

Streamlining Geoprocessing with ModelBuilder

Jennifer Kuntz
ESRI – St. Louis
May 2008

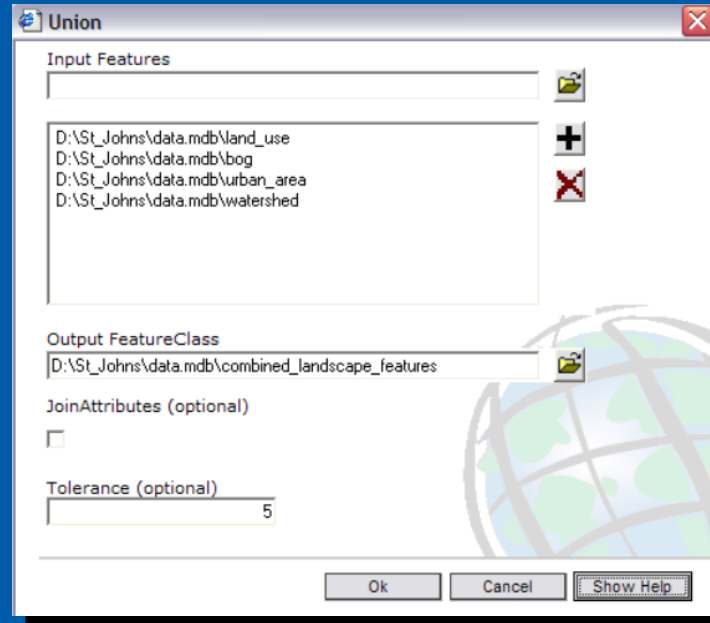
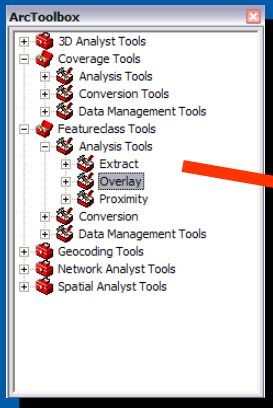
Topics

- Geoprocessing
- Navigating ArcToolbox
- Using ModelBuilder
- Learning More

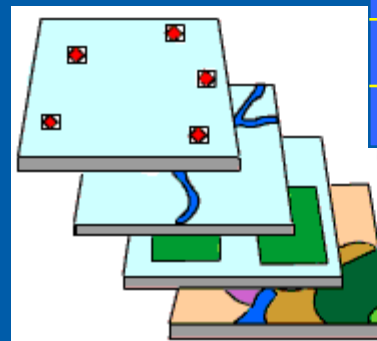
Geoprocessing

Geoprocessing

Data + Function = Data



Input



Well type	Drilled
Building owner	Smith
Soil type	Sandy

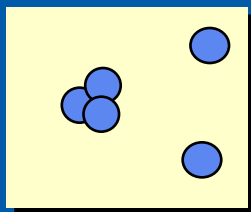


Output

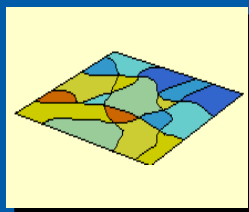
An Operation Used to Manipulate GIS Data

Analysis capabilities in ArcGIS Desktop

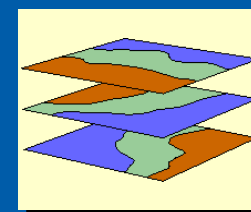
Point pattern analysis



Single-layer operations



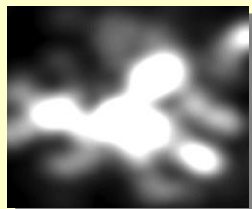
Multiple-layer operations



Core Functionality

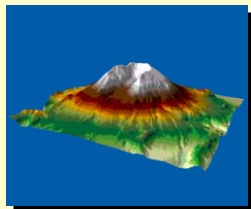
Extensions

Raster analysis



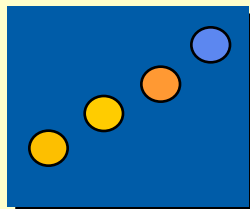
Spatial Analyst

Surface analysis



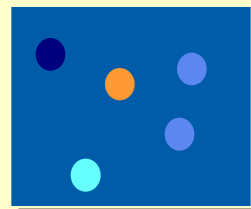
3D Analyst

Temporal analysis



Tracking Analyst

Geostatistical analysis



Geostatistical Analyst

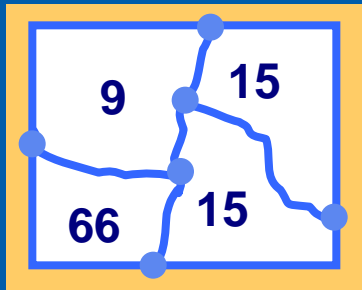
Business analysis



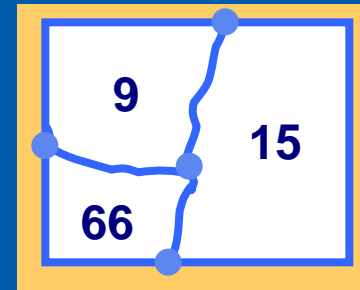
Business Analyst

Dissolving Features

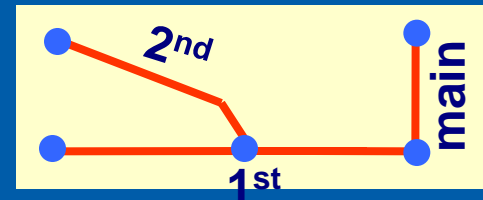
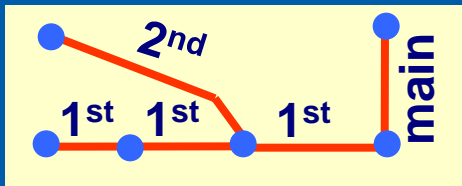
- Simplify data based on common attribute values



Input features with attribute values

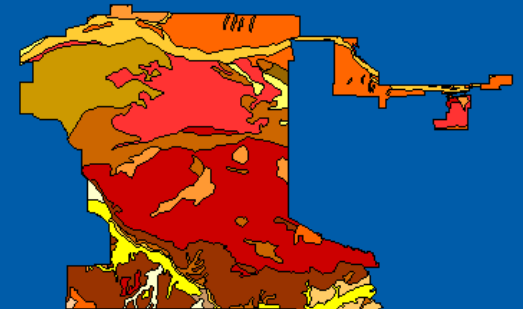
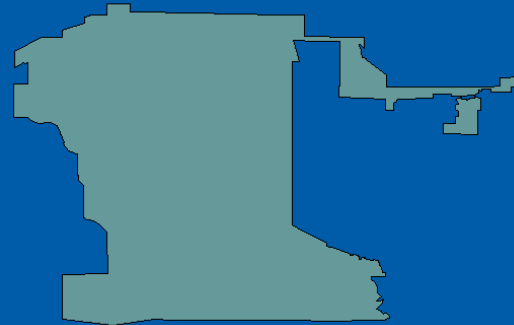
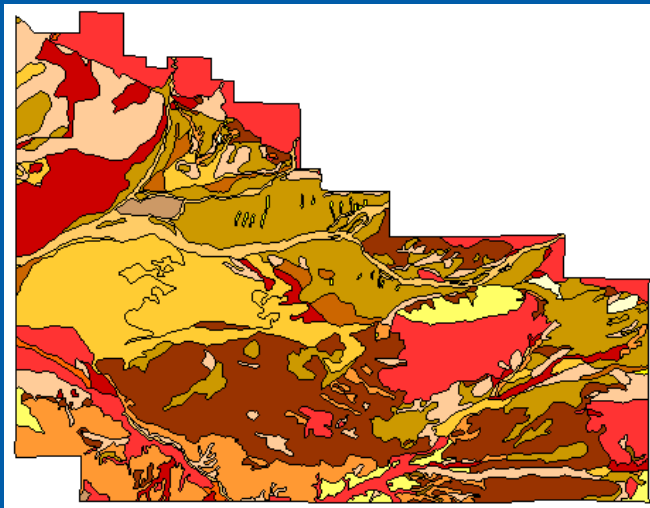


Fewer output features with attribute values



Clipping Features

- Use one feature class to define the boundary of another



Scalable Geoprocessing Functions

ArcInfo 269 Tools at 9.2

Plus more coverage tools

**ArcEditor 208 Tools at
9.2**

**Can also write to all other
GDB types**

ArcView 183 Tools at 9.2

**Write to file geodatabase,
pGDB or .shp**

Additional Extension Tools

3D Analyst Tools

Spatial Analyst Tools

Geostatistical Analyst

Tools...

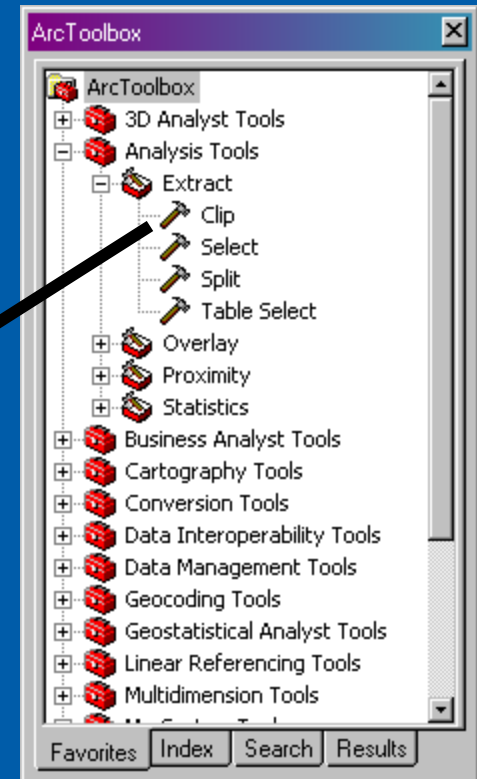
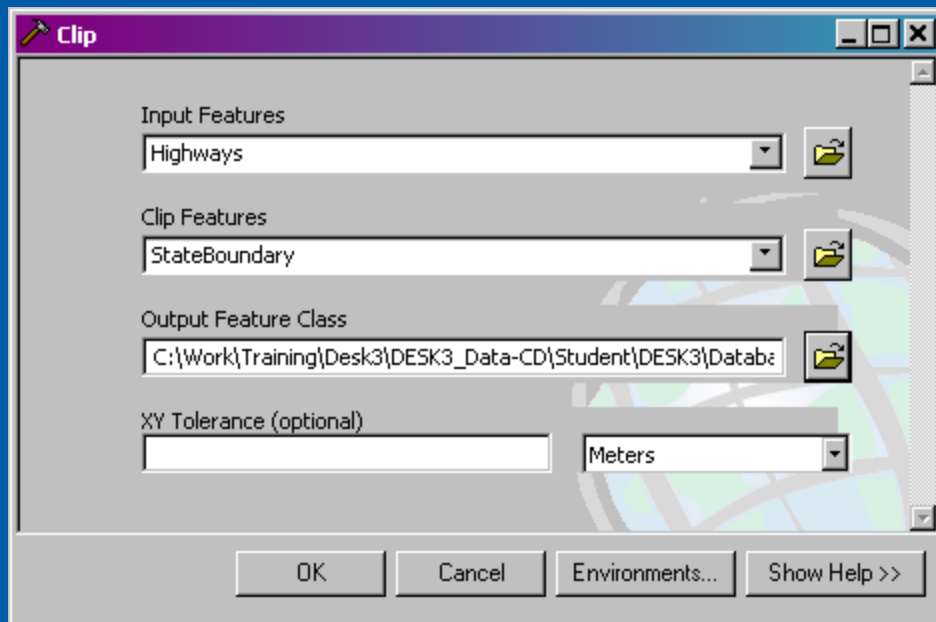
How Do I Know Which Tools Are Available to Me?

- ArcInfo licenses have access to all geoprocessing tools
- ArcView or ArcEditor users can choose to see only the tools available or to see “locked” tools
- ArcGIS Desktop Help
 - “Licensing for Geoprocessing Tools” topic
 - ArcGIS 9 Geoprocessing Commands Quick Reference Guide (.pdf)

Navigating ArcToolbox

ArcToolbox Window

- Available in ArcCatalog and ArcMap
- Geographic processing functions
 - Data management, analysis, and conversion
 - Your Custom Tools



Geoprocessing Interfaces

Scripting

Dialogs

ModelBuilder

ArcObjects
.NET, VB, Visual C++

```
PythonWin - [shp2gdb_batch.py]
File Edit View Tools Window Help
# David Maguire, 5/27/03 SHP->GDB
import win32com.client, sys, os, string

pGP = win32com.client.Dispatch("esriGeoprocessing.GPDispatch.1")
pGP.workspace = "C:\\Student\\WNAN\\Database\\OrangeCountyDta\\SuitabilityLayers"

# Get a list of shapefiles in the workspace
fcs = pGP.listfeatureclasses("", "all")

# Store path to the output geodatabase
gdbpath = "C:\\Student\\WNAN\\Database\\OrangeCounty.mdb"

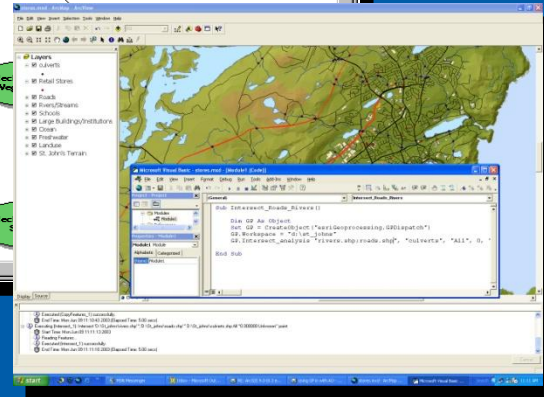
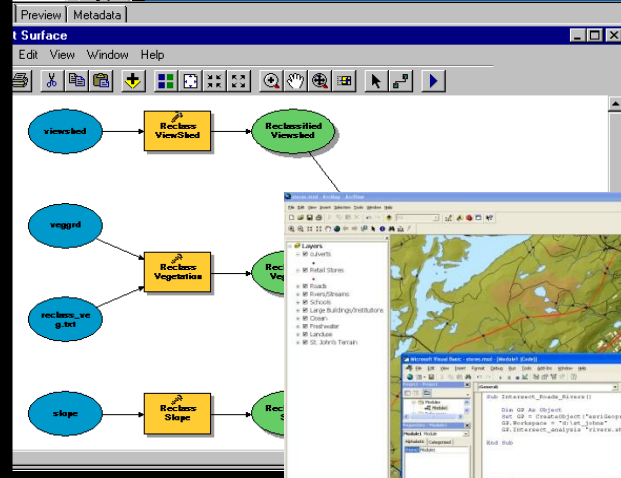
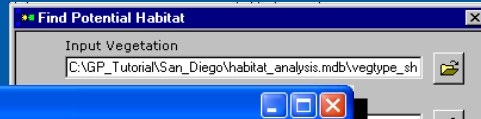
# For each shapefile in the list
fc = fcs.next()

while fc != "":
    # Set the outputname for each shapefile to be the same as the input
    outputname = fc

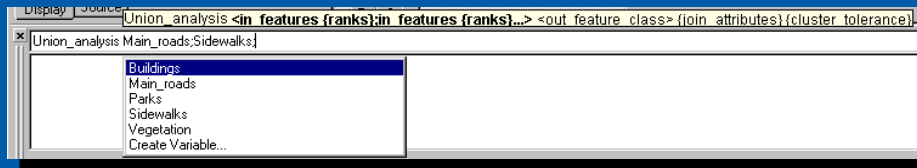
    # For each:
    # Give each:
    pGP.CopyFeatures(pGP.workspace + "\\ " + fc, os.path.splitext(outputname) [0])
    fc = fcs.next()

Ready 00001 001
```

Python, JScript, VBScript



Commands



... Shared Tools, Scripts, and Models

Geoprocessing Tip:

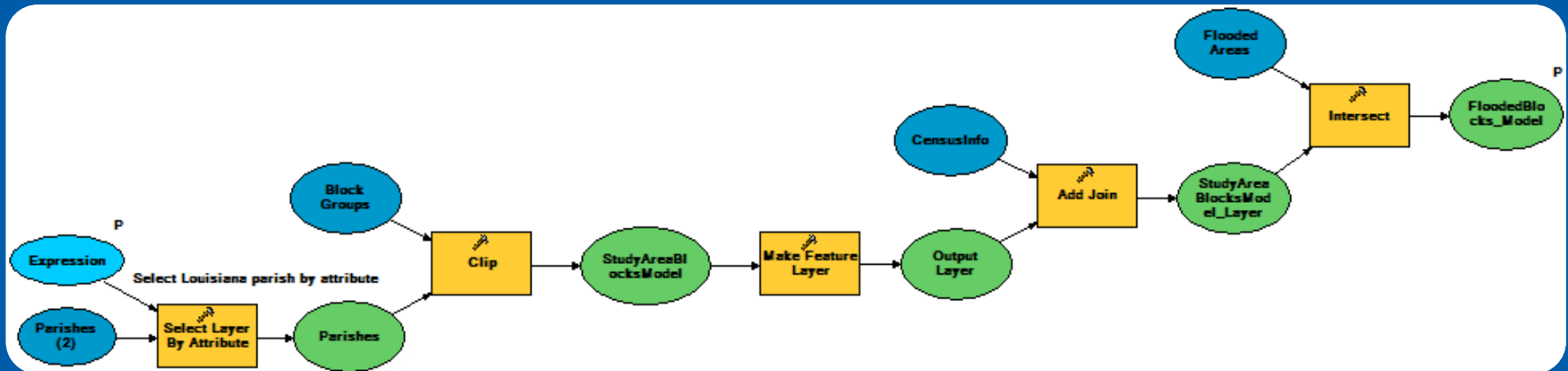
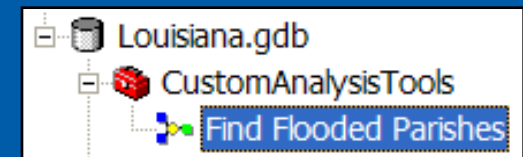
Sometimes it is faster to use a tool than it is to do a task through the User Interface!

- Examples
 - Deleting Multiple Fields
 - Tagging Point Features with Attributes from a Polygon

Creating Models with Model Builder

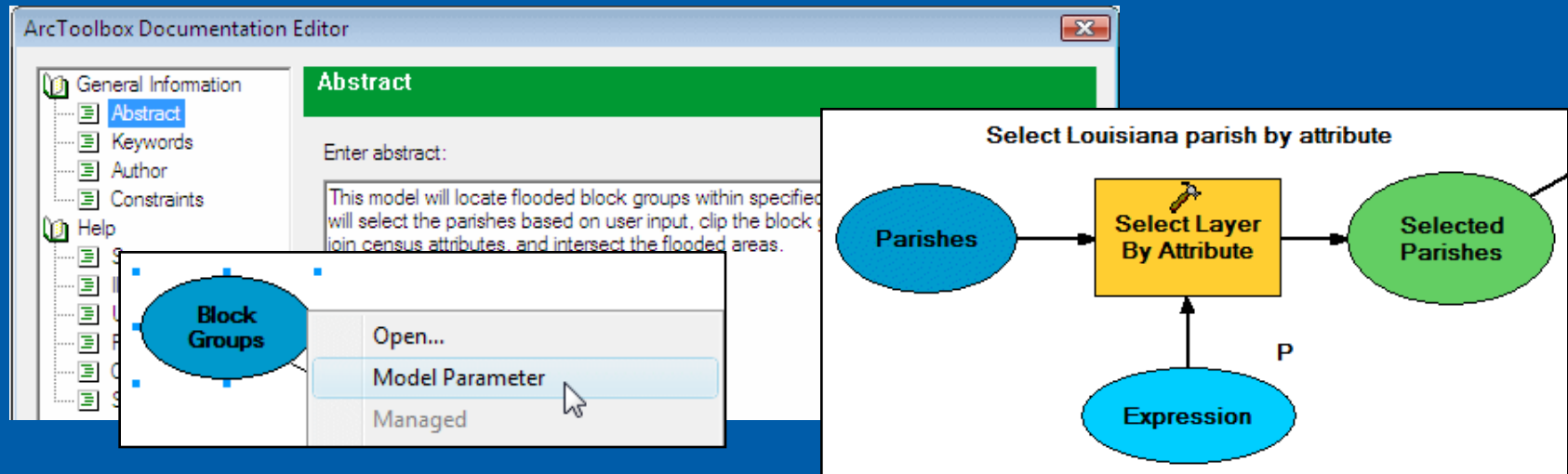
What is ModelBuilder?

- Application for creating geoprocessing models
- Allows for creation of flowcharts you can process
- Streamlines and automates analysis workflows
- Models stored in custom toolboxes



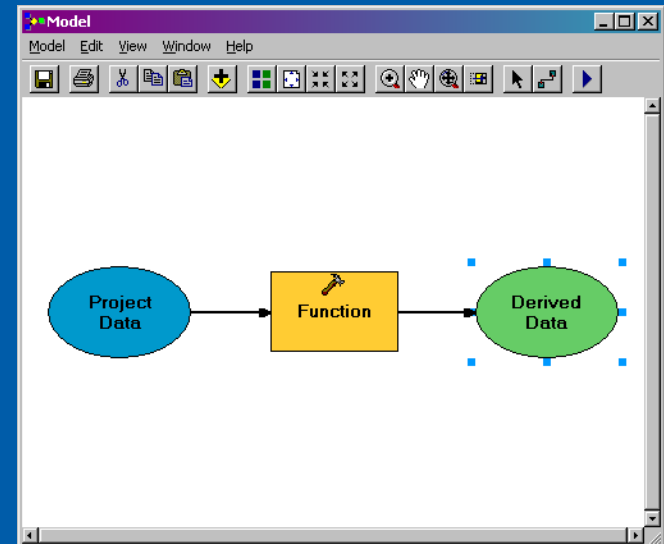
Why use ModelBuilder for analysis?

- Automate and manage geoprocessing tasks
- Run complex succession of processes as one tool
- Plug in additional tools and parameters as needed
- Manage intermediate data
- See visual representation of analysis operations



Model Elements

- **Input Data:** data that exists before model is run
 - Blue Oval
- **Tool:** operation performed on input data
 - Yellow-orange Rectangle
- **Derived Data:** output data created by a function
 - Green Oval
- **Process:** Set of elements
 - Run one process at a time or all at once



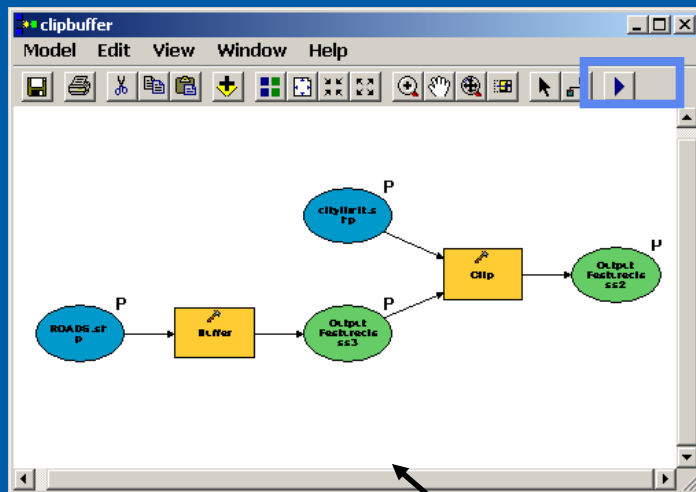
Constructing a Model

- Drag and drop tools from toolbox and data from ArcCatalog
- Connect the data to the tool
- Modify the settings of the tool

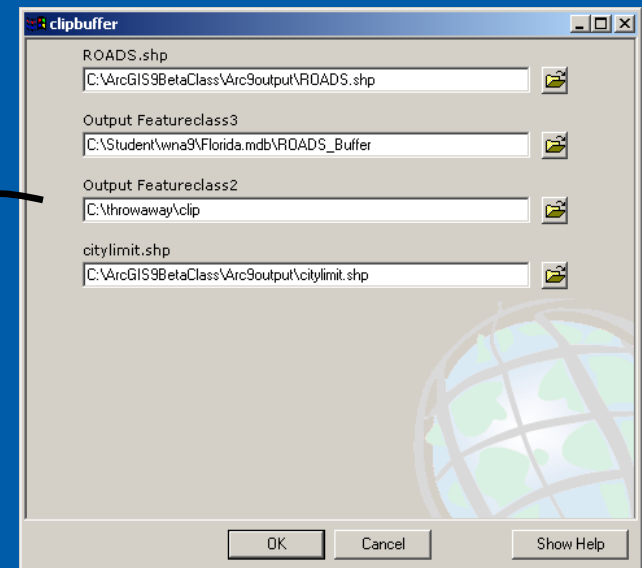
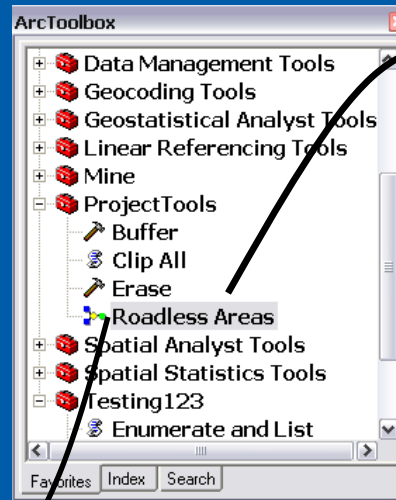
The image displays the ArcGIS interface for building a model. On the left, the ArcCatalog window shows a tree view of data sources, with 'street' selected under the 'transportation' folder. In the center, the Buffer tool dialog is open, showing 'street' as the input feature. On the right, the ArcToolbox window is visible, with the Buffer tool highlighted. Below these, two Model Builder windows are shown. The first window shows a single blue oval labeled 'street'. The second window shows a complete workflow: a blue oval labeled 'street' is connected to a yellow rectangular tool labeled 'Buffer', which is then connected to a green oval labeled 'Output Feature'. A blue banner at the bottom of the second Model Builder window reads 'Ready to Run'. At the very bottom, the 'OK', 'Cancel', 'Apply', and 'Show Help' buttons are visible.

How to Execute Models

- Run from Model Builder
- Run a single process from Model Builder
- As a tool from toolbox



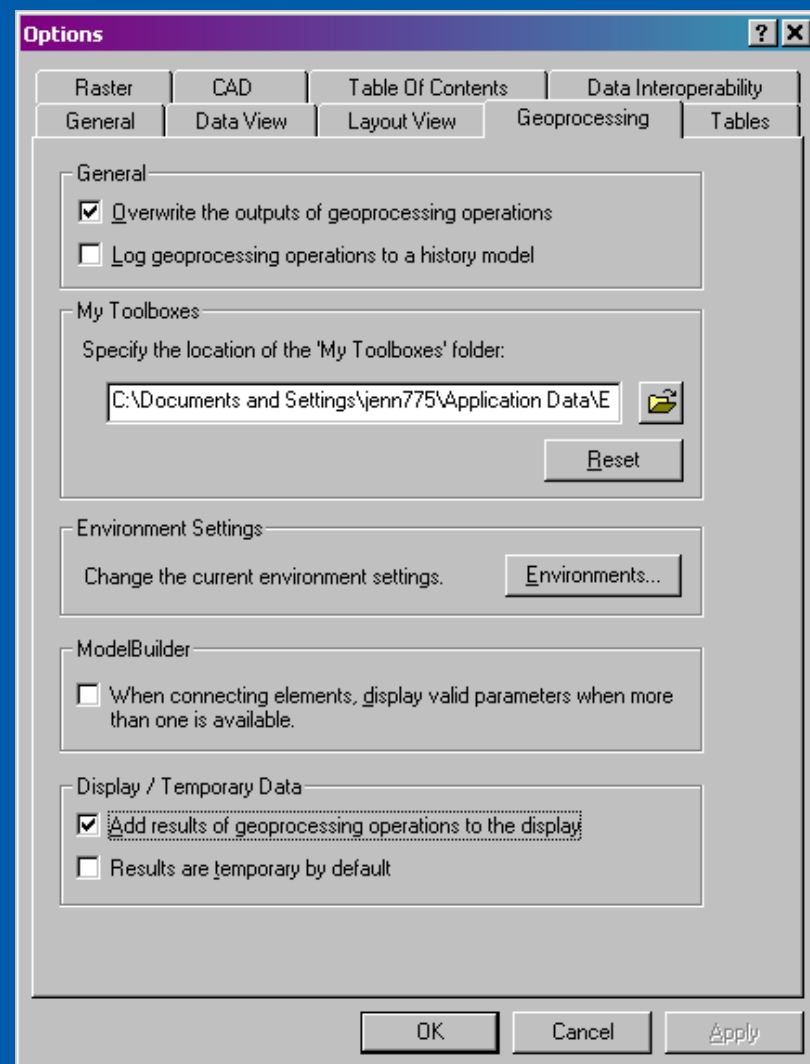
Edit



Execute

Geoprocessing Tip:

You can control whether ArcGIS Desktop allows overwriting of geoprocessing outputs.
(Tools > Options)

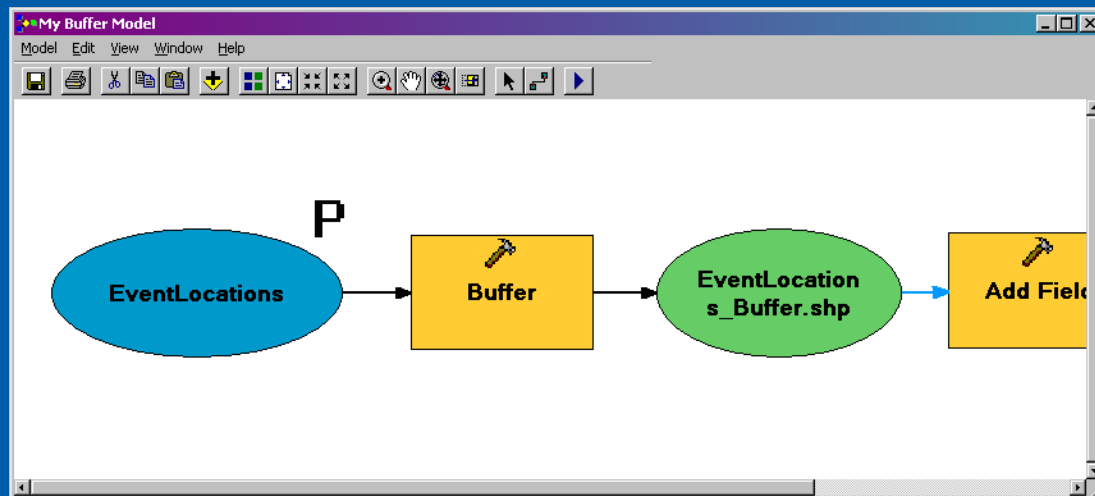


Demonstration: Building a Model – the Basics

Enhancing a Model

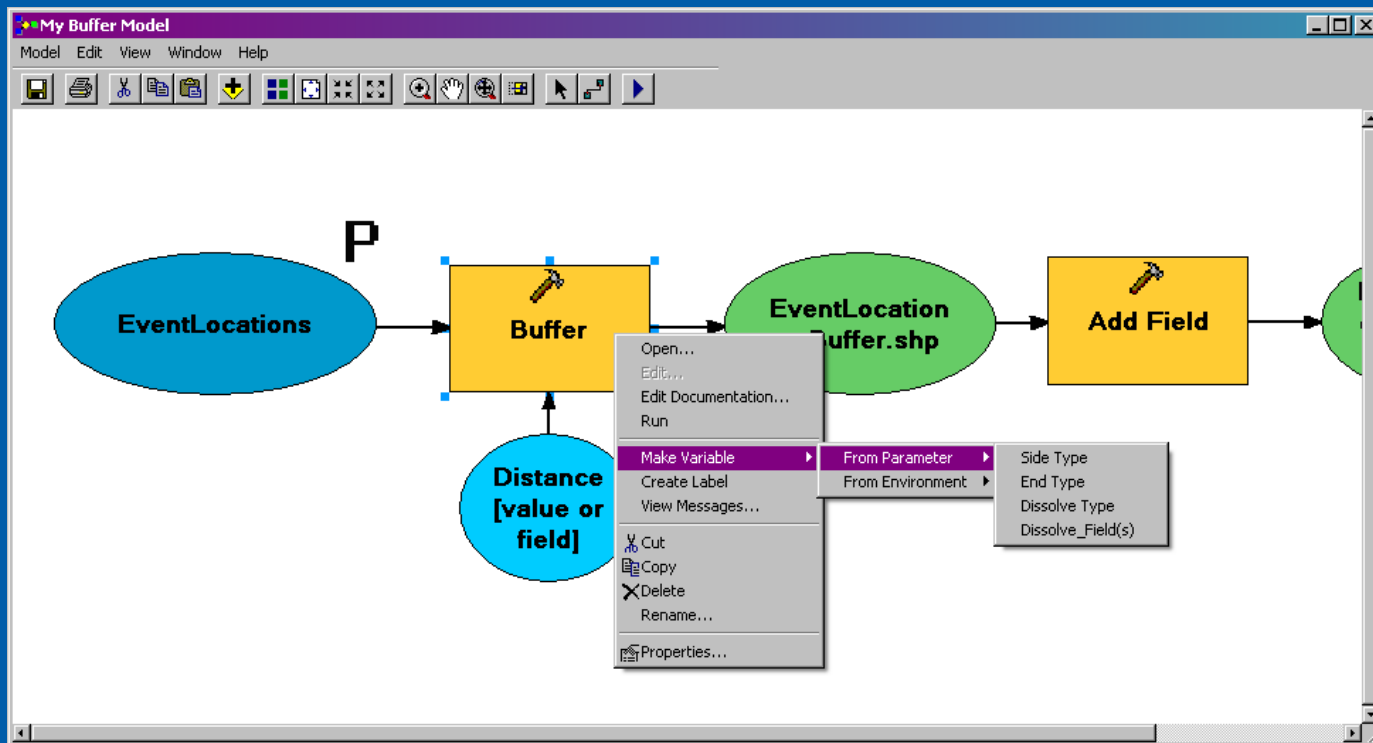
Model Parameters

- Allow for User Input
- Are Used when Running Model as Dialog
- Can Create a Data Independent Tool



Variables in Models

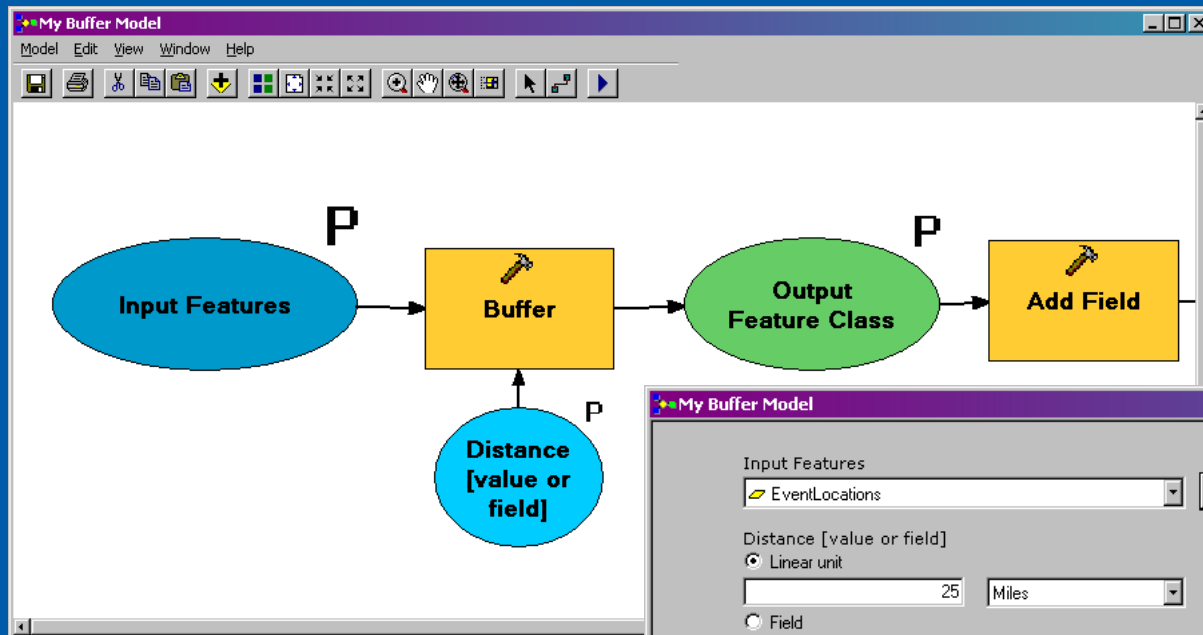
- Can be Parameters or Environment Settings
- Share Value between Processes
- Allow for User Input



Intermediate Data

- Outputs are set to Intermediate by Default
- Use context menu to change setting
- Intermediate data **is not** deleted when models are run from ModelBuilder window
- Intermediate data **is** deleted when models are run from a dialog box or the command line

Edit Text on Model Elements to Control Text on Dialog

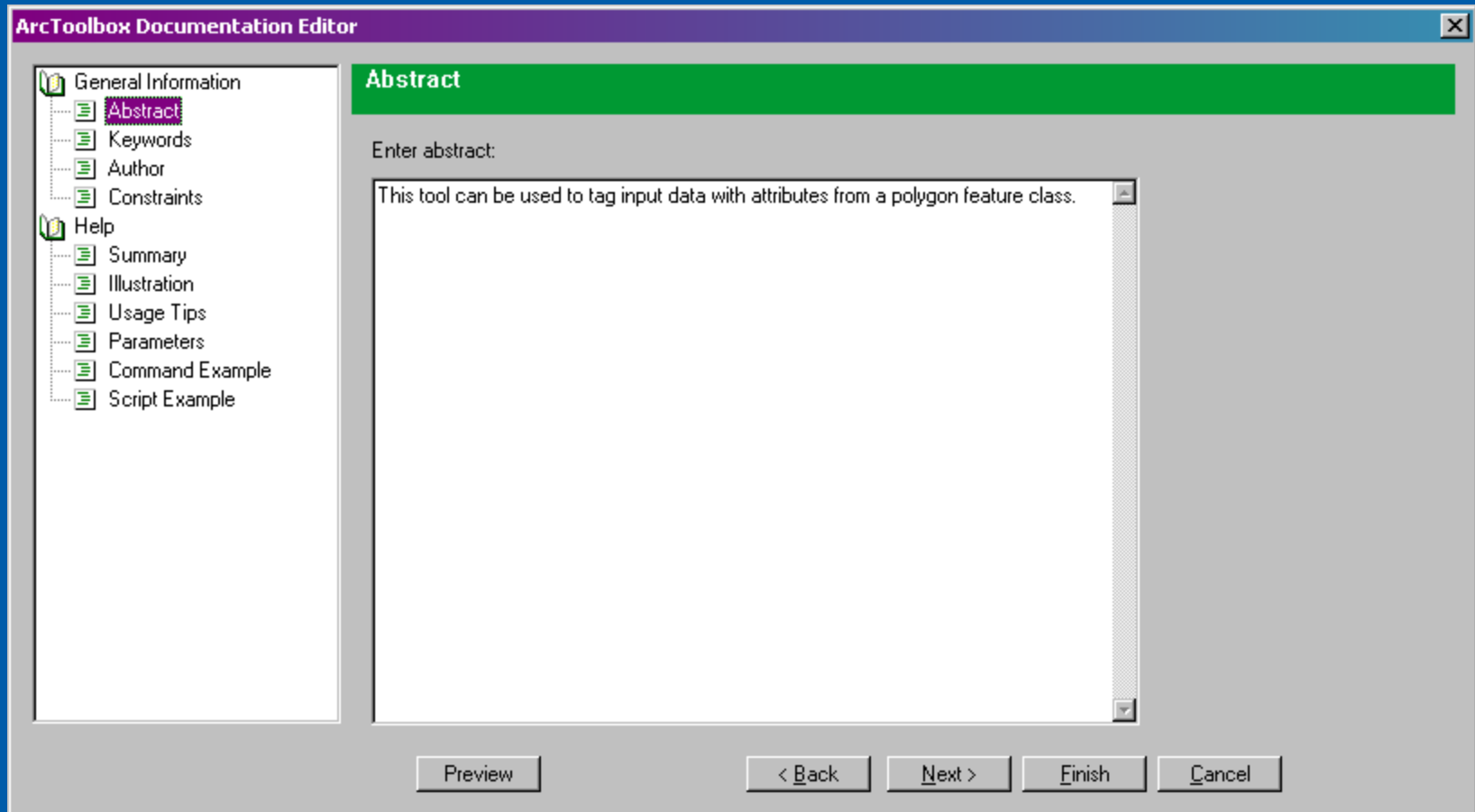


The dialog box is titled 'My Buffer Model' and contains the following settings:

- Input Features:** EventLocations
- Distance [value or field]:**
 - Linear unit
 - 25 Miles
 - Field
- Output Feature Class:** D:\Work\Presentations\Analysis_ModelBuilder\Data_for_Exa

Buttons at the bottom: OK, Cancel, Environments..., << Hide Help

Documenting a Model



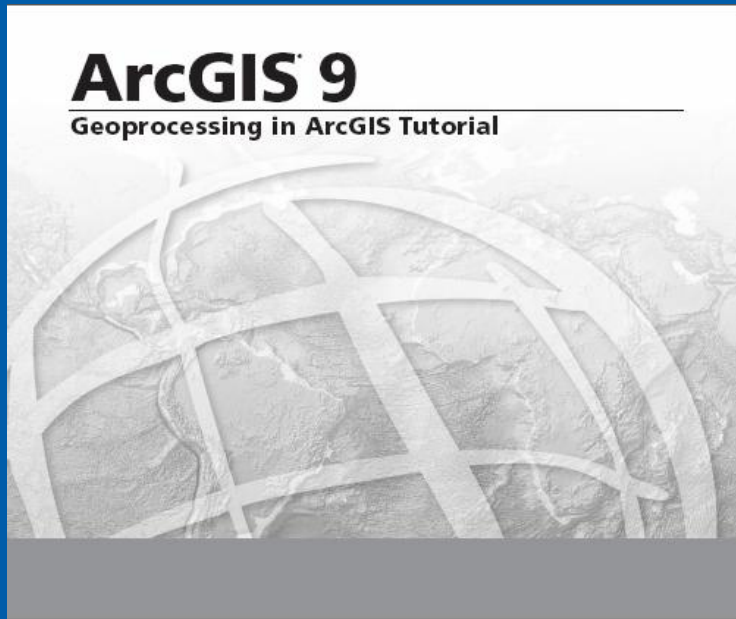
Sharing a Model

- Toolboxes are stored in .tbx files
 - C:\Documents and Settings\\Application Data\ESRI\ArcToolbox\My Toolboxes
- List appears in ArcCatalog
- Be sure recipients have access to all data
- Can set data paths as relative to toolbox (Model Properties)

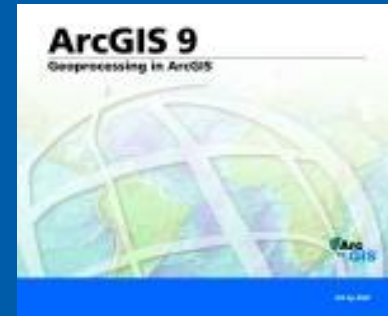
Demonstration: Enhancing a Model

Learning More

Geoprocessing



C:\Program Files\ArcGIS\Documentation



Book in the Box

Geoprocessing Using ModelBuilder

ESRI Training and Education - Catalog: : Geoprocessing Using ModelBuilder - Windows Internet Explorer

http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=844

ESRI Training and Education - Catalog: : Geopr...

ESRI Training and Education Learn from the World Leader in GIS

Home Course Catalog My Training Library ESRI Press

Welcome, Jennifer Learning Center Locations Types of Training Help Edit Global Account Logout

Home > Course Catalog > Course Description

Geoprocessing Using ModelBuilder

60 minutes TS Authorized by ESRI

[Viewing Requirements](#)

Overview

Geoprocessing is an essential aspect of GIS that provides the ability to analyze and process geographic data. Geoprocessing tools can be accessed in ArcGIS via dialog boxes, the command line, multipart scripts, or visual workflow models. ModelBuilder provides a graphical modeling framework for designing and implementing geoprocessing models that can include system tools, scripts, models, and data. This seminar discusses how ModelBuilder can be used to create advanced procedures and workflows.

The presenter will discuss:

- Creating, editing, and running models
- How to make models more dynamic by exposing model parameters and working with environment settings and variables
- Validating, repairing, and documenting models to share with others

Course Purchase

This is a FREE course.

[TRY IT NOW](#)

[VIEW MY ORDER](#)

- [How do I register for Self-Study Virtual Campus courses?](#)
- [Payment options](#)
- [Pricing for training](#)

Print and Share

- [Printer-friendly description](#)
- [E-mail a friend](#)
- [Bookmark this page](#)

“Not only did I learn how to use ModelBuilder, but I also picked up a few tricks for using ArcToolbox.”

Ryan Bowe, Kentucky

Internet 100%

Getting Started with Scripting in ArcGIS 9

The screenshot shows a Windows Internet Explorer browser window displaying the ESRI Training and Education website. The browser's address bar shows the URL: http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=815. The website header includes the ESRI logo and the text "ESRI Training and Education Learn from the World Leader in GIS". Navigation tabs include Home, Course Catalog, My Training, Library, and ESRI Press. A user is logged in as Jennifer, with a "Welcome, Jennifer" message and links for Learning Center Locations, Types of Training, Help, Edit Global Account, and Logout. The main content area displays the course title "Getting Started with Scripting in ArcGIS 9" with a duration of 60 minutes, a "TS" icon, and a camera icon. It is authored by ESRI. A "Viewing Requirements" section is visible. The "Overview" section contains the following text: "Many GIS users are familiar with scripts and the benefits they provide, including being able to automate everyday tasks. Each generation of ESRI software provides a scripting environment: ArcInfo Workstation offers AML; ArcView 3.x offers Avenue; and ArcGIS 9 now offers a scripting environment that can use a variety of scripting languages like VBScript, Python, JScript, and Perl. In this training seminar, participants learn exactly what can be accomplished within the ArcGIS 9 scripting environment. All examples and demonstrations will use Python." On the right side, there is a "Course Purchase" section stating "This is a FREE course." with buttons for "TRY IT NOW" and "VIEW MY ORDER". Below this are links for "How do I register for Self-Study Virtual Campus courses?", "Payment options", and "Pricing for training". A "Print and Share" section includes links for "Printer-friendly description", "E-mail a friend", and "Bookmark this page". The browser's status bar at the bottom shows "Internet" and "100%" zoom.

Instructor-Led Training

The screenshot shows a web browser window displaying the ESRI Training and Education Course Catalog search results. The search term is 'modelbuilder' and the results are filtered to 'All Software'. Five instructor-led courses are listed, each with a price and a 'Go to schedule' link.

ESRI Training and Education Learn from the World Leader in GIS

Home | Course Catalog | My Training | Library | ESRI Press

Welcome, Jennifer | [Learning Center Locations](#) | [Types of Training](#) | [Help](#) | [Edit Global Account](#) | [Logout](#)

Home > Course Catalog > Search Results

Search Results

You searched for with [New Search](#)

5 courses found. [View Entire Catalog](#)

View Instructor-Led [5] View Self-Study **Sort:** Relevance * | [A-Z](#) | [Price](#)

ArcGIS Desktop III: GIS Workflows and Analysis IL Instructor-Led (Classroom)	\$980.00 USD Go to schedule
Advanced Analysis with ArcGIS IL Instructor-Led (Classroom)	\$1,470.00 USD Go to schedule
Introduction to ArcGIS Business Analyst IL Instructor-Led (Classroom)	\$980.00 USD Go to schedule
Working with ArcGIS Spatial Analyst IL Instructor-Led (Classroom)	\$1,470.00 USD Go to schedule
Writing Advanced Geoprocessing Scripts Using Python IL Instructor-Led (Classroom)	\$1,470.00 USD Go to schedule

[Home](#) | [Course Catalog](#) | [My Training](#) | [Library](#) | [ESRI Press](#)

[Send Web Site Comments](#) | [Copyright © ESRI](#) | [PRIVACY](#) | [Legal](#) | [Careers](#)

Questions?