Using ArcGIS Server and the Data Interoperability Extension to Integrate Data from Internal and External Sources

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Project Background

- The Office of Surface Mining (OSM) regulates surface coalmines in the US
- Most permitting is done by states in cooperation with OSM
- Most mine permit information resides in states
- No central repository of coalmine permit information
- Need exists for centralized geodatabase of permit boundaries and other coalmine information
- OSM, Virginia and West Virginia created a prototype centralized geodatabase using ESRI tools.
Prototype Goals

- Replicate relevant feature classes from external sources to geodatabases at OSM’s Denver office
- Select pertinent attributes and transform them to a common standard
- Re-project data to a common geographic system
- Merge replicated and OSM internal feature classes into a single feature class
Prototype Methodology

- Virginia and West Virginia published SDE 9.2 feature classes with relevant permit boundary information using ArcGIS Server 9.2
  - Published “geodata services” which allow geodatabase replication
- OSM created one-way replicas of the published features on an SDE 9.2 server in their Denver office
- OSM created an extract, transform and load (ETL) tool using the “Data Interoperability Extension”, a.k.a. Safe Software Feature Manipulation Engine (FME)
  - Tool ingests state replicas and several OSM internal feature classes and outputs a single feature class
Prototype Configuration

State GIS systems and services

- Virginia SDE Geodatabase
  - ArcGIS Server / Web Server
  - One-way Replication Service
- West Virginia SDE Geodatabase
  - ArcGIS Server / Web Server
  - One-way Replication Service

Internet

OSM GIS systems and services

- Read Only Replica Virginia SDE Geodatabase
- Read Only Replica West Virginia SDE Geodatabase
- Extract Transform & Load Data Interoperability Extension (A.K.A. FME)

- National Data Set
  - Denver SDE Geodatabase
  - Knoxville FO SDE Geodatabase

- GeoData Service

- Geodatabase
ArcGIS Server Security Considerations

Data Providers (States)
- Web Server
- ArcGIS Server
- SDE Geodatabase

DMZ (States)
- Internal Firewall
- Reverse Proxy Server

Internet
- External Firewall

Data Consumers (Office of Surface Mining)
- Client Browser (access map services and applications)
- External SDE Replica
ETL Tool Designed for Prototype
Connection to Replicated Virginia Database
Merging Virginia's Permit Polygon Data with Related Attribute Table
Generating Time Stamp
Generating "Contact" Information
Generating Unique National ID Attribute
Merging Virginia's Data into Single National Feature Class
Setting the National Feature Class' Attributes and Coordinate System
National Feature Class – National View
National Feature Class – Western View
National Feature Class – Eastern View
National Feature Class – Zoom Near Virginia -West Virginia State Line
Permit Attributes
ETL Processing Statistics

- Total Permits Processed = 7966
- Total Time to Run ETL Tool = 5.5 minutes
Lessons Learned

- Design and approvals for external connections can be more challenging than the GIS work
- Test small / test local
  - simplified single-purpose map service
  - simple geodatabase structures
- Scale up one step at a time
- Keep security as open as possible as long as possible
- Be mindful of the internal and external names of machines and how they affect access to ArcGIS servers
More Lessons Learned

- When trying to troubleshoot replication, the error messages from ArcGIS are not good. The replication toolbar in ArcMap gives better error messages for troubleshooting.

- The sender and the receiver for replication should agree on the name of the replica since a replica with a duplicate name cannot be made and the error messages generated are not helpful. If one or the other party removes the replica registration from their system, they should inform the other party since there is no automated cleanup and the replication will fail.
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