Automating Geodatabase Creation with Geoprocessing
Russell Brennan
Ian Wittenmyer
Assumptions

• Geodatabase fundamentals

• Experience with geoprocessing (GP)

• Understanding of geodatabase design
Agenda

- Geodatabase creation options
- Geoprocessing review
- Schema creation in ModelBuilder
- Making model tools
- Using Python
- Making schema changes
- Enterprise considerations
Geodatabase Creation Options
Schema Creation Options

Pros vs Cons

- ArcMap/ArcCatalog wizards
- Data Models (Solutions/Templates)
- UML
- Geoprocessing
Geoprocessing Review
What is geoprocessing?

• **Suite of tools**
  - Over 1000 tools and functions
  - Analysis
  - Data conversion
  - Dataset creation

• **Framework**
  - Link tools together (ModelBuilder)
  - Share/publish
  - Script and customize
ModelBuilder

- Create, edit and manage models
- Re-run workflows
- Visual programming language
Model Elements
What tools should I use?

- Look in Data Management toolbox
- Many tools to create geodatabase objects
ModelBuilder Review

Discover tools
Renaming model elements
Creating basic schema
Pop-ups for gathering info
Schema Creation
What is schema?
Getting started…

Violations (table related to inspections via InspectionID Field

- InspectionID, long
- ViolationType, long, subtype field

  - Subtypes:
    - 0 = Administration
    - 1 = General fire precautions
    - 2 = Fire Service features
    - 3 = Fire protection systems
    - 4 = Means of egress
    - 5 = Misc Violations ((Includes: Building services and systems (Fuel fired appliances), Fire resistance rated construction, Interior finish, decorative materials and furnishings))

- Comments
- Enable attachments for photos, videos etc
Model Tools
Model tools

• Built in tools = good but limited
• Model tools
  - Implement custom behavior
  - Group of tasks
  - Run like system tools
Why create model tools?

- Reduce clutter, improve readability
  - Fewer tools

- Reduce data entry
  - Fewer parameters to change
Growing pains
Organizing your tools
Turning models into model tools

• ‘Model parameter’
  - Allow tools to consume other tools
• Can be any parameter within the tool
• Input and output (derived) parameters
Creating a model tool
Creating a model tool

This tool has no parameters.
Creating a model tool
Creating a model tool
Creating a model tool

[Diagram showing steps to create a model tool]

- Workspace
- Feature Class Name
- Create Feature Class
- Add Field
- Output Feature Class
- OutputFC
- CreateFCModel

[Menu options for model parameters]
- Open...
- Model Parameter
- Managed
- Add To Display
- Intermediate
- Create Label
- View Messages...
- Cut
- Copy
- Delete
- Rename

- Output Feature Class
Creating a model tool
Creating a model tool
Creating a model tool
Organizing your models

- Organize your models into logical groups
  - Feature datasets
  - Departments in your organization
  - Applications you are building
  - Domains*
- Makes schema modular
Overriding Default Behavior

Tips and tricks
Overriding Default Behavior

Tips and tricks
Overriding Default Behavior

Tips and tricks
Overriding Default Behavior

Tips and tricks

• Geometry type = POINT
• Has Z = ENABLED
• Coordinate System = Web Mercator
Overriding Default Behavior

Tips and tricks
Overriding Default Behavior

Tips and tricks
Template Feature Class or Template Table

More tips and tricks

- Create feature class and Create table tools
- All template fields will be in the output
- Use when creating the same field/type in multiple tables/feature classes
Template Feature Class or Template Table

More tips and tricks
Schema Creation with Model Tools

Implement data model
Geodatabase behavior
Template Feature Class/Table
Model tools as sub models
Python
Script tools

- Get access to:
  - Programming logic
  - arcpy functions
  - Custom validation
Using Python for Geodatabase creation

- Improving user experience
- Focused functions
- Documentation
  - Reports
Reporting

• arcpy.List… , arcpy.Describe
• Examine contents of geodatabase
• Get information that is not reported through UI
  - Not easily returned from UI
Using a table to run a tool

• Look for:
  - Redundant info
  - Tools running multiple times
• Use cursors to loop through a table to get parameters.
Python
Table to fields
Reporting
Schema Changes
Data Modification
Schema Changes

• Over time your data model will change.
• Use additional models or scripts to push out updates.
• Deploy when appropriate.
Schema Changes

• Change documentation
• No recreating schema or reloading data
• Schedule changes via simple scripts
• Report on dependencies
Domain Report Tool
Domain Report Tool

Failed to delete a domain from the database. The domain is used as a default domain.

OK
import arcpy, os

# get parameters from the tool
ingdb = arcpy.GetParameterAsText(0)
outputDir = arcpy.GetParameterAsText(1)
outputName = arcpy.GetParameterAsText(2)

textFile = (outputDir + os.sep + outputName + ".csv")
f = open(textFile, "a")
f.write("FeatureClass + "," + "FieldName + "," + "FieldDomain + "\n")  # write headers

# get a list all Feature Classes in a geodatabase, including inside Feature Datasets
arcpy.env.workspace = gdb
fcs = []
for fds in arcpy.ListDatasets('', 'feature') + ['']:
    for fc in arcpy.ListFeatureClasses('', fds):
        fcs.append(os.path.join(fds, fc))

# based on the list of feature classes collected above, this will create a list of fields
# and the write out the feature class, field name and domain name.
for fc in fcs:
    fields = arcpy.ListFields(fc)
    for field in fields:
        # check to see if there is a value in the domain property, basically if string != "":
        if field.domain:
            f.write(fc + "," + field.name + "," + field.domain + "\n")
            arcpy.AddMessage("FC=(0) FieldName=(1) Domain=(2)".format(fc, field.name, field.domain))
f.close()
<table>
<thead>
<tr>
<th>FeatureClass</th>
<th>FieldName</th>
<th>FieldDomain</th>
</tr>
</thead>
<tbody>
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<td>GeometricNetworkcircuits_bkr_1</td>
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<tr>
<td>GeometricNetworkStreetLights_1</td>
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<tr>
<td>GeometricNetworkStreetLights_2</td>
<td>Status</td>
<td>StreetlightStatus</td>
</tr>
<tr>
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<td>Employee</td>
</tr>
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<tr>
<td>GeometricNetworkworkRequest_2</td>
<td>Employee</td>
<td>Employee</td>
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<td>Inspector</td>
<td>Employee</td>
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<tr>
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<tr>
<td>Representations</td>
<td>Inspector</td>
<td>Employee</td>
</tr>
</tbody>
</table>
Scheduling

- Important to reduce downtime.
- Simple to schedule using OS scheduler
Inline Variables in ModelBuilder

Tips and Tricks

• Use the contents of one variable as a substitute for another variable.
• Enclose the substituting variable in percent signs (%)
  - Eg: %Input Workspace%
• Dynamic
  - For schema creation they are essentially relative paths
• Example:
  - %InputWorkspace%\Street Centerlines
  - Gets evaluated as \Database Connections\LandUse_ian.sde\StreetCenterlines
Modifying Geodatabase

Inline variables
Scripting models
Schedule changes
Enterprise Geodatabases
Considerations for enterprise

- Creating Users
- Creating Roles
- Assigning Privileges
- Managing Versions
- Registering data as versioned
- Replicas
Limitations

- Create Network Datasets
- Create Parcel Fabrics
- Create Annotation
- Create Schematic Dataset
Final Thoughts

- Use model tools and python
- Make schema changes easily
- Use Python to report
- Geoprocessing creates full featured geodatabases
Other Sessions - Geoprocessing

• ModelBuilder: Branching, Iterating, and Other Advanced Methods
  - Tuesday, 15 Jul 2014, 1:30pm - 2:45pm
  - Location: Room 04
  - Wednesday, 16 Jul 2014, 3:15pm - 4:30pm
  - Location: Room 03

• Python: Building Geoprocessing Tools
  - Tuesday, 15 Jul 2014, 3:15pm - 4:30pm
  - Location: Room 05 B
  - Wednesday, 16 Jul 2014, 10:15am - 11:30am
  - Location: Room 05 B

• ModelBuilder: Tips and Tricks
  - Wednesday, 16 Jul 2014, 10:30am - 11:00am
  - Location: Demo Theater - Analysis and Geoprocessing Exhibit Hall B
Other Sessions - Geodatabase

• Geodatabase Administration: An Introduction
  - Tuesday, 15 Jul 2014, 1:30pm - 2:45pm
    - Location: Room 07 A/B
  - Wednesday, 16 Jul 2014, 1:30pm - 2:45pm
    - Location: Room 07 A/B

• Many other Geodatabase sessions can be found in the User Conference agenda
  - http://esriurl.com/ucagenda
Thank you...

- Please fill out the session survey:
  
  **First Offering ID:** 1189  
  **Second Offering ID:** 1410

  **Online** – [www.esri.com/ucsessionsurveys](http://www.esri.com/ucsessionsurveys)  
  **Paper** – pick up and put in drop box