Managing the Twin Risks to your Operations

Data Loss

Down Time
The Three Approaches

Backups
- Snapshot
  - Ability to go back in time

High Availability
- No single point of failure
- Machine redundancy

Disaster Recovery
- No single point of failure
- Environment redundancy

Geographic Redundancy
Choosing Between Them

- Complementary
- Build On Each Other
- Cost and Capability
Backup and Restore
Backups are:

- Simple
- Highly Effective
- Not Disruptive
- Under appreciated
ArcGIS Enterprise Backups – WebGIS DR Tool

What the tool backs up

- Settings
  (Portal, Server, Data Store)
- Portal Content
- Services
- ArcGIS Data Store Data
  (relational, scene tiles)
ArcGIS Enterprise Backups – WebGIS DR Tool

What the tool doesn’t backup

- EGDB or file based data
- Traditional cache tiles
How to Backup an ArcGIS Enterprise deployment

Web GIS DR Tool

Property File
• Location
• Portal URL
• Credentials
• Scene Cache?

Automate
WebGIS DR Properties

• Questions:
  • Where is your content, (file system, bucket in S3, container in Azure)
  • Where do you want your backup stored, (file system, bucket in s3, container in Azure)

• Minimum parameters:
  • \texttt{SHARED\_LOCATION} = where each backup will be staged
  • \texttt{BACKUP\_STORE\_PROVIDER} = where to store the backup (file system, or cloud)
  • \texttt{PORTAL\_ADMIN\_URL} = URL to connect to the portal
  • \texttt{PORTAL\_ADMIN\_USERNAME} = administrator’s username
  • \texttt{PORTAL\_ADMIN\_PASSWORD} = administrator's password
  • \texttt{BACKUP\_RESTORE\_MODE} = defines if a full or incremental backup will be run
WebGIS DR Tool – Usage

• Backup
  - Component backups run concurrently
  - No downtime while exporting
  - Sample syntax
    ```bash
    C:\Program Files\ArcGIS\Portal\tools\webgisdr>webgisdr.bat -e -f webgisdr.properties
    ```

• Restore
  - Runs sequentially
    - Data Store → Server → Portal
  - Downtime while restoring
  - Sample syntax
    ```bash
    C:\Program Files\ArcGIS\Portal\tools\webgisdr>webgisdr.bat -i -f webgisdr.properties
    ```
Scheduling ArcGIS Enterprise backups - Windows
Scheduling ArcGIS Enterprise backups - Windows
Scheduling ArcGIS Enterprise backups - Windows

Start a Program

Program/script:
```
C:\Program Files\ArcGIS\Portal\tools\webgisdr\webgisdr.bat
```
Scheduling ArcGIS Enterprise backups - Windows
Scheduling ArcGIS Enterprise backups - Linux

- Creating a cronjob:

  ```
  [ags@wilson ~]$ crontab -e
  ```

- Cronjob syntax:

  ```
  * * * * * <command>
  ```

Examples:

Run the WebGIS DR Tool at 12:00:00 AM every day:

  ```
  0 0 * * * /data/arcgis/portal/tools/webgisdr/webgisdr.sh -e -f /data/arcgis/portal/tools/webgisdr/webgisdr.properties
  ```

Run the tool every 12 hours every day starting at 12:00:00 AM:

  ```
  0 */12 * * * /data/arcgis/portal/tools/webgisdr/webgisdr.sh -e -f /data/arcgis/portal/tools/webgisdr/webgisdr.properties
  ```
High Availability
Overview

- What is High Availability
- ArcGIS Enterprise High Availability
  - Components
  - Upgrade
- Other factors for High Availability
High Availability (HA)

- Definition:
  - A system or component that is continuously operational for a desirably long length of time. Availability can be measured relative to "100% operational" or "never failing." (SLAs)

- Shorter down time costs more

- Elimination of single points of failure.

- Availability of a system depends on the availability of all components
Portal for ArcGIS: High Available Deployment

Load Balancer

"Highly Available Portal"

Portal Machines

Portal Content (shared)
Highly Available Portal

- Two Portal machines
- Both Portal machines take requests
- Internally, there is a difference between the two machines’ role:
  - Primary
  - Standby
- Behaves a little bit differently:
  - Standby machine is down (or Portal service stops)
    → No interruption
  - Primary is down (or Portal service stops)
    → Under 30 seconds before standby is promoted
    → Improvement at 10.6.1 from typically a few minutes
Portal for ArcGIS: Load Balancing Options

**ArcGIS Web Adaptor**
- Provided by Esri
- Web-Tier Authentication
- Availability dependent on web servers

**3rd Party Load Balancer**
- Not provided by Esri
- Typically already fault tolerant
Portal for ArcGIS: High Availability Deployment Patterns

HA Portal with Load Balancer

- Load Balancer
- Portal Machines
- Portal Content (shared)

- Simpler
- Need certain settings on LB
- Doesn’t support Web Tier Authentication

HA Portal with Load Balancer & Web Adaptors

- Load Balancer
- Web Adaptors
- Portal Machines
- Portal Content (shared)

- More complex
- Web Tier Authentication
Portal for ArcGIS: Health Check

- Provided by Portal for ArcGIS
  - https://<webadaptor machine>.domain.com/<context>/portaladmin/healthCheck
  - https://<machine>.domain.com:7443/arcgis/portaladmin/healthCheck

- Check if Portal is ready to take request. Not individual component, e.g. service, item, etc.

- Or your own customized health check
Upgrade High Availability Portal for ArcGIS

• There is downtime
  - Plan
  - Practice
• Make a backup
• Recommended steps
  - Run setup on STANDBY
  - Run setup on PRIMARY
  - Run upgrade on PRIMARY
• No need to un-register standby (new at 10.6.1)
• Similar other steps as standalone Portal
Portal for ArcGIS: Key Considerations for HA

• Two Portal machines
  - Primary
  - Standby

• Highly Available Load Balancer
  - Web Tier Authentication
  - No single Web Adaptor

• Health Check provided for Portal for ArcGIS

• Highly Available shared content store

• Upgrade: Downtime & steps in order
ArcGIS Server: Multiple-Machine Architecture

- Multiple machines
- Identical Roles
- No interruption when any machine is down
- The config-store and server directories need to be accessible to all machines.
ArcGIS Server: High Availability Deployment Patterns

Server Site with Load Balancer

- Load Balancer
- Server Machines
- Config-store Server Directories *(shared)*

Server Site with Load Balancer & Web Adaptors

- Load Balancer
- Web Adaptors
- Server Machines
- Config-store Server Directories *(shared)*
ArcGIS Server: Health Check

• Provided by ArcGIS Server
  - https://<.....domain.com>/<context>/rest/info/healthcheck
  - https://<machine>.domain.com:6443/arcgis/rest/info/healthcheck

• Server level health check. Not checking service.

• Or your own customized health check
Upgrade multi-machine ArcGIS Server

- Install and Upgrade
- Same on all machines
- Downtime for upgrade one machine
Portal for ArcGIS and ArcGIS Server: Federation

- Portal URL: 443
- Private Portal URL: 7443
- Administrative URL: 6443
- Services URL: 443
- Administrative Communication

Add ArcGIS Server:
- Services URL: example: https://webadapter.domain.com/arcgis
- Administrative URL: example: https://gisserver.domain.com:6443/arcgis
- Username:
- Password:

```
{
  "portalUrl": "https://webgistesting.net/portal",
  "privatePortalUrl": "https://webgistesting.net/portal",
  "portalsSecretkey": "29f015ca0ff749eac50260bf8f31ca2",
  "portalNode": "ArcGIS_PORTAL_FEDERATION",
  "serverId": "755b0ebf662e41e5",
  "serverURL": "https://webgistesting.net/server"
}
```
Portal for ArcGIS and ArcGIS Server: Federation

- **Portal URL:** 443
- **Services URL:** 443
- **Private Portal URL:** 7443
- **Administrative URL:** 6443
ArcGIS Server: Key Considerations for HA

- Highly Available shared config-store and server directories
- Health Check provided for ArcGIS Server
- Highly Available URLs when communicating with Portal
  - Portal URL
  - Private Portal URL
  - Services URL
  - Server Administrative URL
- Install and Upgrade on all machines
ArcGIS Enterprise

Portal

GIS Services

Hosted Feature and Tile Data

Portal for ArcGIS

ArcGIS Server

ArcGIS Data Store
Spatiotemporal Big Data Store

Title: Data Store Management Best Practices

Date: 07/12/2017

Time: 1pm - 2pm

Location: SDCC

Room: SDCC - Room 10
ArcGIS Data Store: High Availability Architecture

Server Site: ArcGIS Data Store's Load Balancer

“Highly Available ArcGIS Data Store”

Primary

Standby

Backups (shared)
ArcGIS Data Store: Failover Scenarios

• Primary ArcGIS Data Store stops working: Define Failure
  - Computer crashes
  - Gets unplugged
  - Lose network connectivity
  - etc

• Not “gracefully” shutdown
  - Data Store service stops

• http://server.arcgis.com/en/documentation/ → Search “Fail over scenarios”
Upgrade High Availability ArcGIS DataStore

- Run setups on both machines
- On PRIMARY, run configure to upgrade
  - Relational
  - TileCache

"Highly Available ArcGIS Data Store"
ArcGIS Enterprise High Availability Deployment

- **Configuration Store**
- **Server Directories** *(shared)*
- **Portal Content** *(shared)*
- **Site**
- **Load Balancer**
- **“Highly Available Portal”**
- **Load Balancer**
- **“Highly Available ArcGIS Data Store”**
- **Primary**
- **Standby**
- **Backups** *(shared)*
Upgrade ArcGIS Enterprise High Availability Deployment

- Upgrade Order

- "Highly Available Portal"
  - Portal Content (shared)

- Site
  - Configuration Store
    - Server Directories (shared)

- "Highly Available ArcGIS Data Store"
  - Primary
  - Standby
  - Backups (shared)
Native Cloud Implementations

- Cloud Store
- Caching Directory
- Data Input Directory
- Backup/Restore
ArcGIS Enterprise HA: Part of Your HA Architecture

• Your Data
  - Enterprise GeoDatabase
  - File based Data

• Software
  - Web Server
  - Software Load Balancer

• Hardware
  - File Server
  - Network

• People
  - HA?
  - IT strong?
ArcGIS Enterprise HA: IT Governance

- Ensure the effective and efficient use of IT

- Policies and procedures highly disciplined
  - Planned and updated in a timely manner
  - Documented clearly
  - Tested properly
  - Exercised with staff
ArcGIS Enterprise HA: Spectrum, Not a Switch

Cost

Days  Hours  Minutes  Seconds

Business Interruption

Workday Interruption

Momentary Interruption

Downtime (decreasing)
Disaster Recovery

Geographic Redundancy
Agenda

- What is geographic redundancy
- Using the Web GIS DR tool
- Roadmap to being geographically redundant
Overview

- Geographically separate data centers
- Duplicated configurations and data between the two data centers
- Components within data centers are typically highly available
- WebGIS DR Tool is used to move snapshots of data from primary to standby
- Complex disaster recovery option
Traffic Manager

East coast data center (primary)

West coast data center (standby)

Geographic Redundancy

Public Portal URL - https://mysite.esri.com/portal
Services URL – https://mysite.esri.com/server

Public portal URL and services URL need to be the same
Referenced data paths need to be the same
Geographic Redundancy

East coast data center (primary)

Traffic Manager

West coast data center (standby)
Geographic Redundancy

Traffic Manager

East coast data center (primary)

West coast data center (standby)
Geographic Redundancy

Traffic Manager

East coast data center (primary)

West coast data center (standby)
Geographic Redundancy – Cloud deployments
Roadmap for geographic redundancy

1. Duplicate the deployment between primary and standby data centers
2. Create snapshots of the primary data center
3. Apply snapshots to the standby data center
4. Monitor your standby data center
• Number of machines should be the same
• Identical URLs between data centers
  - Public Portal URL
  - Services URL
• Identical paths to data and connections to databases or enterprise geodatabases
Duplication – What needs to be the same?

10.4-10.4.1
- Public facing and internal URLs
- By reference data stores
- Server site directory paths
- Machine names
- Security information

10.5-10.6
- Public facing URLs
- By reference data stores
- Server site directory paths
- Security information

10.6.1
- Public facing URLs
- By reference data stores
Creating snapshots

- **Full snapshot**
  - Create an initial snapshot of all of the data within the ArcGIS Enterprise
  - Internally defines a base time that will be used for an incremental snapshot

- **Incremental snapshot**
  - Creates a snapshot of all of the data that has been created or modified since the last full backup
  - Decreases the time it takes to synchronize content, services, and data between primary and standby
Creating incremental snapshots

- Creates a snapshot of all data added or modified since the last full snapshot
Monitoring and Failover

• QC process on standby ArcGIS Enterprise
  - Checking the index within Portal
  - Validating federated Servers
  - Validating data stores using Server Admin
  - Checking important services or applications

• Detecting when components fail within a data center
  - Monitoring the healthCheck URLs of Portal and Server

• Failing over data centers should be a manual, deliberate decision
Takeaway points

- Important to understand the requirements of geographic redundancy as a disaster recovery option

- Take advantage of the Web GIS DR tool to move snapshots of the deployment from primary to standby

- Geographic redundancy is a complex disaster recovery option
Success Stories with HA or DR

- Let us know if you have a success story to share
Please Take Our Survey on the App

Download the Esri Events app and find your event.

Select the session you attended.

Scroll down to find the feedback section.

Complete answers and select “Submit”.

ArcGIS Earth: Introduction and Deployment

Feedback

* Required

The title and description were consistent with the content (*)

Well organized/clear presentation (*)

Public speaking skills (*)

The content of the workshop was relevant to my work (*)

The workshop provided information or techniques I can apply to my work right away (*)

Info

Notes

Feedback

Speakers

Chris Andrews