High Availability and Disaster Recovery

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Palm Springs, CA

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 Geographic Redundancy	No single point of failure Environment 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)

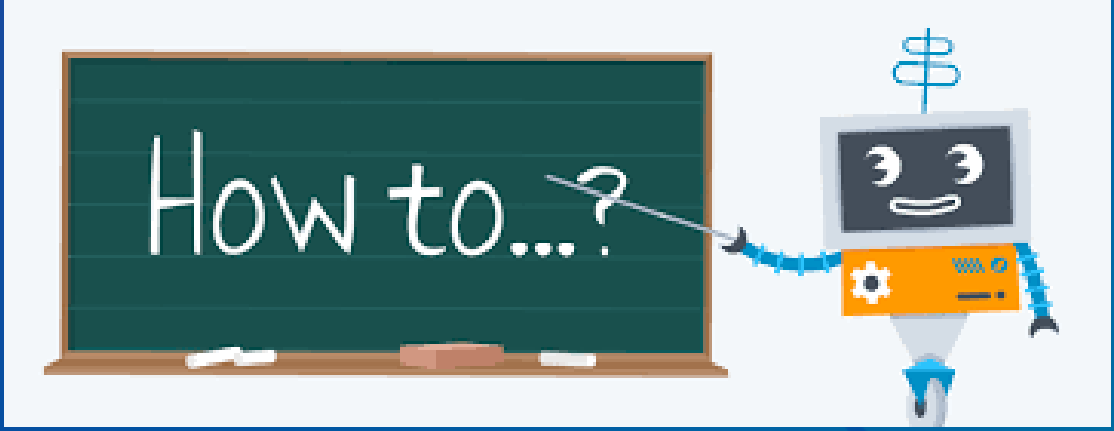
ArcGIS Enterprise Backups – WebGIS DR Tool

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:
  - SHARED_LOCATION = where each backup will be staged
  - BACKUP_STORE_PROVIDER = where to store the backup (file system, or cloud)
  - PORTAL_ADMIN_URL = URL to connect to the portal
  - PORTAL_ADMIN_USERNAME = administrator's username
  - PORTAL_ADMIN_PASSWORD = administrator's password
  - BACKUP_RESTORE_MODE = defines if a full or incremental backup will be run

WebGIS DR Tool – Usage

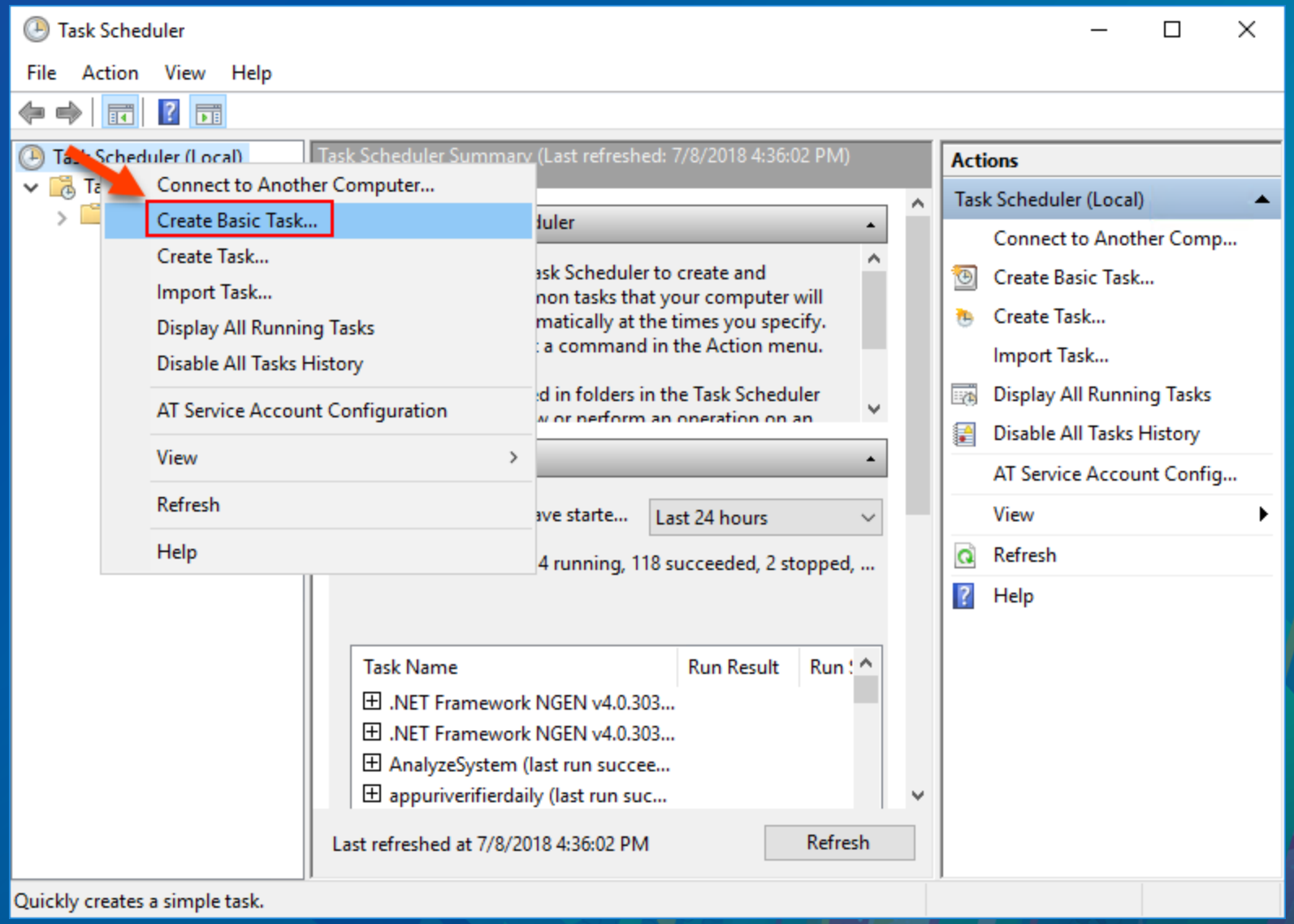
- **Backup**
  - **Component backups run concurrently**
  - **No downtime while exporting**
  - **Sample syntax**

```
C:\Program Files\ArcGIS\Portal\tools\webgisdr>webgisdr.bat -e -f webgisdr.properties
```

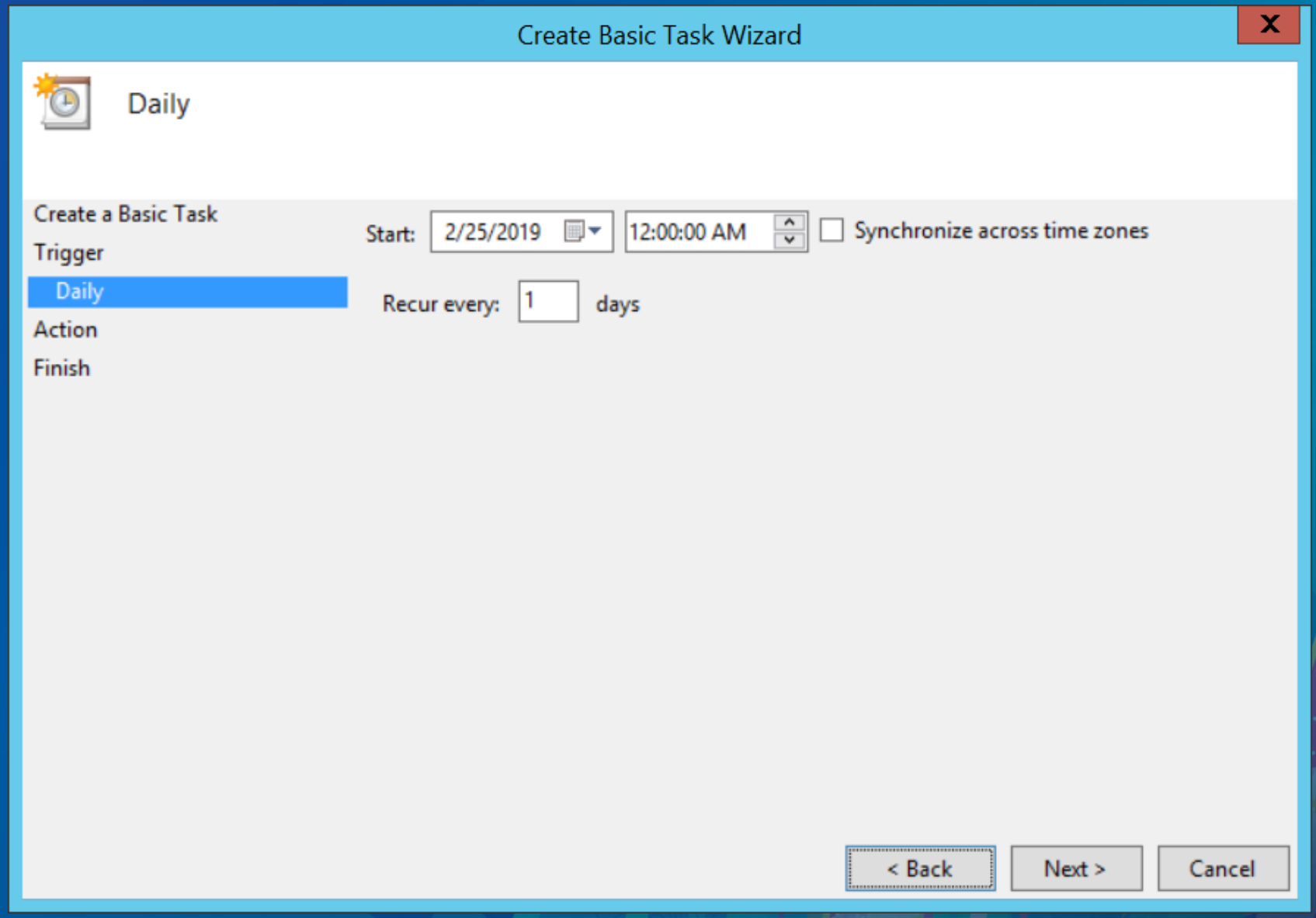
- **Restore**
  - **Runs sequentially**
    - **Data Store → Server → Portal**
  - **Downtime while restoring**
  - **Sample syntax**

```
C:\Program Files\ArcGIS\Portal\tools\webgisdr>webgisdr.bat -i -f webgisdr.properties
```

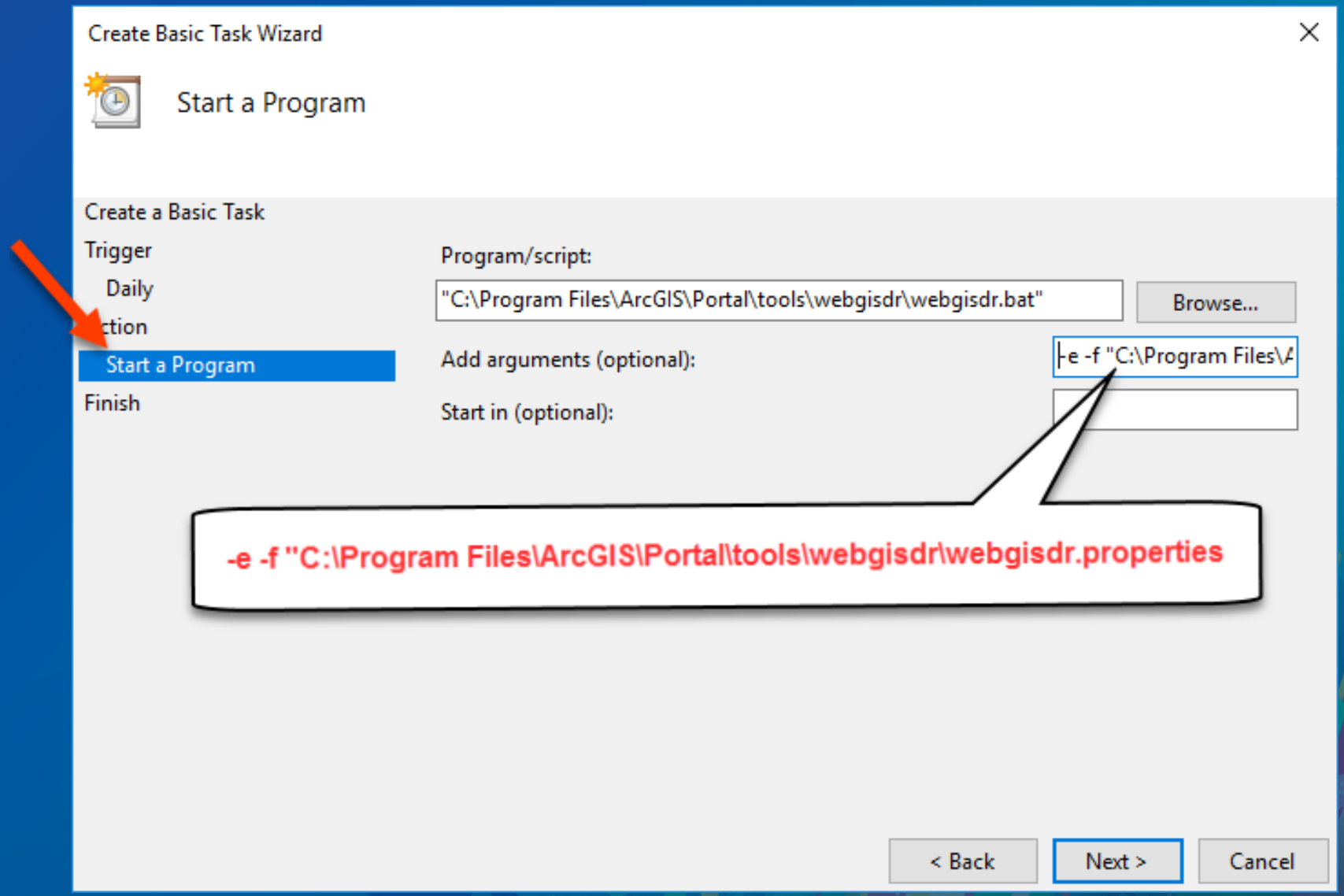
Scheduling ArcGIS Enterprise backups - Windows



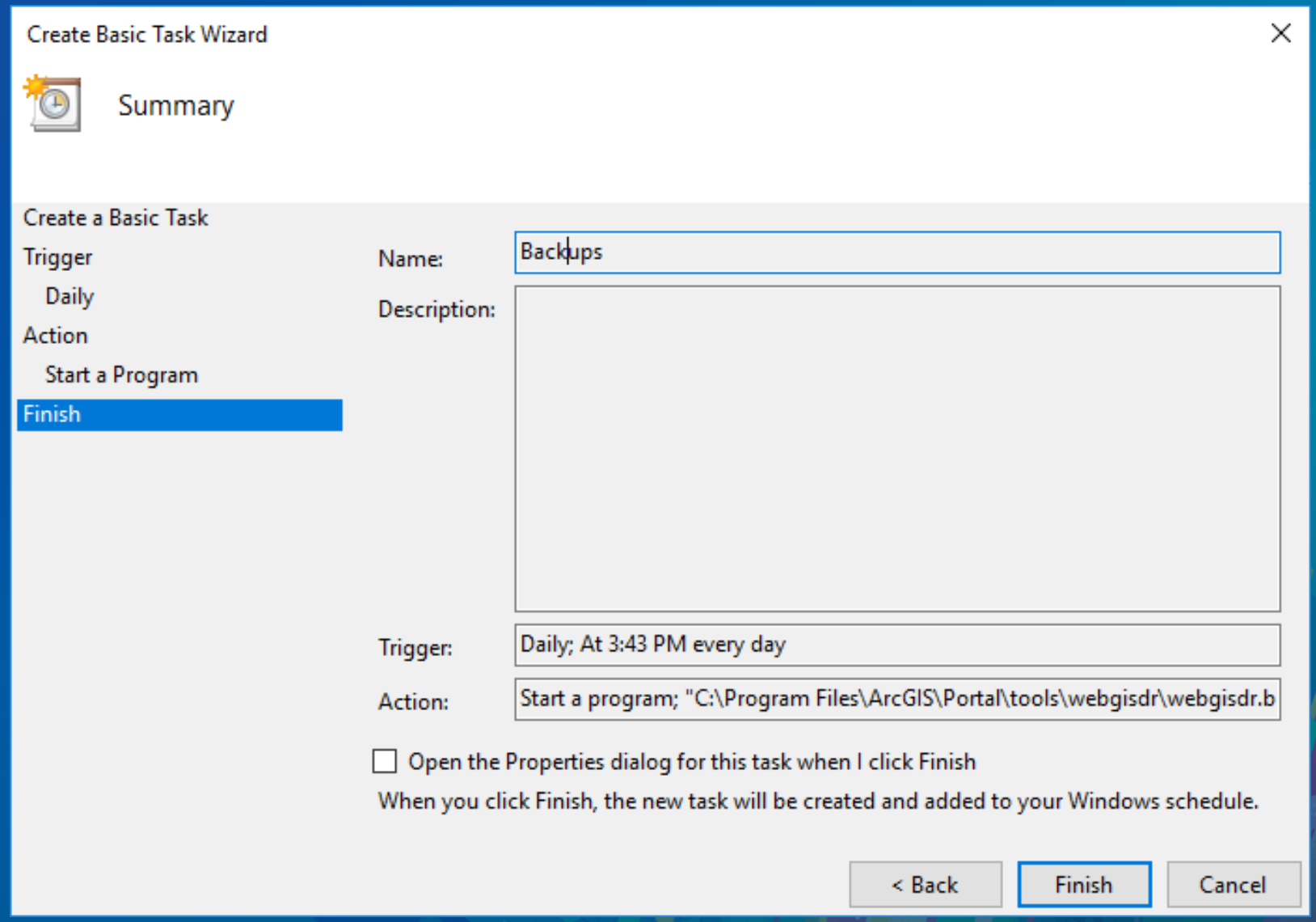
Scheduling ArcGIS Enterprise backups - Windows



Scheduling ArcGIS Enterprise backups - Windows



Scheduling ArcGIS Enterprise backups - Windows



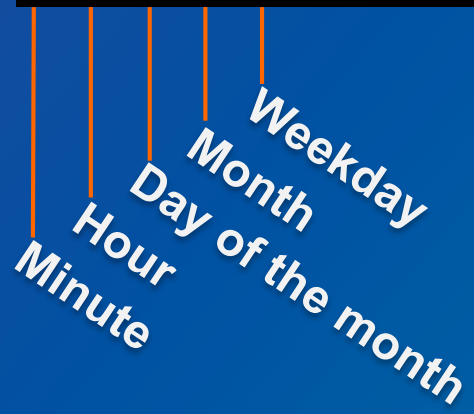
Scheduling ArcGIS Enterprise backups - Linux

- **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**

ArcGIS Enterprise

Portal

GIS Services

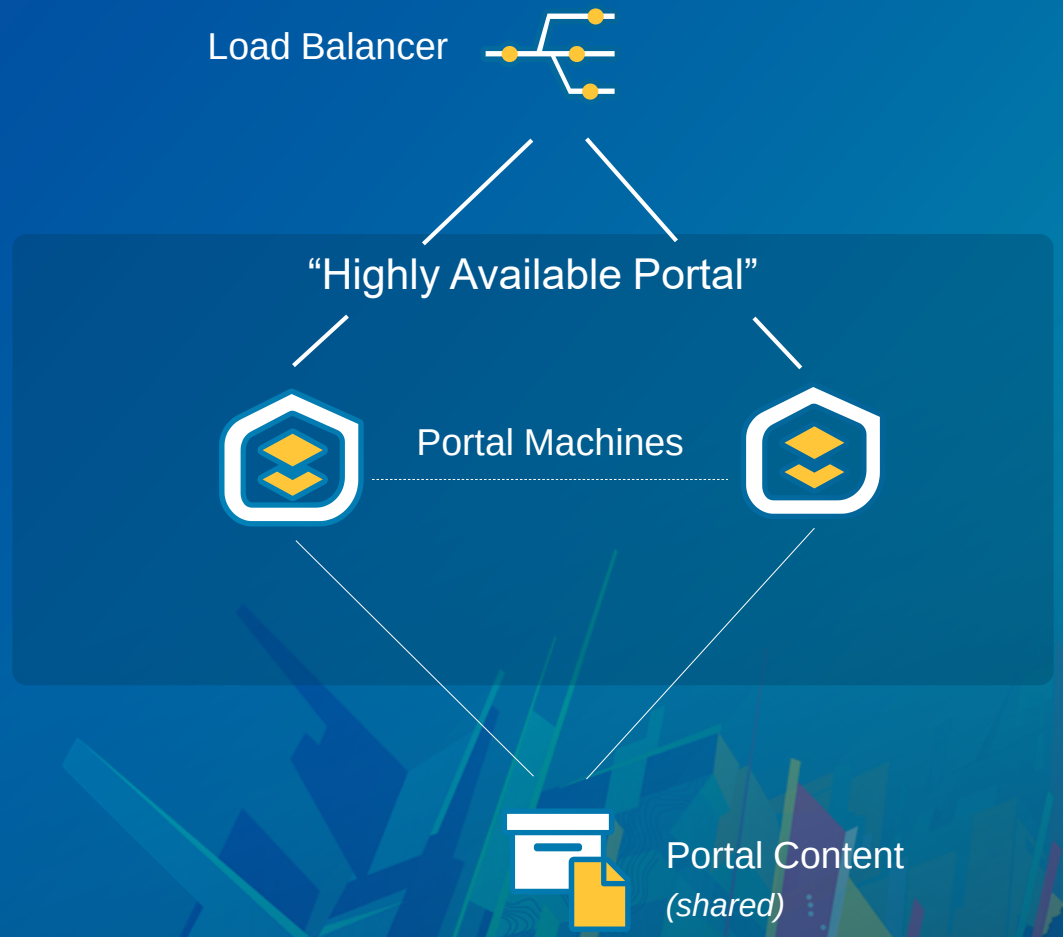
Hosted Feature and Tile Data

Portal for ArcGIS

ArcGIS Server

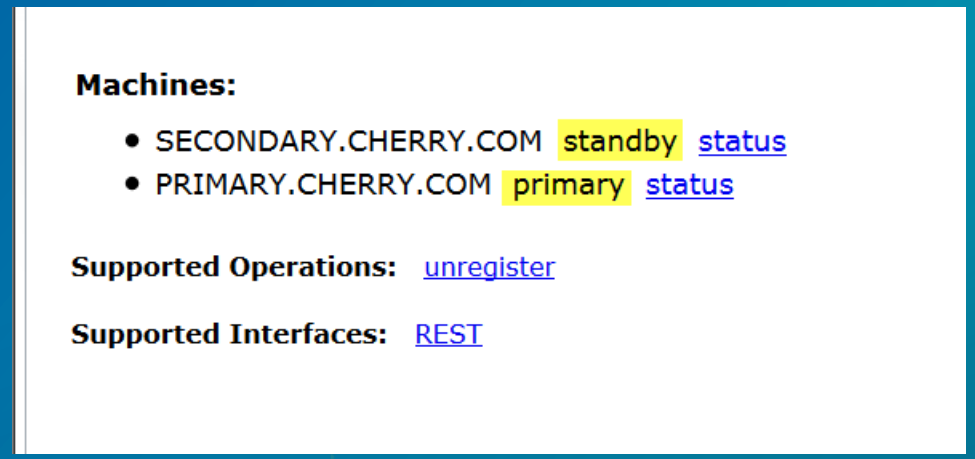
ArcGIS Data Store

Portal for ArcGIS : High Available Deployment



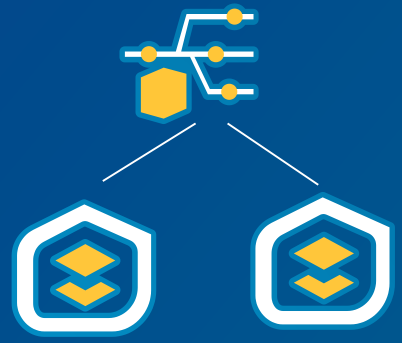
Highly Available Portal

- **Two Portal machines**
- **Both Portal machines take requests**
- **Internally, there is a difference between the two machines' role:**
  - **Primary**
  - **Standby**
- **Behavior after machine shuts down depends on role:**
  - No interruption if standby machine becomes unavailable
  - Typically 30 seconds of unavailability at 10.6.1 and up
    - Improved from a few minutes



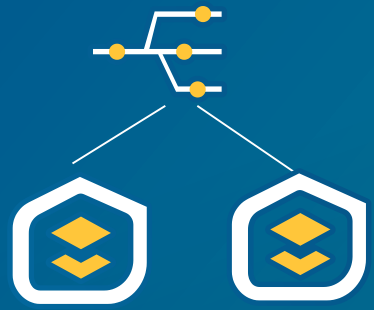
Portal for ArcGIS: Load Balancing Options

ArcGIS Web Adaptor



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

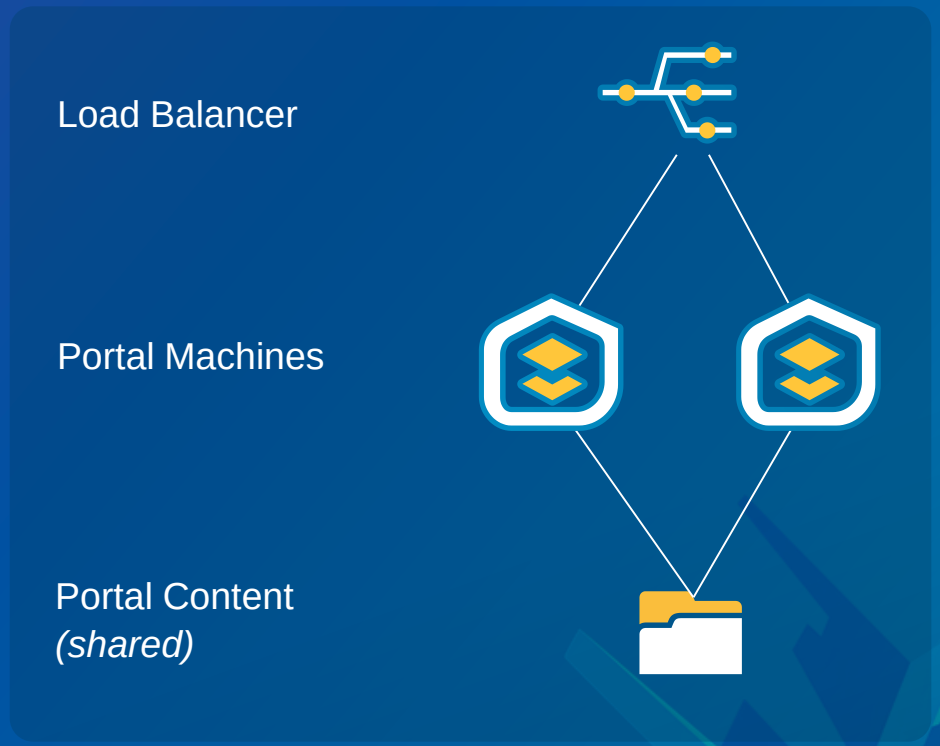
3rd Party Load Balancer



- Not provided by Esri
- Typically already fault tolerant

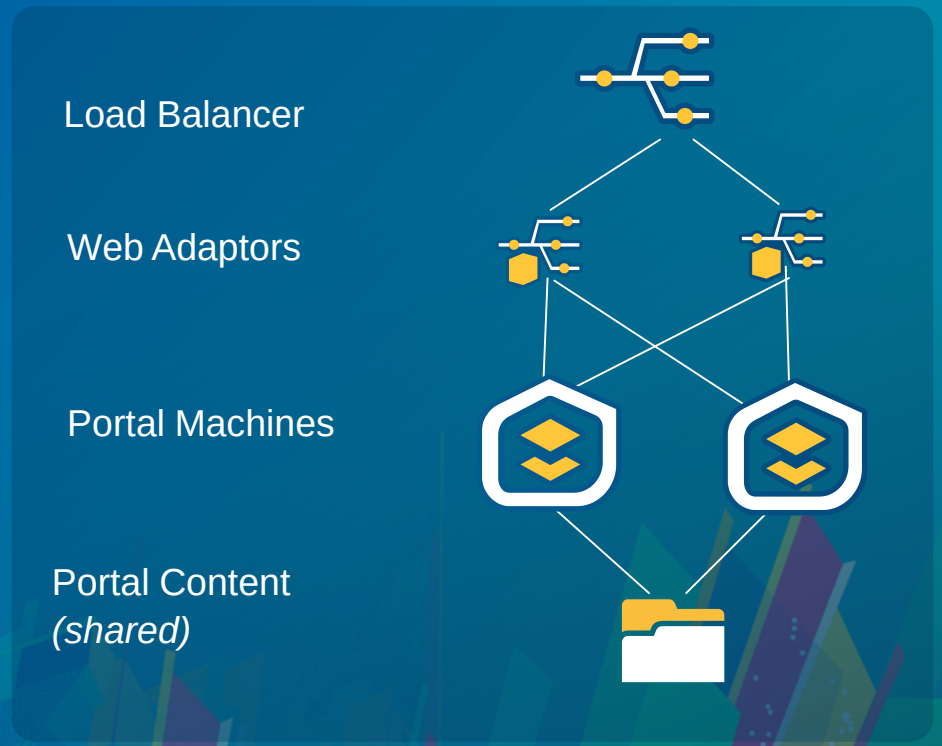
Portal for ArcGIS: High Availability Deployment Patterns

HA Portal with Load Balancer



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

HA Portal with Load Balancer & Web Adaptors



- More complex
- Web Tier Authentication

Portal for ArcGIS: Health Check

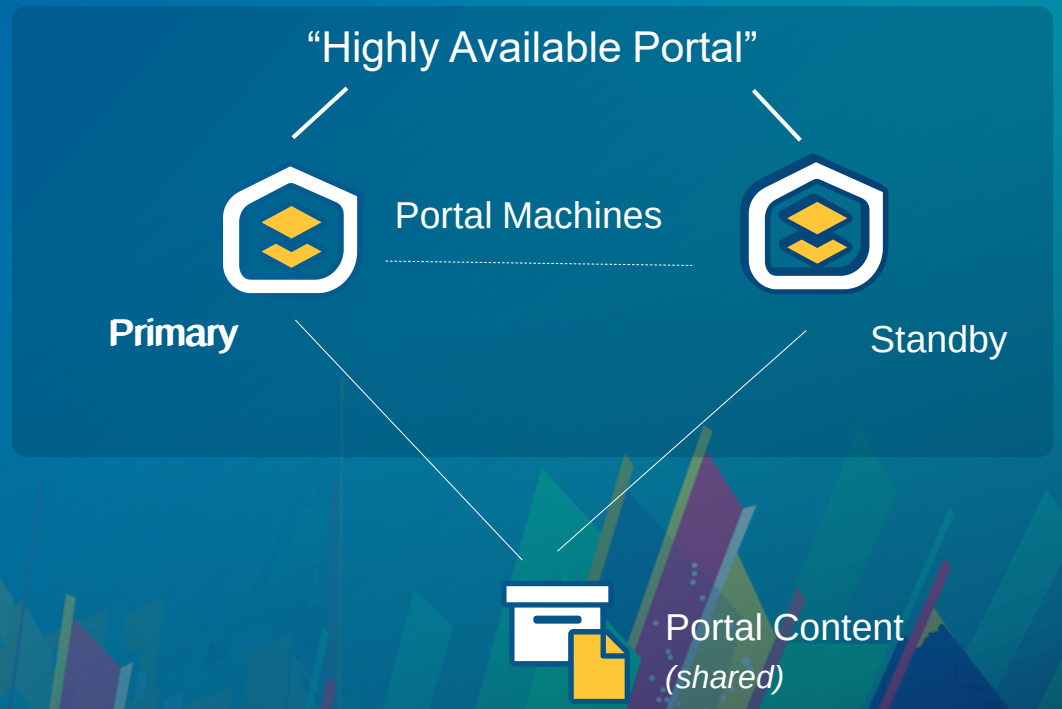
- **Provided by Portal for ArcGIS**
  - **https://<webadaptor machine>.domain.com/<context>/portaladmin/healthCheck**
  - **https://<machine>.domain.com:7443/arcgis/portaladmin/healthCheck**

- **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
- No need to take note of roles (new at 10.7)
- 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 Enterprise

Portal

Portal for ArcGIS

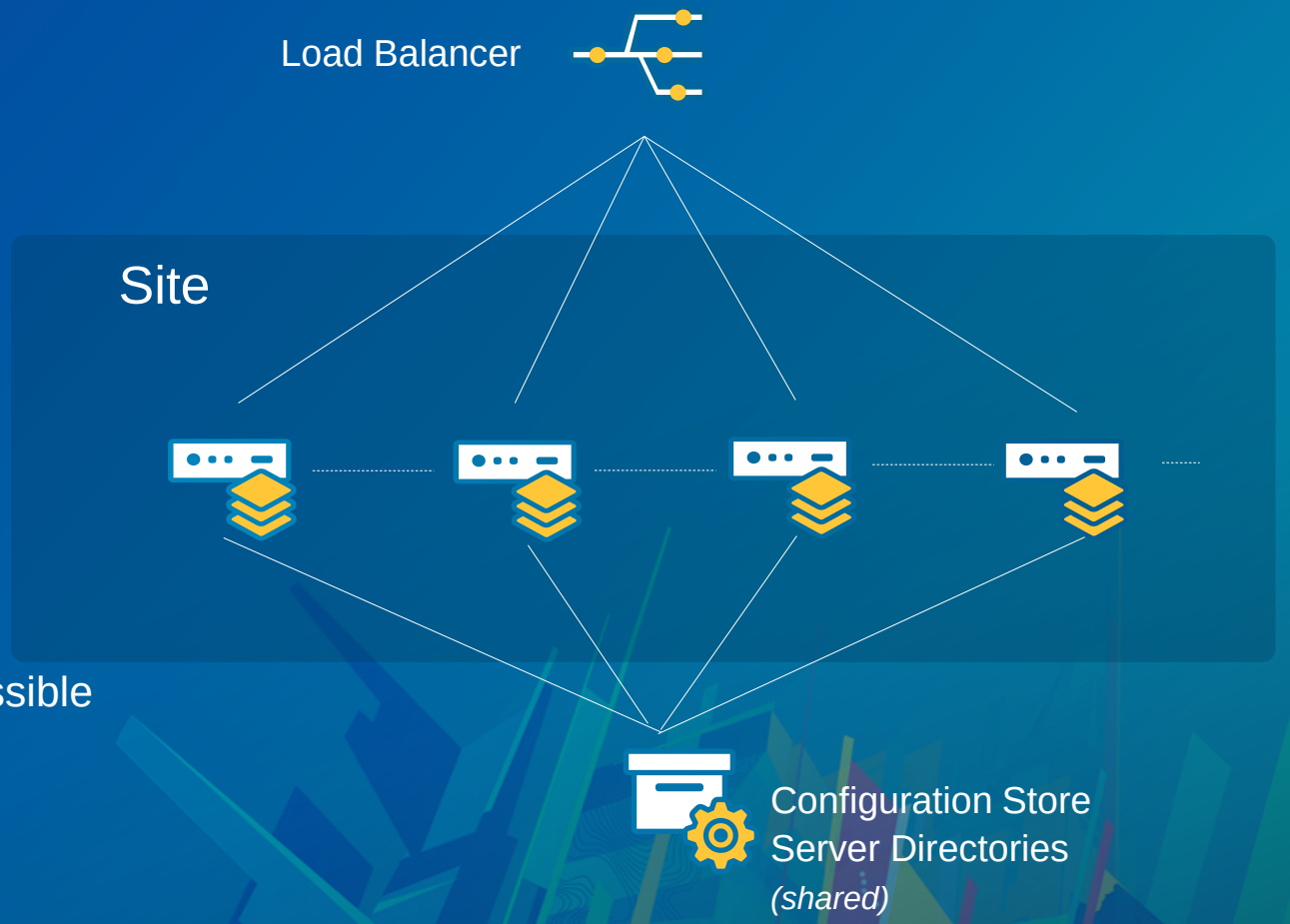
GIS Services

ArcGIS Server

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.



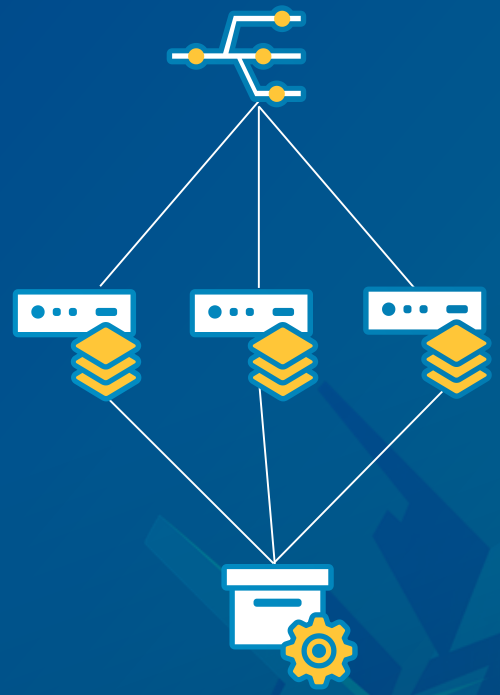
ArcGIS Server: High Availability Deployment Patterns

Server Site with Load Balancer

Load Balancer

Server Machines

Config-store
Server Directories
(shared)



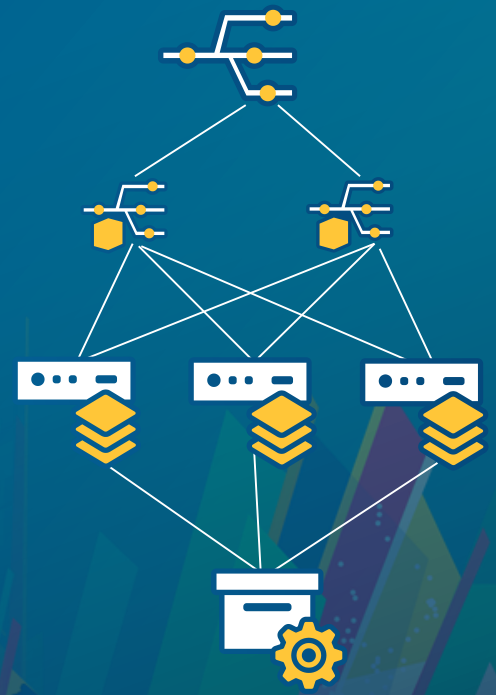
Server Site with Load Balancer & Web Adaptors

Load Balancer

Web Adaptors

Server Machines

Config-store
Server Directories
(shared)



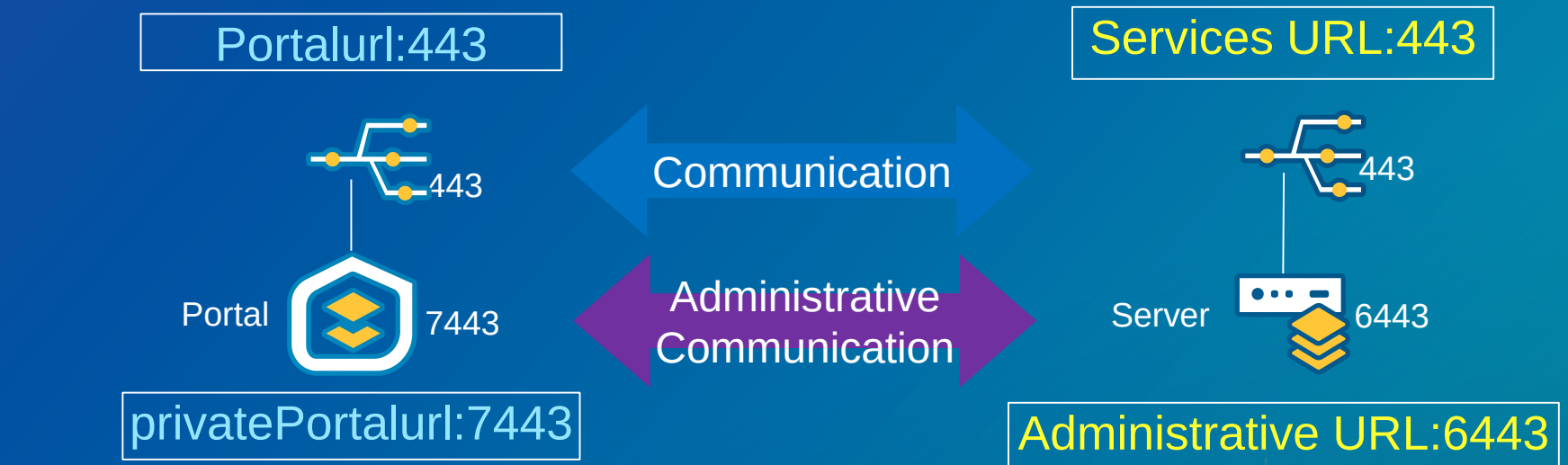
ArcGIS Server: Health Check

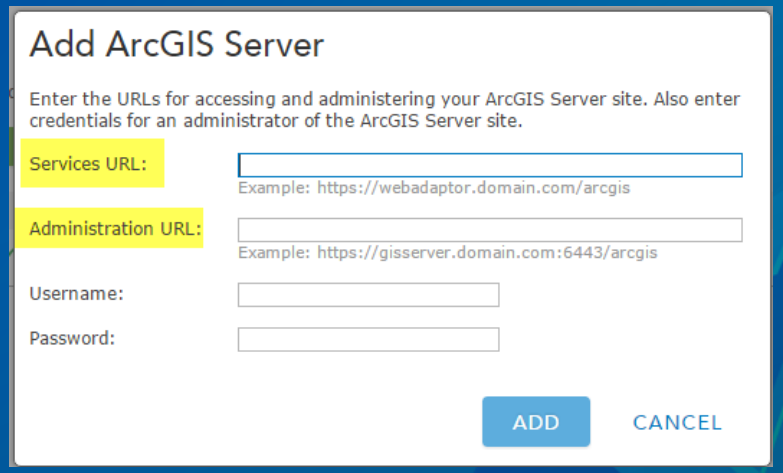
- Provided by ArcGIS Server
  - https://<…..domain.com>/<context>/rest/info/healthcheck
  - https://<machine>.domain.com:6443/arcgis/rest/info/healthcheck
- Server level health check. Not checking service.
- Or your own customized health check

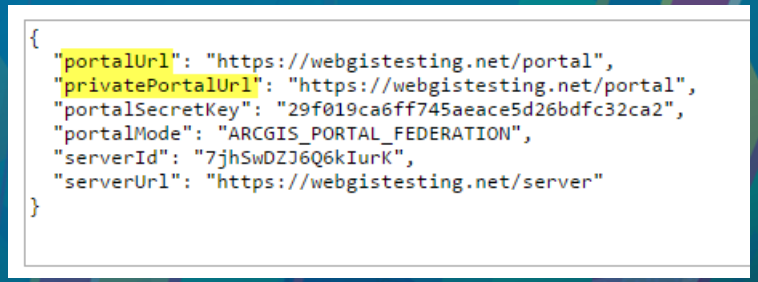
Upgrade multi-machine ArcGIS Server

- Install and Upgrade
- Same on all machines
- Downtime for upgrade one machine

Portal for ArcGIS and ArcGIS Server: Federation







Portal for ArcGIS and ArcGIS Server: Federation

Portalurl:443

Load Balancer

443

Portal Machines

Load Balancer

7443

privatePortalurl:7443

Services URL:443

Load Balancer

443

Server Machines

Load Balancer

6443

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

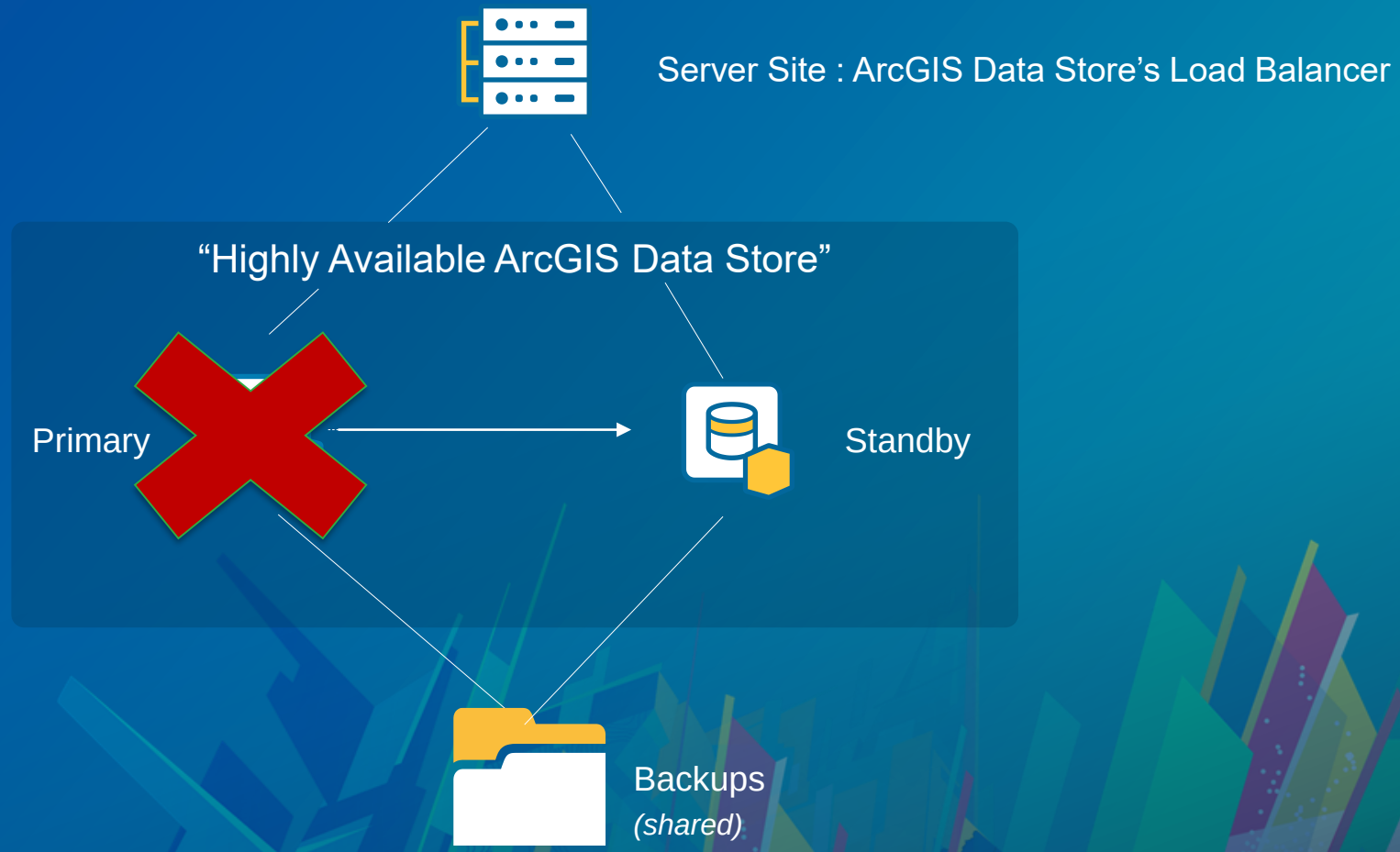
Date: 03/06/2019

Time: 10:30am – 11:30am

Location: Catalina/Madera

The session has already passed
– watch the video later and/or **please bring questions to the Expo.**

ArcGIS Data Store: High Availability Architecture

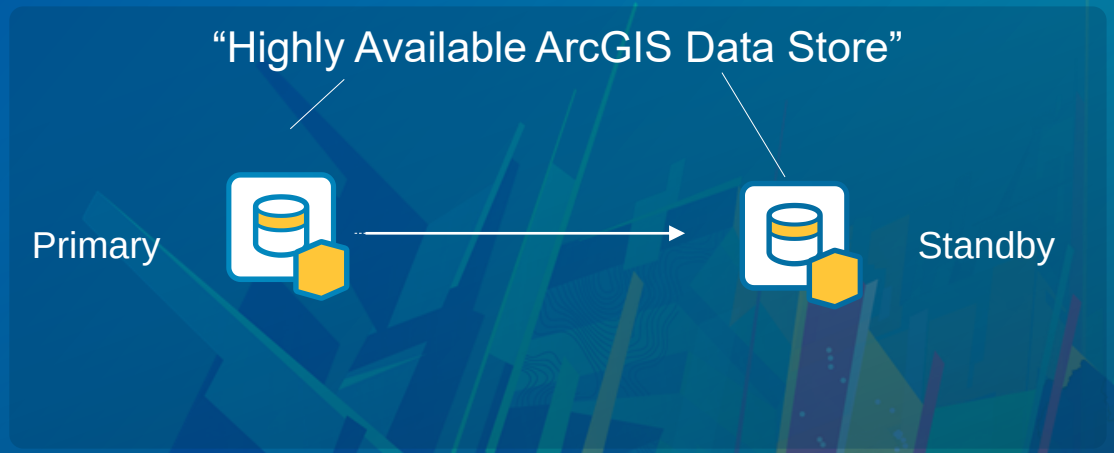


ArcGIS Data Store: Failover Scenarios

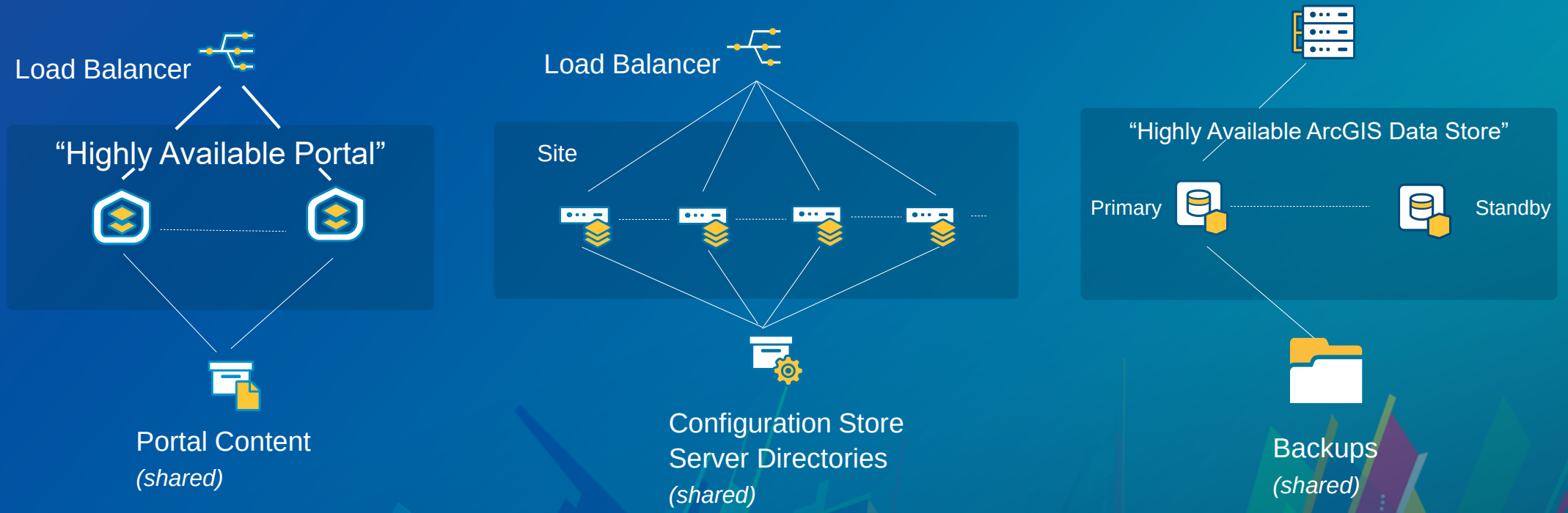
- Primary ArcGIS Data Store stops working: Define Failure
  - Computer crashes
  - Gets unplugged
  - Lose network connectivity
  - etc
- Not “gracefully” shutdown
  - Data Store service stops
- http://server.arcgis.com/en/documentation/ → Search “Fail over scenarios”

Upgrade High Availability ArcGIS DataStore

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



ArcGIS Enterprise High Availability Deployment

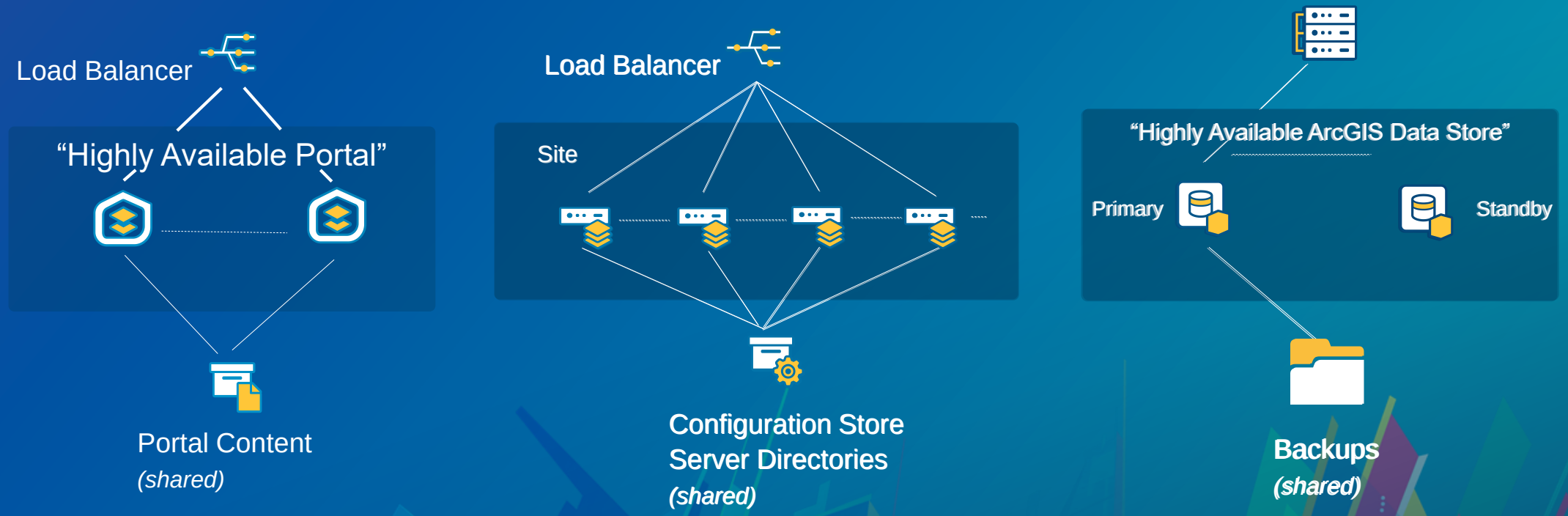


Portal Content
(shared)

Configuration Store
Server Directories
(shared)

Backups
(shared)

Upgrade ArcGIS Enterprise High Availability Deployment



- **Upgrade Order**

Cloud Storage Support

- S3
  - Portal content store
  - Cloud Storage in Server Manager
    - Caching
    - GeoAnalytics Data Input
    - Raster Analytics
  - ArcGIS Spatial Temporal DataStore backups
  - Webgisdr backups
- DynamoDB & S3
  - ArcGIS Server config-store
- User-defined compatible storage
  - Caching

NEW

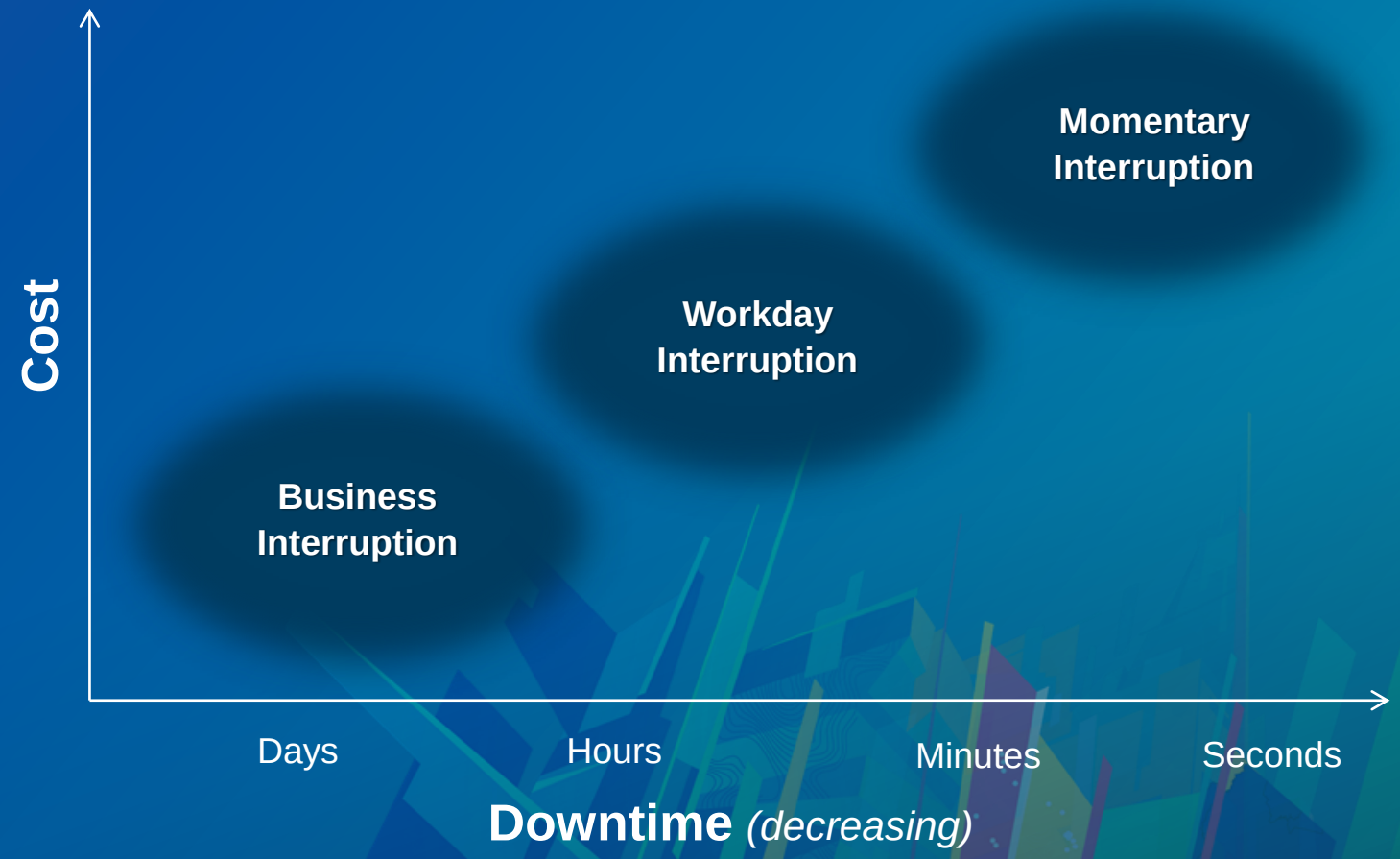
ArcGIS Enterprise HA: Part of Your HA Architecture

- 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



Disaster Recovery

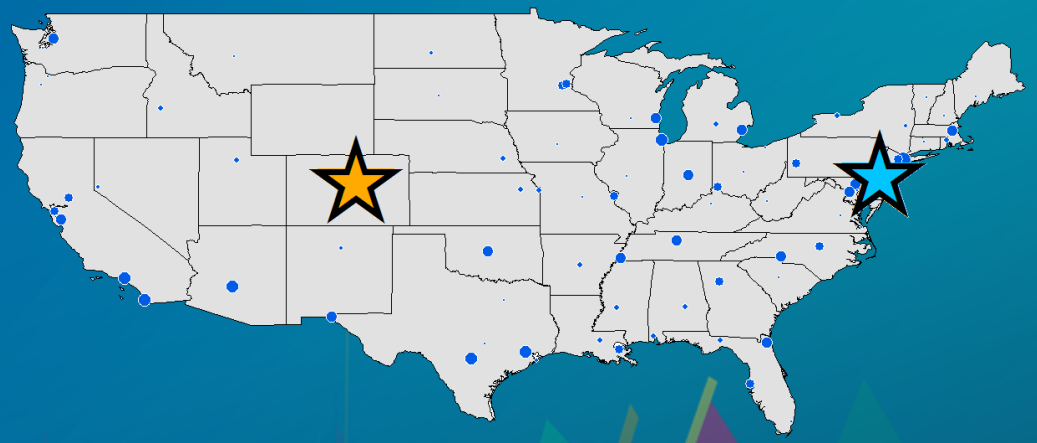
Geographic Redundancy

Agenda

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

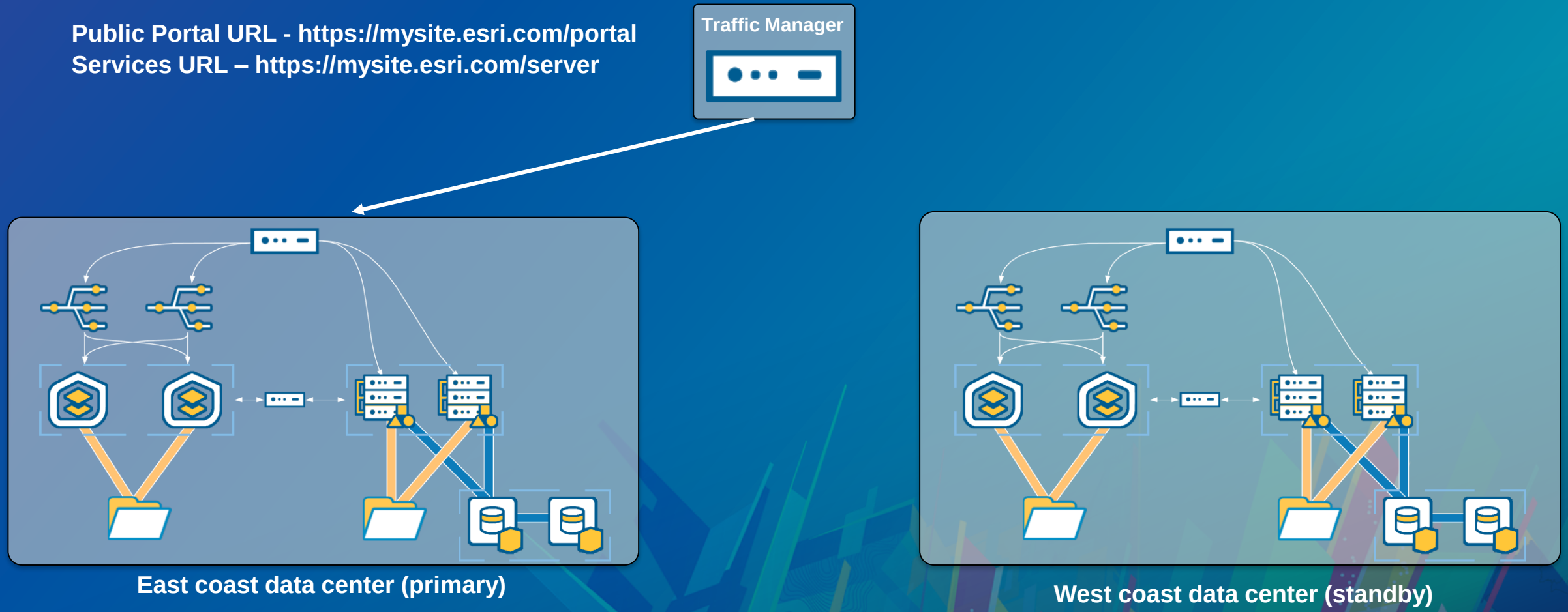
Overview

- 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



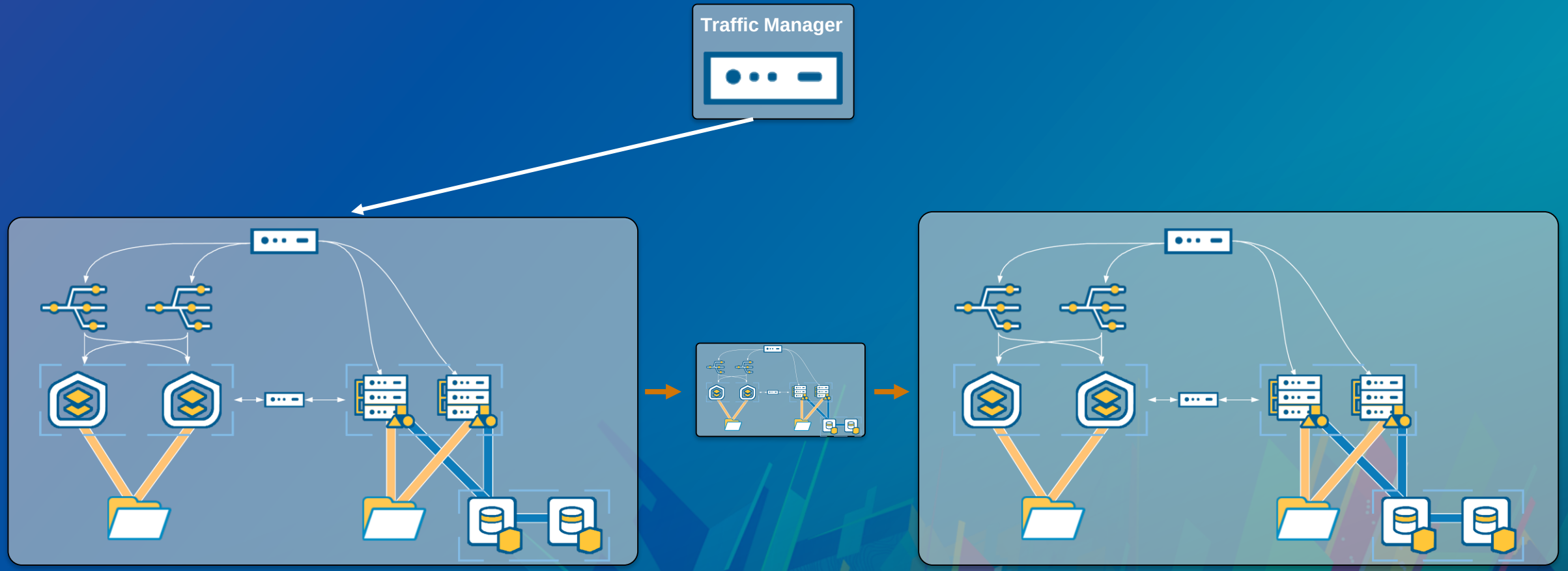
Geographic Redundancy

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

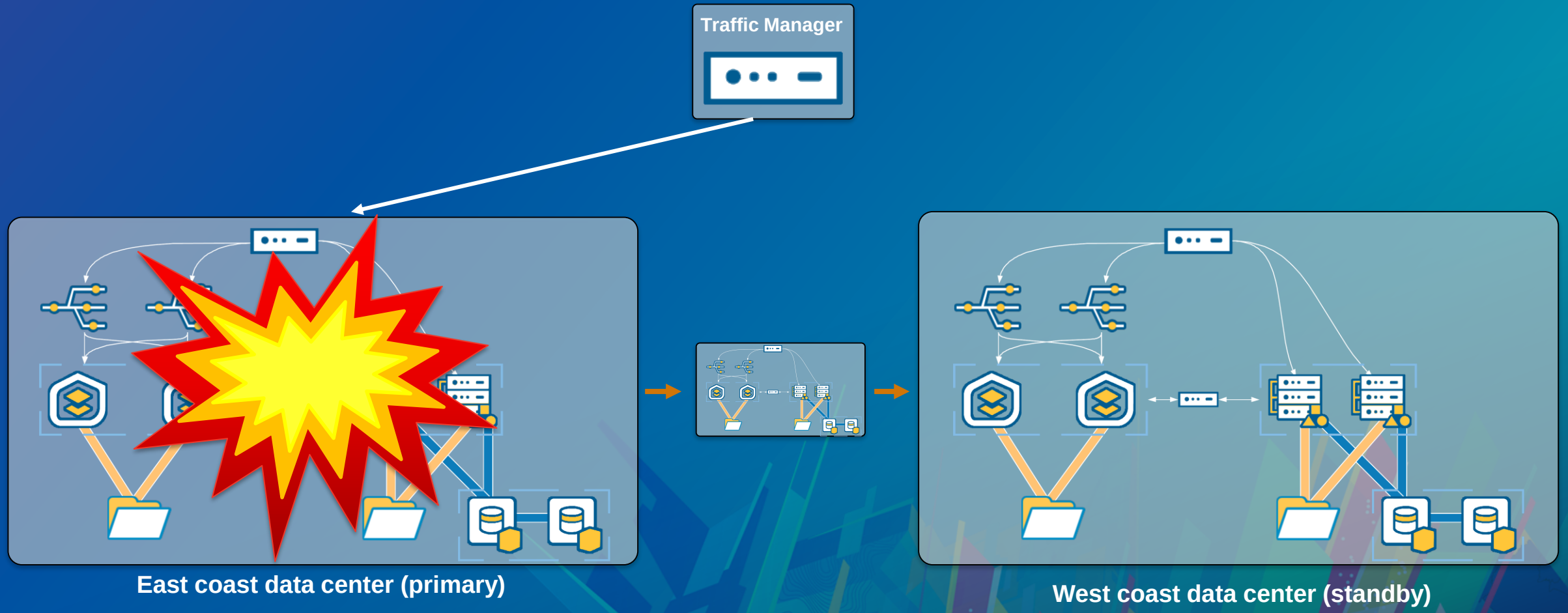


Public portal URL and services URL need to be the same

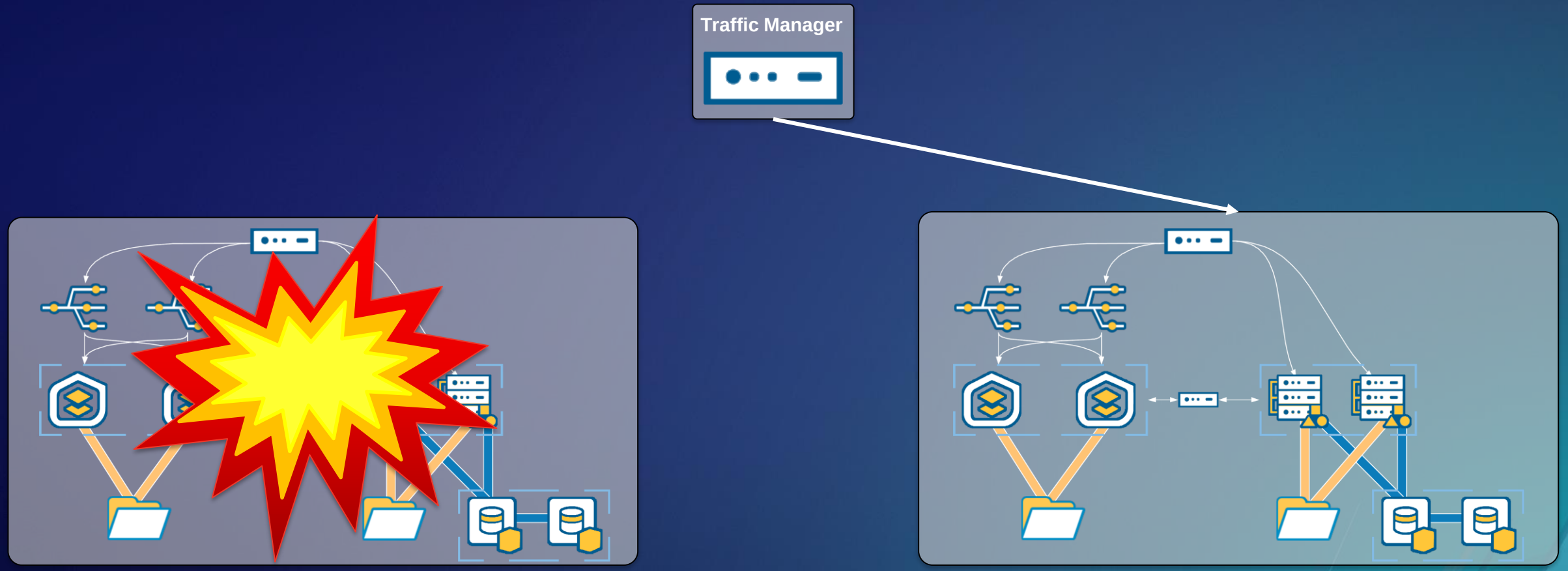
Geographic Redundancy



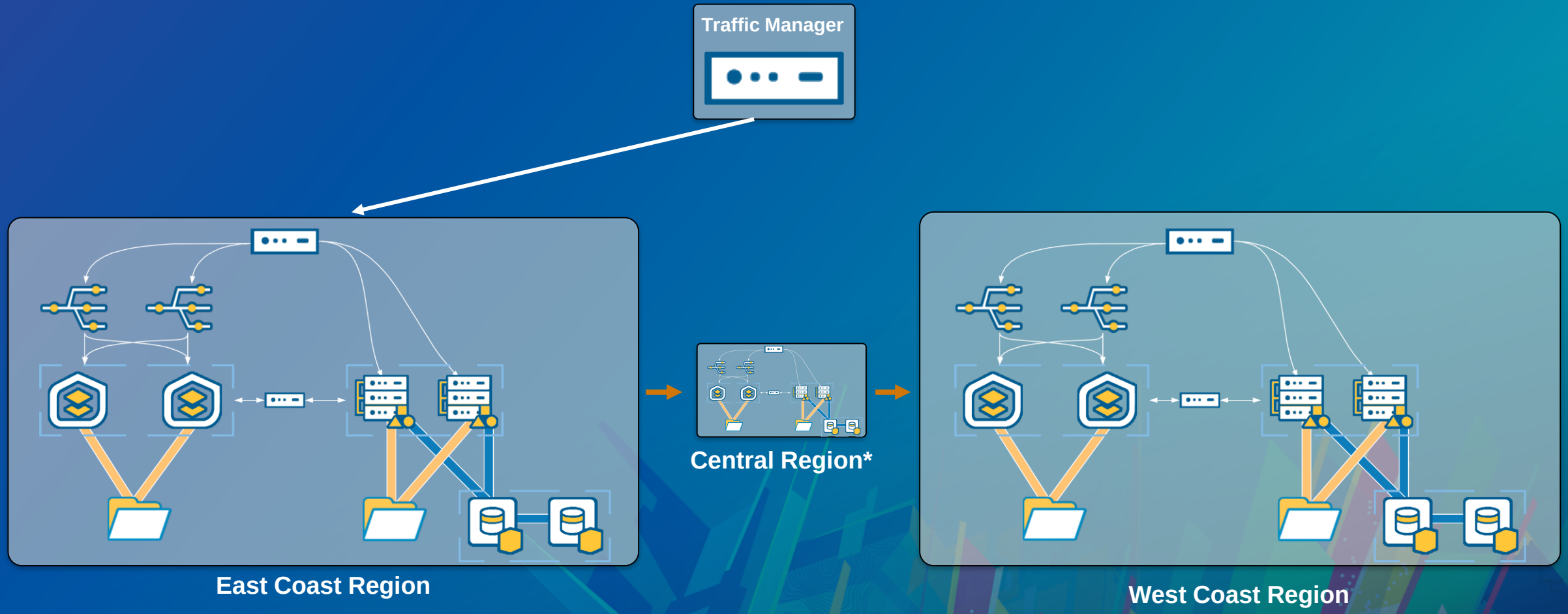
Geographic Redundancy



Geographic Redundancy



Geographic Redundancy – Cloud deployments

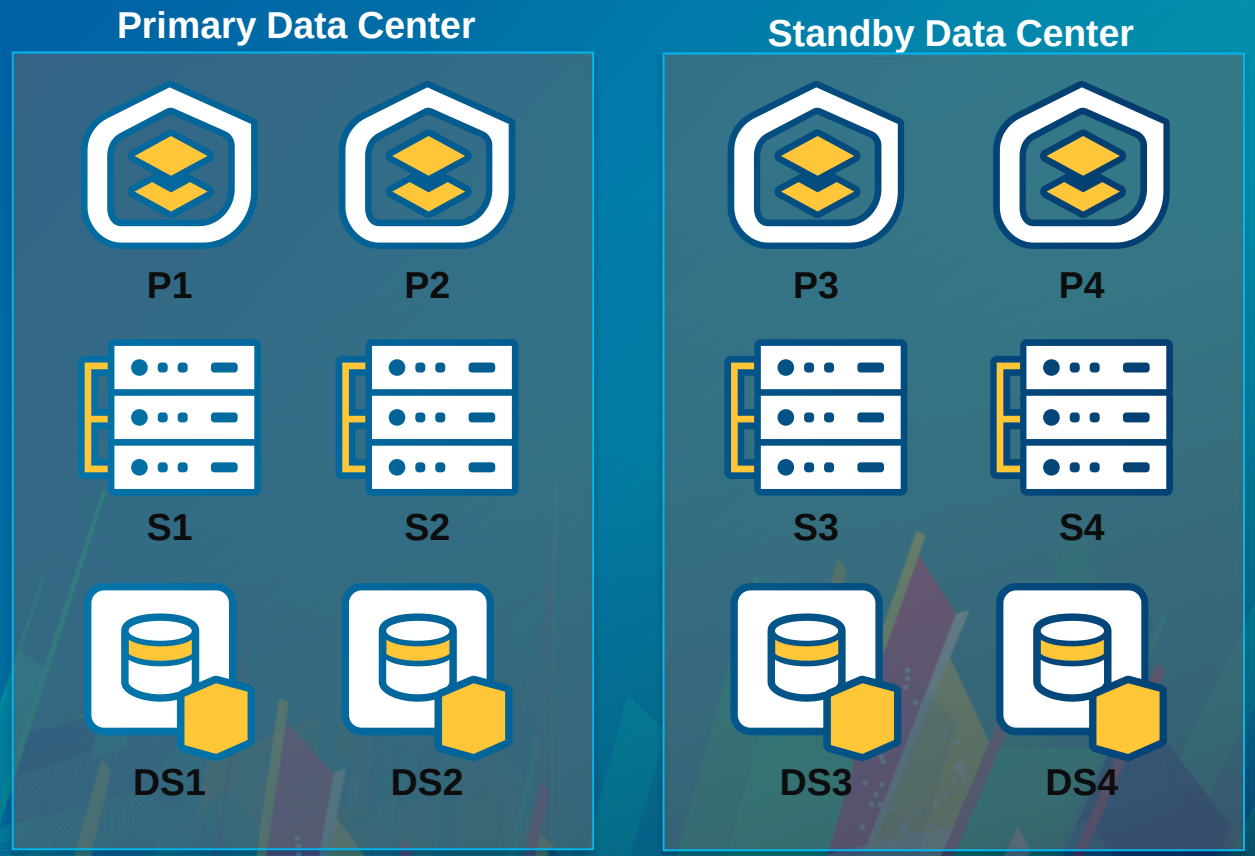


Roadmap for geographic redundancy

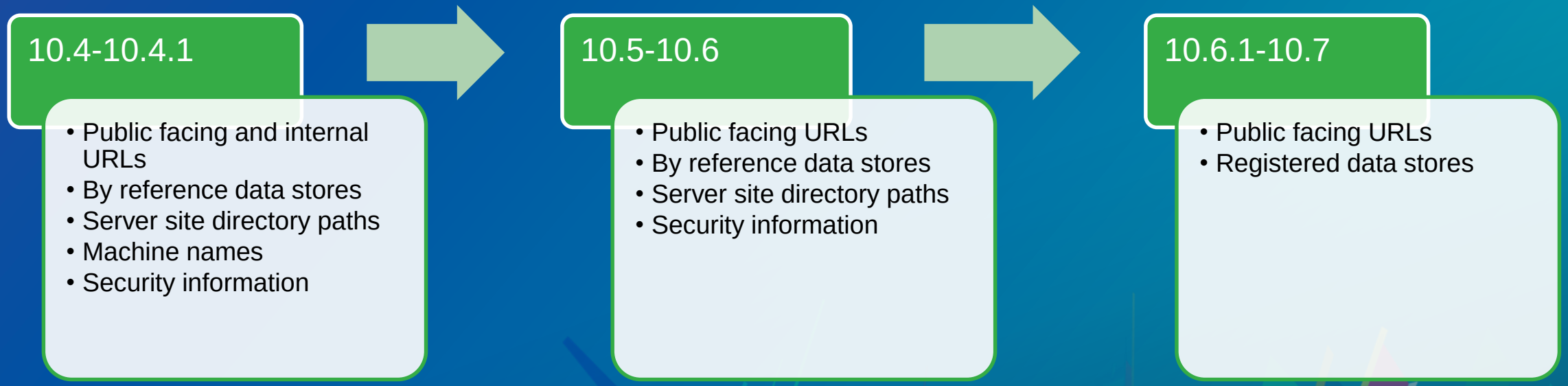
1. Duplicate the deployment between primary and standby data centers
2. Create snapshots of the primary data center
3. Apply snapshots to the standby data center
4. Monitor your standby data center

Step 1 - Duplication

- Number of machines should be the same
- Identical URLs between data centers
  - Public Portal URL
  - Services URL
- Identical paths to file based data
  - Enterprise data stores can be different, relying on the data store name for the mapping



Duplication – What needs to be the same?

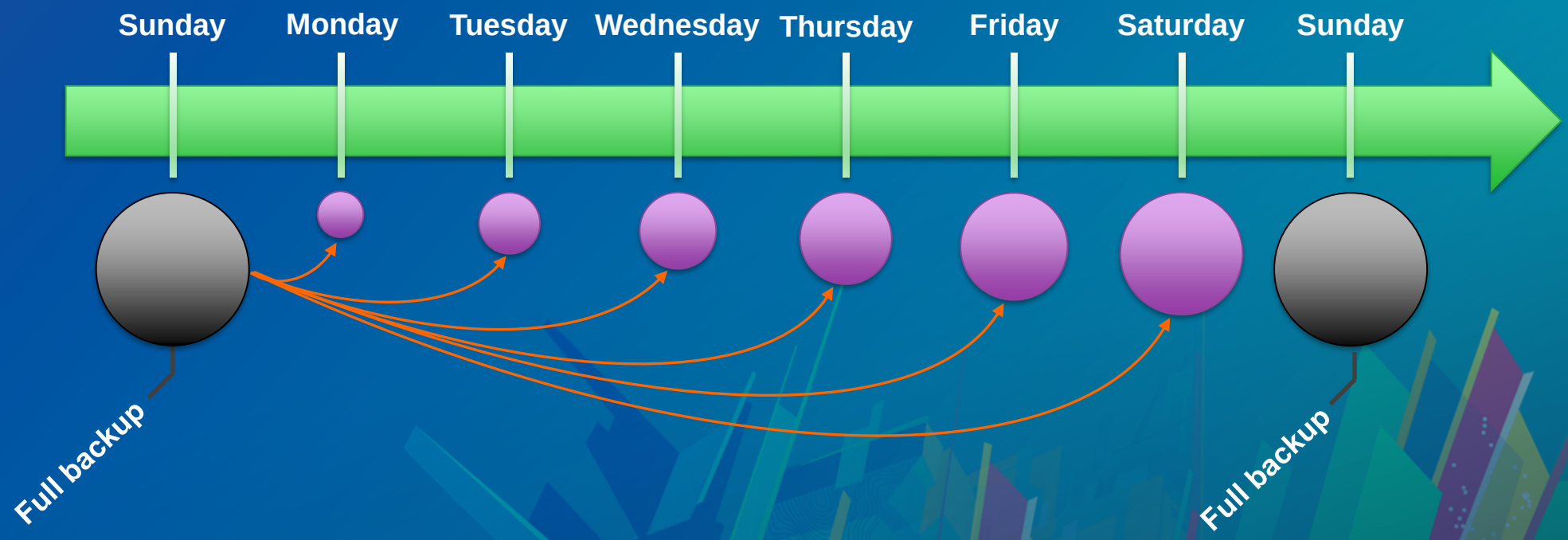


Step 2 - Creating snapshots

- **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

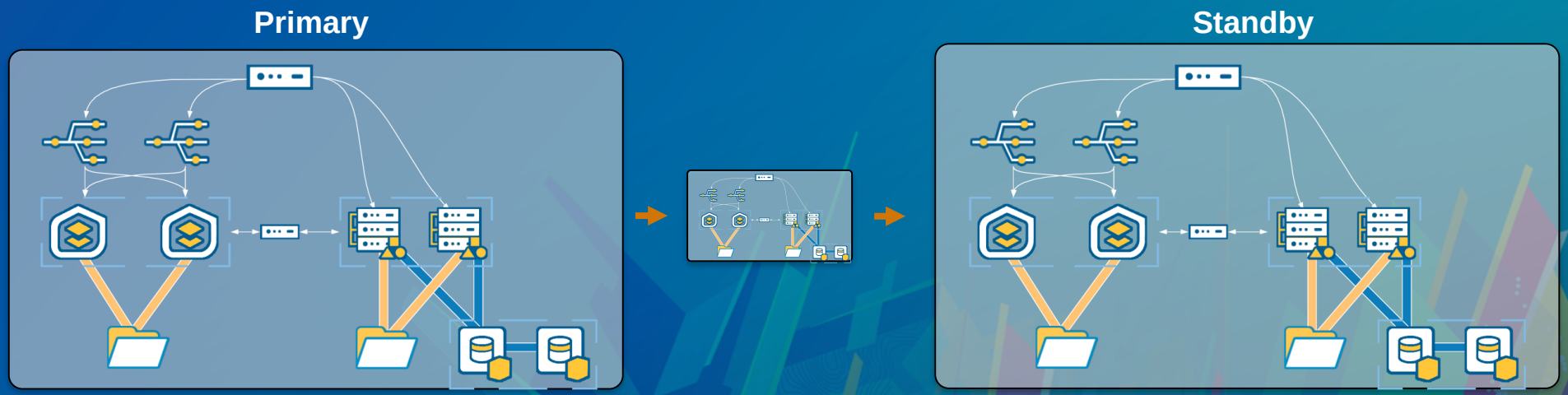
Creating incremental snapshots

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



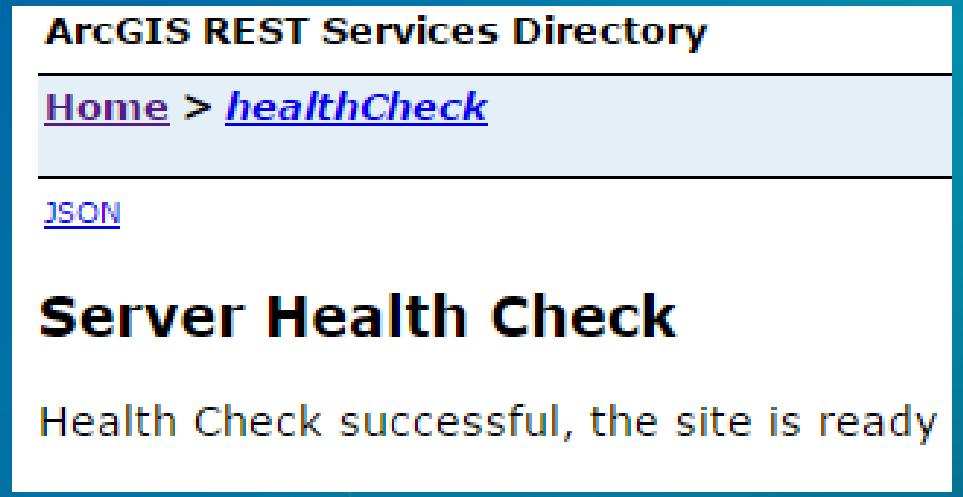
Step 3 - Applying snapshots

- Two approaches
  - As snapshots are ready
  - At the time of a failure
- Define an automated schedule that works for your organization



Step 4 - Monitoring

- QC process on standby ArcGIS Enterprise
  - Checking the index within Portal
  - Validating federated Servers
  - Validating data stores through the 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 can be expensive



Takeaway points

- Important to understands 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

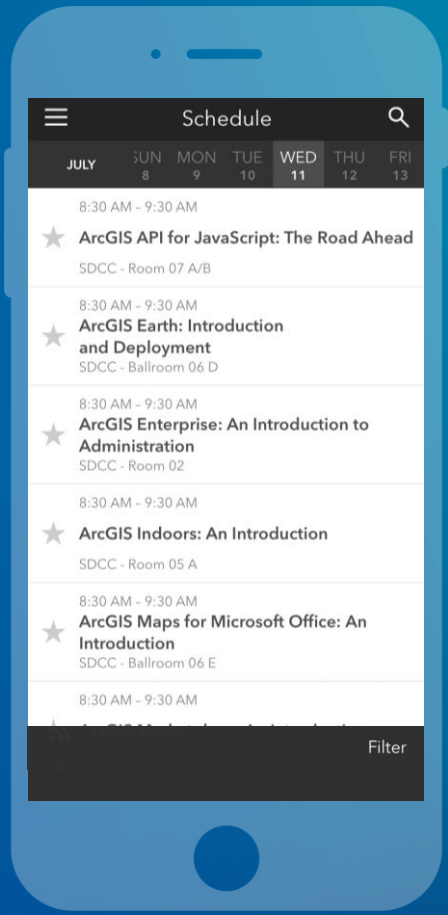
Success Stories with HA or DR

- Let us know if you have a success story to share

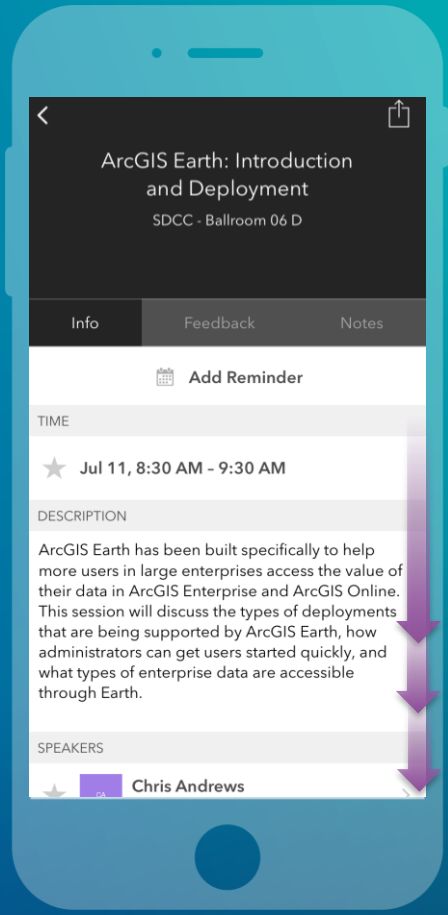
Please Take Our Survey on the App

Download the Esri Events app and find your event

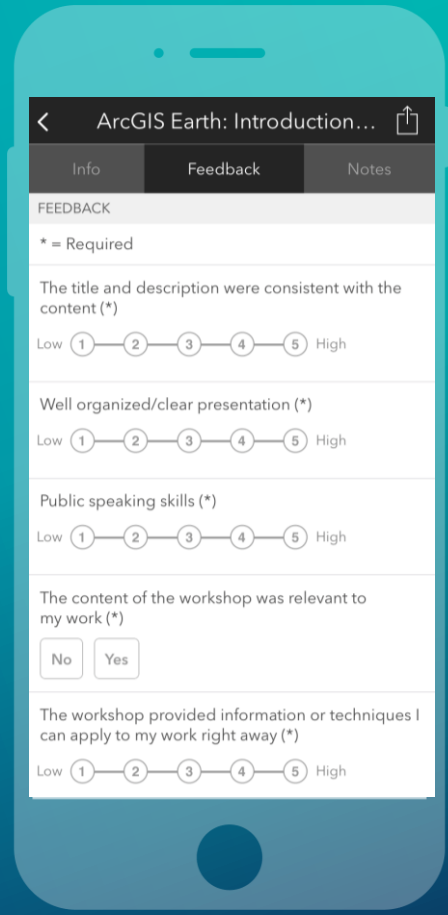
Select the session you attended



Scroll down to find the feedback section



Complete answers and select “Submit”

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