Lesson 3: Where do grids come from?

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Goals

In this lesson, you will learn:

- how ArcView Spatial Analyst manages grid themes
- how to use the Source Manager
- how to convert themes to grids
- how to create grids from various raster import formats
- how to export grids
- how to obtain data for use in ArcView Spatial Analyst

TOPIC1: Managing grid themes

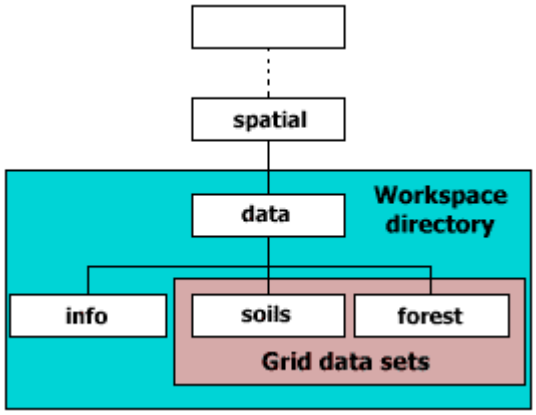
Grid datasets are stored in a workspace directory and use INFO format files. Because the INFO file format is used to store grid theme data, you should be careful when copying, deleting, and renaming grids.

In this topic, you will learn about the grid data model and grid data structure and how grid datasets are stored in a workspace. You will also learn about the Source Manager, which should be used to manage grid datasets instead of operating system file managers

Concept

Workspaces

A workspace is a directory that contains geographic datasets like ArcInfo coverages or grid datasets. A workspace contains one info subdirectory and a subdirectory for each grid. Grid subdirectories contain several files that store geographic location and attribute data. The info subdirectories contain several files that relate to each grid's theme table.



Grids are stored in a workspace directory. A workspace contains one info subdirectory. Each grid is a subdirectory.

ArcInfo grids and coverages are stored in workspaces. If you create a grid and do not already have a workspace to store it, ArcView GIS will create the workspace directory for you. It will make the info subdirectory and create a grid subdirectory with all its corresponding data files. Copying workspaces with operating system commands is permissible, as long as you use a recursive copy command (e.g., DOS xcopy with the /s option or UNIX cp with the -r option).

Grid datasets are stored as a directory of several files that have related or corresponding data files in the info subdirectory. Therefore, deleting a grid directory with an operating system command does not remove all of that grid's data files. Use the Source Manager (discussed later in this section) to delete grid directories.

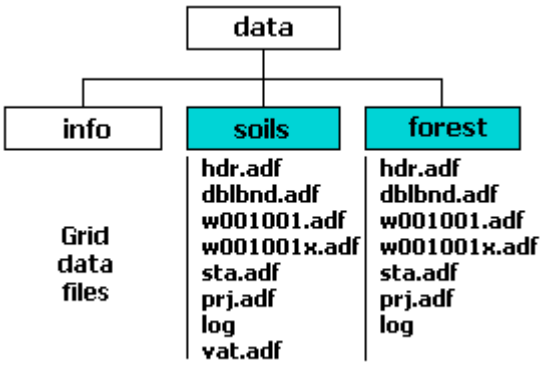
The info subdirectory contains data files about each grid. ArcView creates, reads, and edits info subdirectories and corresponding data files

Concept

Grid directory structure

Grid subdirectories store data files about each grid. Some grid data files have related INFO files and some do not. If a grid is altered, ArcView Spatial Analyst automatically updates the corresponding information in these files.

Only integer grids have a grid theme table, vat.adf, to store unique cell values and a cell count for each value.



Grid subdirectories contain data files about each grid. Some files are in INFO format, while others are ASCII format and binary format.

The boundary file, dblbnd.adf, contains the minimum and maximum x,y coordinates of the grid theme. The boundary is a rectangle that surrounds all cells in a grid.

The statistics about cell values, including the minimum, maximum, mean, and standard deviation, are stored in the sta.adf file. You can see these statistics for any theme by clicking the Statistics button inside the Legend Editor.

The log file is an ASCII file containing a history of the grid dataset from its creation through any alterations that have been performed on it. Log files store the type of operation and the time and date it was performed.

The projection file (prj.adf) is an optional ASCII text file used to store known map projection information. The projection file is typically present in grids from ArcInfo and is created if the grid was imported from a DEM or projected. ArcView GIS does not create a projection file. The projection file, if present, provides the projection parameters you will need to set the projection of a view.

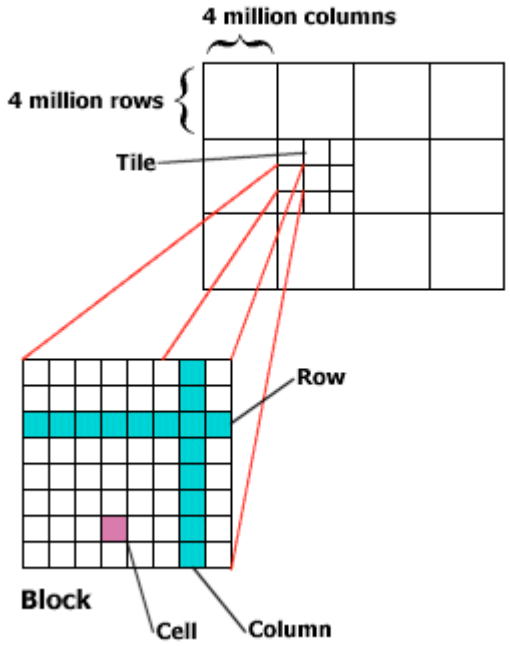
The data in a grid theme is tiled and stored in binary row and column tile files. The w001001.adf file stores the first tile. If more tiles are needed, the second tile is named w001002.adf. The corresponding X files are an index to the tile file.

The header file (hdr.adf) is a binary file containing the grid's cell resolution, type (integer or floating point), compression, blocking factor, and tile information

Concept

Grid data structure

The format of grid datasets is based on a hierarchical tile block structure. A tile is a variable length file capable of handling grids as large as 4,000,000 by 4,000,000 cells. Larger grids are automatically divided into multiple tiles. A tile is divided into blocks, which are stored as variable length records. The tile block structure allows sequential and random access to data. The size limit for a grid is a function of the tile naming convention; there can be as many as 999 by 999 tiles, each with up to 4,000,000 by 4,000,000 cells.



Grids are stored as a series of blocks with data compressed within each block. There's no need to worry about how blocks are created and used in a grid dataset; ArcView Spatial Analyst manages this for you. What you see and use is a single grid dataset, not a number of adjacent grids that must be managed individually. Thus, grid data management is transparent.

There are more blocks on the y-axis than on the x-axis; therefore, a block is not a square, but a rectangle that is wider than it is tall. (A rectangular structure is used to increase efficiency of certain operations that examine the grid on a row-by-row basis. It also aids in integer data compression.) A block is made up of cells arranged in a Cartesian matrix consisting of rows and columns. Cells inside the block are always square.

The tile, block, and row-column hierarchical divisions form the spatial indexing for grid datasets. Spatial indexing allows for fast data retrieval regardless of the grid's size.

Grid data is accessible seamlessly. In the rare event that more than one tile is needed for data storage, ArcView Spatial Analyst automatically keeps track of the tile and block positions through spatial indexing. Spatial Analyst optimizes tile and block sizes automatically, a process that is totally transparent to the user.

Integer grids are compressed using a run-length compression scheme within each block ("adaptive run-length encoding"). When adjacent cells have the same value, runs are created and the data can be compressed. Floating point grids are never compressed because there may be a unique value for every cell.

The location and size of all grid cells are stored in double precision (8-byte) floating point numbers. The values of floating point grids are stored as 4-byte floating point numbers (single precision). The values of integer grids are 4-byte integers (long integers).

Concept

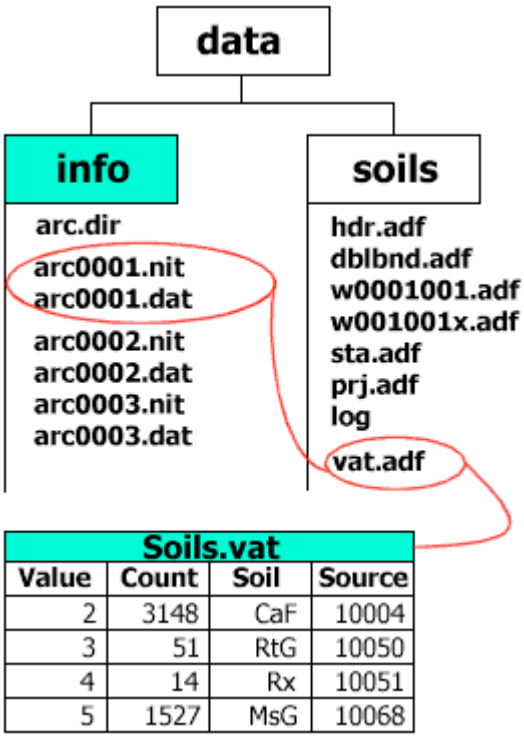
The info subdirectory

Some grid data files, like the VAT, have related INFO files called the nit and dat pairs. These files have filename extensions nit and dat.

The vat.adf, sta.adf, and dblbnd.adf files in a grid subdirectory have corresponding INFO files, the nit and dat pairs, in the info subdirectory. The info subdirectory also contains a data dictionary file called arc.dir. ArcView knows how to read and edit INFO format files. Do not try to edit the INFO files with the operating system.

Grid INFO format files have a pair of related INFO files. The grid file (e.g., vat.adf) contains raw data values. Its corresponding INFO nit (e.g., arc0001.nit) file contains file structure and field definition information. The INFO dat (e.g., arc0001.dat) file contains a relative path to the grid data file (e.g., ../soils/vat.adf).

Also present in the info subdirectory is the INFO directory file, arc.dir. It contains a list of all the INFO files in the database.



Soils.vat

Value	Count	Soil	Source
2	3148	CaF	10004
3	51	RtG	10050
4	14	Rx	10051
5	1527	MsG	10068

The info subdirectory has one nit and data pair per related grid data file (e.g., vat.adf). The vat.adf file is the value attribute table (VAT) for the soils grid theme.

Exercise

Examine the grid data structure

The objective of this exercise is to learn how grid datasets are stored. You will examine a workspace and become familiar with the files associated with a grid.

If you have not downloaded the exercise data for this module, you should download the data now.

Step 1 Start ArcView

Start ArcView and load the Spatial Analyst extension.

Note: If you are running ArcView GIS 3.1, you see a Welcome to ArcView GIS dialog. Click Cancel to close this dialog.

If ArcView is already running, close any open projects.

Step 2 Open the project

From the File menu, choose Open Project. Navigate to the **gridsa\lesson3** folder and open the project **l3_ex01.apr**.

Note: If you are running ArcView GIS 3.1, you see an Update l3_ex01.apr message box. Click No to dismiss this box.

When the project opens, you see a Mt. St. Helens view containing a Mt. St. Helens theme.

Step 3 Examine a workspace

In this step, you will examine the workspace associated with this lesson.

The gridsa\lesson3 directory is a workspace that can store grids. If you try to create a grid dataset in a directory that is not a workspace, ArcView Spatial Analyst converts the directory into a workspace. It adds the info subdirectory and the corresponding grid data files.

Using operating system commands or a file manager, navigate to your **gridsa\lesson3** folder and view the contents.

Workspaces always have one info subdirectory as well as one subdirectory for each grid.

REVIEW CONCEPT

REVIEW CONCEPT

Step 4 Examine a grid directory

Next, take a look at a grid directory.

Now change directories to the **helengrd** grid directory and examine the contents.

Notice that Helengrd is an integer grid as it contains a VAT file (vat.adf), contains one tile and its corresponding index (w001001.adf and w001001x.adf), has a header file (hdr.adf), and contains a log file (log.adf).

REVIEW CONCEPT

Step 5 Examine a grid log file

Each grid directory contains a log file that tracks the procedures performed on the grid. Log files are ASCII text files and can be examined with a text editor or displayed in a script editor window. You will look at the log file for the Helengrd theme. It contains a list of procedures applied to the grid with the date, time, and user information for each.

In the L3ex01.apr project window, open the empty script Helengrd Log File.

Load the log file from the helengrd directory into the script editor window by clicking the Load Text File button  .

In the file browser, navigate to the **gridsa\lesson3\helengrd** directory.

Change the List Files of Type dropdown list to Text file. Double-click the Log file to load it into the script editor window.

Examine the log file. Any procedures performed on helengrd will be listed in the log file in uppercase letters.

Close the Helengrd Log File script.

Step 6 Finish the exercise

You have completed this exercise. If you like, go on to the Challenge

Challenge

Examine a grid data structure

In this exercise, you examined a workspace and became familiar with the files associated with a grid.

Using operating system commands or a file manager, move to the gridsa\lesson3 directory and answer the following questions:

1. How many grids are in this workspace?
2. How many files are in the info directory?
3. In the info directory, how many pairs of nit and dat files are there?

Now change directories to the elev grid directory and answer the following questions:

4. Is elev an integer or floating point grid?
5. Which file indicates an integer grid?
6. Does elev have a projection file?

Use the prj file for elev to answer the following questions:

7. What projection is elev?
8. Which datum is used?
9. What units are used?

Solution to challenge

In the workspace:

1. There are 5 grids.
2. There are 33 files in the info directory.
3. There are 14 pairs of nit and dat files in the info directory.

In the elev grid directory:

4. Elev is an integer grid.
5. A vat.adf file indicates an integer grid.
6. Elev has a projection (prj) file.

The prj file:

7. The prj.adf file is an ASCII file so it may be read with a text editor. Elev is in the UTM projection.
8. Elev uses the NAD83 datum.
9. Elev uses meters as units

TOPIC2: The Source Manager

You use the Source Manager to copy, delete, and rename grid datasets. The Source Manager handles files in the grid subdirectory and the associated files in the info subdirectory.

To manage data sources, choose Manage Data Sources from the File menu. The Source Manager allows you to manage either shapefile or grid data sources. You can copy, rename, or delete these data sources simply by browsing. [Click to enlarge]

Do not use operating system commands to move, copy, or delete grid datasets because each grid dataset stores some of its files in the info directory. You should only rename, copy, or delete grid datasets using the Source Manager.

Using operating system functions to perform these actions will not work because the operating system does not understand the relationship of the info subdirectory and all its related files.

Workspace directories, however, can be moved, copied, or deleted with operating system commands. Workspace directories contain the info subdirectory and any grid data set subdirectories.

You can also use the Source Manager to copy, delete, and rename shapefiles

Concept

Grid theme properties

Similar to feature themes, grid themes have a name and source location. Grid theme properties also include the following: cell size, number of rows and columns, grid extent, type, and status. Changing the grid theme name does not change the grid dataset's source name. To change the source name, use the Source Manager.

To access grid theme properties, choose Properties from the Theme menu.

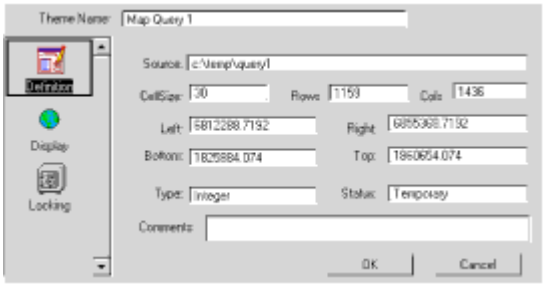
Grid theme properties include source directory, cell size, rows and columns, extent of grid, grid type, and permanent or temporary status

Concept

Temporary grids

Grids created as a result of performing analysis are stored as temporary datasets in the project's working directory. They are deleted when the corresponding theme is deleted from a view, when the project is quit without saving, or on exiting ArcView without saving.

The grid datasets become permanent when the project is saved or if the Save Data Set option is chosen from the Theme menu. Once a grid dataset is permanent, you can use the Source Manager to copy, delete, or rename it.



Temporary grids result from spatial analysis and map queries. They are created in the project's working directory. [Click to enlarge]

It is important to know your working directory. As you perform analysis functions, many temporary grids may be created. The more temporary grids you create, the greater the risk of filling up your computer's storage space. Remember to manage your working directory.

You can set the working directory in the Project Properties dialog. If you don't set the working directory, it is automatically set to your home directory or to the temp directory if no home directory is defined.

Exercise

Compare permanent and temporary grids

When using Spatial Analyst for map queries, temporary grids are created to store the results of the query. In this exercise, you will make a map query, examine the resulting grid theme and its temporary dataset, then save the grid permanently.

If you have not downloaded the exercise data for this module, you should download the data now.

Step 1 Start ArcView

Start ArcView and load the Spatial Analyst extension. Note: If you are running ArcView GIS 3.1, you see a Welcome to ArcView GIS dialog. Click Cancel to close this dialog.

If ArcView is already running, close any open projects.

Step 2 Open a project

From the File menu, choose Open Project. Navigate to the **gridsa\lesson3** directory and open the project **l3_ex02.apr**.

Note: If you are running ArcView GIS 3.1, you see an Update l3_ex02.apr message box. Click No to dismiss this box.

When the project opens, you see a Mt. St. Helens view containing a Mt. St. Helens theme.

Step 3 Create a working directory

Using your operating system, navigate to the **gridsa\lesson3** directory and create a subdirectory named **work**.

Step 4 Use Map Query

In this step, you'll build a map query on the Helengrd theme to find areas with elevations greater than 2000 meters.

Make the Helengrd theme active. From the Analysis menu, choose Map Query. In the Map Query 1 dialog, build the query shown below:

([Helengrd] > 2000)

Click Evaluate.

When the new theme is created, close the Map Query 1 dialog.

Notice the new theme, Map Query 1. It has values of 0 and 1. Areas with a value of 1 are above 2000 meters.

Turn off the Helengrd theme. Turn on the Map Query 1 theme and make it active.

Step 5 Examine theme properties for a temporary grid

From the Theme menu, choose Properties.

In the Theme Properties dialog, notice that the status of the new grid data source is temporary. You'll probably also notice that the source is listed as your temp directory. The name associated with the grid dataset is Map Query 1. After you are familiar with the properties of this temporary grid, click Cancel to close the Theme Properties dialog.

REVIEW CONCEPT

Step 6 Save Map Query 1 as a permanent grid

Now you will save Map Query 1 as a permanent dataset.

From the Theme menu, choose Save Data Set.

In the Save Data Set dialog, navigate to the **gridsa\lesson3\work** directory and name the output grid **heln2000**.

From the Theme menu, choose Properties and change the name of the theme to **Helen 2000**.

Notice that the status is now permanent and the grid dataset is stored in the work directory as heln2000.

Click OK. Close the project without saving any changes.

You have completed this exercise

Exercise

Manage grids

The objective of this exercise is to learn how to use the Source Manager to copy, rename, and delete grid datasets from a workspace.

If you have not downloaded the exercise data for this module, you should download the data now.

Step 1 Start ArcView

Start ArcView and load the Spatial Analyst extension.

Note: If you are running ArcView GIS 3.1, you see a Welcome to ArcView GIS dialog. Click Cancel to close this dialog.

If ArcView is already running, close any open projects.

Step 2 Open a project

From the File menu, choose Open Project. Navigate to the **gridsa\lesson3** directory and open the project **l3_ex03.apr**.

Note: If you are running ArcView GIS 3.1, you see an Update l3_ex03.apr message box. Click No to dismiss this box.

When the project opens, you see an empty Mt. St. Helens view.

Step 3 Use the Source Manager

First, you will copy grids of Mt. St. Helens before and after the eruption.

From the File menu, choose Manage Data Sources.

In the file browser, move to the **gridsa\lesson3** directory and change Source Types to grid.

Select the grid **hbefore** and click Copy.

Next, you are prompted for a directory location and name for the new grid dataset.

Navigate to the **gridsa\lesson3\work** directory and name the new grid **Before**. Click OK.

The new Before grid is copied into the work directory and the Source Manager returns to the original directory.

Repeat this procedure for **hafter**. Name the new grid **After**.

Click Cancel to close the Source Manager.

Step 4 Add themes

Click the Add Theme button.

Navigate to the **gridsa\lesson3\work** directory and select the Before grid.

Click OK to add the Before grid to the Mt. St. Helens view.

Turn on the Before grid theme and notice that the eruption has not taken place yet.

Now add the After grid theme using the same procedure. This grid represents Mt. St. Helens after the eruption.

Step 5 Compare themes using Map Calculator

Now you will subtract the Before and After Mt. St. Helens grids.

From the Analysis menu, choose Map Calculator.

In the Map Calculator, enter the following expression:

([Before] - [After])

Click Evaluate and close the Map Calculator.

Turn on the new theme Map Calculation 1 and make it active. Turn off all other themes.

VIEW RESULT

The positive elevations represent areas that are gone now and the negative elevations represent deposits of rock, soil, and ash from the eruption.

Choose Properties from the Theme menu. Notice the grid is a temporary grid.

In the next step, you will permanently save the dataset.

REVIEW CONCEPT

Step 6 Save a temporary grid to permanent

From the Theme menu, choose Save Data Set.

Name the grid **eruptdif** and save it in the **gridsa\lesson3\work** directory.

Step 7 Clean up the project

Finish this exercise by cleaning up the project.

Make all the themes active, then from the Edit menu, choose Delete Themes to delete all the themes.

Next, you will remove the Before and After grid datasets, keeping only the eruptdif grid.

From the File menu, choose Manage Data Sources.

In the Source Manager, navigate to the **work** directory and click on Before, then click Delete. Repeat this procedure for the After grid dataset.

Click Cancel to close the Source Manager. Close the Mt. St. Helens view.

Step 8 Close the project

Close the project without saving any changes.

You have completed this exercise

TOPIC3: Converting grids

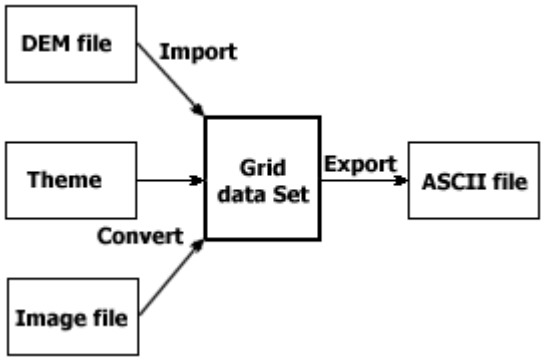
ArcView Spatial Analyst can convert a variety of data to the ARC GRID format. This data includes both feature and image themes. ArcView Spatial Analyst also allows for several standard raster file formats to be converted to grids.

Grids may also be converted to other formats. Integer grids can be converted to polygon themes. ArcView Spatial Analyst can also export grids to two standard raster file formats.

Concept

Grid data sources

ArcView Spatial Analyst can use data in many different formats. Some datasets may be converted or imported to grids. Spatial Analyst also has two export formats to output grids.



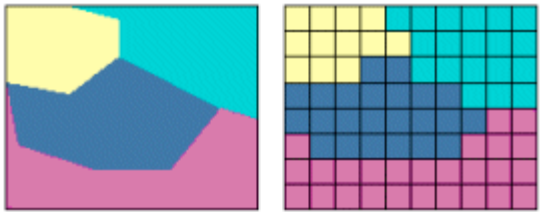
ArcView GIS can convert data to and from many formats.

Concept

Converting themes to grids

Themes, including feature and image themes, can be converted to grids. This vector to raster conversion (rasterization) changes the point, line, and polygon features that are stored as lists of x,y coordinates into cells that have a value and the same x,y location.

Any feature theme can be converted to a grid, including themes that have shapefile, ArcInfo coverage, or CAD drawing data sources.



ArcView Spatial Analyst can convert both feature and image themes into grids. This process is called rasterization. The left part of the diagram represents a polygon feature theme. The right part of the diagram is its representation as a grid theme.

Several image formats may also be converted to grids. Why convert an image to a grid? You may want to convert an image to a grid to use some ArcView Spatial Analyst functionality, such as Warp to register an image.

An image that is typically produced by a remote sensing device, such as a camera or an electronic scanner. Examples of images include photographs taken from satellites and aircraft. An image is stored in a raster file with a header that contains important information such as the number of rows and columns in the image, the number of bits per pixel, and georeferencing data.

Images can have one or more bands, each representing the energy response in a defined portion of the electromagnetic spectrum. These bands can be displayed with different colors (normally red, green, and blue). Single band images are often displayed using a gray scale.

Image conversion formats include:

- ERDAS®
- IMAGINE® (if the Images extension is loaded)
- RLC (run-length compressed files)
- BIL, BIP, BSQ
- Sun® Rasterfile
- TIFF
- JPEG (if the Images extension is loaded)
- BMP (Windows™ bitmap images)

Concept

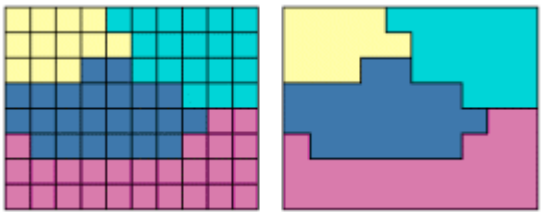
Converting grids to polygon shapes

Integer grid themes can be converted to polygon feature themes.

ArcView Spatial Analyst creates a polygon shapefile from the cell value information in an integer grid. Polygons are created from groups of contiguous cells having the same cell values. Polygon boundaries are formed by the cell boundaries of a grid. Coordinates for the shapefiles are determined by the grid's boundary file information and cell size.

The generalization algorithm maintains the integrity of the data. If you convert grids to a polygon theme and then convert the polygon theme right back to grids, the two grids will match up with the same cell values. The beginning grid and the ending grid would be the same.

During the basic raster to polygon (vectorization) conversion, the lines for polygons are formed from the grid cell regions. The polygon line will never cross cell centers of bordering cells.



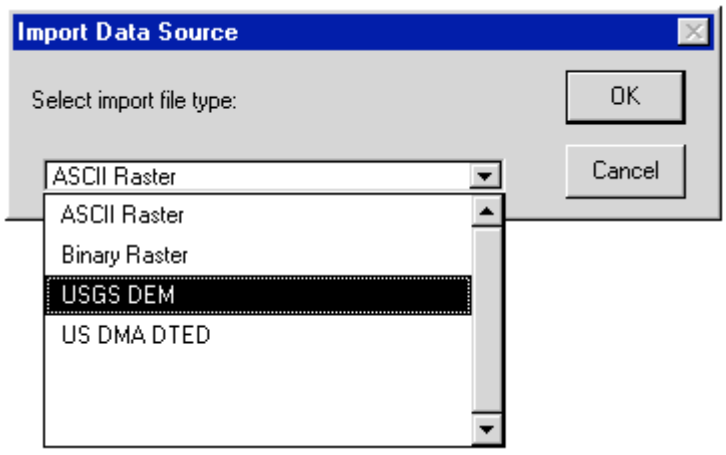
Only integer grids can be converted to polygon themes. At left you see a representation of a grid theme. At right is its representation after its conversion to a feature theme.

Using the AsPolygonFTab Avenue request, you can specify a second algorithm that makes the polygons with the stair-step effect. Polygon boundaries are created from the cell outlines. No smoothing, weeding, or generalization takes place

Concept

Import formats

Several standard file formats can be imported to create grids. The import process creates a grid dataset from the import file and asks whether you want to add the grid as a theme to your view.



With a view active, ASCII, Binary, USGS DEM, and US DMA DTED data may be imported by selecting Import Data Source from the File menu.

ArcView Spatial Analyst can import ASCII and binary format files to create grid datasets. This allows the transfer from other cell-based systems.

Digital elevation model (DEM) files in USGS format can be converted into grids. The input DEM file can be any standard USGS 7.5 minute, 1-degree, or any other file in USGS DEM format.

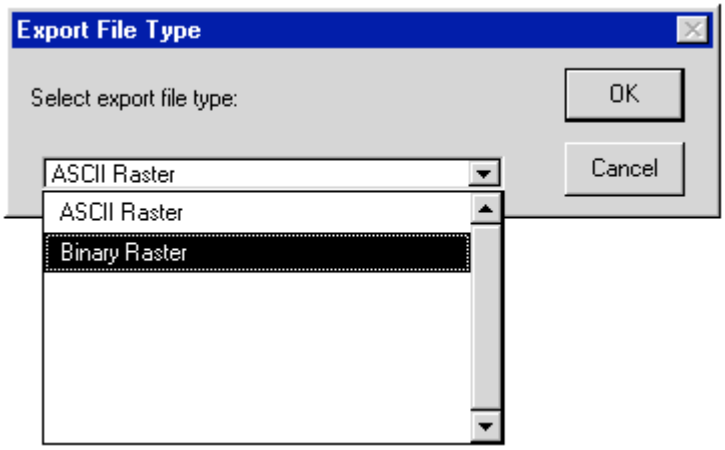
The USGS has digital terrain data for most regions in the United States. For more information, contact the USGS at National Cartographic Information Center, 507 National Center, Reston, VA 22092. The corresponding WWW site is at **http://nsdi.usgs.gov/nsdi/**.

US DMA (Defense Mapping Agency, now the National Imagery and Mapping Agency) Digital Terrain Elevation Data files can be converted to grids. Refer to military specification MIL-D-89020 for more information. The URL for the NIMA Web site is **http://www.nima.mil**

Concept

Export formats

Grid themes can be exported to ASCII or binary raster files. This is useful for transfer or exchange of data with other cell-based or raster software systems that do not support the ESRI grid dataset. These export files make exchanging data across networks simple and quick.



With a view active, grid themes may be exported to ASCII or binary raster files by selecting Export Data Source from the File menu.

The ASCII raster file contains a few lines of header data followed by lists of cell values. The header data includes the following: number of rows and columns, origin, cell size, and No Data value information.

The binary export creates two files: a floating point binary file and a supporting ASCII header file. The header file has an .hdr file extension and includes the following: number of rows and columns, origin, cell size, No Data value information, and the byte order of the binary values. If the grid dataset contains projection information, it will be stored in a third file that has .prj file extension.

Concept

Getting data

The purpose of the ArcData Publishing Program is to make high-quality data accessible to ESRI software users.

Geographic data from over 40 leading commercial data publishers offers you an unsurpassed collection of data, including business demographics, political geographies, satellite imagery, postal geocodes and boundaries, and environmental data. For example, available business data includes address, franchise, census, lifestyle, employment, transportation, crime, and other data.

ArcData is delivered in formats that are directly usable with ArcView, ArcCAD, PC ARC/INFO, and ArcInfo software. Basemap data for areas as large as the world and as small as a census block are available.

The ArcData catalog is your complete reference for geographic data in formats compatible with ESRI software. With more than 150 pages of information, the ArcData catalog summarizes the many diverse datasets available through the ArcData Publishing Program. This document provides instructions for downloading or ordering the ArcData catalog. The Web Edition of the ArcData catalog is accessible from the ESRI Web page at **http://www.esri.com/data**.

To order an ArcData catalog or some data, contact ESRI at 1-800-GIS-XPRT (1-800-447-9778).

Through the Geography Network Web site (**http://www.geographynetwork.com**), you can access many types of geographic content, including live maps, downloadable data, and more advanced services. The Geography Network provides access to the latest information available directly from the source.

Exercise

Import and convert data to grids

In this exercise, you will convert a USGS digital elevation model (DEM) into a grid theme. DEMs contain sample points of elevation. You will use the Compute Hillshade function to visualize the new theme.

If you have not downloaded the exercise data for this module, you should download the data now.

Step 1 Start ArcView

Start ArcView and load the Spatial Analyst extension.

Note: If you are running ArcView GIS 3.1, you see a Welcome to ArcView GIS dialog.

Click Cancel to close this dialog.

If ArcView is already running, close any open projects.

Step 2 Open the project

From the File menu, choose Open Project. Navigate to the **gridsa\lesson3** directory and open the project **l3_ex04.apr**.

Note: If you are running ArcView GIS 3.1, you see an Update l3_ex04.apr message box. Click No to dismiss this box.

When the project opens, you see an empty Mt. Whitney view.

Step 3 Import a DEM to a grid

From the File menu, choose Import Data Source.

In the Import File Type dropdown list, choose USGS DEM and click OK.

In the Import dialog, navigate to the **gridsa\lesson3** directory and select the file **whitney.dem**. Click OK.

In the Output Grid dialog, navigate to the **gridsa\lesson3\work** directory and name the new grid **whitney**.

The whitney.dem file is converted to a grid and stored in the work directory.

When prompted to add the grid as a theme to the view, click Yes. Turn on the whitney theme and make it active.

REVIEW CONCEPT

Step 4 Visualize the theme

To get a better visualization of the mountains, from the Surface menu, choose Compute Hillshade. Click OK to accept the Hillshade settings and then turn on the Hillshade theme.

Step 5 Close the project

Close the project without saving any changes.

You have completed this exercise

Summary

In this lesson, you learned how ArcView Spatial Analyst stores and manages grid themes. Grids are stored in a workspace, each containing one info directory. Each grid is a subdirectory within the workspace. The grid subdirectories contain data files about the grid. The grid data structure is based on a transparent tile-block structure. You should use the Source Manager to copy, delete, and rename grid datasets. Do not use operating system commands to perform these tasks.

Grid themes have properties including source directory, cell size, row and column, grid extent, type and status. Grids can be temporary or permanent. Temporary grids result from spatial analysis and map queries.

Grids can be created or exported to and from a variety of data sources. Feature and image themes can be converted to grids. ArcView Spatial Analyst can create grids from ASCII, Binary, USGS DEM and USDMA DTED files. ArcView Spatial Analyst can export to ASCII or binary raster files. Integer grid themes can converted to polygon shapefiles.

Sources for data include the ArcData publishing program, ArcData providers, and DataHound

This is the **Understanding the ArcView Spatial Analyst Grid Model - Lesson 3 Self test**.
Please watch your time—you have 2 hours to complete this test.

Use the knowledge you have gained in *Understanding the ArcView Spatial Analyst Grid Model* to answer the following questions. You will need to correctly answer 7 of the following questions to pass.

Netscape Users: Do not resize this browser window. This can cause the page to reload and generate new questions.

GOOD LUCK!

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1. Integer grid values are stored as four-byte integers (long integers).
   - True
   - False

2. A tile is divided into squares known as blocks.
   - True
   - False

3. Both integer and floating point grids are compressed using adaptive run-length encoding.
   - True
   - False

4. Grids are stored within a workspace directory.
   - True
   - False

5. You should not use your operating system to move, copy, or delete grid sets.
   - True
   - False

6. What is the maximum number of tiles in a grid?

- 999 x 999
- 9,999 x 9,999
- 40,000 x 40,000 cells
- 4,000,000 x 4,000,000

7. ArcView Spatial Analyst can import grids from ASCII or binary raster files, USGS DEMs, and U.S. DMA DTED files.
   - True
   - False

8. ArcView Spatial Analyst can export grids to ASCII or binary raster files, USGS DEMs, and U.S. DMA DTED files.
   - True
   - False

9. Which of the following is never found in a grid subdirectory?
   - Blk.adf
   - Hdr.adf
   - Prj.adf
   - Dblbnd.adf

10. What is the maximum size for a tile in a grid?
    - 40,000 x 40,000 cells
    - 400,000 x 400,000 cells
    - 4,000,000 x 4,000,000 cells
    - 4,000,000,000 x 4,000,000,000 cells

Calculate My Grade