Advanced Topics with ArcGIS Server

Eric Rodenberg, ESRI
Environmental Systems Research Institute, Inc.

Copyright © 1999–2007 ESRI All rights reserved. Printed in the United States of America.
The information contained in this document is the exclusive property of ESRI. This work is protected under United States copyright law and the copyright laws of the given countries of origin and applicable international laws, treaties, and/or conventions. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying or recording, or by any information storage or retrieval system, except as expressly permitted in writing by ESRI. All requests should be sent to Attention: Contracts Manager, ESRI, 380 New York Street, Redlands, CA 92373-8100, USA.

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

ESRI, ARC/INFO, ArcGIS, ArcView, BusinessMAP, MapObjects, PC ARC/INFO, SDE, and the ESRI globe logo are trademarks of Environmental Systems Research Institute, Inc., registered in the United States and certain other countries; registration is pending in the European Community. 3D Analyst, ADF, ARC COGO, the ARC COGO logo, ARC GRID, the ARC GRID logo, the ARC/INFO logo, AML, ARC NETWORK, the ARC NETWORK logo, ArcNews, ARC TIN, the ARC TIN logo, ArclInfo, the ArclInfo logo, ArclInfo LIBRARIAN, ArclInfo—Professional GIS, ArclInfo—The World's GIS, ArcAtlas, the ArcAtlas logo, the ArcCAD logo, the ArcCAD WorkBench logo, ArcCatalog, the ArcData logo, the ArcData Online logo, ArcDoc, ARCEDIT, the ARCEdit logo, ArcEurope, the ArcEurope logo, ArcEditor, the ArcExplorer logo, ArcExpress, the ArcExpress logo, ArcFM, the ArcFM logo, the ArcFM Viewer logo, ArcGIS, ArcIMS, the ArcIMS logo, ArcLogistics, the ArcLogistics Route logo, ArcMap, ArcObjects, ArcPad, the ArcPad logo, ARCPLOT, the ARCPLOT logo, ArcPress, the ArcPress logo, the ArcPress for ArcView logo, ArcScan, the ArcScan logo, ArcScene, the ArcScene logo, ArcSchool, ArcSDE, the ArcSDE logo, the ArcSDE CAD Client logo, ArcSdl, ArcStorm, the ArcStorm logo, ArcSurvey, ArcToolbox, ArcTools, the ArcTools logo, ArcUSA, the ArcUSA logo, ArcUser, the ArcView GIS logo, the ArcView 3D Analyst logo, the ArcView Business Analyst logo, the ArcView Data Publisher logo, the ArcView Image Analysis logo, the ArcView Internet Map Server logo, the ArcView Network Analyst logo, the ArcView Spatial Analyst logo, the ArcView StreetMap logo, the ArcView StreetMap 2000 logo, the ArcView Tracking Analyst logo, ArcVoyager, ArcWorld, the ArcWorld logo, Atlas GIS, the Atlas GIS logo, AtlasWare, Avenue, the Avenue logo, the BusinessMAP logo, DAK, the DAK logo, DATABASE INTEGRATOR, DBI Kit, the Digital Chart of the World logo, the ESRI Data logo, the ESRI Press logo, ESRI—Team GIS, ESRI—The GIS People, FormEdit, Geographic Design System, Geography Matters, GIS by ESRI, GIS Day, the GIS Day logo, GIS for Everyone, GISData Server, InsiteMAP, MapBeans, MapCafé, the MapCafé logo, the MapObjects logo, the MapObjects Internet Map Server logo, ModelBuilder, MOLE, the MOLE logo, NetEngine, the NetEngine logo, the PC ARC/INFO logo, PC ARCEDIT, PC ARCPLOT, PC ARCSHELL, PC DATA CONVERSION, PC NETWORK, PC OVERLAY, PC STARTER KIT, PC TABLES, the Production Line Tool Set logo, RouteMAP, the RouteMAP logo, the RouteMAP IMS logo, Spatial Database Engine, the SDE logo, SML, StreetEditor, StreetMap, TABLES, The World's Leading Desktop GIS, Water Writes, and Your Personal Geographic Information System are trademarks; and ArcData, ArcOpen, ArcQuest, ArcWatch, ArcWeb, Rent-a-Tech, Geography Network, the Geography Network logo, www.geographynetwork.com, @esri.com, and www.esri.com are service marks of ESRI.

The names of other companies and products herein are trademarks or registered trademarks of their respective trademark owners. ArcView GIS uses Neuron Data’s Open Interface.
Browser Based Editing
Session Overview

- **Web Editing**
  - Web-based editing capabilities in 9.2
  - Creating a web application that supports Editing
  - Using the web-editor task

- **Creating a Geoprocessing Task**
- **Publishing a Geoprocessing Task**
- **Geodata Replication**
- **Clip Zip and Ship**
Web Editing

• New at ArcGIS 9.2

• Available with ArcGIS Server Advanced Workgroup and Enterprise Editions
Web Editing Capabilities

- Edit ArcSDE Geodatabase features and attributes
- Versioned and Non-Versioned Data
- The Editing Task tools include
  - Create, Move, Copy
  - Split, Merge, Delete
- The Editing task is customizable
Creating a Web Editing Application that Supports Editing

- Author the map with the layers you want to edit
- Publish the map to the server
  - Map Service can be Pooled or Non-Pooled
- Create the web application with Manager
- Use the web application for editing
Author the Map Containing Editable Layers

• **How does the editing work?**
  - All Geodatabase editing behavior is applied
  - Deleting a feature deletes related feature linked annotation
  - Editing features in a topology creates dirty areas
  - Supports attribute domains and subtypes of features

• **What kind of editing can I expect to do?**
  - Simple editing: delete, create and copy features; update attributes; update geometry
  - Snap to feature vertices when editing geometry
  - Undo and Redo
Publish The Map To The Server

- Editing is a stateful use of a GIS service
- Create a non pooled service and connect via a local connection
- Create one instance for each editor
Create the Web Editing Application

- Make an ArcGIS Server Local connection in Manager
- Add your map service
- Add the Editing task and configure it
  - Editable Layers
  - Versions
  - Settings
- Add other tasks and map elements
Using the Web Application For Editing

- Choose the version to edit
- Choose the layer to edit, the Editor displays the appropriate tools for the layer
- Create and modify feature geometry
- Update attributes
Summary

- Editing is a stateful use of a GIS Service
- Editable Feature classes must reside in SDE
- Map service can be pooled or non-pooled
- Edit layers can be versioned on un-versioned
- All Geodatabase behavior is applied to web-editing
Demo
Spatial Analysis and Modeling

Geoprocessing
Session Overview

- Web Editing
- Creating a Geoprocessing Task
  - What is Geoprocessing with ArcGIS Server
  - How does it work
- Publishing a Geoprocessing Task
- Geodata Replication
- Clip Zip and Ship
## ArcGIS Server Functionality matrix

### Spatial Analysis/Geoprocessing

<table>
<thead>
<tr>
<th>Feature</th>
<th>Basic</th>
<th>Standard</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geodatabase Management (ArcSDE)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Geodatabase Replication</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Mapping</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>3D Services (Globe, KML)</td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>ArcView-Level Geoprocessing</td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>ArcInfo-Level Geoprocessing</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Web ADF (.NET or Java)</td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Mobile ADF (.NET)</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Enterprise Java Beans (Java)</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Web-Based Editing</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Support for Some Extensions *</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Support for All Extensions +</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

* Network, Data Interoperability extensions
* Spatial, 3D extensions
What is Geoprocessing?

- Geoprocessing is the process of defining and executing a workflow
- A workflow defines the execution of a task
  - Find a path from here to there
  - Find all the homes within a certain distance of here
  - Download data that meets certain criteria from a database
  - Etc
- In ArcGIS a model is a workflow
Geoprocessing is...

...one of the 3 critical components of a GIS

- Processing data
  “computing with data” using Tools

- Data storage and integrity
  (Geodatabase)

- Visualization map-based
  analysis, exploration, interpretation and editing
  (Desktop applications)
Geoprocessing with ArcGIS Server

- GIS professionals can publish tools used as tasks
- Centralize both data and processing on the server
- Geoprocessing operations to be run on the server from light weight clients across the web
- Analyst expertise stored in models can be exposed to wider audiences and skill levels

No programming necessary!
How a Geoprocessing Service Works - a high level peek behind the scenes

Client receives results, deserializes them, and displays them.

User fills in input dialogs and hits ok tool information.

Client serializes inputs to XML and sends them to server.

Server receive request, deserializes the inputs and runs the tool.

When the tool completes, the server serializes the results to XML and sends them to the client.

Client receives results, deserializes them, and displays them.

Tool Information

2008 Indiana GIS Conference
Geoprocessing Services

- **Author – Designing the service**
  - A GIS Analyst authors a model.

- **Serve – Publish the service**
  - Publish a toolbox that contains a model
  - Publish a map document with a Tool Layer

- **Use – Consume the service**
  - Use the geoprocessing service in out of the box clients or custom clients
Service Behavior

- Geoprocessing Services are very flexible and allow many different behaviors and optimizations.

- Before Authoring and Publishing, identify what you want your service to do and how you want it to behave with clients.
  - Determines what you publish
    - Toolbox
    - Map with Tool Layer
  - Determines how you author your model.
Demo
Session Overview

- **Web Editing**
- **Creating a Geoprocessing Task**
- **Publishing a Geoprocessing Task**
  - Review considerations when publishing models
  - Using Geoprocessing services
  - Result Management, provide inputs
  - Serving (Publishing)
  - Authoring GP Services
- **Geodata Replication**
- **Clip Zip and Ship**
Using Geoprocessing Services

• Out of the Box Clients
  – ArcGIS Desktop
  – ArcGIS Explorer
  – Web Mapping Applications

• Custom Clients
  – Programatically created clients
Using GP Services in Web Applications

Manager: Geoprocessing Tasks

- Add Geoprocessing task
- Set Supporting Services (GP Services)
- Configure
Server tools are treated the same as any other tool in the geoprocessing framework.

- Run with Tool Dialog
- Add the server tool to a model
- Call the tool from command line
- Run from scripting
Using GP services ArcGIS Desktop

Results Tab

- Add Toolbox from Server
  - Run Tool

- View Progress and Results
  - Results Tab on Toolbox window

- Outputs appear in TOC
  - Toolboxes return data to client
  - Tool Layers return image stored on server
Using GP Services with ArcGIS Explorer

Geoprocessing services are called “tasks” in ArcGIS Explorer

- Add tasks to Explorer using the Task Manager

- Tasks added to the Task Panel

- Dialogs with inputs provide simple user experience

- Progress can be tracked in Results panel

- Upon completion, Outputs and messages available in Results panel
Publishing – Overview

• Depending on the desired behavior you can publish a map document or a toolbox.
  – ArcCatalog
    • Right click toolbox or map document → Publish to ArcGIS Server
    • Right click Server → Add New Service...
  – ArcGIS Server Manager
    • Publish a GIS resource
    • Browse to toolbox or a map document
Publishing a Toolbox

Desktop - ArcCatalog

• Publishing a toolbox creates a Geoprocessing Service

• You want to publish a Toolbox if:
  - You want to send results datasets (features, rasters, etc) to the client.
  - You want the client to be responsible for drawing the results.
Publishing a Map Document

*Desktop - ArcCatalog*

- Map documents with **Tool Layers** can be published to create Geoprocessing services.
- Creates 2 services, Map and Geoprocessing Service

You want to publish a Map Document if:
- You want the server to draw the results.
- You do **not** want to send the datasets to the client.
  - The results of the service are massive (>1000’s of features)
- You want control over the rendering of raster results
- You want to use map layers (from TOC) in your model.
Execution Mode

Publishing Considerations

• **Asynchronous**
  - Results are saved on the server
  - Results can be drawn on the server
  - Clients free to do other tasks
    • e.g. in ArcMap you can pan/zoom, run other tools while the job is running

• **Synchronous**
  - Results on the server are temporary
  - Results must be drawn by the client
  - Client waits until job is completed and results are returned
Other Publishing Considerations

- **Maximum Number of Records (Default 500)**
  - Limits the number of features returned from server.
  - Prevents large amounts of data from being transported across the internet.
  - **Warning will appear in the tool messages**

- **Pooling**
  - Overlay tools like “Union” recommend 1 instance per SOC

- **Timeout**
  - 10 Minutes is default, so adjust if your Model takes longer
Authoring – overview

• Tools must be published to be executed
  – To access geoprocessing functionality as a service, the tool(s) must first be published as part of an ArcGIS Server Geoprocessing service
  – A geoprocessing service is a script or model tool plus its source data

• Model tools or Script tools contain the geoprocessing functionality run by geoprocessing services
  – Do not publish system tools directly.
Authoring a Model suitable for publishing

- Models that are run by services need to have certain characteristics to run correctly.

- Changes will likely be required to allow existing toolboxes with models and/or scripts to be published.

- Things to consider when creating a model for use as a Geoprocessing Service
  - Data Type of Parameters
  - Data Management (Source, Intermediate, Output)
  - Symbology
  - Optimization
Parameter Types

- A subset of desktop’s data types are supported as valid parameters to a geoprocessing service
  - Subset determined by ESRI’s out of the box light weight clients
    - ArcGIS Explorer
    - Web Mapping Applications

- Publishable tools need to be built accordingly.

*output only
Parameter Types – Features and Records

- **Feature Set and Record Set variables**
  - Use Feature/Record Set for interactive input of features or rows
  - Schema defined in properties from existing layer, feature class or table
    - *Fields*
    - *Field domains*
    - *Feature type*
    - *Symbology*

- **Feature Class and Table variables**
  - Publish only as output parameters.
Parameter Types – Layers

- **Layer parameter type allows clients to select from layers in a map on the server.**
  - Enables the use of datasets on the server.
  - Gives ability to work with “non publishable” data types.

- **Models that use layers must be published as Tool Layers in Map Documents**
Parameter Types - File

- Publishes as input or output parameter
- Can be used to upload zip files to a server.
  - Samples in the help:
  - Can send anything up to the server in a zip file and unzip server side.
Data Management – Source Data

• The Server Object Container account (SOC) executes the geoprocessing tools in a geoprocessing service.

• Data/Tools/Scripts must be accessible by this account

• Troubleshooting technique.
  – Login as the SOC account and run the tool you want to publish. If there is an accessibility problem, the tool will fail.
Data Management – Source Data

• Use relative paths

• Use UNC paths data accessed over the network

• Copy SDE Connection files relative to tbx.
  – Will not find “Database Connections” node.

• UNIX / Linux
  – Set up model / scripts to run with data relative to the tool.
LAN Configuration: Services reside on machines that can be reached by the server by UNC pathname.
http://server/arcgisjobs

Every time a server tool executes, a Scratch folder is created with a Scratch.gdb
Data Management – Intermediate and Output data

• When the server runs a model, the output and intermediate data should be written to the arcgisjobs directory

  – Use the `%ScratchWorkspace%` inline variable in your paths.

  – A file geodatabase named “scratch.gdb” is guaranteed to be in the jobs folder created for each job submission

  – Examples:
    • `%scratchworkspace%\output.shp`
    • `%scratchworkspace%\scratch.gdb\output`
Symbology – Overview

- As the author of a service you may want to set the symbology you want the client to use.
- ESRI’s out of the box clients (ArcGIS Desktop and Explorer) will respect symbology set on services.
Symbology – when publishing a toolbox

- Symbology is stored in the variables of a model.
  - Import from a layer in the map or a layer file
  - Both inputs and outputs.

- Not all symbology supported on the lightweight clients like ArcGIS Explorer or Web Applications you publish.
  - Only simple symbols
Symbology – when publishing a Map Document

- Symbology stored in a Tool Layer

- A Tool Layer is a group layer in the table of contents representing a tool and its parameters.

- The map service that draws the result will use the symbology of the tool layer for inputs and outputs.
Example Model Published as a Toolbox

- Parcels in Geodatabase (Update Source)
  - Source Parcels
  - Make Feature Layer
  - InputParcels
  - Select Layer By Location
  - SubjectParcel
  - Get Count
  - Copy Features
  - Row Count
  - Buffer
  - Buffer300Feet
  - ParcelsInBuffer
  - Copy Features (2)
  - ParcelsToNotify

- Make Feature Layer is used because it:
  1. Limits fields in output
  2. Is Required by Select By Location

- Copy Features ONLY executes if Row Count = 1

- Get Count is used to verify that a Parcel exists where user clicked

- If Row Count = 0 stop processing

- Default 100 Feet

- Write SelectedParcel to %ScratchWorkspace% for Display

- Select Parcels that "Intersect" the Buffer

- SelectedParcel

- Model Parameter
  - Managed
  - Add To Display

- Buffer Distance

- Write Parcel To Notify to %ScratchWorkspace% for Display
Optimization – Pre-Processing

- It is smart to pre-process any geoprocessing operations that you can and remove them from your model.
  - EX: A suitability model may use slope and aspect as criteria. It is not necessary to run slope every time the model is executed. Pre-process slope and aspect.
Optimization – In Memory

• Data can be written to an “in_memory” workspace.
  – Only appropriate when overhead of writing to disk is significant portion of the total time it takes to run the model
  – If output is “in_memory” the client must draw the result, therefore you must publish a toolbox

• Use the “in_memory” keyword to indicate that a dataset will be stored in memory.
Models that have many source datasets can be optimized by using layers in a map.

- Referencing layers in a map cuts out the time it takes to open the data when a job is run.
Troubleshooting GP Services

• Data Source doesn’t exist
  – the data source may have been inadvertently deleted
  – the “all outputs are temporary by default” setting is checked on in Tools -> Options -> Geoprocessing Tab.

• Path to the source is not readable by the publisher
  – for example the publisher is unable to read paths with “~” in them.

• ArcSOC account can’t see the location
  – its on a different machine and the SOC account cannot access the location.
Troubleshooting

• Troubleshooting website


• Most common problems and their solutions
  – Tool does not show up
    • Usually this means there is a parameter with an invalid type.
  – Model/Script errors with "cannot overwrite" or the result is always the same.
    • Scratchworkspace Environment is set in the model overriding the servers scratchworkspace.

• Check the log files if you are getting errors
  – Via manager or on disk (..\ArcGIS\server\user\log)
Summary

- Geoprocessing is the process of defining data and a workflow
- Use ArcMap and ArcCatalog to Author GP Tasks
- ArcMap, ArcCatalog, ArcGIS Explorer, and Web Map Applications are all clients of Geoprocessing Tasks
- Users can publish Map Documents containing GP Tools or Toolboxes from ArcCatalog
Geodatabase Management and Replication
Geodatabase Management and Replication

- Web Editing
- Creating a Geoprocessing Task
- Publishing a Geoprocessing Task
- Geodata Replication
  - What is Distributed Data
  - Replica Types
  - Synchronization
  - Replication Considerations
- Clip Zip and Ship
<table>
<thead>
<tr>
<th>Functionality</th>
<th>Basic</th>
<th>Standard</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geodatabase Management (ArcSDE)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Geodatabase Replication</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Mapping (Extraction)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3D Services (Globe, KML)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ArcView-Level Geoprocessing</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ArcInfo-Level Geoprocessing</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Web ADF (.NET or Java)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Mobile ADF (.NET)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Enterprise Java Beans (Java)</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Web-Based Editing</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support for Some Extensions *</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support for All Extensions +</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* Network, Data Interoperability extensions
+ Spatial, 3D extensions
Distributing data

- Copies of data distributed in multiple locations
- Can provide
  - Improved data availability with poor networks
  - Load balancing: Separate offices can work on same data
  - Field projects
  - Fail over
- Options
  - Copy/Paste: Hard to synchronize edits
  - Geodatabase replication: Built into ArcGIS 9.2
  - DBMS replication: Limited support for geodatabases
Distributed geodatabase overview

- Distributed subsets of data
  - Two or more Geodatabases
  - Replica pair: Parent/child
    - Sender/receiver
- Data edited independently
  - Synchronize changes
- Implement as part of business workflow, examples:
  - Mobile field crews disconnected from network
  - Distribute work to contractors
  - Maintain copies of data at different organizational levels
Replica creation

- All replicas
  - Read/Write on data
  - Read on version
  - Data registered as versioned

- One-way and two-way
  - Global Unique IDs required
  - ArcSDE Geodatabases

- Filters
  - Create filters before running check-out wizard
  - Customized for each object

- Check-out related objects to preserve relationships
Replica type: Check-out/Check-in

- Single round trip
  - Check out once, check in once
  - Only **one** synchronization operation allowed

- Synchronization
  - Connected check in or through delta database
  - Conflicts detected on check in

- Same as pre 9.2 disconnected editing

- Workflow scenarios
  - Contractor delivering one set of updates at end of project
  - Mobile crew replicates small set of data for editing in the field
Replica type: One-way

- Changes sent from parent to child
- Replica model
  - Full—supports simple and complex data
  - Simple—supports only simple data
    - Data in child geodatabase not versioned
- Child geodatabase must be ArcSDE
- Synchronization
  - Connected or disconnected
  - No conflicts detected
- Workflow scenarios
  - Read-only publication database requires updates from parent
Replica type: Two-way

- Changes sent in both directions
  - Parent to child; child to parent
- Child geodatabase must be multiuser
- Synchronization:
  - Connected or disconnected
  - Conflicts detected on synchronization
- Workflow scenarios:
  - Data edited in different offices
    - Functionally or geographically separated data
  - Inconsistent/slow network speed
    - Subsets of data in different location; send changes back and forth
Synchronization occurs via messaging

- Replica pairs synchronize through messages
  - Data change message—includes data changes
    - All changes since last acknowledgement
  - Acknowledgement message
    - Data receiver acknowledges receipt of changes
  - Switch roles message
    - Data receiver now can send changes to replica relative

- Online synchronization (connected on same network)
  - ArcGIS manages messages

- Offline synchronization (not on same network)
  - Manual messaging required
Understanding Distributed Data

- Topic in ArcGIS Desktop Help
- Outlines Scenarios and Desktop Tools
GeoData Services
Demo
Geodatabase Management and Replication

- Web Editing
- Creating a Geoprocessing Task
- Publishing a Geoprocessing Task
- Geodata Replication
- Clip Zip and Ship
  - Publishing Geodata Services
  - Extracting Data
  - Data Transfer
  - Large Datasets
Publishing GeoData Services

• All Geodatabase Types can be Published
  - Personal Geodatabase (read only)
  - File Geodatabase (read only)
  - ArcSDE Geodatabases

• Two ways to create a GeoData Service
  - Publish Geodatabase
  - Publish with Map Service*  

*Standard (or Advanced) Edition Required
Allowed operations

• **Query**
  – Requires code written with the SDK

• **Extraction**
  – Standard Edition allows ArcMap to Extract data via Map Service

• **Replication**
  – MUST *manually enable* Replication (ArcSDE ONLY)
Data Transfer (Replication and Extraction)

- Strongly recommend setting Output Directory

![Specify output directory](image)

- If not set, Data is embedded in messages
  - Default Max message size limit is 5 MB
  - Easily can be exceeded and will fail when
    - Creating large replicas
    - Synchronizing lots of edits may fail
Controlling Web Access to GeoData Services

- Enable http authentication
- Will require Login to Access GeoData Service
- Users will need access to both:
  - GeoData Service
  - Virtual Directory
- Messages will contain login/password
  - Can be encrypted using SSL
Creating Replicas of Large Datasets

1. Add global ids to the data in the source Geodatabase before sending to the destination Geodatabase.

2. Export the data to an export format.
   a) XML workspace document
   or
   b) Using tools from the DBMS.

3. Send it to the destination electronically (e.g. ftp or e-mail) or on media sent through a courier.

4. Load the data into the destination Geodatabase.

5. Create Replica using register existing data option
Demo
Summary

- Geodatabase Replication
  - Check Out/Check In Replicas
  - One Way Replicas
  - Two Way Replicas

- GeoData Services
  - Query
  - Extract
  - Replication
Questions ?