



# Building your Server for High Availability and Disaster Recovery

Witt Mathot  
Danny Krouk

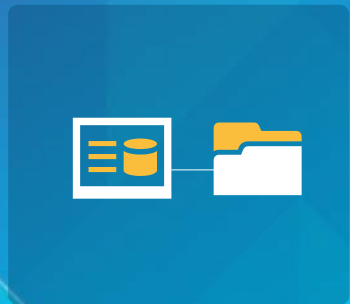
# Terminology

Whoa!

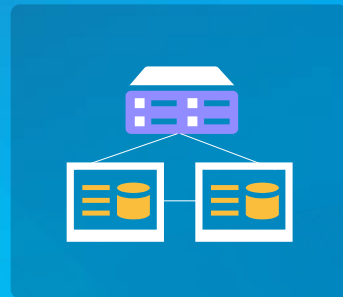
Resiliency  
Fault Tolerance  
RPO  
Backups  
High Availability  
Load Balancer  
Disaster Recovery  
RTO  
Failover  
Round Robin  
SLA  
Change Management  
Geographic Redundancy  
Redundancy  
Continuity  
Active-Active  
Recovery  
Contingency  
Mission Critical  
BC/BCM  
Federation  
Data Loss Threshold  
Active-Passive

# Business Continuity

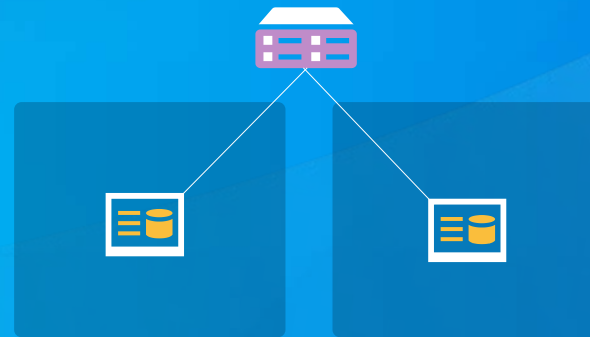
A Spectrum, Not a Switch



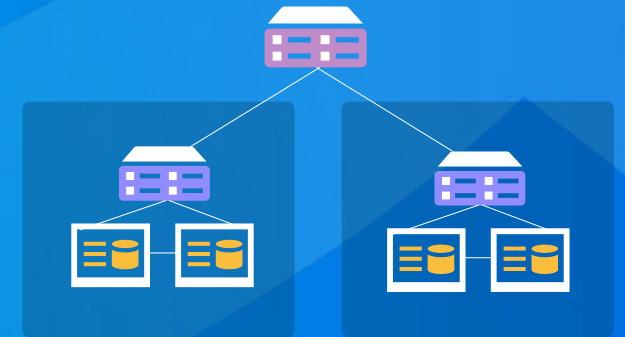
**Backup &  
Recovery**



**High Availability**



**Geographic  
Redundancy**



**Geographic  
Redundancy w/  
High Availability**

# Business Continuity

A Spectrum, Not a Switch

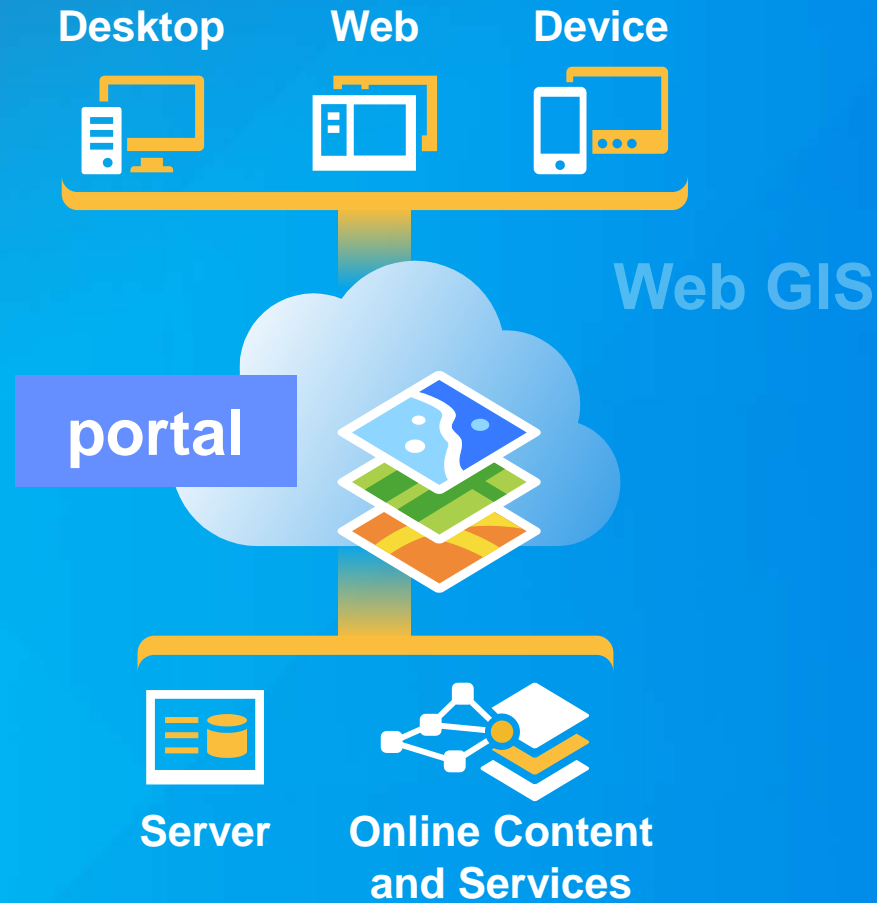




# ArcGIS

Your Favorite GIS

Simple  
Integrated  
Open



*Available in the Cloud...  
... or On-Premises*

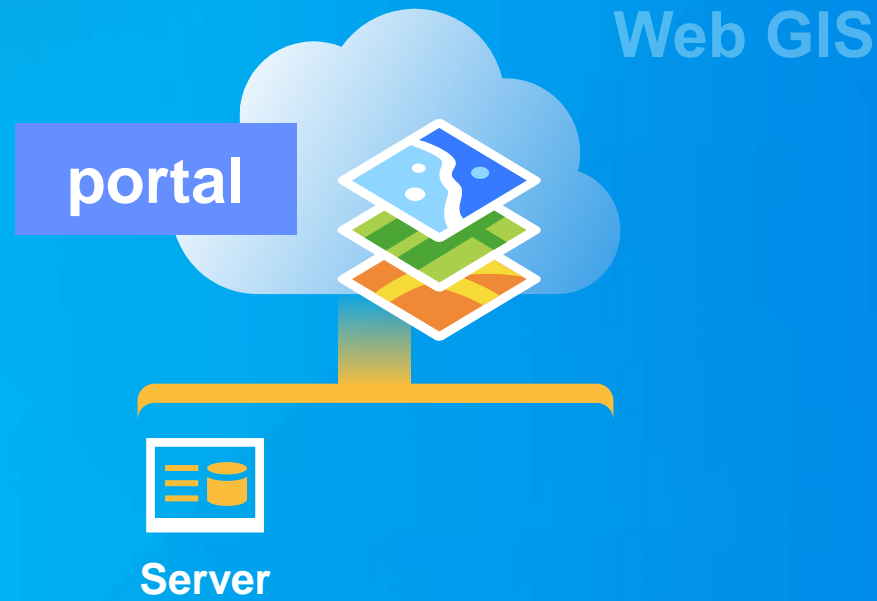
# ArcGIS

Your Favorite GIS

Simple

Integrated

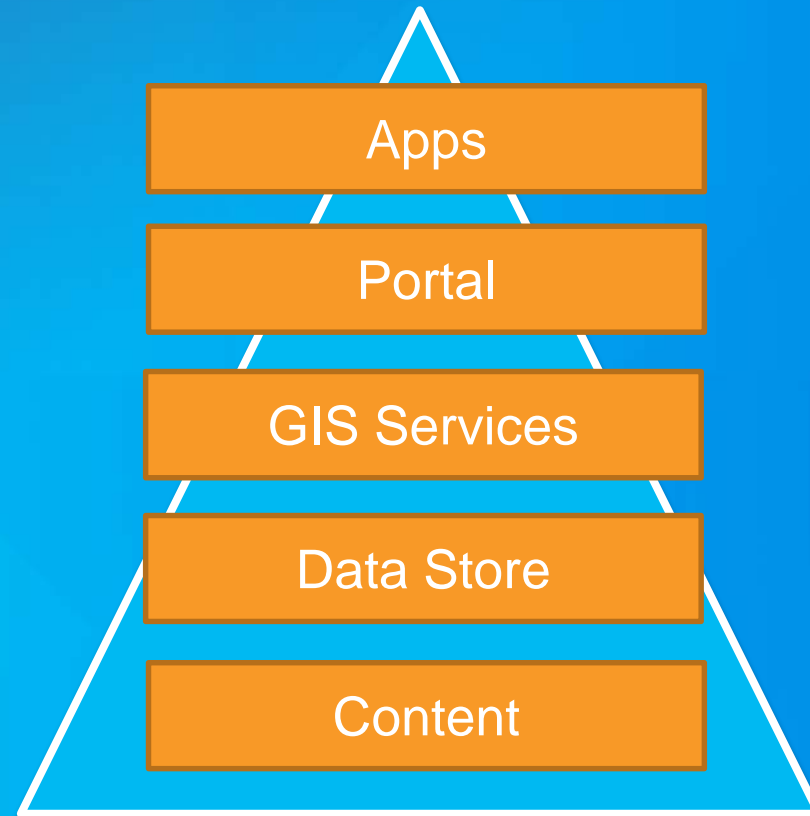
Open



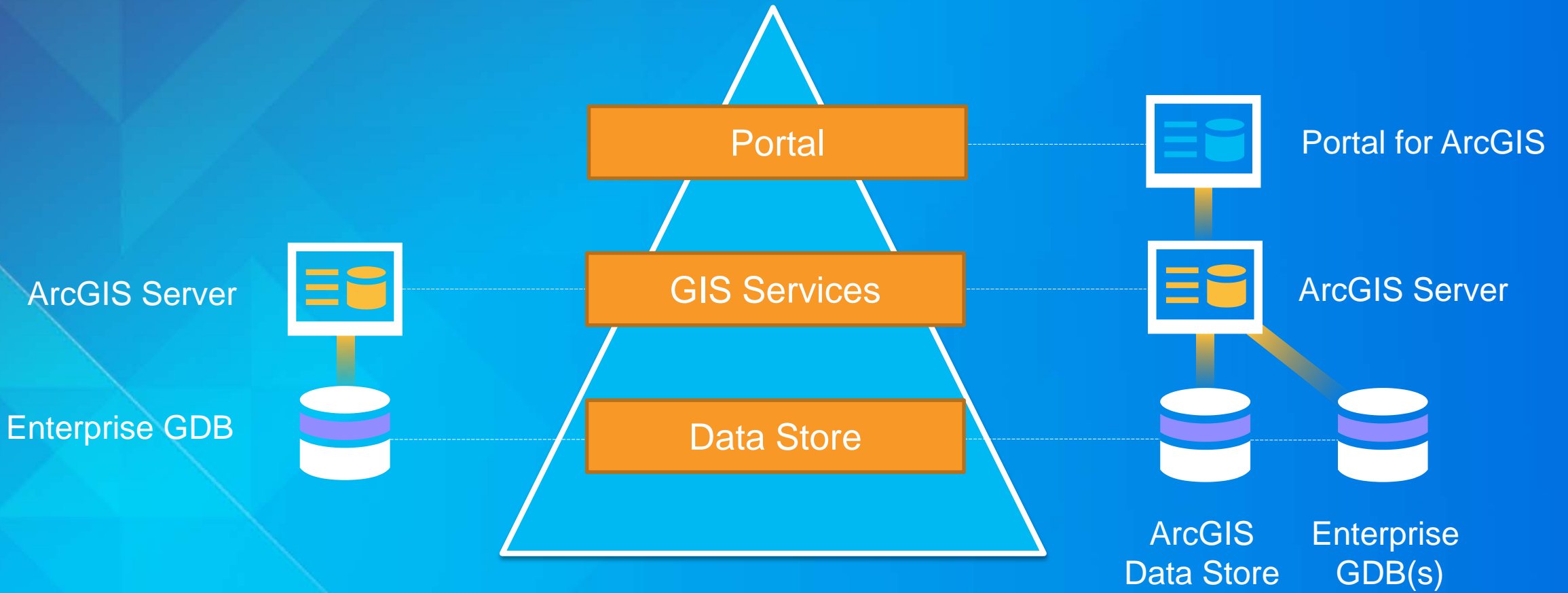
*On-Premises*

# ArcGIS

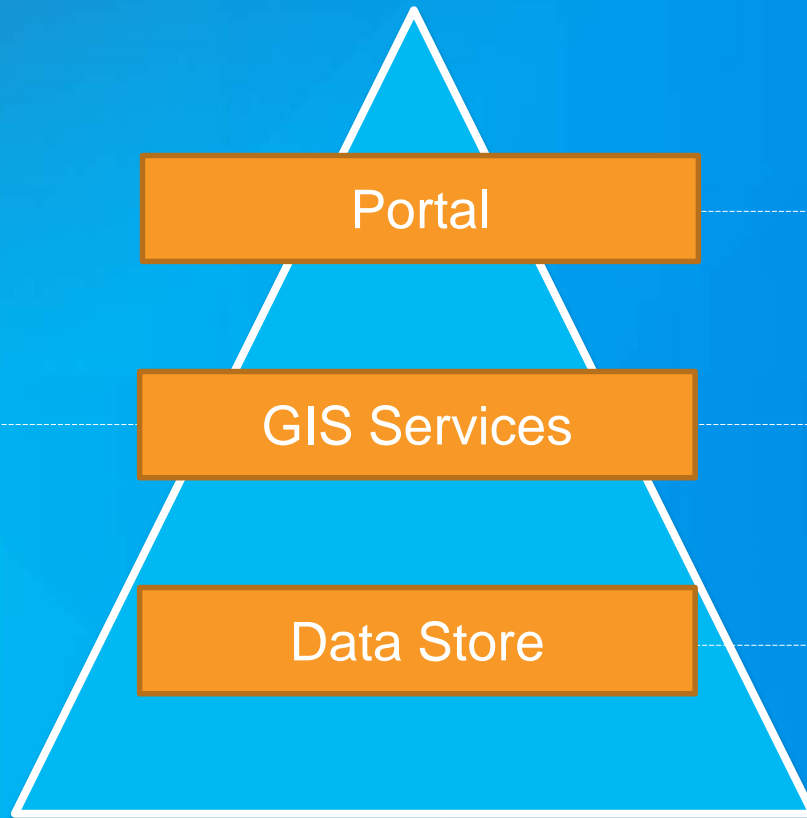
## The Platform Components



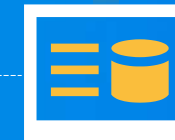




ArcGIS Server



Portal for ArcGIS



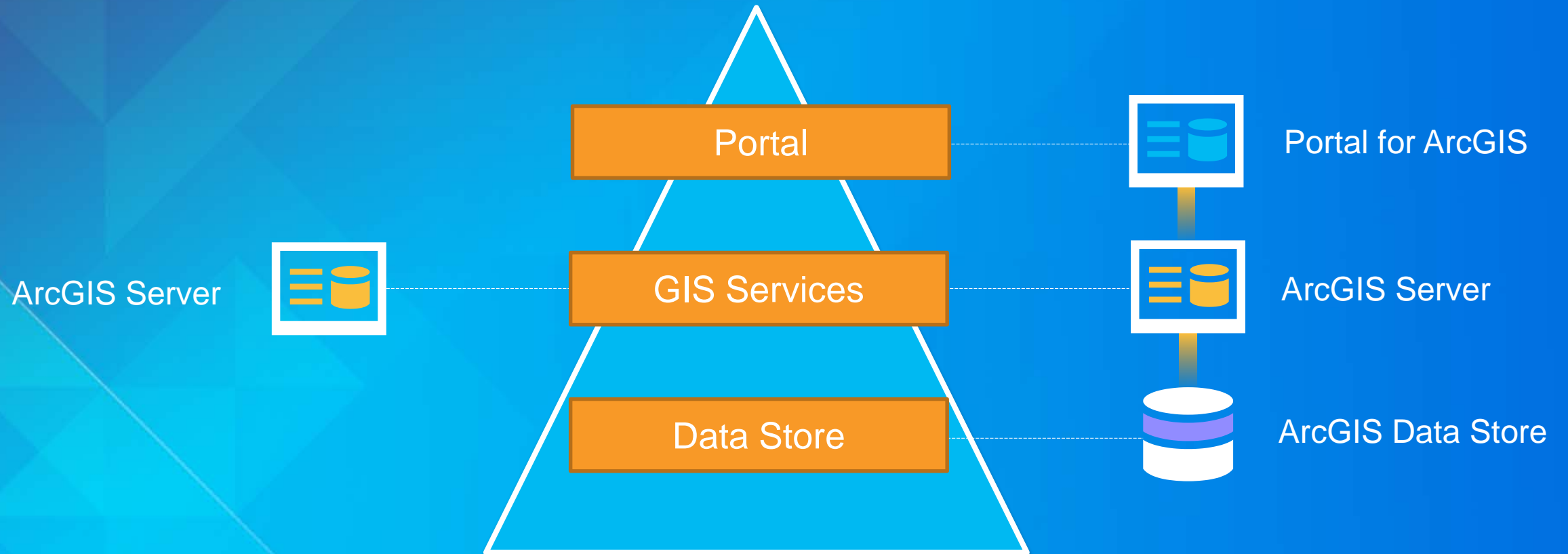
ArcGIS Server



ArcGIS Data Store

# Server GIS

# Web GIS



# Server GIS

ArcGIS Server Patterns for  
High Availability & Disaster Recovery



# ArcGIS Server

Single Machine Deployment



ArcGIS Server

# ArcGIS Server

Single Machine Deployment



**Processing** (*Physical / Virtual*)

**Storage** (*Local / Shared*)

**Network**

# ArcGIS Server

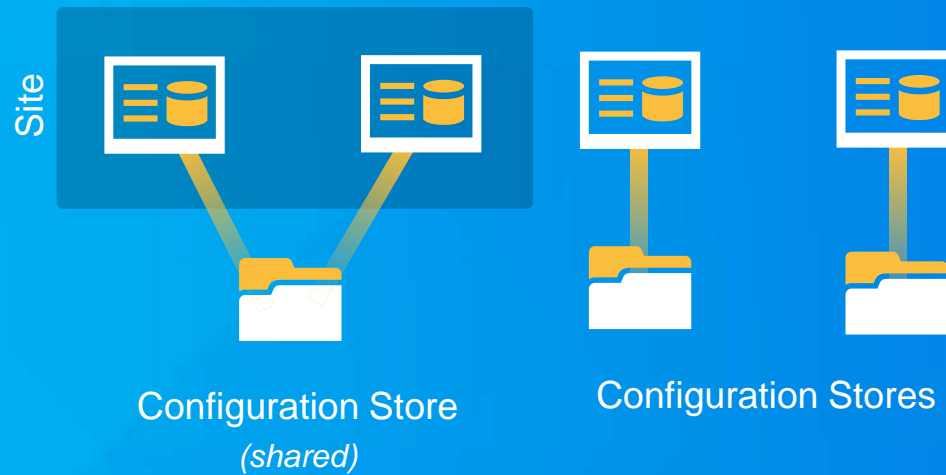
Single Machine Deployment

# ArcGIS Server

## Multiple Machine Configuration Options

Site

Silo

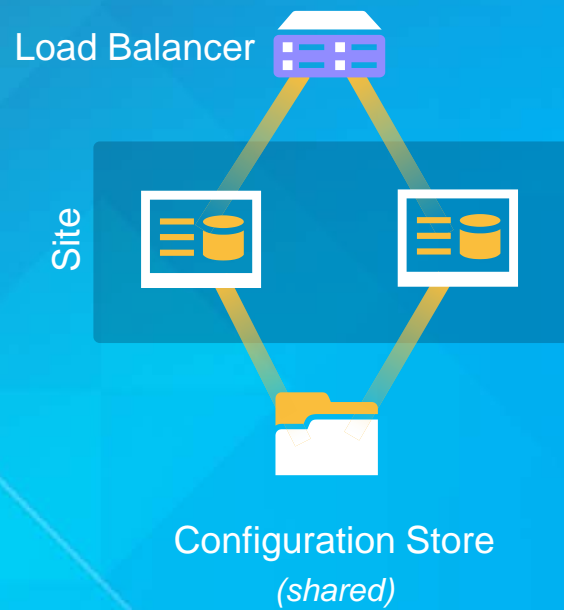




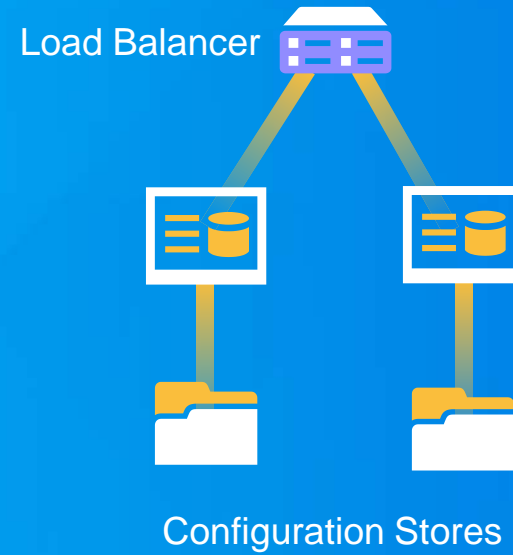
# ArcGIS Server

## Multiple Machine Configuration Options

### Site



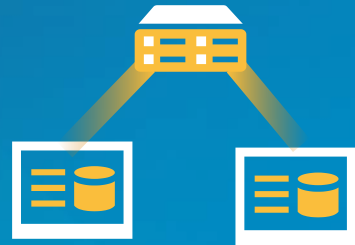
### Silo



# ArcGIS Server

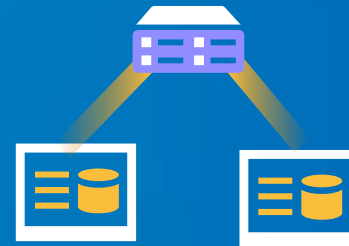
## Load Balancing Options

### ArcGIS Web Adaptor



- Provided by Esri
- Works w/ ArcGIS Server sites (not silos)
- Discovers new machines dynamically
- Availability dependent on web servers
- Enables additional security patterns

### 3<sup>rd</sup> Party Load Balancer

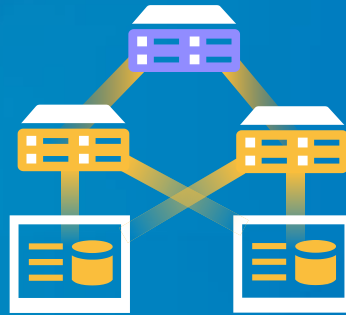


- Not provided by Esri (e.g. F5, CSM)
- Works w/ ArcGIS Server sites & silos
- Doesn't discover new machines dynamically
- Hardware options typically already fault tolerant

# ArcGIS Server

## Load Balancing Options

### Multiple Web Adaptors w/ 3<sup>rd</sup> Party Load Balancer



- Leverages existing 3<sup>rd</sup> Party Load Balancer
- Enables additional security patterns
- Discovers new machines dynamically
- Fault tolerant
- More moving pieces

# ArcGIS Server High Availability Deployment Patterns

## Key Considerations

- **Full Fault Tolerance** *(i.e. no single Web Adaptor)*
- **Web-tier Authentication** *(i.e. Web Adaptor required)*
- **Publication Workflows & Server Management** *(i.e. Site vs. Silo)*
- **Highly Available Shared Storage** *(i.e. Site vs. Silo)*
- **Highly Available Load Balancer** *(i.e. required!)*
- **Throughput** *(i.e. active-active or active-passive)*
- **Licensing Fees** *(i.e. active-active or active-passive)*
- **Functional Limitations** *(e.g. Silos and async GP, offline maps)*

# ArcGIS Server High Availability Patterns

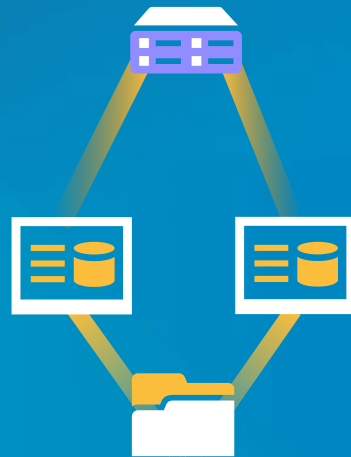
## Multiple Machine HA Patterns

### Multiple Machine HA w/ 3<sup>rd</sup> Party Load Balancer

Load Balancer

ArcGIS Servers

Configuration  
Store *(shared)*



- Simpler, less moving parts
- Doesn't support certain security patterns

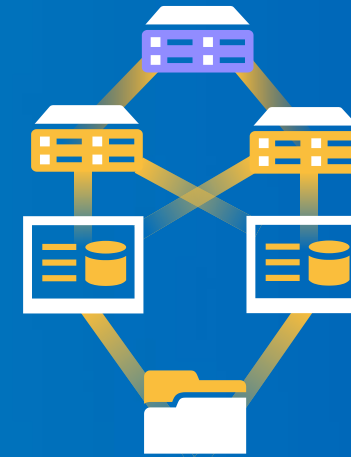
### Multiple Machine HA w/ 3<sup>rd</sup> Party LB & Web Adaptors

Load Balancer

Web Adaptors

ArcGIS Servers

Configuration  
Store *(shared)*



- More complex
- Supports additional security patterns

# ArcGIS Server High Availability Patterns

## Single Machine (Silo) HA Patterns

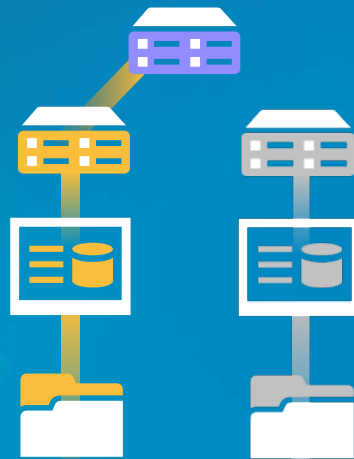
### Single Machine HA (active-passive)

Load Balancer

Web Adaptors  
(optional)

ArcGIS Servers

Configuration  
Stores



- Single Machine Throughput
- Single Machine Licensing Fees

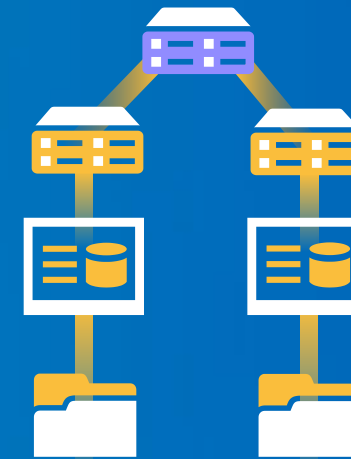
### Single Machine HA (active-active)

Load Balancer

Web Adaptors  
(optional)

ArcGIS Servers

Configuration  
Stores



- Multiple Machine Throughput
- Multiple Machine Licensing Fees



# Demo

ArcGIS Server High Availability

## Site

- ags1
- ags2



## Load Balancer

- Port translation
- Virtual directory
- 'Public' domain name

- Single Cluster Mode
- No Web Adaptor
- WebContextURL

## Highly Available File Share

- Config store
- Server directories



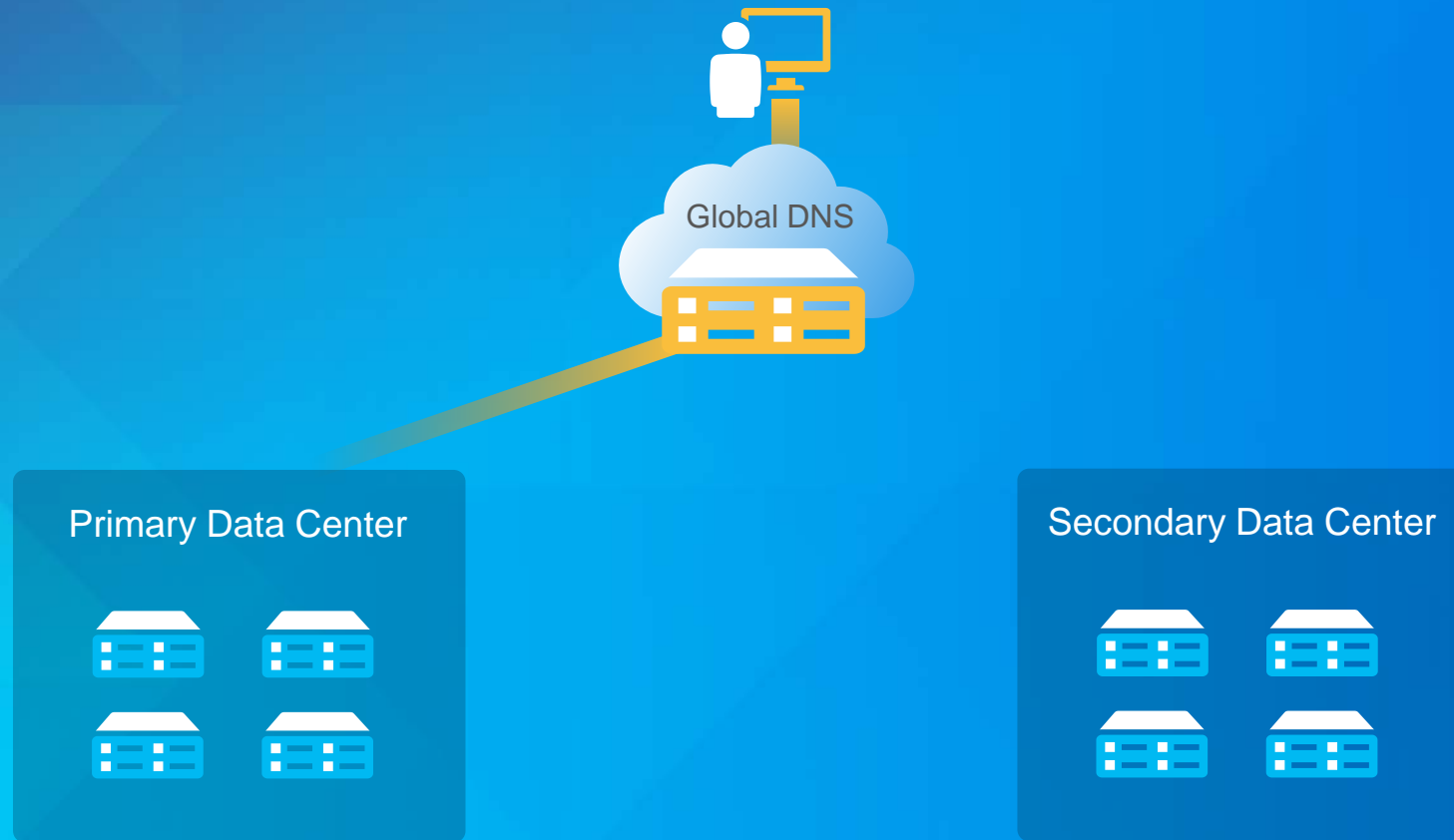
# ArcGIS Server High Availability Deployment Patterns

## Comparison

	<b>Site w/ Web Adaptor</b>	<b>Site w/ 3<sup>rd</sup> Party LB</b>	<b>Silo, active-active</b>	<b>Silo, active-passive</b>
<b>Supports web-tier authentication</b>	Yes	No	Yes	Yes
<b>Publishing Multiple Times</b>	No	No	Yes	Yes
<b>Requires HA Shared Storage</b>	Yes	Yes	No	No
<b>Requires 3<sup>rd</sup> Party LB</b>	Yes	Yes	Yes	Yes
<b>Throughput</b>	All Machines	All Machines	All Machines	One Machine
<b>Licensing</b>	All Machines	All Machines	All Machines	One Machine
<b>Functional Limitations</b>	None	None	Many	Many

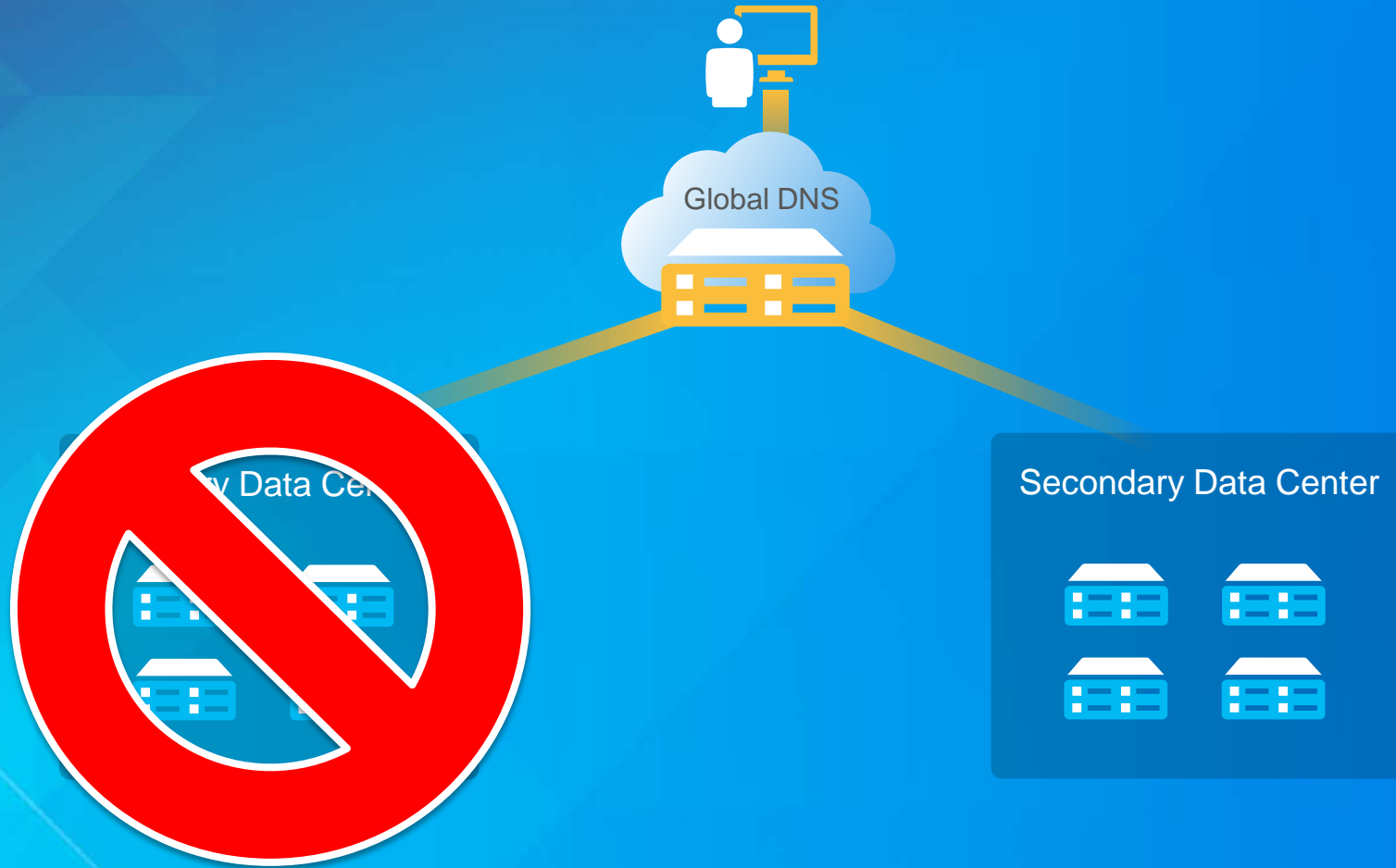
# Disaster Recovery

## Typical Workflow



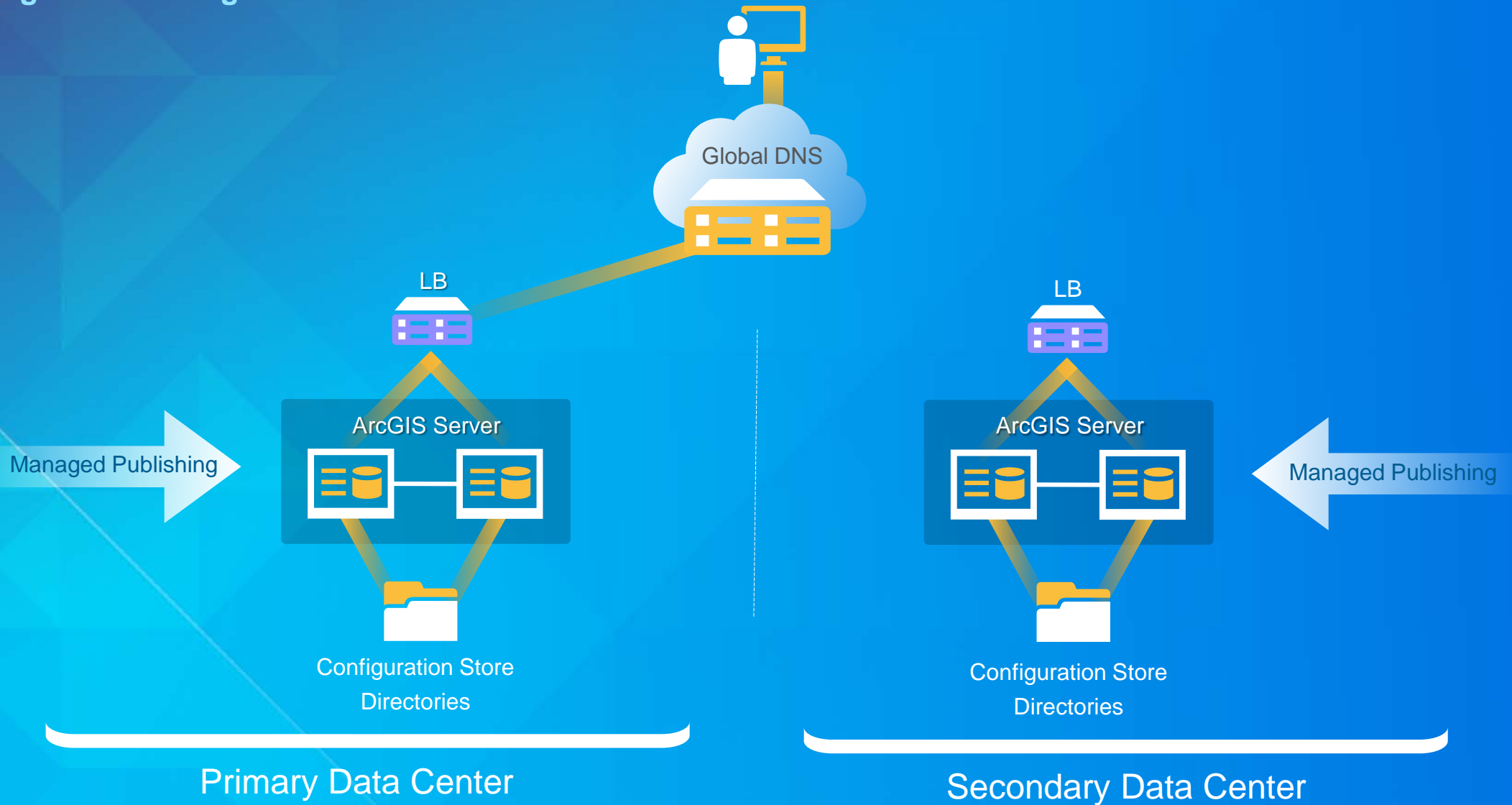
# Disaster Recovery

## Typical Workflow



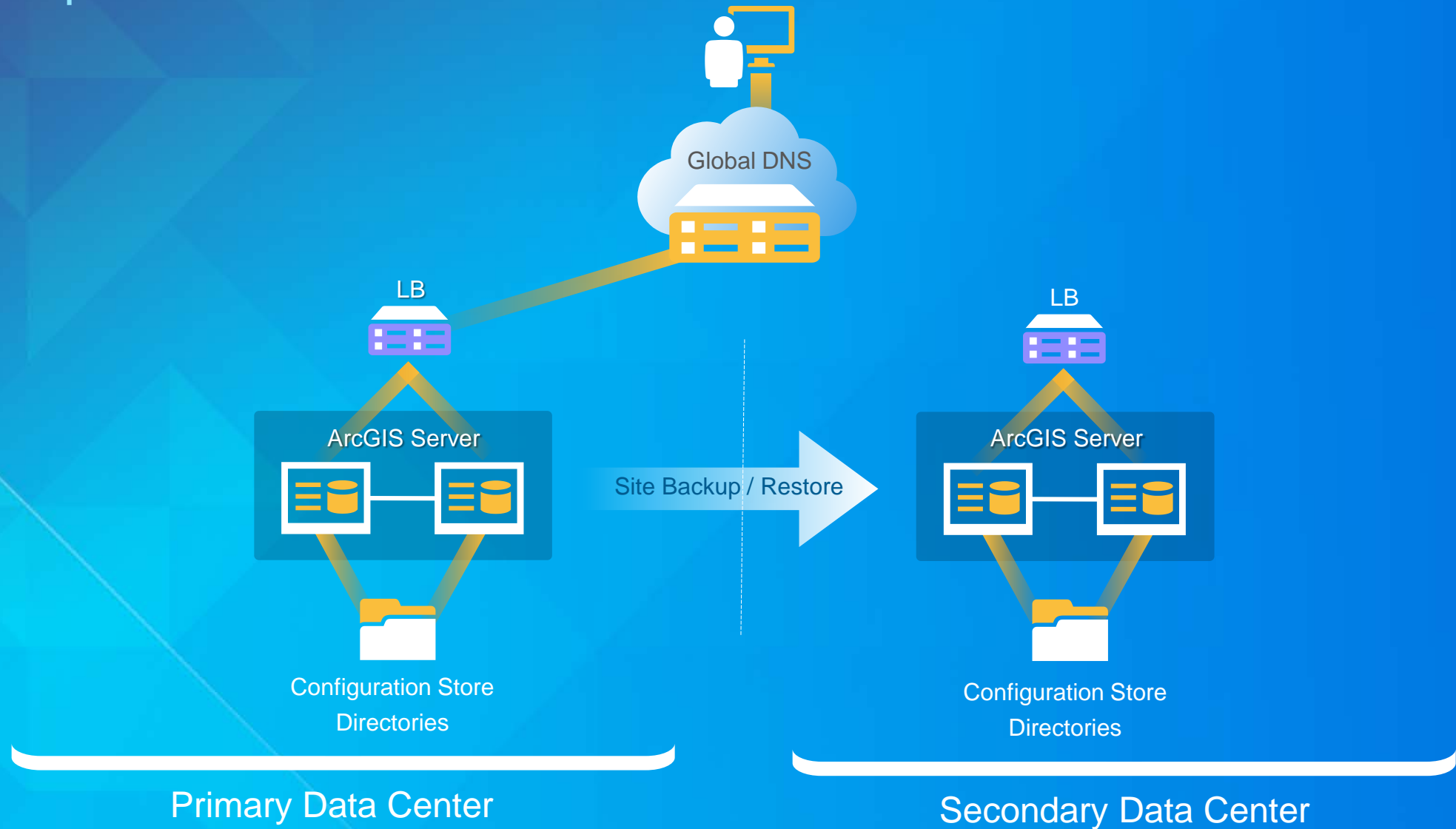
# ArcGIS Server Disaster Recovery Patterns

## Managed Publishing Pattern



# ArcGIS Server Disaster Recovery Patterns

## Site Backup / Restore Pattern



# ArcGIS Server Disaster Recovery Deployment Patterns

## Comparison

	Managed Publishing Pattern	Site Backup / Restore Pattern
<b>Operational Impact</b>	Managed, concurrent publishing	Site Export and Import Script
<b>Use Type</b>	Active-Active or Active-Passive	Active-Passive
<b>Supports Automated Failover</b>	Yes	Yes <i>(note site will be down during import)</i>
<b>Additional Considerations</b>	Not possible when federating with Portal for ArcGIS	Web Adaptor must be reconfigured after site import  Challenging when federating with Portal for ArcGIS

# Server GIS Deployment Patterns

## Summary

- **There Are Patterns to Meet Your Non-Functional (IT) Requirements**
- **Consider These Requirements...**
  - **Full fault Tolerance** *(i.e. no single Web Adaptor)*
  - **Web-tier Authentication** *(i.e. Web Adaptor required)*
  - **Publication Workflows & Server Management** *(i.e. Site vs. Silo)*
  - **Highly Available Shared Storage** *(i.e. Site vs. Silo)*
  - **Highly Available Load Balancer** *(i.e. required!)*
  - **Throughput** *(i.e. active-active or active-passive)*
  - **Licensing Fees** *(i.e. active-active or active-passive)*
  - **Functional Limitations** *(e.g. Silos and async GP, offline maps)*
  - **Geographic Redundancy** *(i.e. disaster recovery)*

... it is possible to achieve RTOs and RPOs of < 1min!

# Web GIS

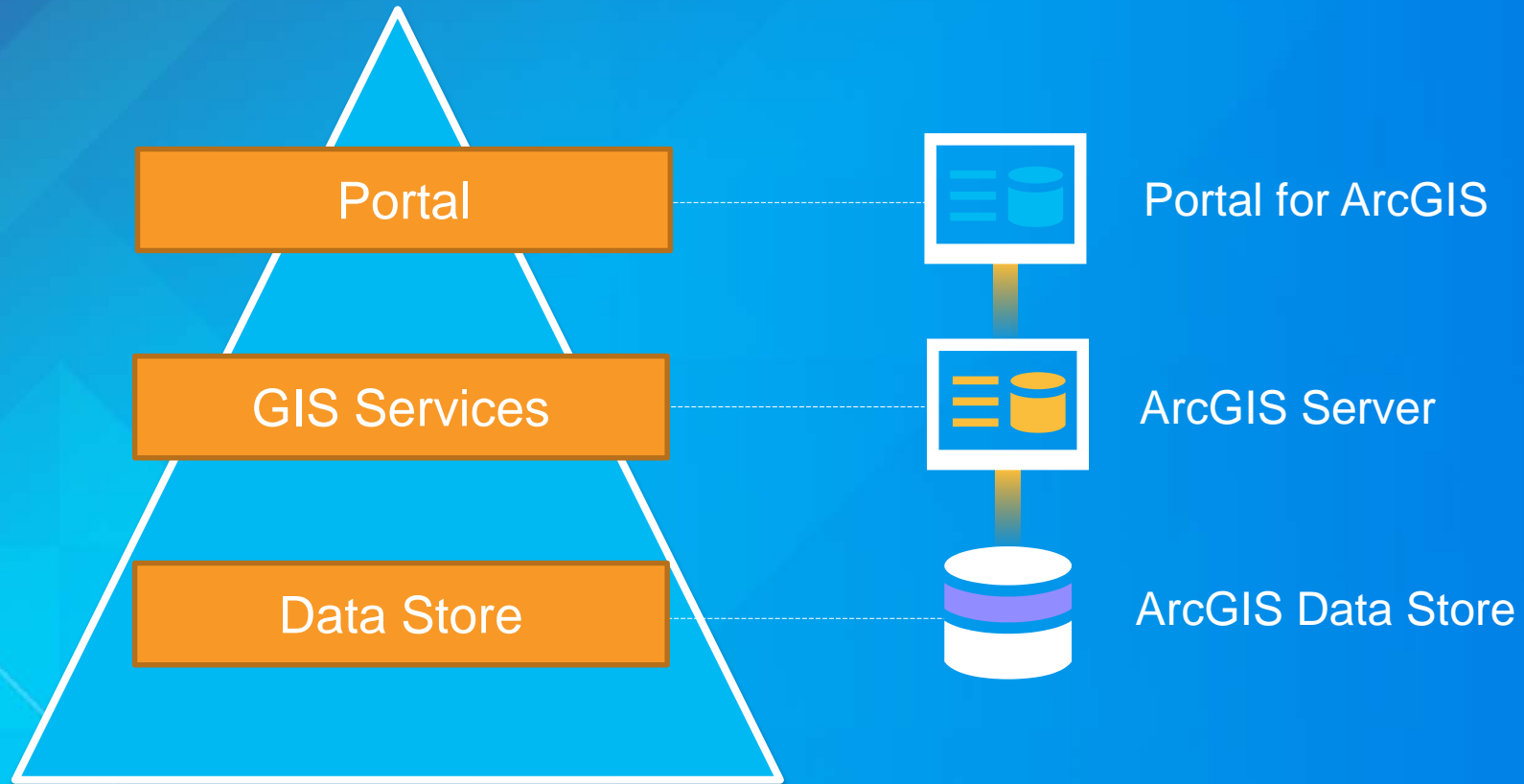
Full-Stack On-Premises Patterns for  
High Availability & Disaster Recovery

*(Portal for ArcGIS, ArcGIS Server, ArcGIS Data Store)*



# Web GIS On-Premises

## Components



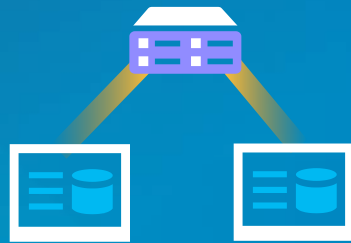
# Portal for ArcGIS

## A Brief Introduction

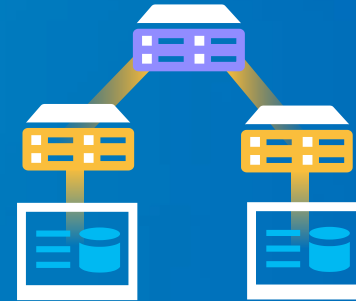
- **Separate install & processes from ArcGIS Server**
- **Can co-exist on same machine as ArcGIS Server** *(not recommended in production)*
- **Has architectural similarities w/ ArcGIS Server**
  - Internal application server
  - Config / Content store on disk
  - Leverages Web Adaptor
- **Has architectural differences w/ ArcGIS Server**
  - Has some different internal components
  - Web Adaptor required for single machine deployments
  - Web Adaptor cannot load balance multiple machines
  - Multi-machine configurations limited to 2 machines

# Portal for ArcGIS

## Load Balancing Options



Portal w/ 3<sup>rd</sup> Party LB



Portal w/ Multiple  
Web Adaptors & 3<sup>rd</sup> Party LB

NOTE: The Web Adaptor cannot load balance multiple machines

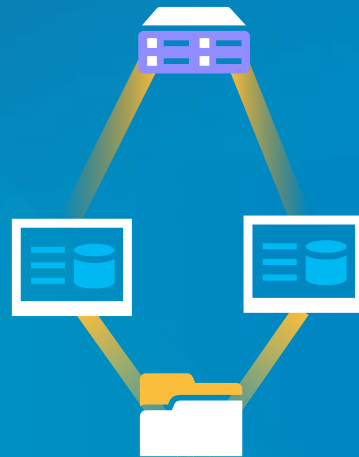
# Portal for ArcGIS High Availability Pattern

## Portal HA w/ 3<sup>rd</sup> Party Load Balancer

Load Balancer

Portal for ArcGIS

Content  
Store *(shared)*



- Simpler, less moving parts
- Doesn't support certain security patterns

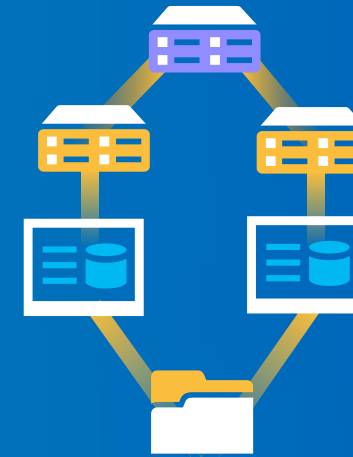
## Portal HA w/ 3<sup>rd</sup> Party LB & Web Adaptors

Load Balancer

Web Adaptors

Portal for ArcGIS

Content  
Store *(shared)*



- More complex
- Supports additional security patterns



# Demo

Portal for ArcGIS High Availability

## Web Adaptor & Portal

- prt11
- prt12



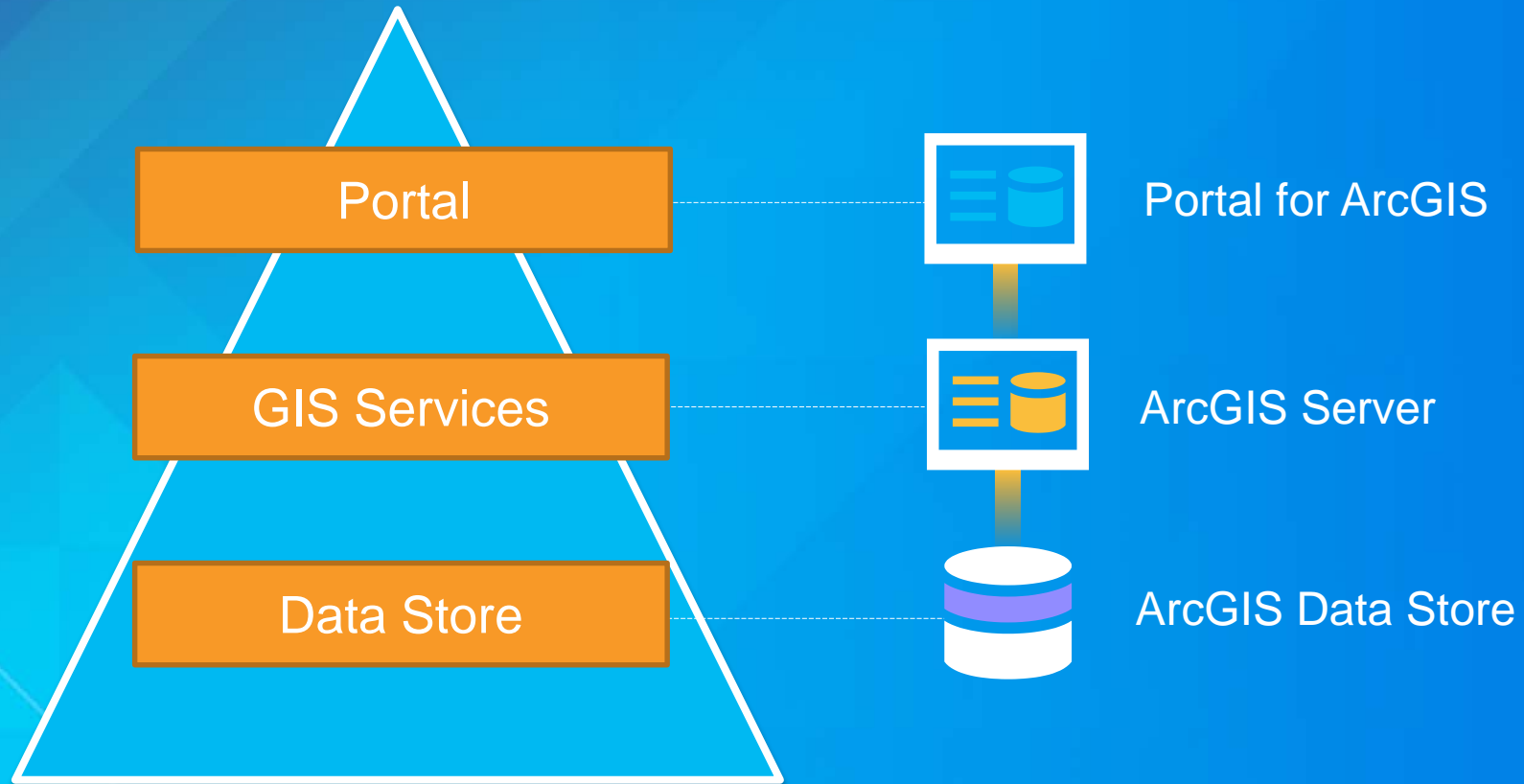
## Load Balancer

- 'Public' domain name

- Port translation (WA)
- Virtual directory (WA)

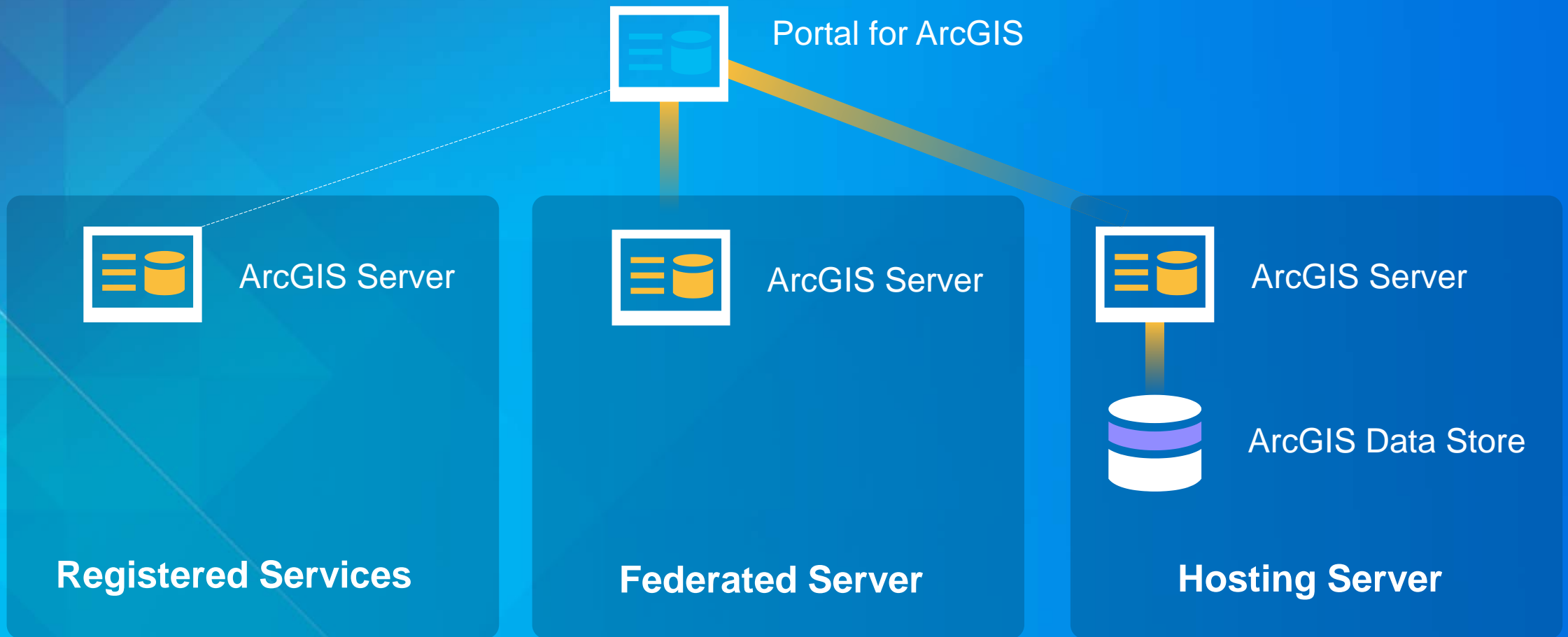
# Web GIS On-Premises

## Components



# ArcGIS Server's Role in the Web GIS

## Federation & Hosting Concepts





# Web GIS On-Premises High Availability Pattern

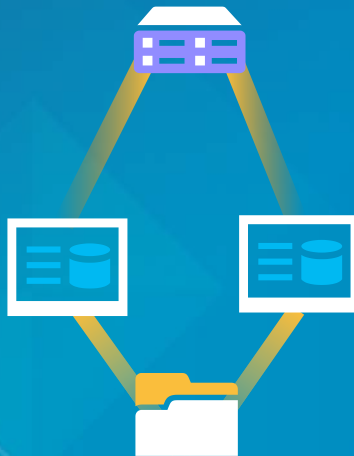
Putting the Pieces Together – Example

## Portal HA w/ 3<sup>rd</sup> Party Load Balancer

Load Balancer

Portal for ArcGIS

Content  
Store (*shared*)

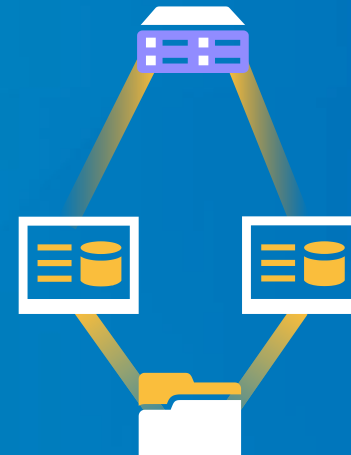


## Multiple Machine HA w/ 3<sup>rd</sup> Party Load Balancer

Load Balancer

ArcGIS Servers

Configuration  
Store (*shared*)



## Multiple Machine ArcGIS Data Store



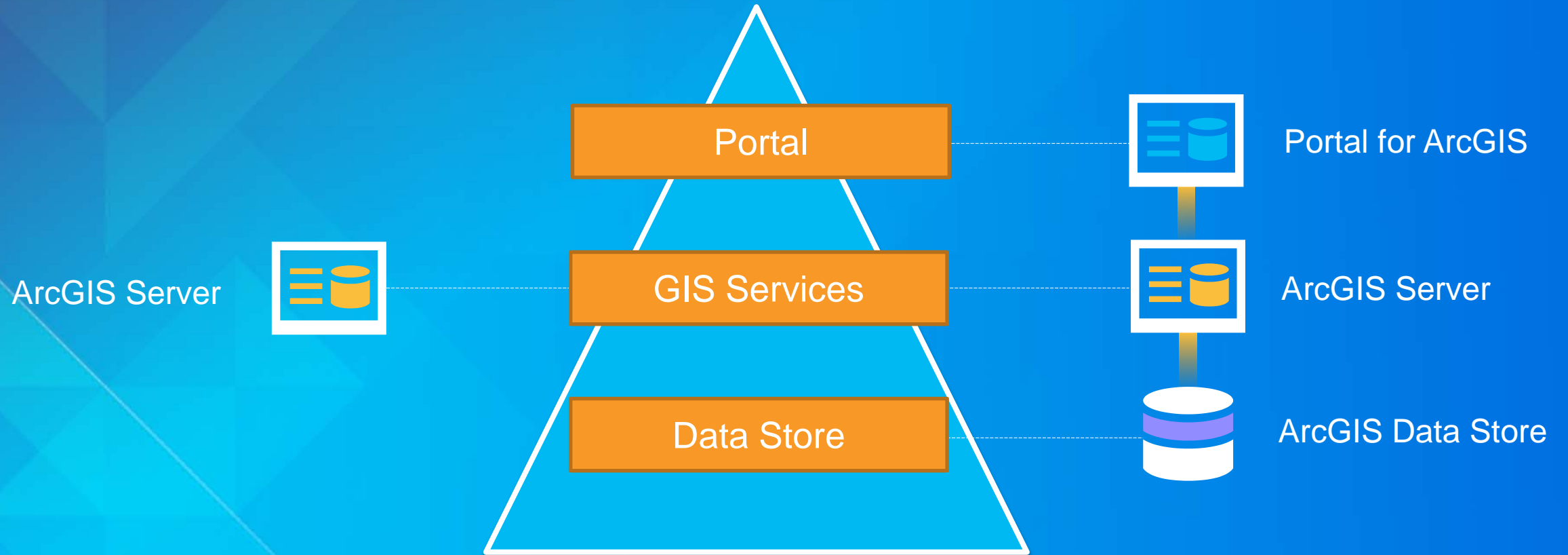
ArcGIS Data Store

# Web GIS On-Premises Disaster Recovery

- Possible, but very challenging to implement today at 10.3.1
- Key Considerations:
  - Active-passive Global DNS configuration
  - Can support hot or cold backups from primary
  - Restoration in secondary may take time *(1hr+ in some cases)*
  - Machine names need to be identical in both data centers *(done via local DNS or hosts file)*
  - Esri Professional Services required
- Support for full Web GIS backup / restore planned for 10.4

# Server GIS

# Web GIS



# Summary

## Patterns

	High Availability	Disaster Recovery
Server GIS	Site w/ 3 <sup>rd</sup> Party LB Site w/ 3 <sup>rd</sup> Party LB & Web Adaptor Silo, Active-Active Silo, Active-Passive	Managed Service Publishing Site Backup / Restore
Web GIS (on-premises)	Two machines w/ 3 <sup>rd</sup> Party LB Two machines w/ 3 <sup>rd</sup> Party LB & WA	Esri Professional Services More Coming at 10.4

# Want to learn more?

- **Documentation & Links**

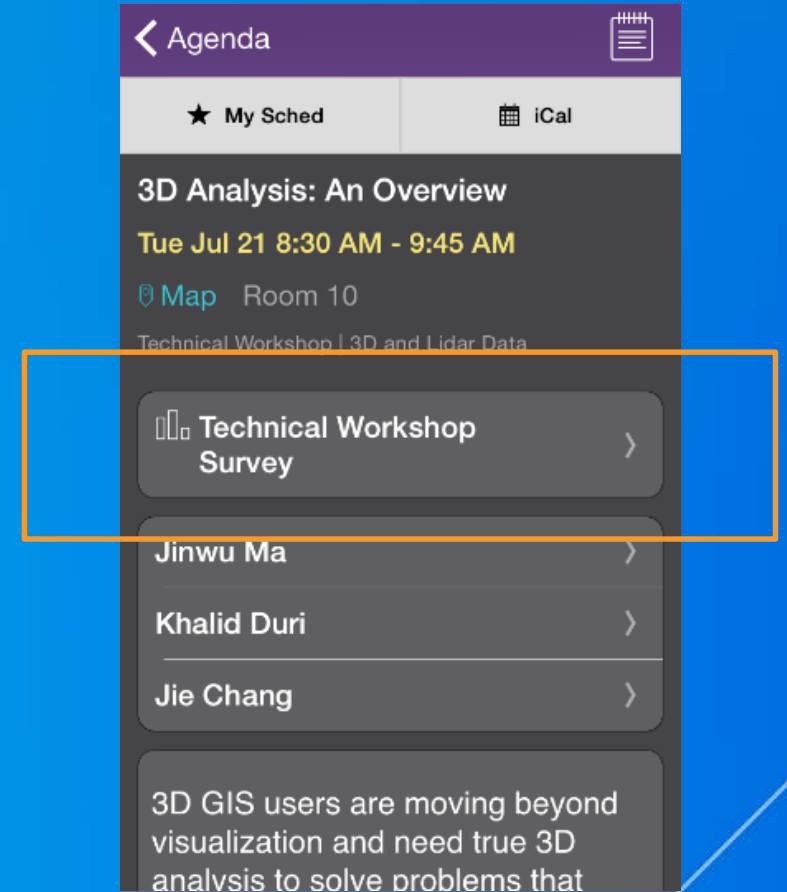
- [ArcGIS Server Deployment Scenarios](#)
- [What is Portal for ArcGIS](#)
- [Using Your Portal with ArcGIS Server](#)
- [Configuring a High Availability Portal](#)

- **Sessions**

- **ArcGIS Server Reference Implementations**  
**Portal for ArcGIS: An Introduction**

# Thank you...

- Please fill out the session survey in your mobile app
- Select **“Building your Server for High Availability and Disaster Recovery”**
  - Use the Search Feature to quickly find this title
- Click **“Technical Workshop Survey”**
- Answer a few short questions and enter any comments





Understanding our world.