Agenda

- Understand GIS Server architecture
- ArcGIS Web Adaptor
- Single and Multi-machine deployments
- Explore ArcGIS Server Manager
- Server Administrator Directory
- ArcGIS Server Command Line utilities
- Upgrading a Server site
- Summary

Strongly Recommend:
Knowledge of ArcGIS Server
ArcGIS for Server enables Web GIS in your infrastructure

Deskop | Web | Device

*Portal*

*Server* Online Content and Services

*GIS server*
- ArcGIS Web Adaptor
- Enterprise geodatabase
- ArcGIS Data Store

*Portal for ArcGIS*
Includes data from ArcGIS Online

*Client applications*
E.g.: Collector, Dashboard, Explorer, Esri Maps for … Apps, and Web AppBuilder

*Apps*
ArcGIS Server – GIS Server

- Pure web services GIS server
  - Easy install and configuration
  - Self contained, no external dependencies
- Built for resilience
- Designed for enterprise systems
- **Works on physical machines or in the cloud**
  - E.g., Amazon or Microsoft Azure
- Works with other server-side components
  - ArcGIS Web Adaptor
  - Enterprise geodatabase
  - ArcGIS Data Store
Installing the GIS Server

• Workflow
  - Run installer
  - Specify arcgis account
  - Authorize the software
  - Create new Server site
  - Specify Primary Site Admin (PSA) account

• Optional
  - Install ArcGIS Web Adaptor
ArcGIS Server Architecture

- ArcGIS account (OS level)
- Server site
  - Service directories
  - ArcGIS Server Manager
  - Server Administrator API
- Primary Site Administrator (PSA)
- Configuration store
- Server directories
- Data

http://6080
https://6443
GIS Server Site – Concepts

• **arcgis account** → OS level account, used by ArcGIS Server
  - Created when you install GIS Server software

• **Primary Site Administrator (PSA) account** → Server site level account
  - Created after software install, when you create new Server site

• **Key components:**
  - **Configuration Store**
    - Contains all the essential properties of the site
  - **Server directories**
    - Locations on disk where the server writes information
    - 4 directories: cache, jobs, output, and system
    - Both should be located in redundant storage location(s)
GIS Server Site Ports

- **Port** → communication endpoint used by the GIS Server
- **Port #** → identifies port internet protocol (IP) address

**Default installation**
- GIS Server uses **port 6080**
- ArcGIS Web Adaptor uses web server port (e.g., IIS **port 80**)

**Secure installation (HTTPS)**
- GIS Server uses **port 6443**
- ArcGIS Web Adaptor uses web server port (e.g., IIS **port 443**)

http://6080
https://6443
ArcGIS Web Adaptor

- Enables ArcGIS Server to work with 3rd party web server
  - E.g., Microsoft IIS, IBM Web Sphere, etc.
- Leverage web server features
- Enables web-tier authentication
- Provides more flexibility to control site access
- Conceptually like a reverse proxy
- Optional, but recommended component for GIS Server
  - Required to integrate with your enterprise infrastructure
  - Separate software install
GIS Server Architecture with Web Adaptor

Outside client connections

https://443

Web Server

Web Adaptor

Firewall

Admin connections

https://6443

GIS Server

Server site

Configuration store

Server directories
Single vs. Multi-Machine Deployment – GIS Server

- May want to scale GIS Servers for very active Server sites
  - Deploy enough resources to meet demand
Multi-Machine Deployment – GIS Server

- Web Server
  - Web Adaptor
  - https://443
  - Server site

- GIS Server machine 1
- GIS Server machine 2
- GIS Server machine 3

- Configuration store
- Server directories
ArcGIS Web Adaptor session

• **ArcGIS Web Adaptor Basics**
  - Wed 12:30 noon Expo: Demo Theater 6 – Server

• **Web GIS Architecture Deployment Options**
  - Thurs 1:30 pm Ballroom 6E
Check for Patches and Updates

- Notification app included with software
- Start > All Programs > ArcGIS > ArcGIS for Server > Check for Updates
Explore ArcGIS Server Manager

- Web browser based administrative console to manage Server
  - Pre-installed web services
  - Read-only mode (optional)
  - Discuss GIS Server “data store” concept vs. the ArcGIS Data Store
  - GIS Server security – basics
  - Service usage statistics
  - Server logging
Pre-Installed Web Services

- GIS Server includes 11 “out-of-the box” web services
  - In System and Utilities folders
  - Provided to help support many common workflows
- A sample map service is also included
  - SampleWorldCities
- Strongly recommend: Do not modify
Notable built in GP services

- **PublishingTools** → Enables publishing service definition files in Manager
- **CachingTools** → Helps to create caches (map, globe, image services)
- **PrintingTools** → Enables custom print layouts to be used in web apps
  - Publish custom layouts from ArcMap, enable in your web app clients
- **SpatialAnalysisTools** → Powers analysis functionality in Portal map viewer
  - Requires Portal for ArcGIS with hosting server configuration to work
  - Introduced at 10.4
Web Service Properties

- Click on a web service to configure its properties
- Set capabilities, resources, item description, etc.
GIS Server – Optional Read-Only Mode

• Disables all administrative functionality
  - Except adding and removing machines from the site
• Useful for change management
  - Better manage publishing of services to production sites
Understanding Data Stores

- **GIS Server “data store” concept**
  - Valid location that contains data used for web services
  - Read/write by the *arcgis* account

- **ArcGIS Data Store**
  - Separate software install included with ArcGIS for Server (since 10.3)
  - Used to configure and deploy a “hosting server” configuration with Portal for ArcGIS
Understanding Data Stores

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Review: Publishing GIS Web Services

- **ArcMap** publishes directly to the GIS Server
- **ArcGIS Pro** shares to a portal (ArcGIS Online or Portal for ArcGIS)
  - Does NOT directly publish to the GIS Server
Review: Publishing in ArcMap

- **Share As Service wizard**
  - Publish GIS service
  - Create service definition file
  - Overwrite an existing GIS service

- **Service Editor**
  - Defines GIS service properties

- **Analyze map for optimization**
  - Fix errors and address warnings

- **Service definition file**
  Defines service schema, can contain data
  Can be used to publish service later
GIS Server “data store” Concept

• Valid data source locations accessible by Server site
• 2 types
  1. Databases
  2. Folders

• 2 ways to define
  - ArcGIS Server Manager
  - ArcMap
Data Registration Workflow

1. Copy the data

- Default option, easy user experience
- Source data is copied to the server machine
- Does not support data updates
- Option to “block copying” in ArcGIS Server Manager
Data Registration Workflow

2. Reference the data

- Need to define a “data store”
  - Valid data source locations accessible by Server site
- Source data is not copied
- Supports data updates
Data Registration Workflow

3. Replace data path

- Supports secure workflows
- Need to have 2 copies of your data, additional management
- Does not support data updates
GIS Server “data store” Concept

- Relates to publishing GIS resources to the GIS Server
- Valid data source locations accessible by Server site
- 2 types
  1. Databases
  2. Folders

- Used to support data registration workflows
  - Publish by referencing the data
  - Publish by replacing data path
Understanding Data Stores

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ArcGIS Data Store – Introduced at 10.3

- Deploy with Portal for ArcGIS to enable publishing directly to Portal
- Enables
  - Scalable hosted feature services
  - 3D scene services
  - Analysis tools in Portal map viewer
- Highly Available
- Automatic Backup and Recovery
- Component of ArcGIS for Server
  - Separate software install
ArcGIS Data Store

- Can have 3 types of ArcGIS Data Store
  1. **Relational**
     - 1A for hosted feature services
     - 1B for scene services *(Tile Cache)*
  2. **Spatialtemporal**
     - Used to archive high volume data from GeoEvent extension

- You decide which type(s) to use when you install the ArcGIS Data Store
  - Wizard will install relational
  - Command line enables you to explicitly select which type(s)
    - `<install directory>\ArcGIS\DataStore\tools\configuredatastore.bat`
GIS Server Security – Basics

• Default installation is set to “HTTP and HTTPS”
  - Since 10.4
  - GIS Server uses port 6443
• Designed to work with your Enterprise systems
  - Many security options available

• Can be federated with Portal for ArcGIS
  - Where the GIS Server uses the security model used by Portal
2 Key Security Concepts

- **Authentication** → The security protocol to check and verify a user
  - GIS Server offers 2 options: Web tier vs. GIS tier

- **Authorization** → What a user is permitted to do in the Server site
GIS Server Access and Authorization

- **User** → Valid login to access
- **Role** → Grouping of users
  - 3 types
  1. **Administrators** – Full admin control
  2. **Publishers** – Publish web services
  3. **Users** – View web services

- **Identity store** → Defines your users and roles
  - User store + Role store
GIS Server: Identity Store

- **Identity Store** → Defines your users and roles

- 3 different options
  1. **Built-in** (default)
  2. **Register with an enterprise identity store**
     - Windows Active Directory
     - LDAP
     - Requires ArcGIS Web Adaptor
  3. **“Mixed mode”**
     - Users from enterprise identity store
     - Roles from built-in store
Securing GIS Web Services

- Set permissions for roles on folders and services
  - Administrators/Publishers grant permissions
- All new services are public by default
  - Anonymous access
- Ensure you set appropriate security on them
ArcGIS for Server Security technical session

- **ArcGIS for Server Security: An Introduction**
  - Wed 1:30 pm Room 15A
  - Thurs 8:30 am Room 5B
- **Portal for ArcGIS: An Introduction**
  - Wed 10:15 am Room 7 A/B
  - Fri 9:00 am Room 5A
GIS Server – Service Usage Statistics

- View and create reports showing web service usage
- Monitor total requests, average response time(s), and timeouts
GIS Server Logging

- View log messages in ArcGIS Server Manager
- Specify log level, # of days to keep log on disk, log directory, etc.
Server Administrator Directory

https://<server name>:6443/arcgis/admin

- Enables **scripting of Server administration tasks**
  - E.g., Join machine to a site, start/stop services, security, etc.
- Can be invoked from:
  - Python, Java, JavaScript, C#, PowerShell, Ruby, Scala, Perl, etc.

![ArcGIS Server Administrator Directory](image)
Change Security Setting of GIS Server

- Switch from "HTTP and HTTPS" to "HTTP" or "HTTPS only"
- Security > config > update
  - Change protocol option
Disable the Services Directory

- ArcGIS Services Directory exposes GIS web services
  - http://<FullyQualifiedMachinename>/ArcGIS/rest
- Recommend to NOT expose GIS web services
How to Disable the Services Directory

- **Server Administrator Directory**
  - System > Handlers > Rest > Servicesdirectory > edit
  - Uncheck **Services Directory Enabled** option
- **Help topic:** [Disable the Services Directory](#)
ArcGIS for Server Security technical sessions

- **ArcGIS for Server Security: An Introduction**
  - Wed 1:30 pm  Room 15A
  - Thurs 8:30 am  Room 5B

- **ArcGIS for Server Security: Advanced**
  - Wed 3:15 pm  Ballroom 6A
  - Thurs 10:15 am  Room 16B
ArcGIS Server Command Line Utilities

- Part of the installation, series of python scripts
  - `<install directory>/arcgis/server/tools/admin`
- Allows you to administer the server from batch files or the operating system command line
Check GIS Server for Security Best Practices

- `serverScan.py` is a script in the Server installation directory
- Script checks for security settings → generates a report that makes recommendations to improve Server site security

### ArcGIS for Server Security Scan Report - 2016-02-17

**dlaw2.esri.com**

<table>
<thead>
<tr>
<th>Id</th>
<th>Severity</th>
<th>Property Tested</th>
<th>Scan Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS08</td>
<td>Important</td>
<td>Cross-domain requests</td>
<td>Cross-domain requests are unrestricted. To reduce the possibility of an unknown application sending malicious commands to your web services, it is recommended to restrict the use of your services to applications hosted only in domains that you trust.</td>
</tr>
<tr>
<td>SS07</td>
<td>Important</td>
<td>Rest services directory</td>
<td>The Rest services directory is accessible through a web browser. Unless being actively used to search for and find services by users, this should be disabled to reduce the chance that your services can be browsed, found in a web search, or queried through HTML forms. This also provides further protection against cross-site scripting (XSS) attacks.</td>
</tr>
<tr>
<td>SS11</td>
<td>Recommended</td>
<td>PSA account status</td>
<td>The primary site administrator account is enabled. It is recommended that you disable this account to ensure that there is not another way to administer ArcGIS Server other than the group or role that has been specified in your identity store.</td>
</tr>
<tr>
<td>SS10</td>
<td>Recommended</td>
<td>Web adaptor registration</td>
<td>One or more web adaptors are registered over HTTP. To allow Server Manager to successfully redirect to HTTPS, all web adaptors should be registered over HTTPS.</td>
</tr>
</tbody>
</table>
Backup and Restore Server Site Scripts

- Create a backup of your Server site configuration
- Preserves information about your services and settings
- stored as an .agssite file
- Use Restore script to return Server site to backup state
Upgrading the GIS Server

- Software allows for an in-place upgrade
  - 10.1, 10.2, 10.2.1, 10.2.2, 10.3, 10.3.1, 10.4 → 10.4.1

- 5 key points
  1. GIS Server is considered “offline” during upgrade
  2. Use the same PSA account
  3. Uninstall, then re-install the ArcGIS Web Adaptor
  4. For Server sites federated with Portal, do NOT un-federate site
     - Perform upgrade on Portal and Server sites individually
     - Order does NOT matter
  5. For hosting server deployments,
     - Upgrade GIS Server BEFORE upgrading the ArcGIS Data Store
Summary

- Understand GIS Server architecture
- ArcGIS Web Adaptor
- Single and Multi-machine deployments
- Explore ArcGIS Server Manager
- Server Administrator Directory
- ArcGIS Server Command Line utilities
- Upgrading a Server site
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