. For example, if you find your geodatabase is nearing its maximum size of 4 GB, you could shrink the database and possibly gain some extra storage space. Be aware, though, that shrinking the geodatabase could actually increase index fragmentation in the database. If you find that the geodatabase size increases to its preshrunk state shortly after you shrink it, it means the space that you shrank is required for regular operations; therefore, the shrink operation was not needed.

For this example, you will shrink the Osokopf geodatabase. Before doing that, however, check the current size of the geodatabase.

Checking the size of the geodatabase

Steps:

1. Right-click the Osokopf geodatabase and click **Properties**.

2. Click the **Administration** tab.

3. Note the size of the database shown in the **General** section of the **Administration** tab.

4. Click **OK** to close the *Geodatabase Properties* dialog box.

Shrinking the geodatabase

Now, shrink the Osokopf geodatabase.

Steps:

1. Right-click the Osokopf geodatabase, point to **Administration**, then click **Geodatabase Maintenance**.

2. Click **Shrink geodatabase**.

3. Click **OK**.

To see if the shrink operation gained you any space in the database, check the size again. Follow steps 1 through 4 under "Checking the size of the geodatabase."

Exercise 10: Detach the buildings geodatabase from the database server

To move a geodatabase from one database server to another, you can detach it from the database server, copy the database files (the .mdf file if you are using SQL Server 2008 Express or the .mdf and full-text catalog folder if you are using SQL Server 2005 Express) over the network or onto transfer media, such as a thumb drive, then paste it onto the destination server. Once there, you can attach the geodatabase to the database server.

Complexity:
Beginner
Data Requirement:
ArcGIS Tutorial Data Setup
Goal:
Learn how to detach a geodatabase from a database server.

Some examples of situations when you might do this include the following:

- If you use the data from the geodatabase on a database server on your desktop computer, then want to take the geodatabase into the field to collect data, you could detach the database server from the server on your desktop computer, transfer the database files to your laptop, and attach the geodatabase to the database server on your laptop.

- When ownership of a geodatabase is transferred, such as when an employee leaves the company, you could move the geodatabase from the database server on the former employee's computer, copy it to the new owner's computer, and attach it to a database server there.

- When you hire consultants to collect or create datasets for you, you can request they deliver the data in a geodatabase in SQL Server Express. Then, when they send you the files, you can attach them to your database server.

> **Note:** Detaching a geodatabase from the database server does not delete the database files, but it removes references to the database from the SQL Server Express instance.

When sharing geodatabases across database servers, be aware of who owns the data and has permission to work with it. This is important because ArcSDE geodatabases in SQL Server Express use Windows-authenticated logins. If you are using local Windows logins, when you transfer the geodatabase to a new computer, those users won't exist on the new computer. Similarly, if you use network logins, then transfer the geodatabase to a database server outside the network, those logins will not exist.

How you deal with this depends on your workflow. If you know ahead of time that you are going to be moving the geodatabase around a lot, you might want to create all the data in the geodatabase while logged in as the dbo user. The dbo user and schema are always present in database servers; therefore, even if you move the geodatabase to a database server on a different network, you can still log in as dbo, add new users to the database server, and grant them permissions to the data.

If you hadn't anticipated having to move the geodatabase and the data owners don't exist on the destination database server, you could still log in as the dbo user and perform one of the following set of steps:

1. Add new users to the destination database server.

2. Grant read/write or higher-level access to the geodatabase to the users to whom you want to transfer ownership of the data. Granting these permissions at the geodatabase level allows the users to access all the data in the geodatabase.

3. Ask the users to log in to the geodatabase and either copy the data to a new geodatabase to which they also have read/write access or copy and paste the data in place, giving the pasted datasets and columns new names.

1. Create a second geodatabase on the destination database server.

2. Copy the data to the new geodatabase.

> 📄 **Note:** Dbo is now the owner of all the datasets in the second geodatabase.

3. Add new users to the destination database server.

4. Grant these users access to the datasets.

Detaching the buildings geodatabase

Suppose you want to move the buildings geodatabase (named either buildings05 or buildings08, depending on the version of SQL Server Express you are using) from the database server on your personal computer (PC) to a database server on your laptop so you can take it into the field and collect traffic data there. You could use geodatabase replication to replicate the data to a geodatabase in a database server on your laptop, or you could detach the geodatabase from the database server on your PC, move it to your laptop's hard drive, and attach it to the database server there.

To detach the buildings geodatabase from the database server, do the following:

Steps:

1. Log in to the computer with your own Windows login.

2. Start ArcCatalog by clicking **Start** > **All Programs** > **ArcGIS** > **ArcCatalog 10.**

3. Expand the Database Servers node in the Catalog tree and connect to the database server. However, do not connect to the buildings geodatabase.

4. Right-click the buildings geodatabase on the Catalog **Contents** tab, point to **Administration**, then click **Detach**.

> ⚠️ **Caution:** It is important that you right-click the geodatabase on the **Contents** tab, not in the Catalog tree. If you right-click the geodatabase in the Catalog tree, you connect to it. You cannot detach a geodatabase that has any active connections to it; therefore, if you are connected when you try to detach, the detach operation will fail.

5. When the *Confirm Detach* dialog box appears, take note of the location of the database file; you will need to know where it is so you can copy it to another location or if you plan to reattach the database in the future.

6. Click **Yes** on the *Confirm Detach* dialog box.

You could now open Windows Explorer, navigate to the location of the buildings05.mdf file and buildings05_CAT folder (SQL Server 2005 Express) or buildings08.mdf file (SQL Server 2008 Express), then copy them to media or over the network to transfer them to another computer.

For instructions on attaching the geodatabase, see Exercise 3: Attach, create a backup of, and upgrade a geodatabase or Attaching a geodatabase to a database server.