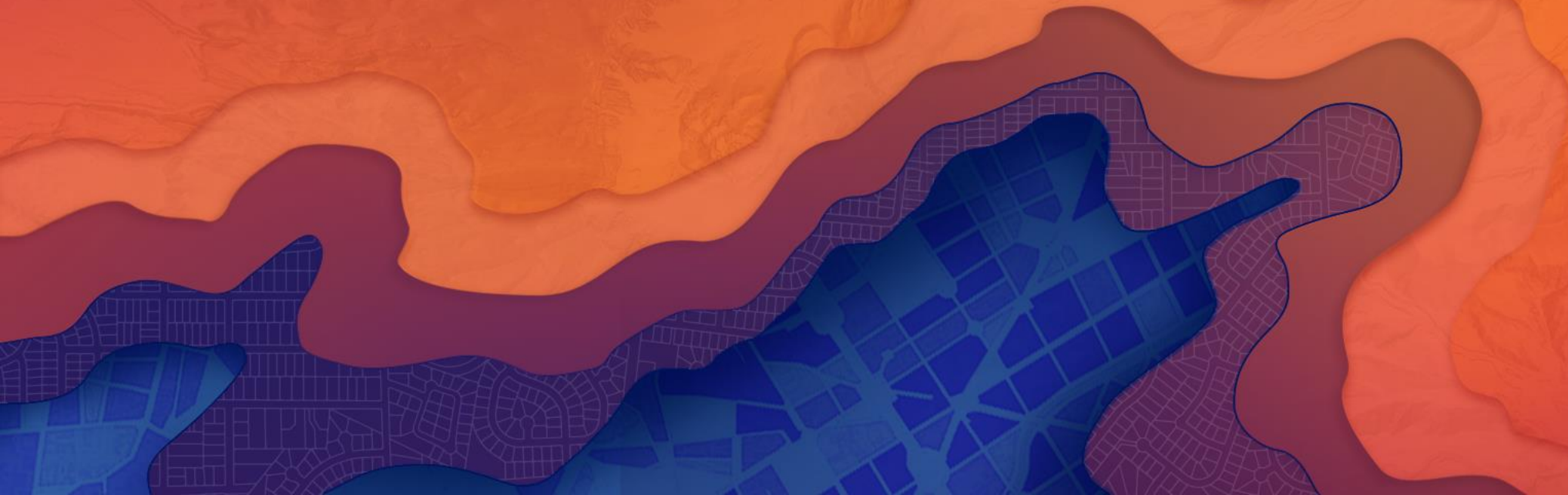


High Availability and Disaster Recovery

Cherry Lin, Jonathan Quinn

Overview of Disaster Recovery



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

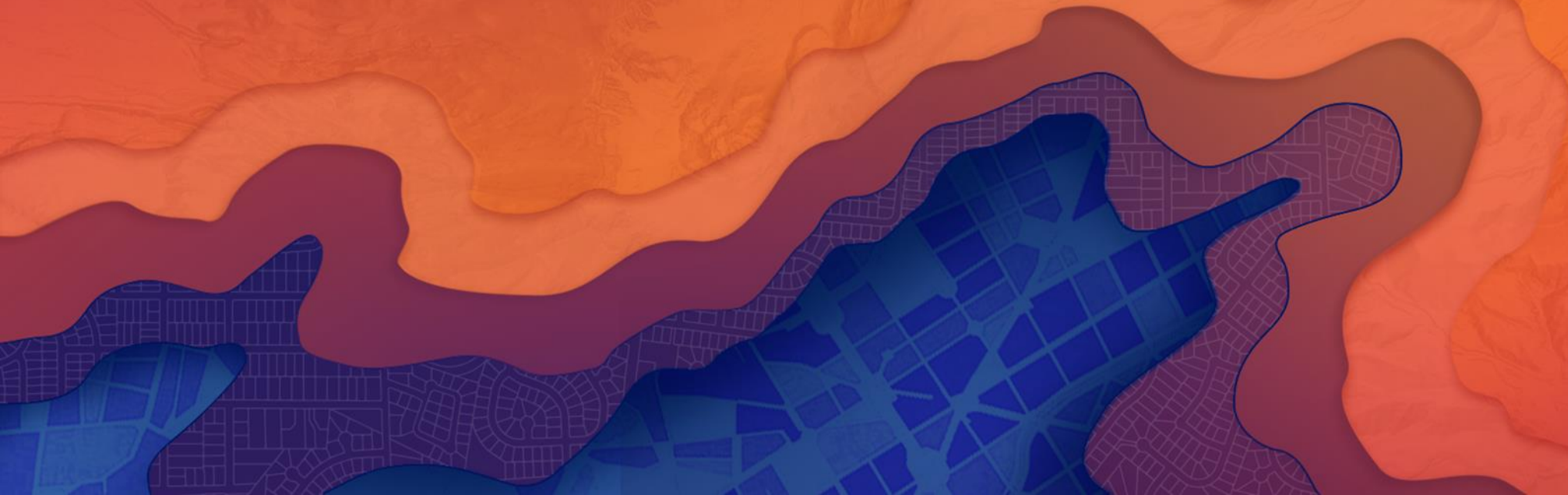


Complementary

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

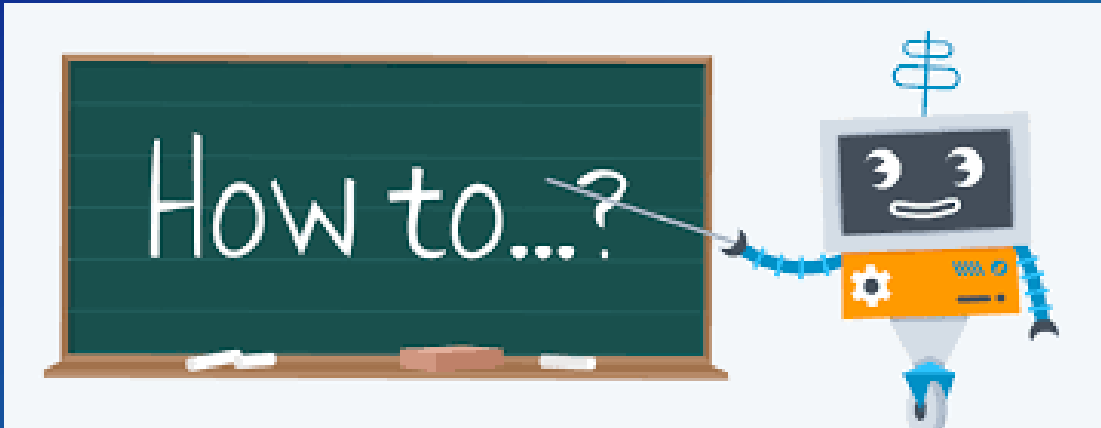


What the tool doesn't backup

EGDB or file based data

Traditional cache tiles

How to Backup Web GIS



Web GIS DR Tool

Property File

- Location
- Portal URL
- Credentials
- Scene Cache?

Automate

New at 10.5 and 10.5.1

- **Reduced requirements for running the tool**
 - Different machine names
 - Different internal URLs
- **Incremental backups**
- **Cloud specific**
 - Different regions for primary and standby data centers
 - Azure BLOB storage
 - Ability to save a WebGIS DR backup to an S3 bucket

WebGIS DR Properties – Backup Restore Mode

```
# Specify the Web GIS backup location if you've set the BACKUP_STORE_PROVIDER to FileSystem.  
BACKUP_LOCATION = \\fileServer\backups\full
```

```
# Specify the Web GIS backup mode: full or incremental.  
BACKUP_RESTORE_MODE = full
```

WebGIS DR Properties – Amazon S3

Information for the backup portal content S3 bucket

```
# If your portal content directory is in Amazon S3, specify Amazon S3 Storage properties for portal backups.  
PORTAL_BACKUP_S3_BUCKET = portal-content  
PORTAL_BACKUP_S3_REGION = US-East-1
```

WebGIS DR Properties – Amazon S3

Storing the WebGIS DR backup in an S3 bucket

```
# Specify a storage provider: FileSystem, or AmazonS3.  
BACKUP_STORE_PROVIDER = AmazonS3
```

```
# Specify Amazon S3 Storage properties if you've set the BACKUP_STORE_PROVIDER to AmazonS3.  
S3_ACCESSKEY = < access key >  
S3_SECRETKEY = < secret access key >  
S3_ENCRYPTED = true  
S3_BUCKET = webgisdr-backup  
# IAMRole or accessKey  
S3_CREDENTIALTYPE = IAMRole  
S3_REGION = US-East-1  
# Specify a backup name used for the Web GIS restore only.  
# Example:  
# April-20-2017-5-04-14-PM-PDT-FULL  
# or  
# webgisdr-backup/10-5-1/full/April-20-2017-5-04-14-PM-PDT-FULL  
S3_BACKUP_NAME =
```


WebGIS DR Properties – Azure

Credentials for the backup portal content container

```
# If your portal content directory is in Azure Blob, specify Azure Blob Storage properties for portal backups.  
PORTAL_BACKUP_BLOB_ACCOUNT_NAME = < account name >  
PORTAL_BACKUP_BLOB_ACCOUNT_KEY = < account key >  
PORTAL_BACKUP_BLOB_ACCOUNT_KEY_ENCRYPTED = true  
PORTAL_BACKUP_BLOB_ACCOUNT_ENDPOINT = blob.core.windows.net  
PORTAL_BACKUP_BLOB_ENDPOINT_URL =https://< account name >.blob.core.windows.net/< container >
```

WebGIS DR Tool – Usage

- **Backup**

- Runs concurrently
- No downtime while exporting
- Sample syntax

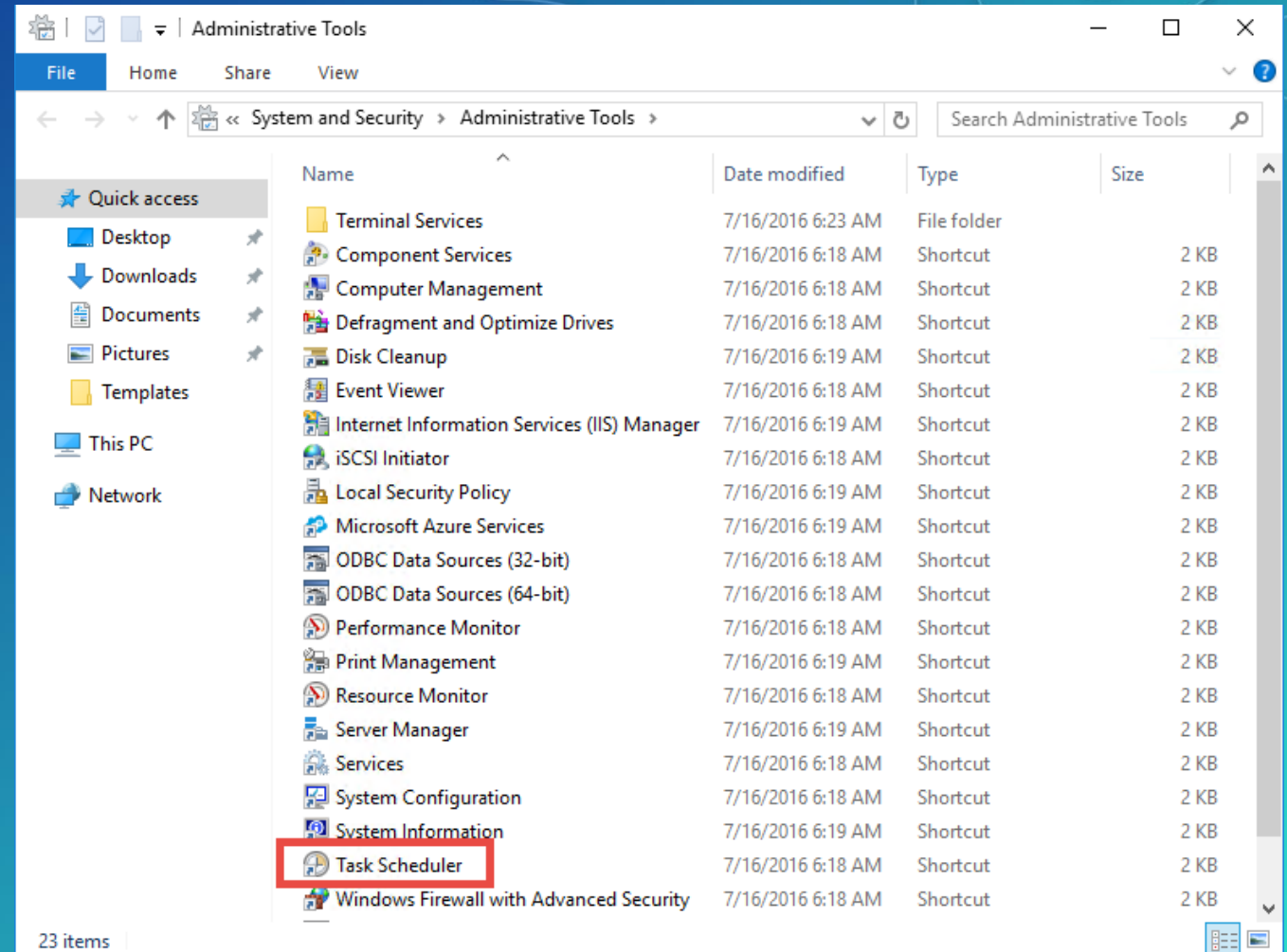
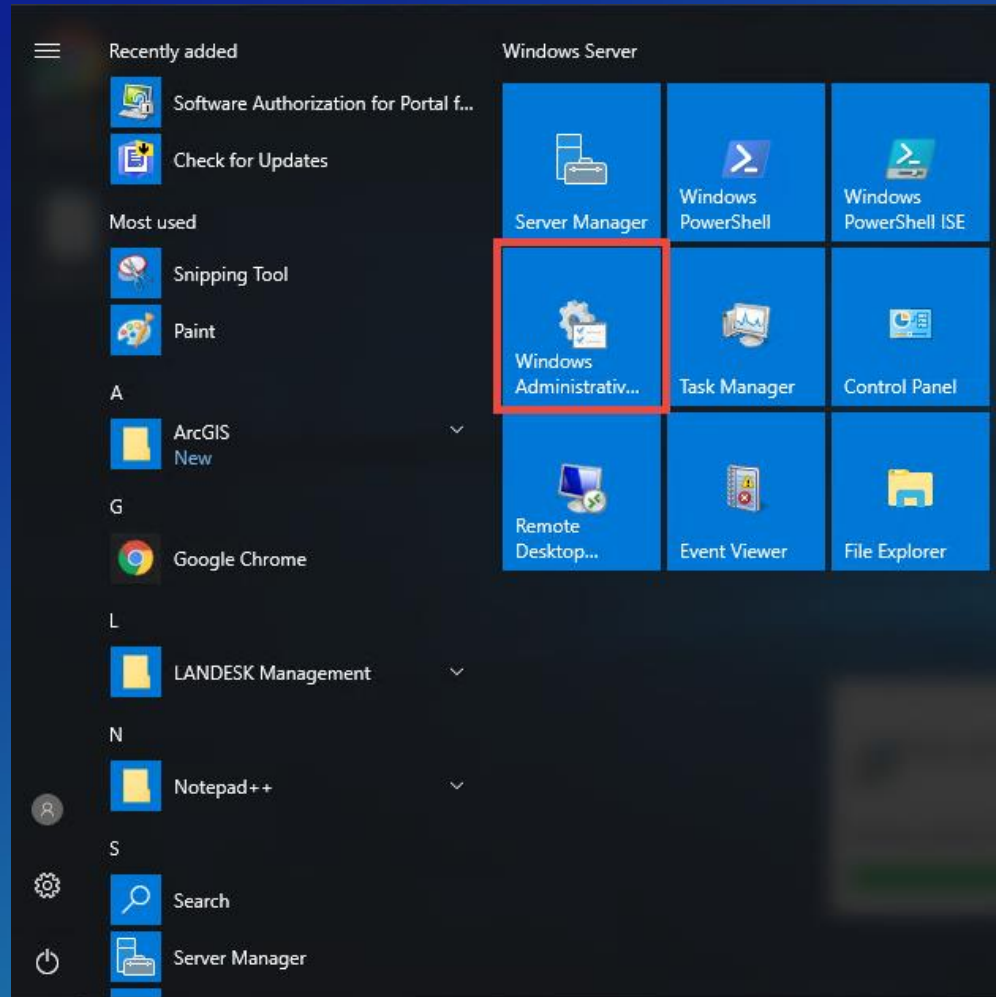
```
C:\Program Files\ArcGIS\Portal\tools\webgisdr>webgisdr.bat -e -f webgisdr.properties
```

- **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
```

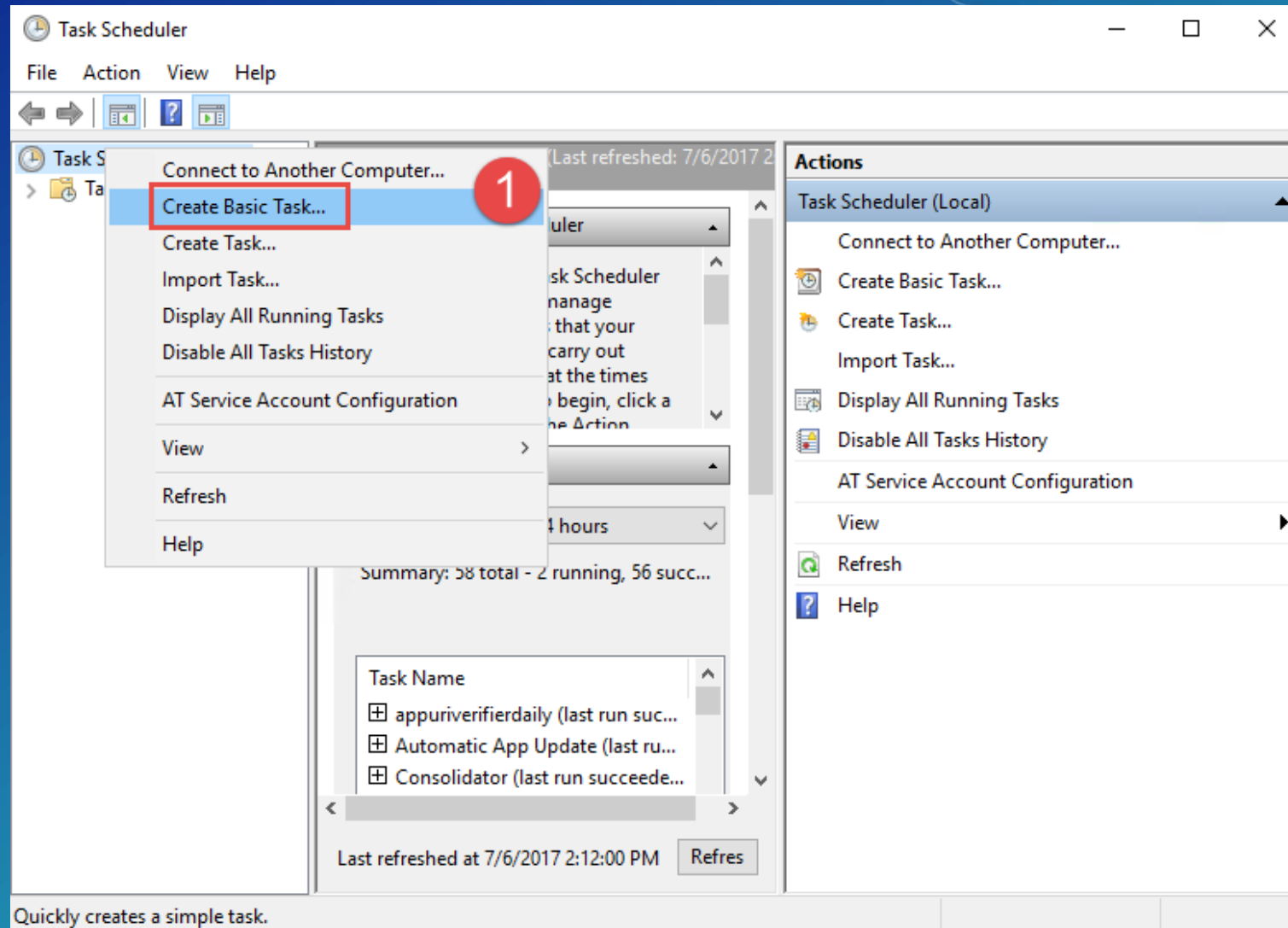
Scheduling ArcGIS Enterprise backups - Windows



Scheduling ArcGIS Enterprise backups - Windows




Scheduling ArcGIS Enterprise backups - Windows



Scheduling ArcGIS Enterprise backups - Windows

Create Basic Task Wizard

 Create a Basic Task

2

Create a Basic Task

Trigger

Action

Finish

Use this wizard to quickly schedule a common task. For more advanced options or settings such as multiple task actions or triggers, use the Create Task command in the Actions pane.


Name: Backup ArcGIS Enterprise

Description:

< Back Next > Cancel

Scheduling ArcGIS Enterprise backups - Windows

Create Basic Task Wizard

 Task Trigger

Create a Basic Task **3**

Trigger

Action

Finish

When do you want the task to start?

☒ Daily

☐ Weekly

☐ Monthly

☐ One time

☐ When the computer starts


☐ When I log on

☐ When a specific event is logged

< Back Next > Cancel

Scheduling ArcGIS Enterprise backups - Windows

Create Basic Task Wizard

 Daily

Create a Basic Task

Trigger

Daily 4

Action

Start a Program

Finish


Start: 7/ 3/2017 12:00:00 AM ☐ Synchronize across time zones

Recur every: 1 days

< Back Next > Cancel

Scheduling ArcGIS Enterprise backups - Windows

Create Basic Task Wizard

 Action

Create a Basic Task

Trigger

Daily

Action 5

Start a Program

Finish

What action do you want the task to perform?

☒ Start a program


☐ Send an e-mail (deprecated)

☐ Display a message (deprecated)

< Back Next > Cancel

Scheduling ArcGIS Enterprise backups - Windows

Create Basic Task Wizard

 Start a Program

Create a Basic Task

Trigger
Daily

Action
Start a Program 6

Finish

Program/script:
"C:\Program Files\ArcGIS\Portal\tools\webgisdr\webgisdr.bat" Browse...

Add arguments (optional):
-e -f "C:\Program Files\A


Start in (optional):

-e -f "C:\Program Files\ArcGIS\Portal\tools\webgisdr\webgisdr.properties"

< Back **Next >** Cancel

Scheduling ArcGIS Enterprise backups - Windows

Create Basic Task Wizard

 Summary

Create a Basic Task

Trigger
Daily
Action
Start a Program
Finish

Name: Backup ArcGIS Enterprise

Description:

Trigger: Daily; At 12:00 AM every day

Action: `cmd -e -f "C:\Program Files\ArcGIS\Portal\tools\webgisdr\webgisdr.properties"`

☐ Open the Properties dialog for this task when I click Finish

When you click Finish, the new task will be created and added to your Windows schedule.

< Back Finish Cancel

7

Scheduling ArcGIS Enterprise backups - Linux

- Creating a cronjob:

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

- Cronjob syntax:

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

Minute
Hour
Day of the month
Month
Weekday

Examples:

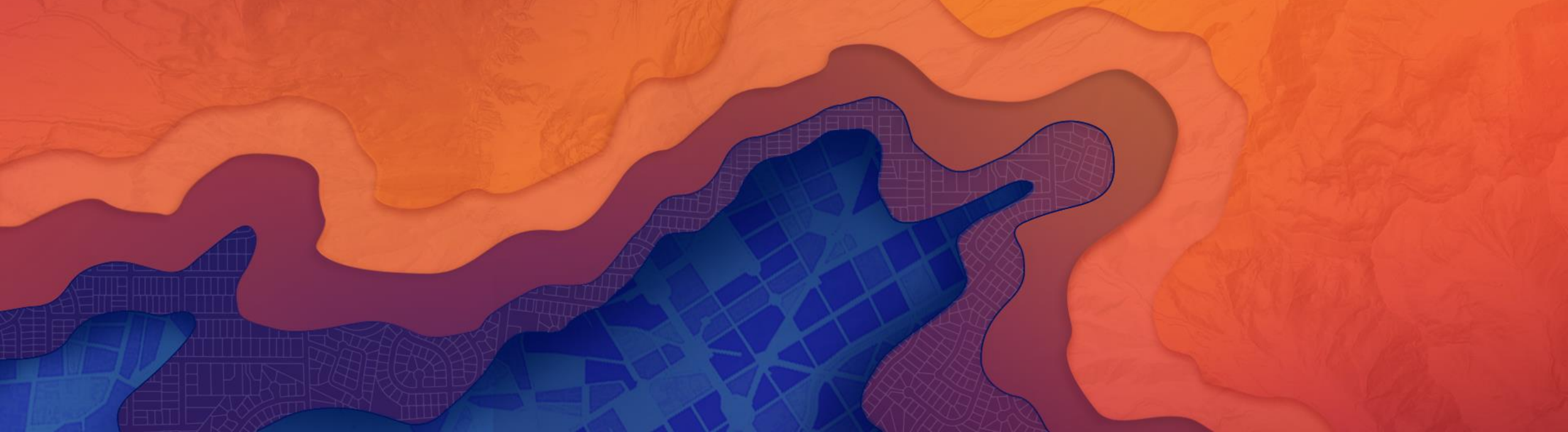
Run the WebGIS DR Tool at 12:00:00 AM every day:

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

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

```
0 */12 * * * /data/arccgis/portal/tools/webgisdr/webgisdr.sh -e -f /data/arccgis/portal/tools/webgisdr/webgisdr.properties
```

High Availability



Overview

- **What is High Availability**
- **ArcGIS Enterprise High Availability**
- **What's New at 10.5 and 10.5.1 – Native Cloud implementations**
- **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

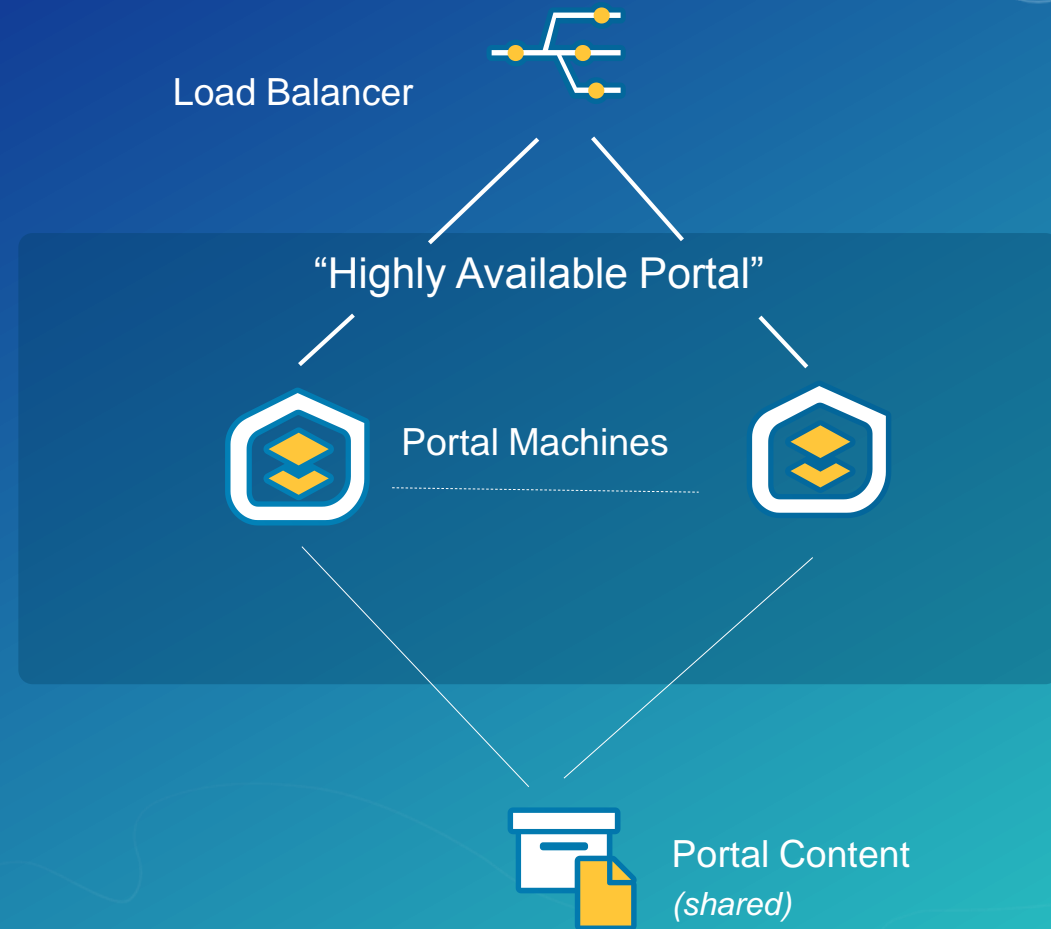


ArcGIS Server



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
- Behaves a little bit differently :
 - Standby machine is down (or Portal service stops)
→ No interruption
 - Primary is down (or Portal service stops)
→ A minute or two Portal behaves like the internet is slow.

Machines:

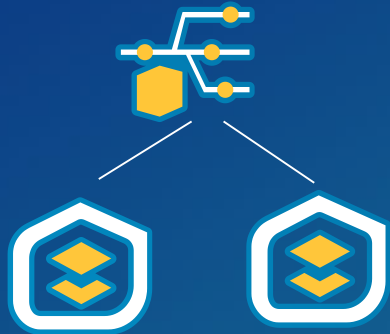
- SECONDARY.CHERRY.COM **standby** [status](#)
- PRIMARY.CHERRY.COM **primary** [status](#)

Supported Operations: [unregister](#)

Supported Interfaces: [REST](#)

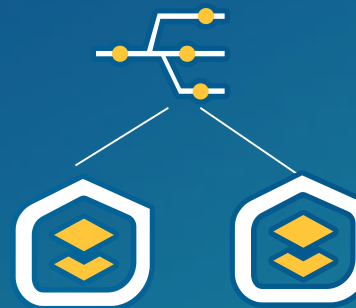
Portal for ArcGIS: Load Balancing Options

ArcGIS Web Adaptor



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

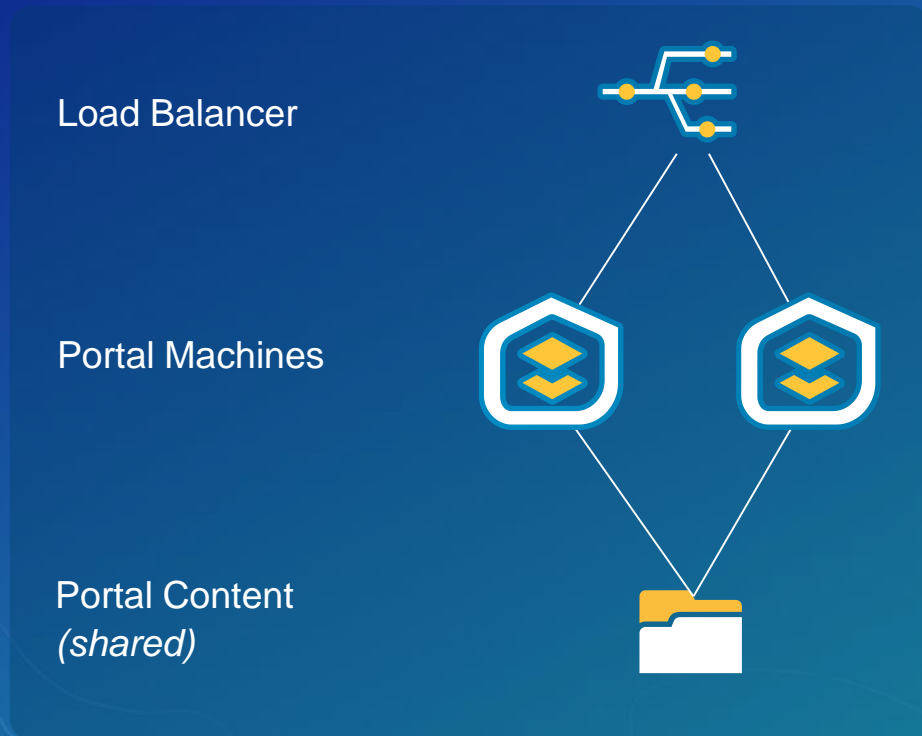
3rd Party Load Balancer



- Not provided by Esri
- Typically already fault tolerant

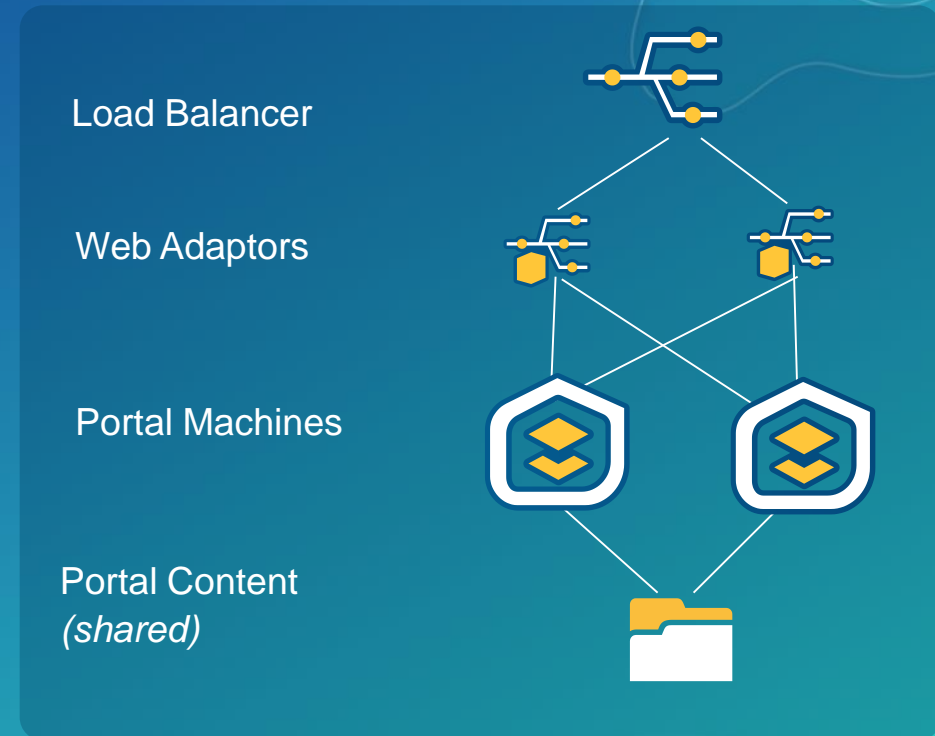
Portal for ArcGIS: High Availability Deployment Patterns

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

Portal for ArcGIS: Key Considerations for HA

- **Two Portal machines**
 - Primary
 - Standby
 - Behaves a little bit different when one machine is down
- **Highly Available Load Balancer**
 - Web Tier Authentication
 - No single Web Adaptor
- **Health Check provided for Portal for ArcGIS**
- **Highly Available shared content store**

ArcGIS Enterprise



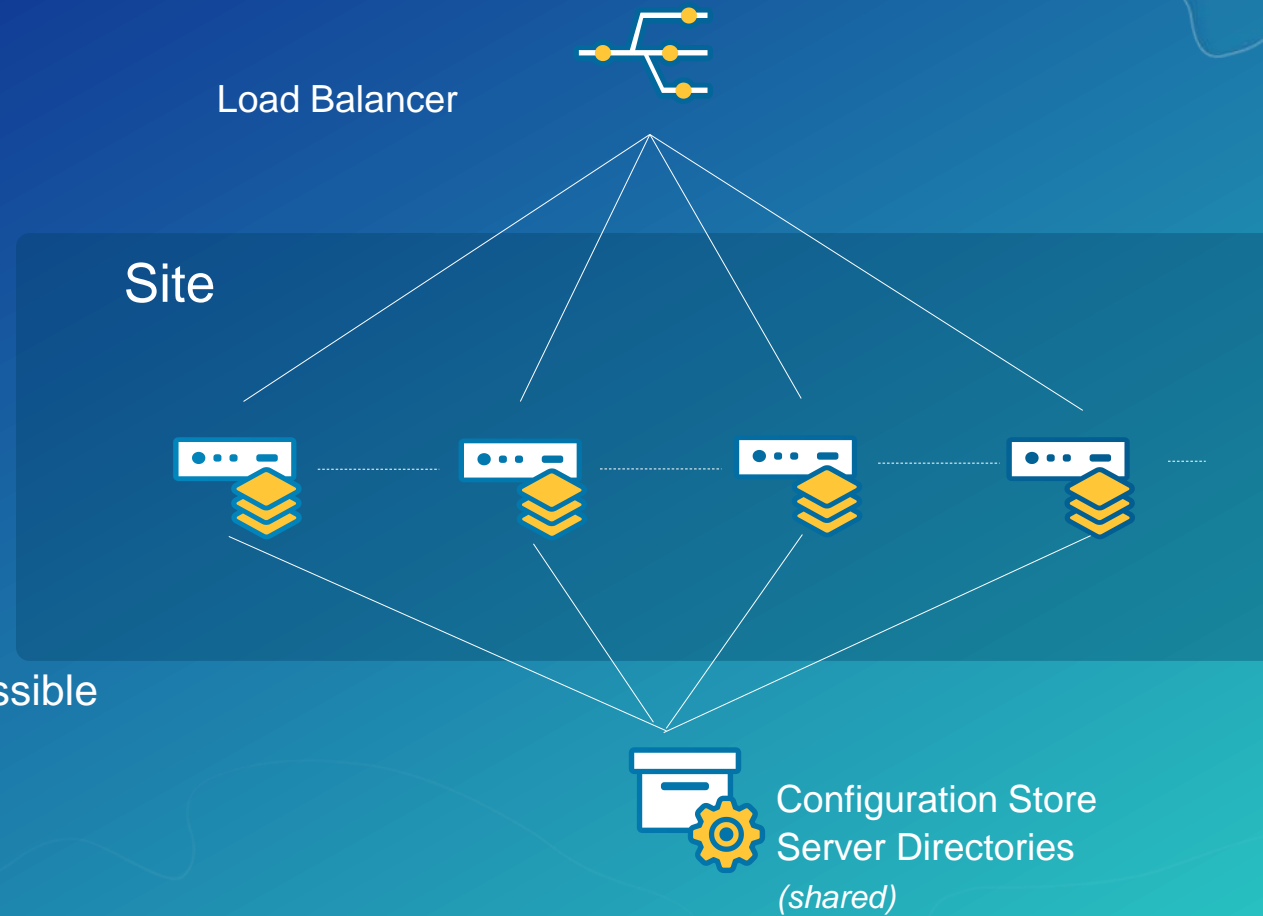
Portal for ArcGIS



ArcGIS Server

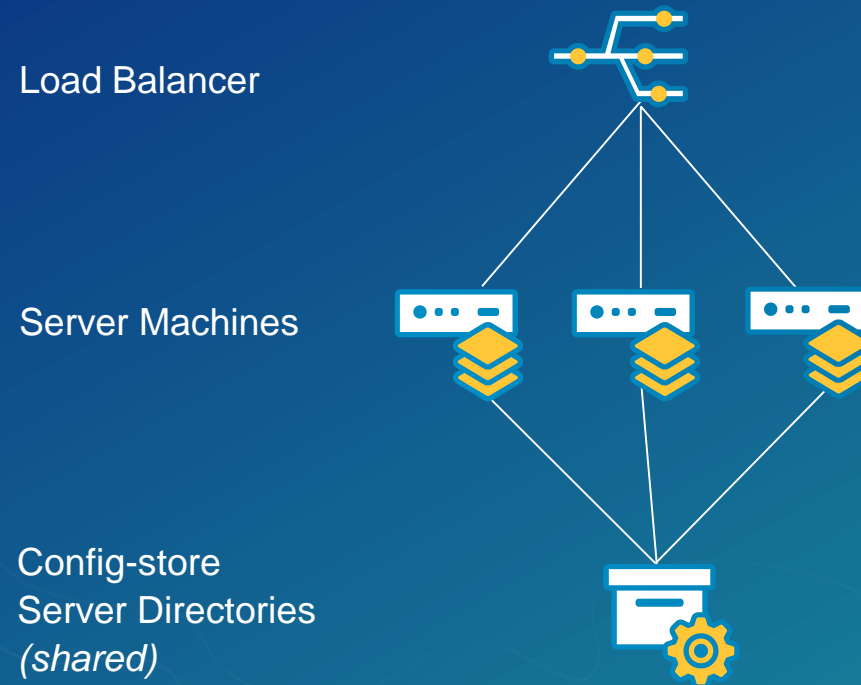
ArcGIS Server: Multiple-Machine Architecture

- Multiple machines
- Identical Roles
- No interruption when any machine is down
- The config-store and server directories need to be accessible to all machines.

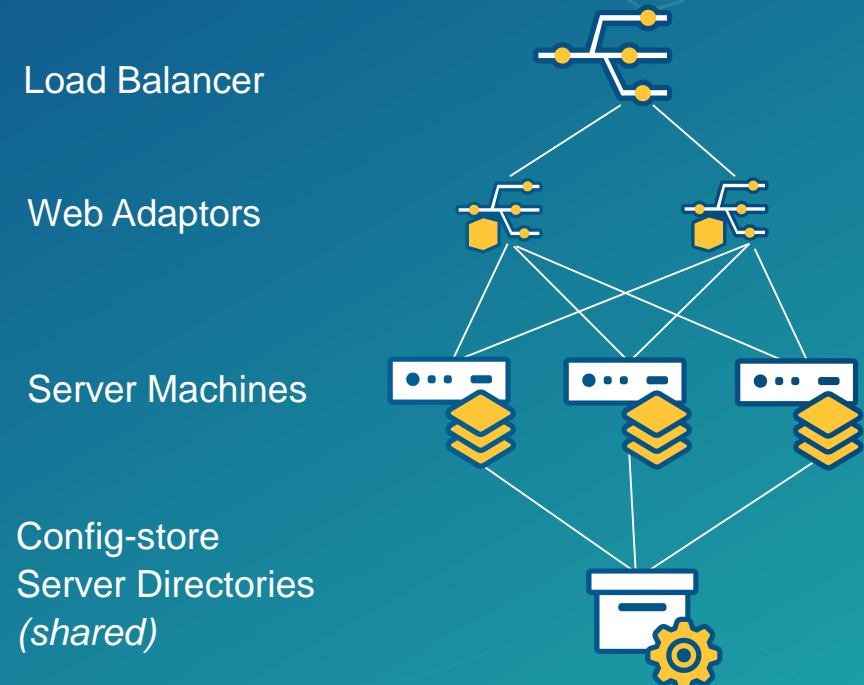


ArcGIS Server: High Availability Deployment Patterns

Server Site with
Load Balancer



Server Site with
Load Balancer & Web Adaptors



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

Portal for ArcGIS and ArcGIS Server: Federation



Add ArcGIS Server

Enter the URLs for accessing and administering your ArcGIS Server site. Also enter credentials for an administrator of the ArcGIS Server site.

Services URL:
Example: <https://webadaptor.domain.com/arcgis>

Administration URL:
Example: <https://gisserver.domain.com:6443/arcgis>

Username:

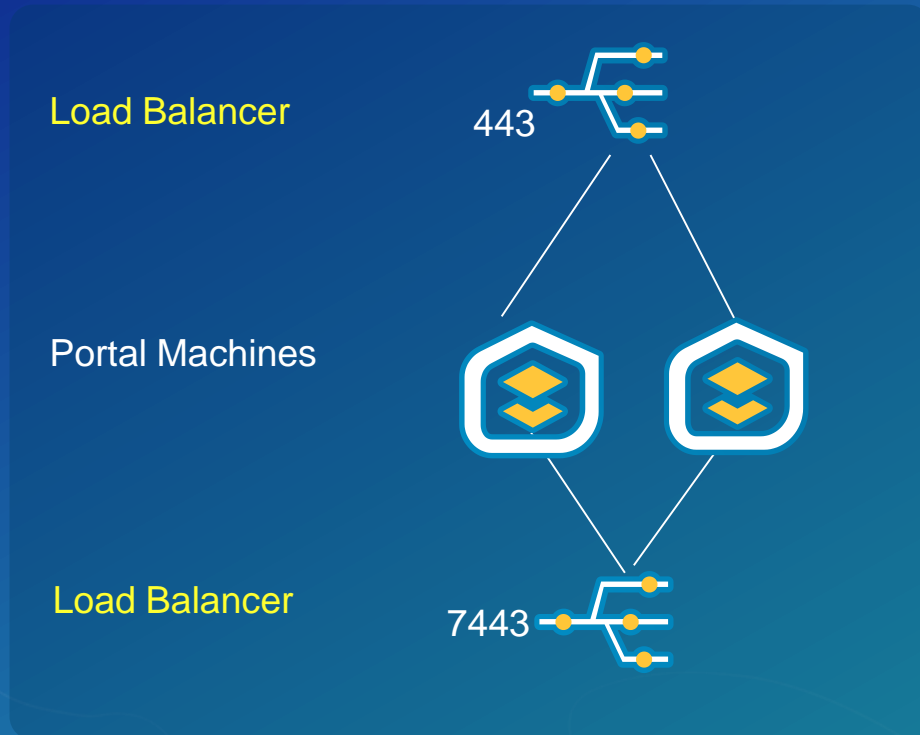
Password:

ADD **CANCEL**

```
{
  "portalUrl": "https://webgistesting.net/portal",
  "privatePortalUrl": "https://webgistesting.net/portal",
  "portalSecretKey": "29f019ca6ff745aeace5d26bdfc32ca2",
  "portalMode": "ARCGIS_PORTAL_FEDERATION",
  "serverId": "7jhSwDZJ6Q6kIurK",
  "serverUrl": "https://webgistesting.net/server"
}
```

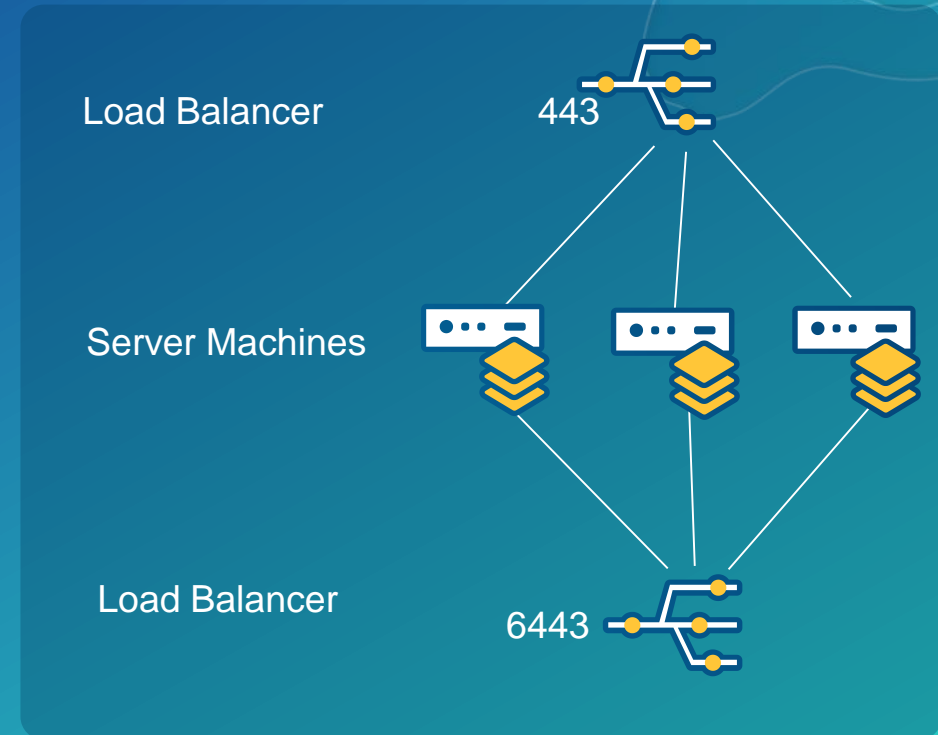
Portal for ArcGIS and ArcGIS Server: Federation

Portalurl:443



privatePortalurl:7443

Services URL:443



Administrative URL:6443

ArcGIS Server : Key Considerations for HA

- **Multiple machines for scalability**
- **All machines have identical roles**
 - All Active roles
 - No interruption when any machine is down or Server stops
- **Highly Available Load Balancer**
 - Web Tier Authentication
 - No single Web Adaptor

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

ArcGIS Enterprise



Portal

GIS Services

Hosted Feature and Tile Data



Portal for ArcGIS

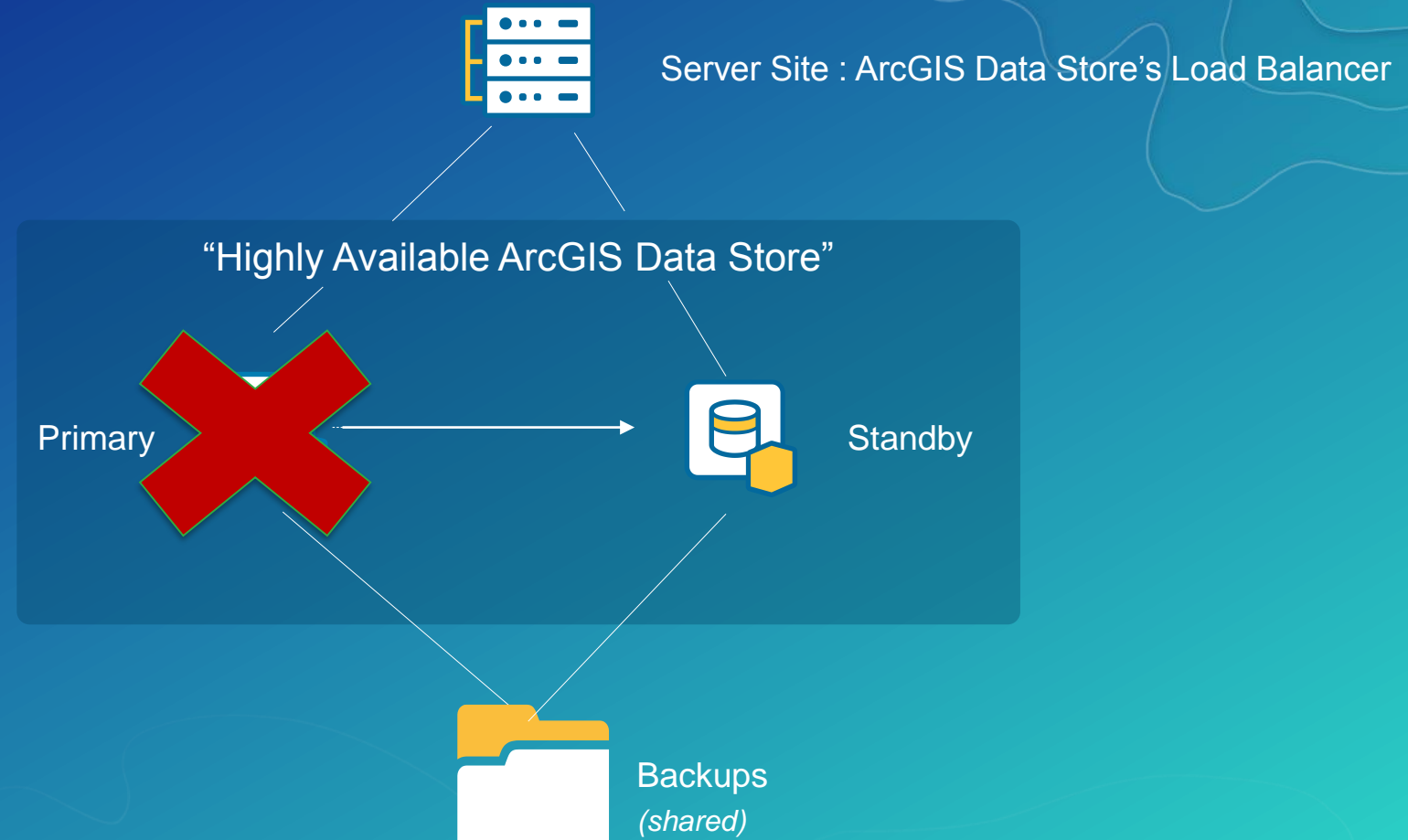


ArcGIS Server



ArcGIS Data Store

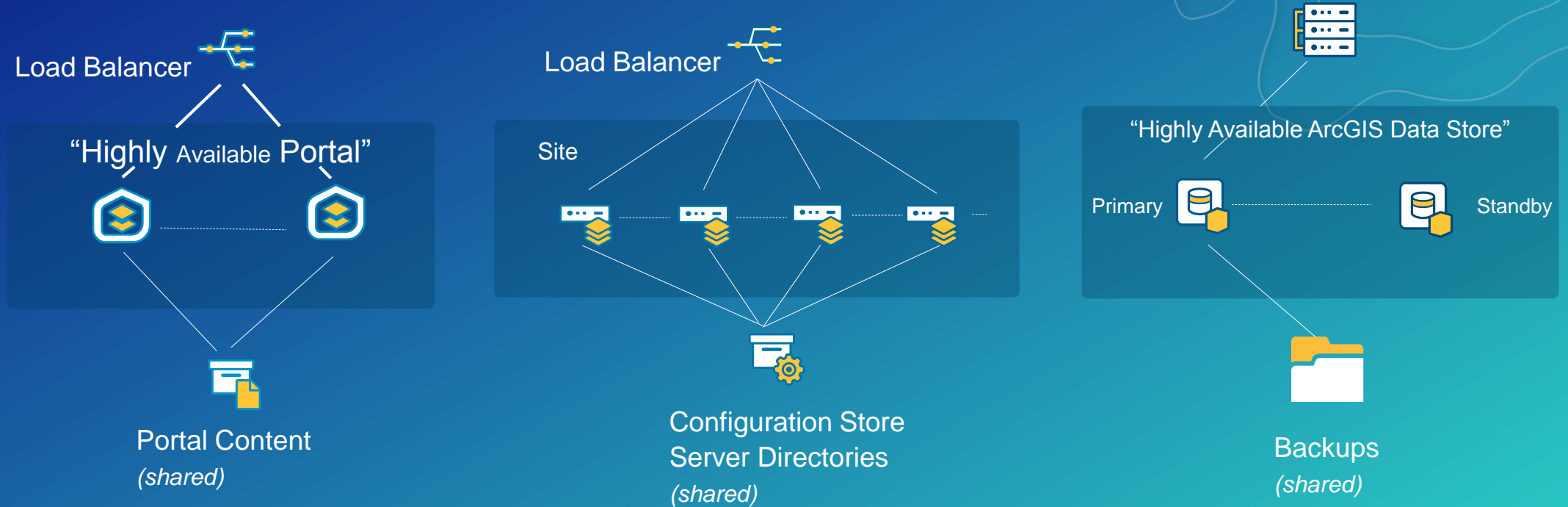
ArcGIS Data Store: High Availability Architecture



ArcGIS Data Store: Failover Scenarios

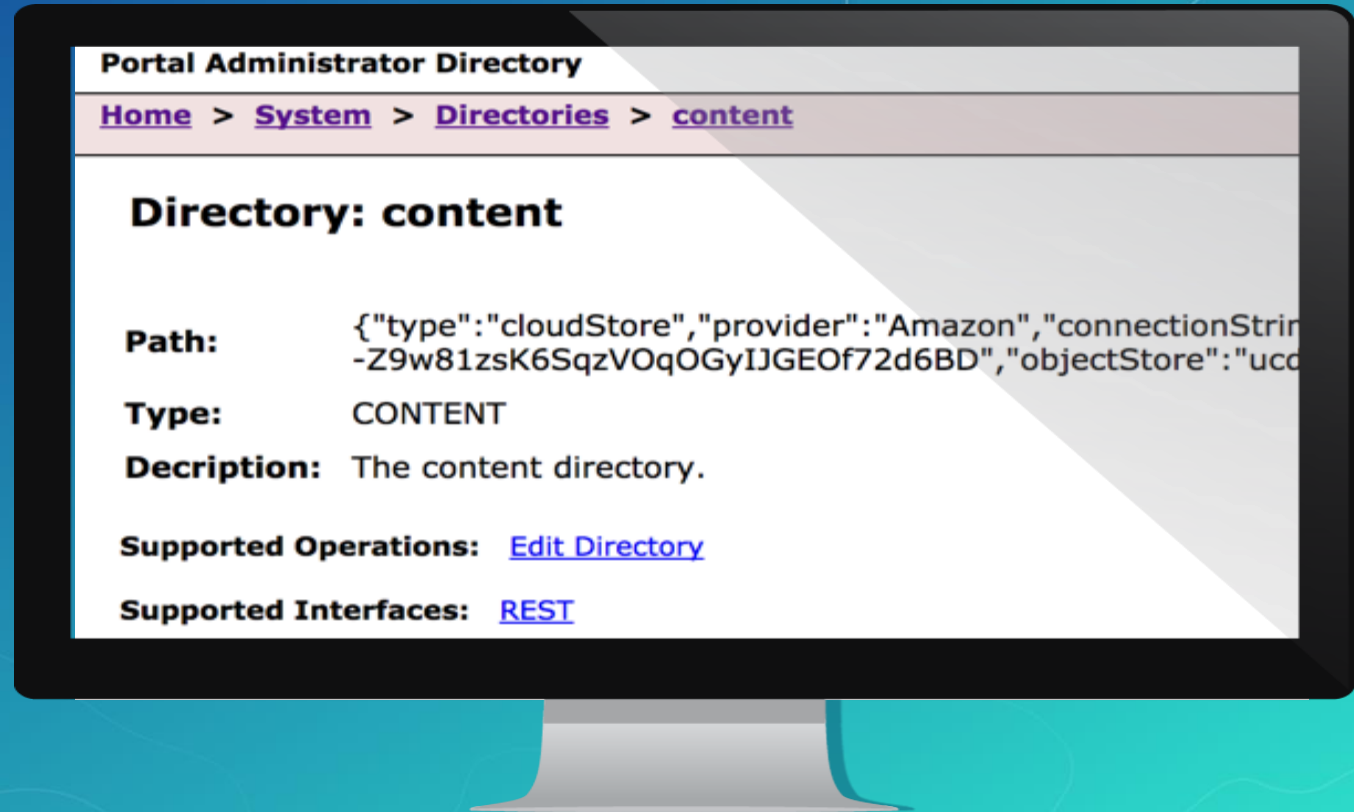
- **Primary ArcGIS Data Store stops working: Define Failure**
 - Computer crashes
 - Gets unplugged
 - Lose network connectivity
 - etc
- **Not “gracefully” shutdown**
 - Data Store service stops
- **<http://server.arcgis.com/en/documentation/> → Search “Fail over scenarios”**

ArcGIS Enterprise High Availability Deployment



What's New at 10.5 and 10.5.1 – Native Cloud Implementations

- Portal Content Store
 - Azure Blob
 - AWS S3
- Create Portal through portaladmin
- Use Esri deployment tools
 - Azure Cloud Builder
 - Esri Amazon Cloudformation templates



What's New at 10.5 and 10.5.1 – Native Cloud Implementations

- **Server config-store**
 - Azure Table and Azure Blob
 - AWS DynamoDB and S3
- **Create Site through serveradmin**
- **Use Esri deployment tools**
 - Azure Cloud Builder
 - Esri Amazon Cloudformation templates



What's New at 10.5 and 10.5.1 – Native Cloud Implementations

- Cloud Store
 - Amazon S3
 - Azure Blob
- Caching Directory
 - Consume Cache
 - Cache management is coming in future release
- Data Input Directory
- Backup/Restore to Cloud Storage



Register a cloud store on your ArcGIS Server

Type: **Amazon S3**

Cloud Store Name: Microsoft Azure Storage

Credential Type: Access Key

Access Key Id:

Secret Access Key:

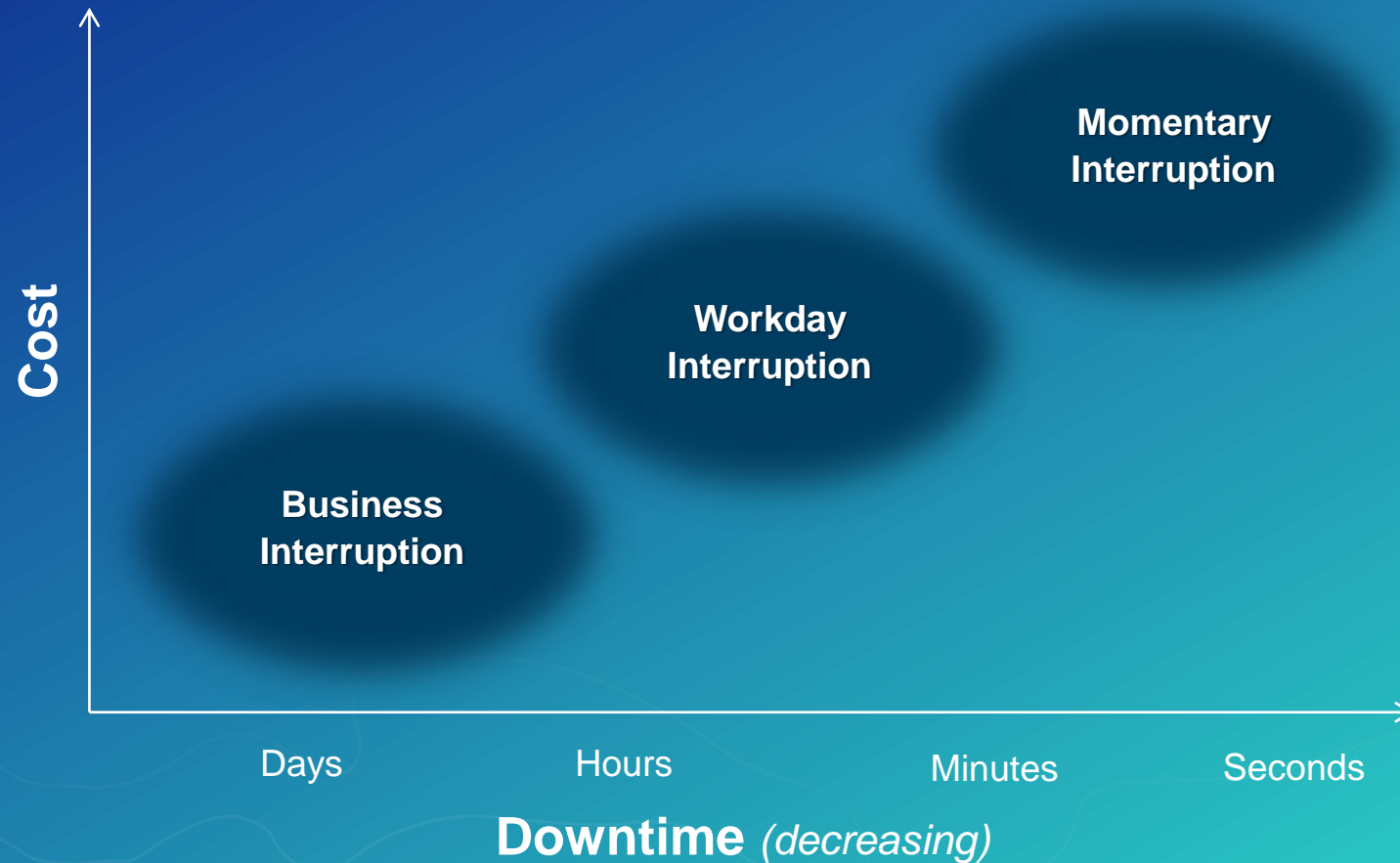
ArcGIS Enterprise HA: Part of Your HA Architecture

- **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

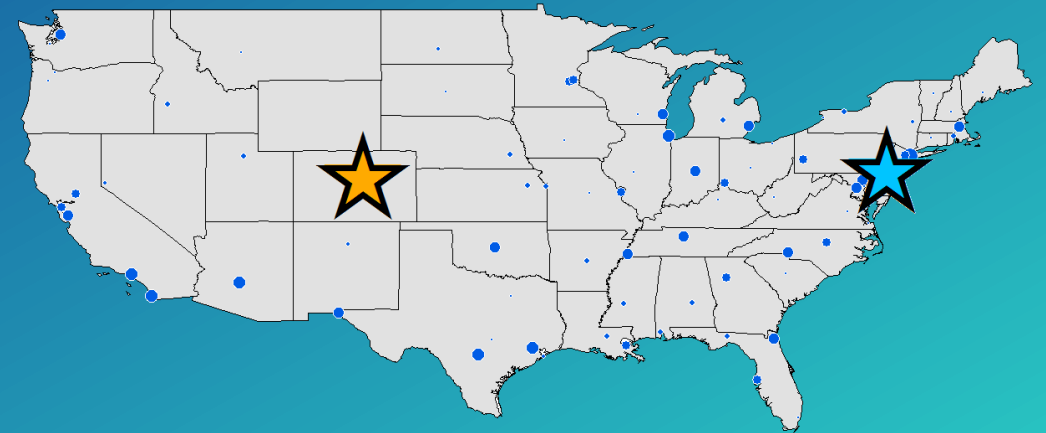


Overview

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

Overview

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

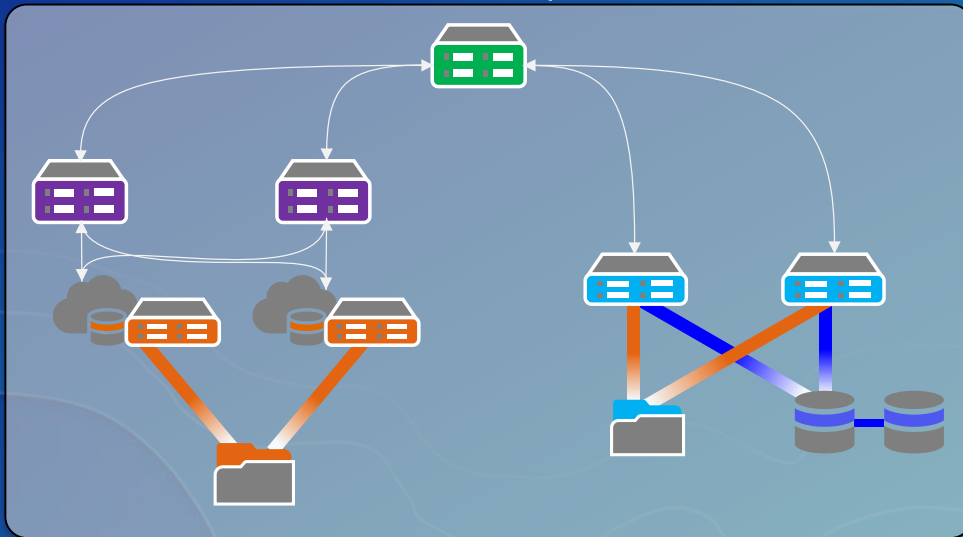


Geographic Redundancy

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

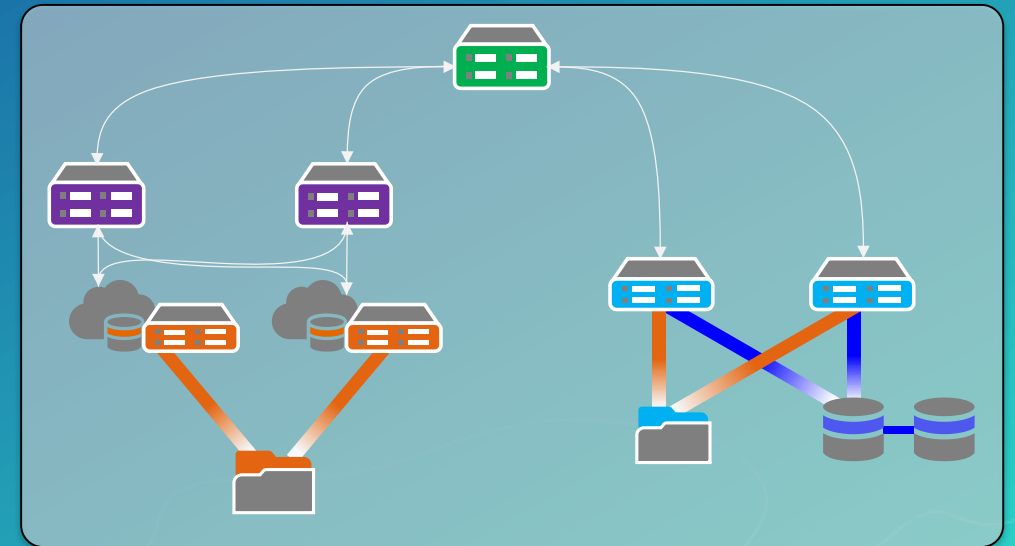


198.0.0.1



East coast data center (primary)

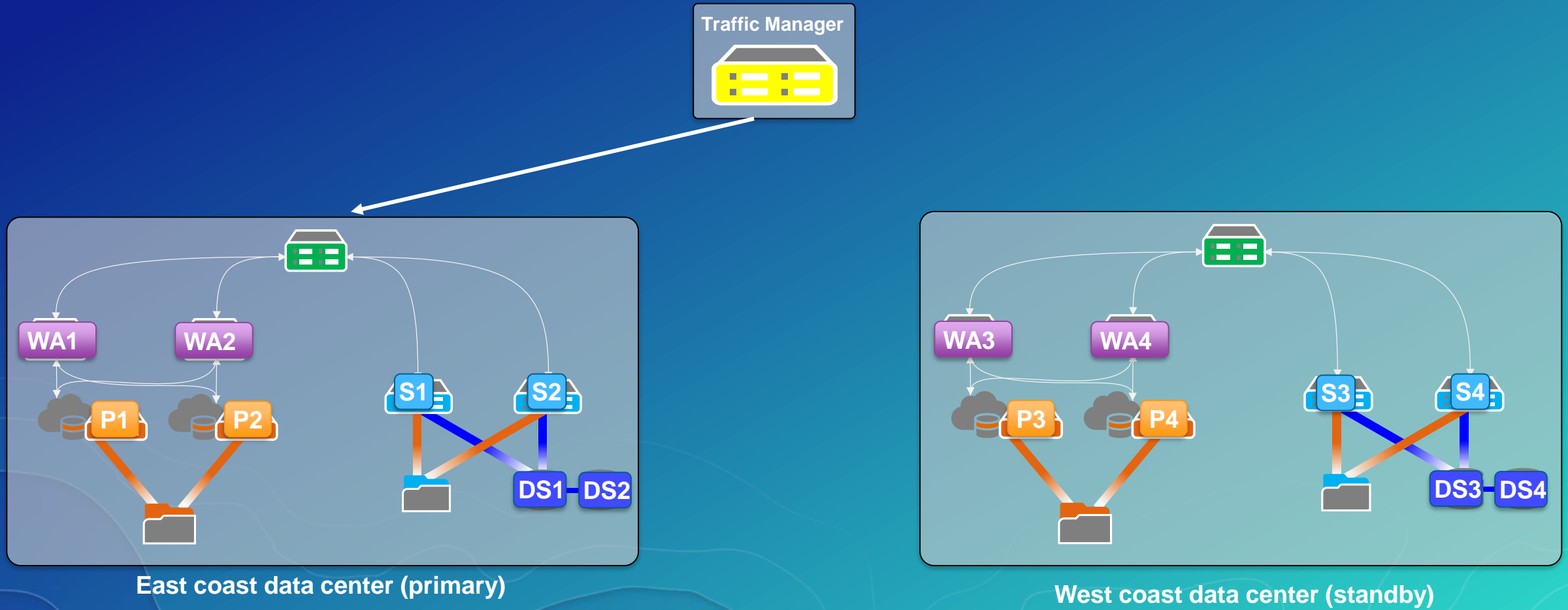
198.0.0.2



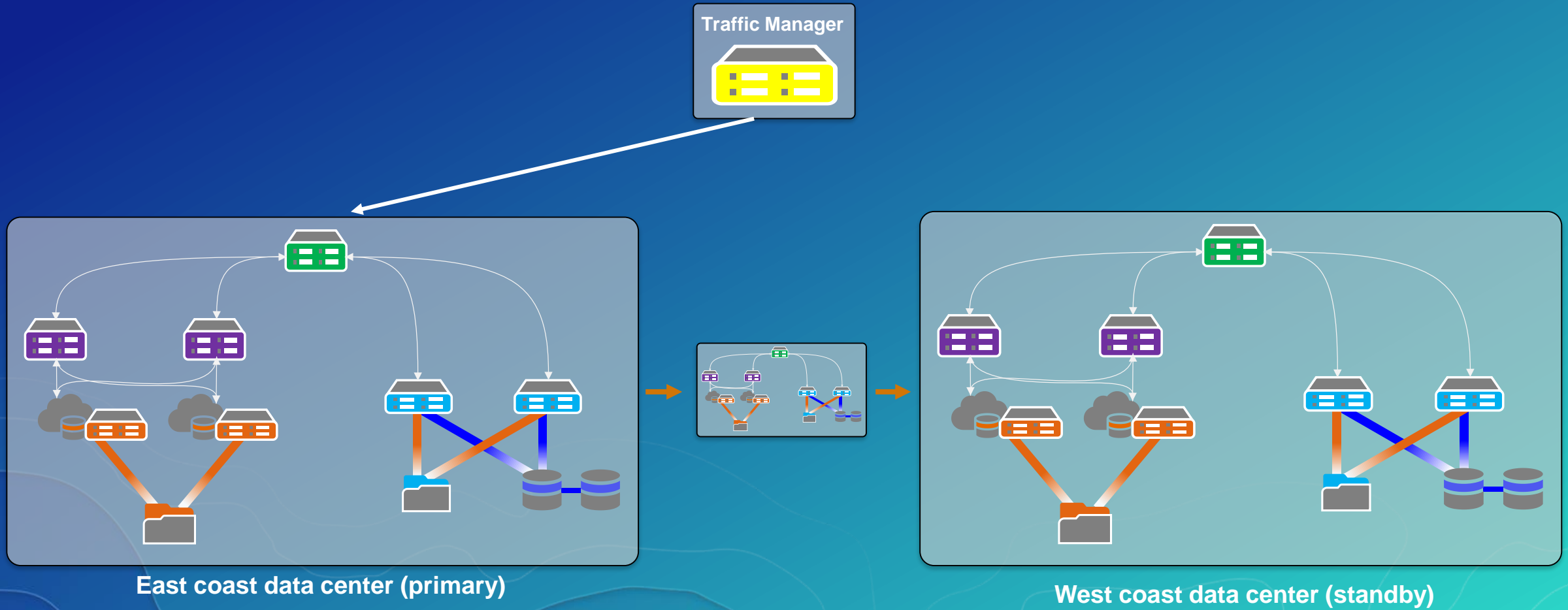
West coast data center (standby)

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

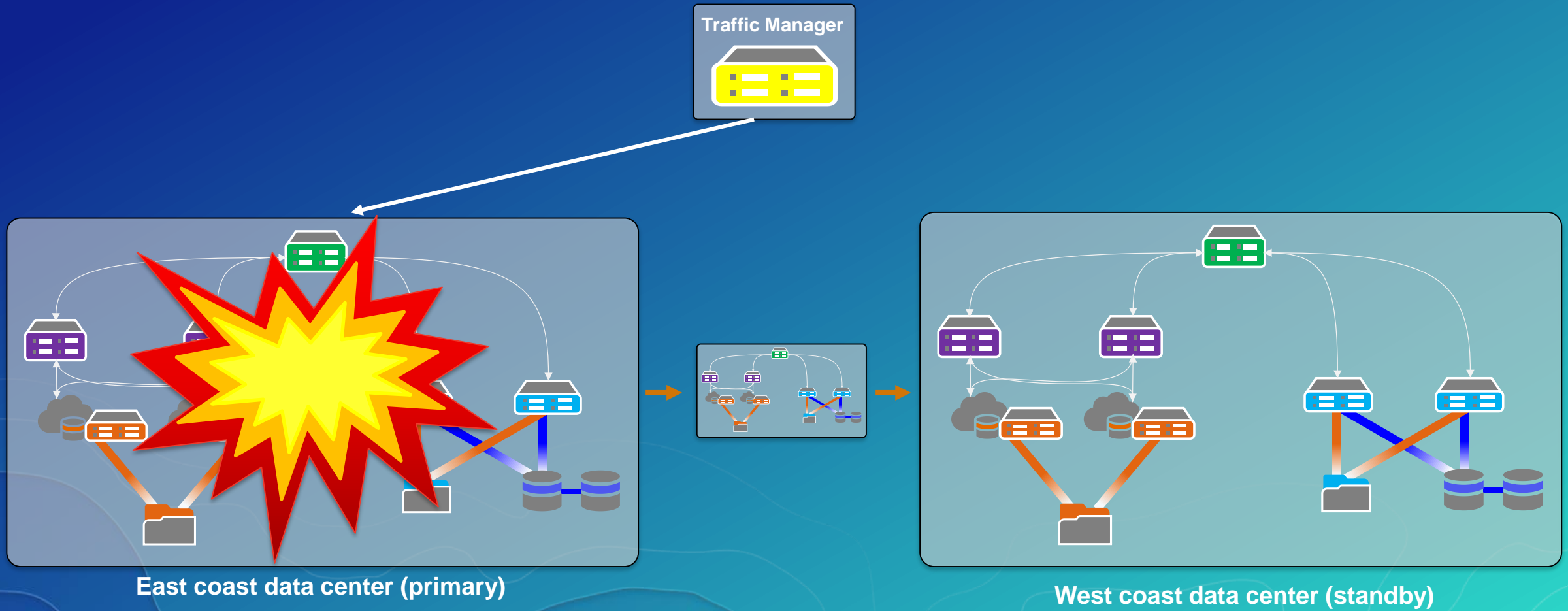
Geographic Redundancy



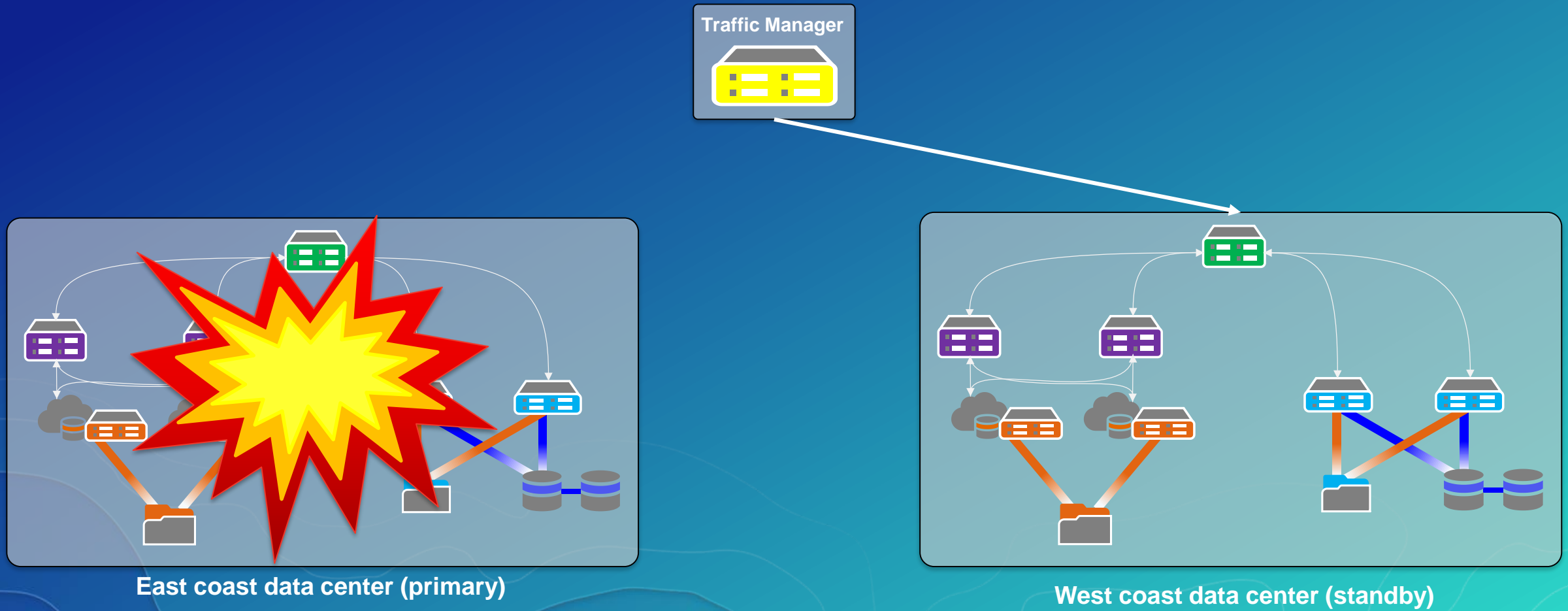
Geographic Redundancy



Geographic Redundancy



Geographic Redundancy

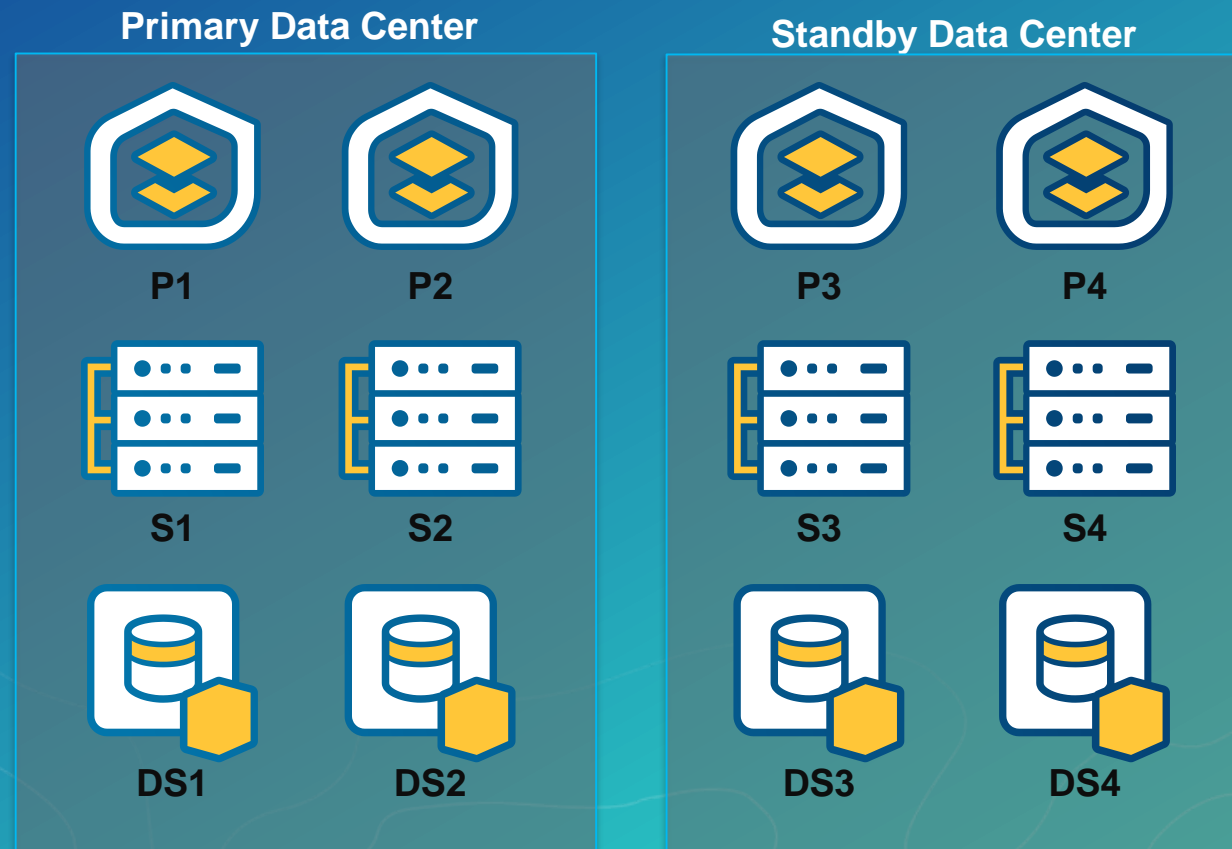


Roadmap for geographic redundancy

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**

Duplication

- 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

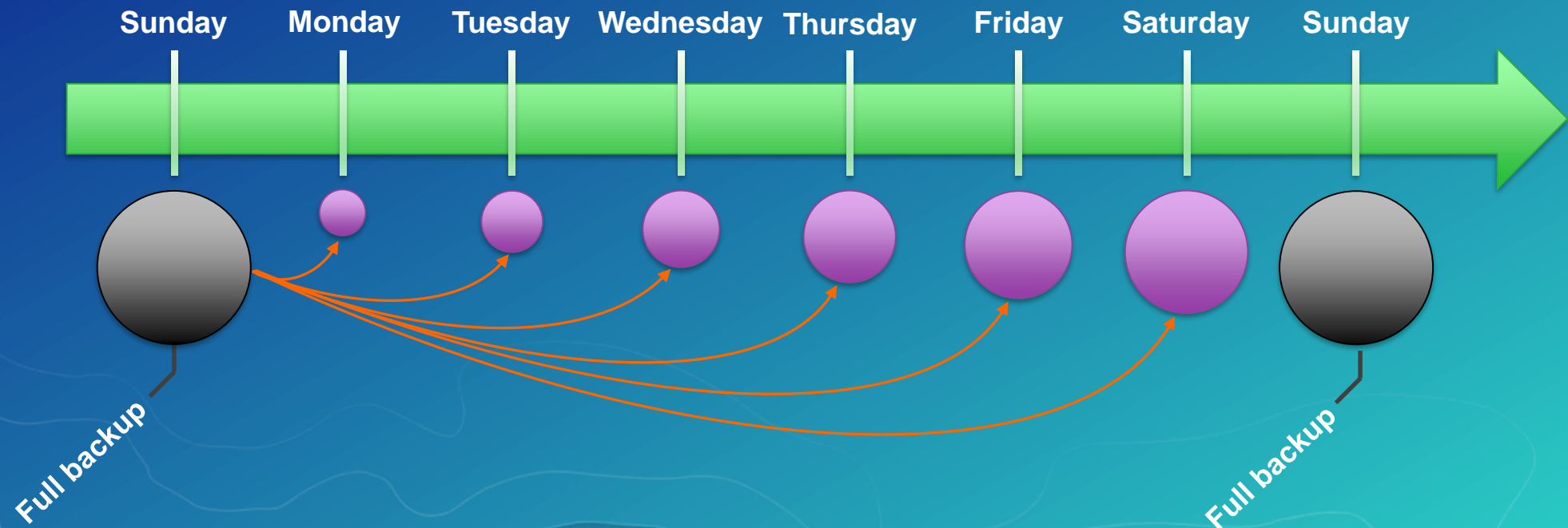


Creating snapshots

- **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



Creating incremental snapshots

- Creates a snapshot of all data added or modified since the last full snapshot
 - Portal
 - Server
 - Data Store

```
# Specify a shared location to store the Web GIS backup file. This is where the backups for
# individual components will be saved to before being moved to the storage that you specify
# for the BACKUP_STORE_PROVIDER property
# The following accounts must have read and write permissions on the shared location:
# 1) The domain account used to run the web GIS software.
# 2) The account to run this tool.
SHARED_LOCATION=\\\\fileServer\\backupLocation
```

```
# Specify a storage provider: FileSystem, or AmazonS3.
BACKUP_STORE_PROVIDER = FileSystem
```

```
# Specify the Web GIS backup location if you've set the BACKUP_STORE_PROVIDER to FileSystem.
BACKUP_LOCATION = \\\\fileServer\\backupLocation\\incremental
```

```
# Specify the Web GIS backup mode: full or incremental.
BACKUP_RESTORE_MODE = incremental
```

Monitoring and Failover

- QA 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

ArcGIS REST Services Directory

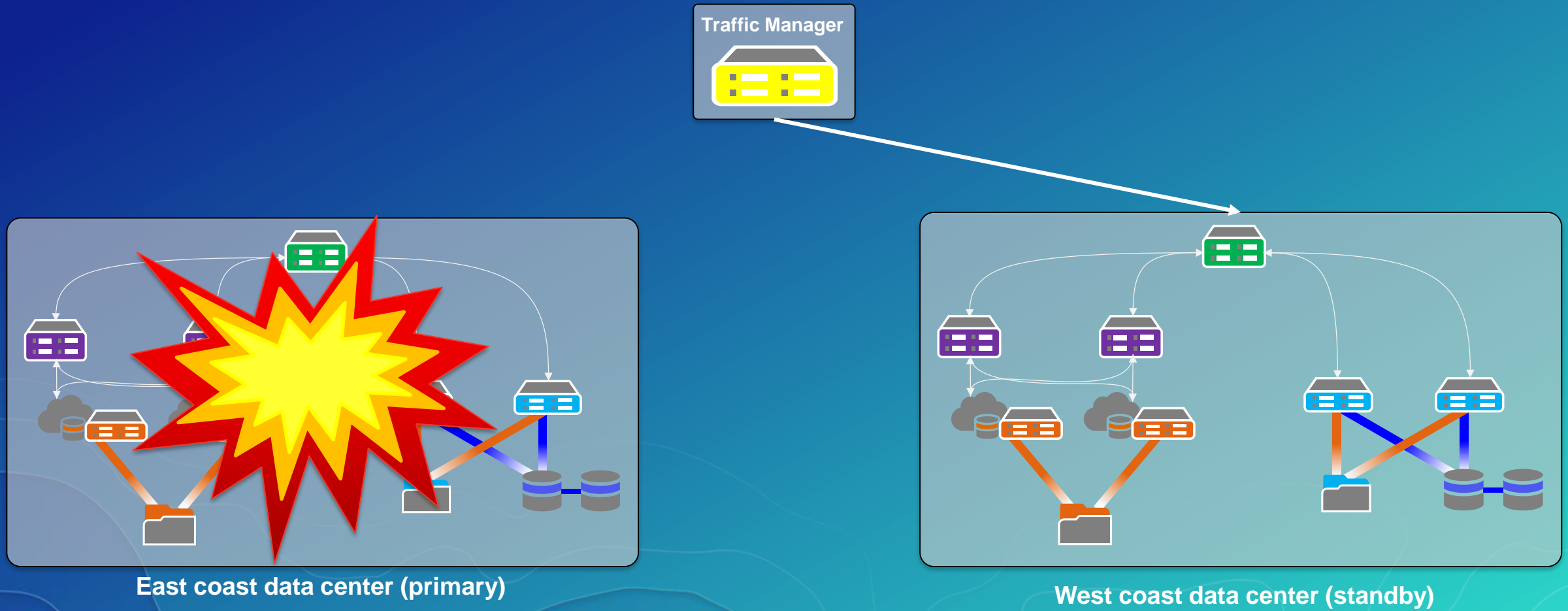
[Home](#) > [healthCheck](#)

[JSON](#)

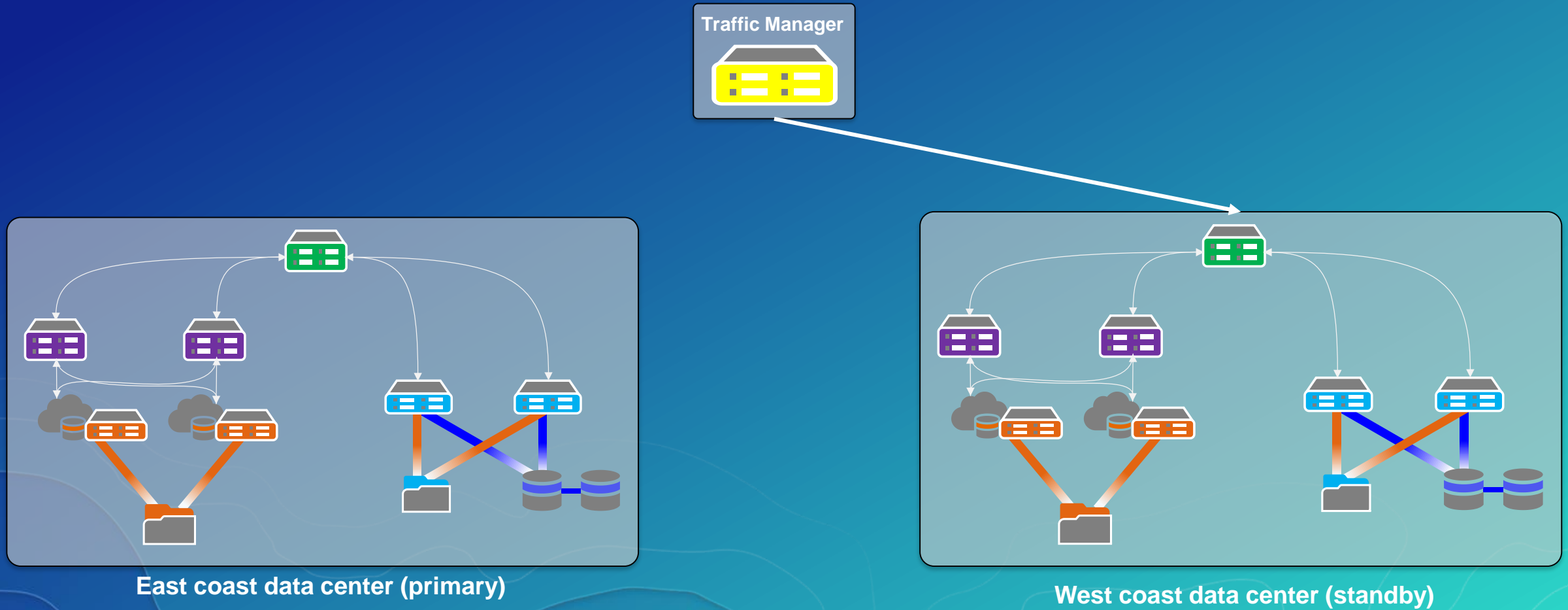
Server Health Check

Health Check successful, the site is ready

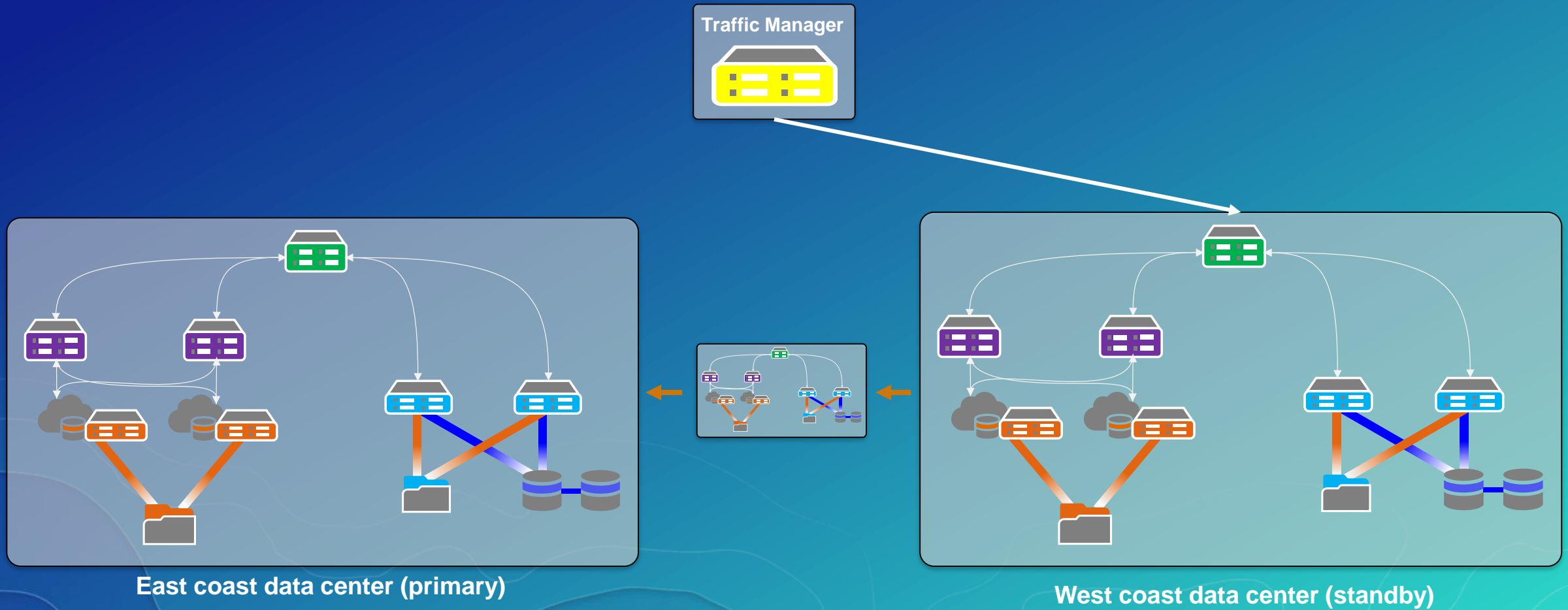
Recovering from a failure



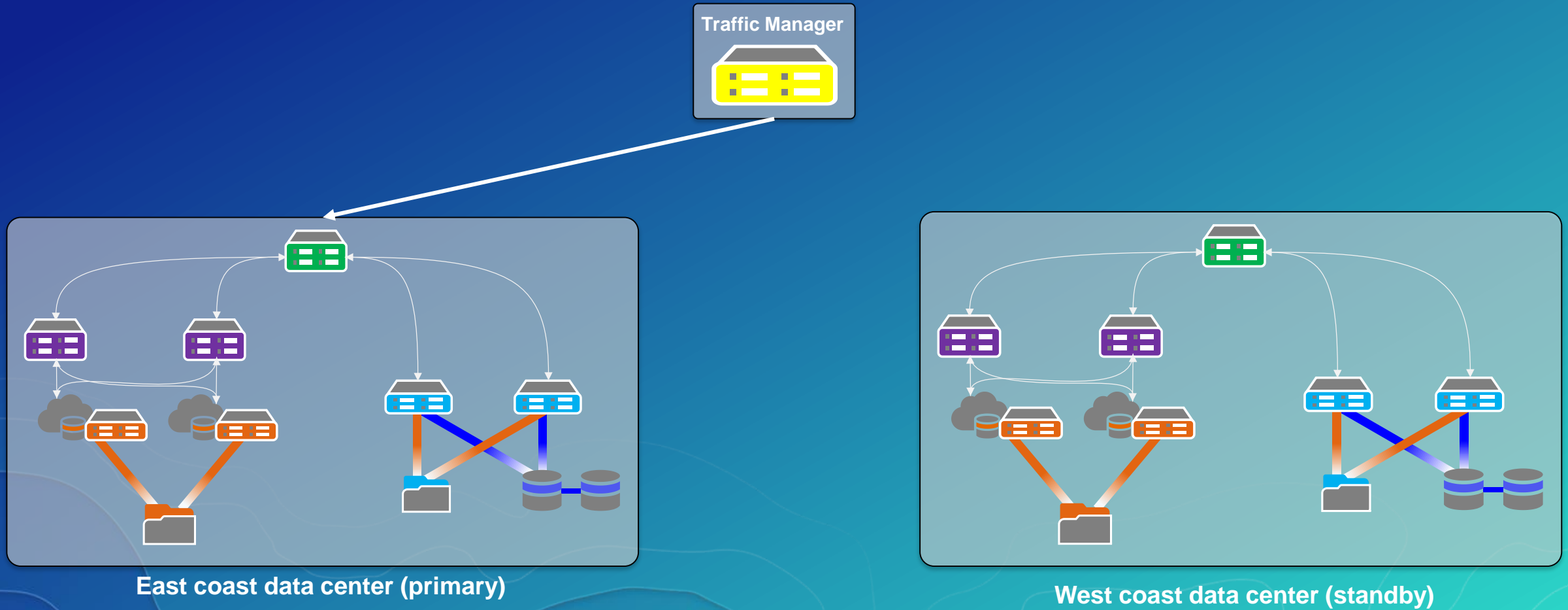
Recovering from a failure – Bringing the primary back online



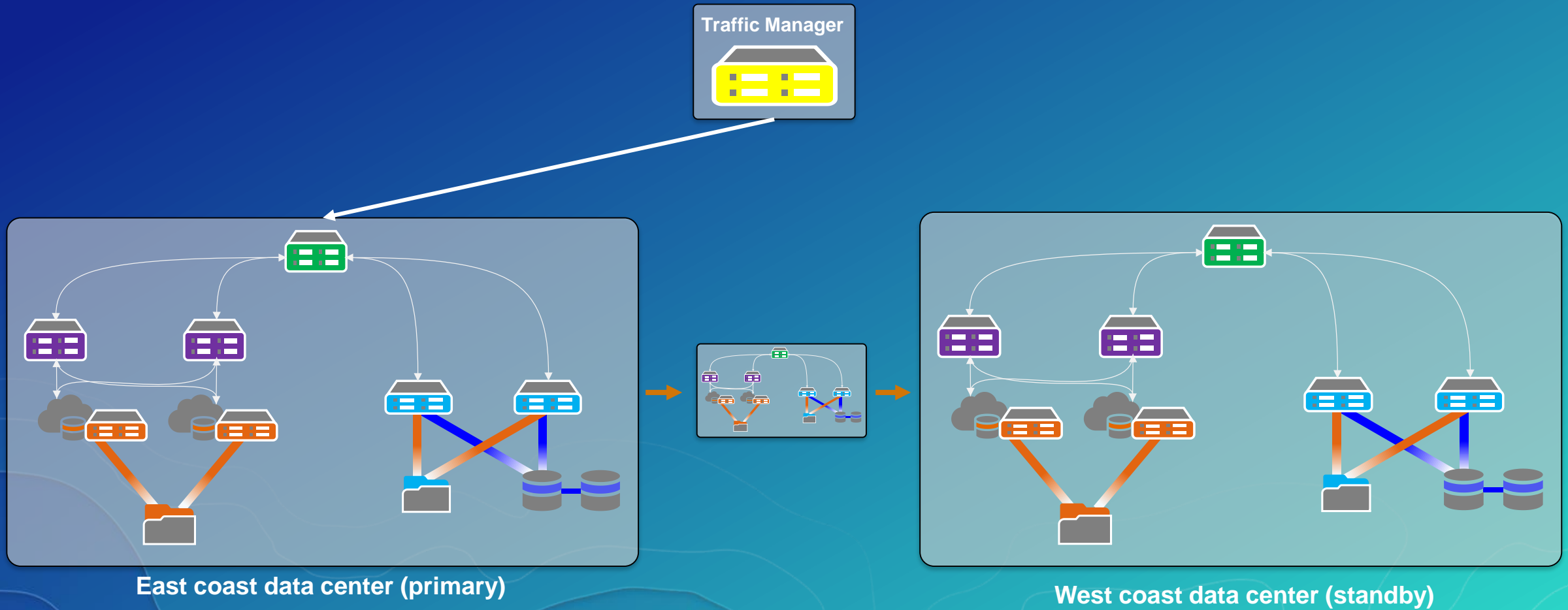
Recovering from a failure – Move data back to primary



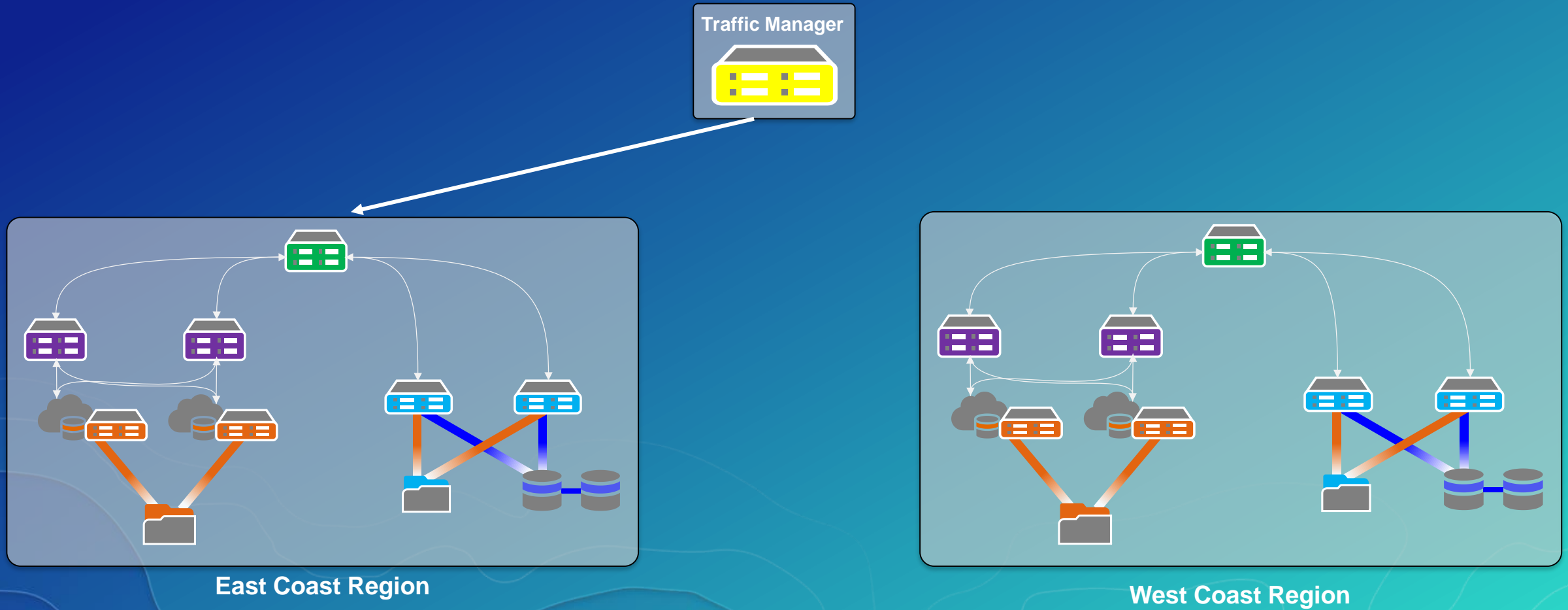
Recovering from a failure – Point traffic manager back to primary



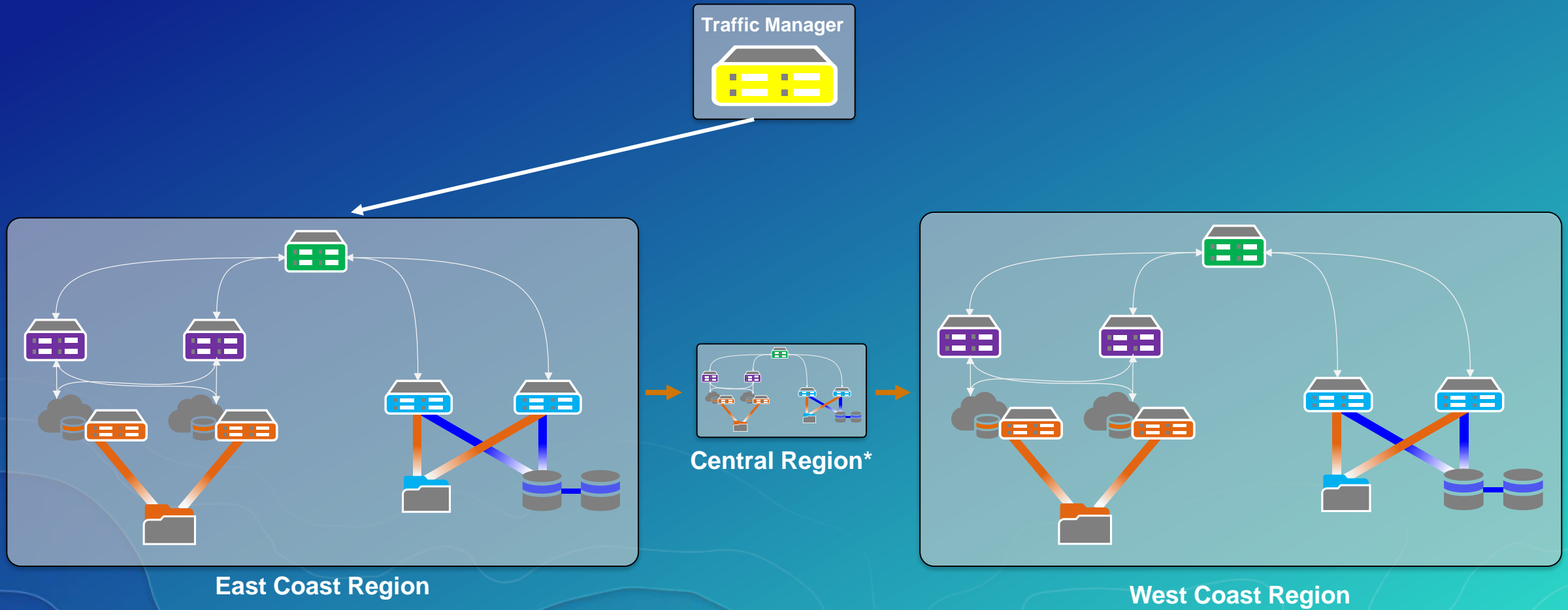
Recovering from a failure – Resume applying snapshots to standby



Geographic Redundancy – Cloud deployments



Geographic Redundancy – Cloud deployments



*Support to store WebGIS DR backups in an Azure container coming at 10.6

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

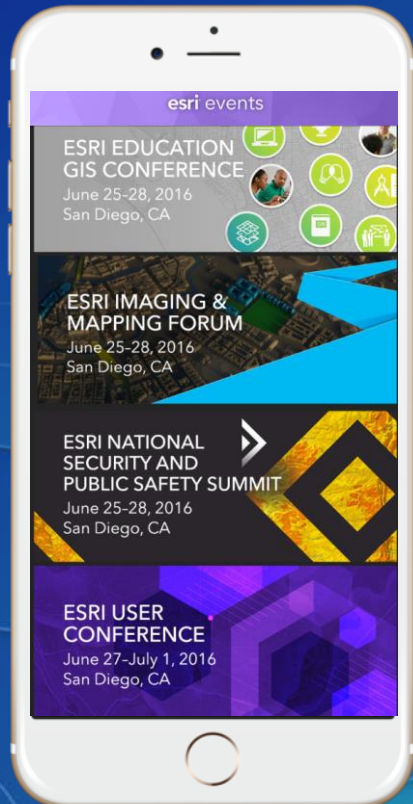


- Let us know if you have a success story to share

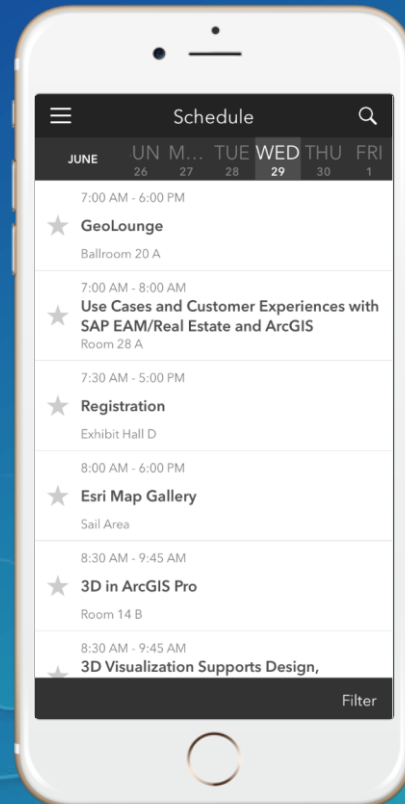
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Your feedback allows us to help maintain high standards and to help presenters

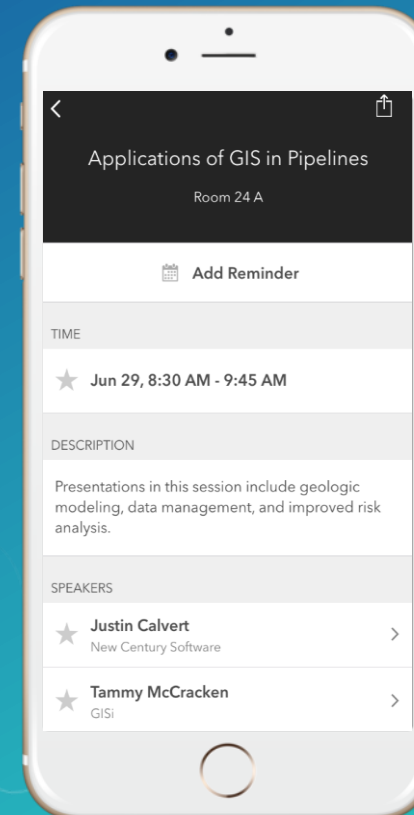
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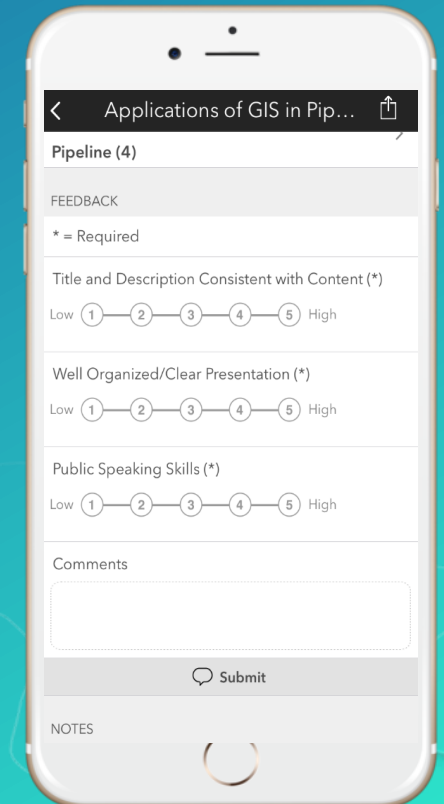
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