Assumptions and prerequisites

- You know what the ArcGIS Enterprise product is and understand the capabilities
- You are an IT administrator (or work as one) who architects and/or installs the software

Recommended prerequisites:

- Prior familiarity with ArcGIS Server
  - E.g. you know what ArcGIS Server 'site' is.

Bonus prerequisites:

- Prior familiarity with Portal for ArcGIS
  - E.g. you're familiar with the concept of 'federating' an ArcGIS Server site with the portal
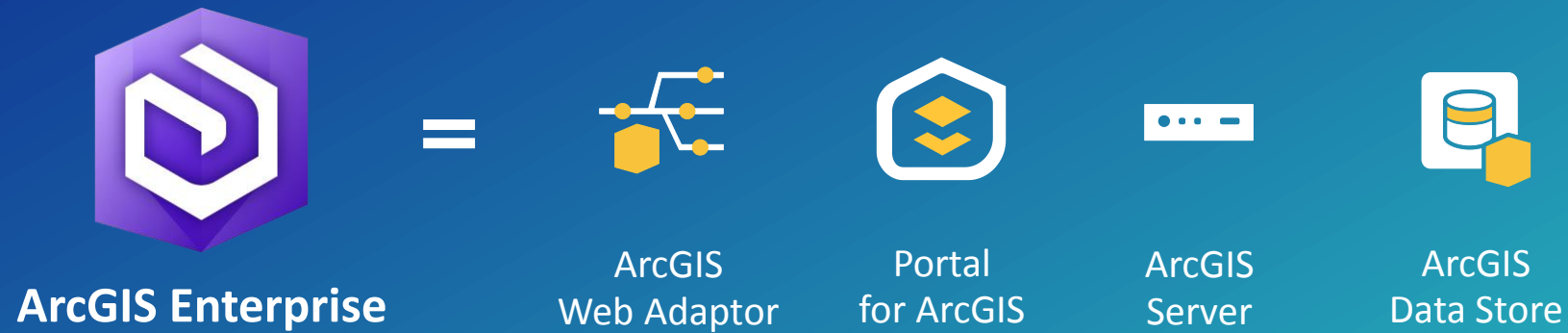
Don't panic!

Focus area of today's session

Desktop GIS

Server GIS

Web GIS

Distributed GIS

Software Components

ArcGIS Enterprise = ArcGIS Web Adaptor · Portal for ArcGIS · ArcGIS Server · ArcGIS Data Store

All of these components existed in the software pre-10.5

Server Licensing Roles

ArcGIS
Server

GIS
Server

GeoEvent
Server*

Image
Server

GeoAnalytics
Server

One software component, multiple server roles

Components of the base deployment

ArcGIS Server

Set up as a GIS Server and configured as the hosting server, ArcGIS Server provides the layers, services, and horsepower required to power your Web GIS.

Portal
for
ArcGIS

ArcGIS
Data
Store

ArcGIS
Web
Adaptor

ArcGIS Enterprise | Components of the base deployment

ArcGIS
Server

**Portal
for
ArcGIS**

ArcGIS
Data
Store

ArcGIS
Web
Adaptor

The web frontend and
infrastructure backend that
supports a user's interaction
and overall experience with
your Web GIS.

ArcGIS Enterprise | Components of the base deployment

ArcGIS
Server

Portal
for
ArcGIS

ArcGIS
Data
Store

ArcGIS
Web
Adaptor

The ArcGIS managed
data repository that
stores the spatial
content that has been
copied to the system

ArcGIS Enterprise | Components of the base deployment

ArcGIS
Server

Portal
for
ArcGIS

ArcGIS
Data
Store

ArcGIS
Web
Adaptor

Relational | Tile Cache | Spatiotemporal

ArcGIS Enterprise | Components of the base deployment

ArcGIS
Server

Portal
for
ArcGIS

ArcGIS
Data
Store

ArcGIS
Web
Adaptor

An Esri built software load balancer that appropriately directs network traffic and serves as a reverse proxy for Web GIS access.

Coming from ArcGIS Server to ArcGIS Enterprise

**Typical deployment of
ArcGIS Server**

**Base deployment of
ArcGIS Enterprise**

Web Adaptor

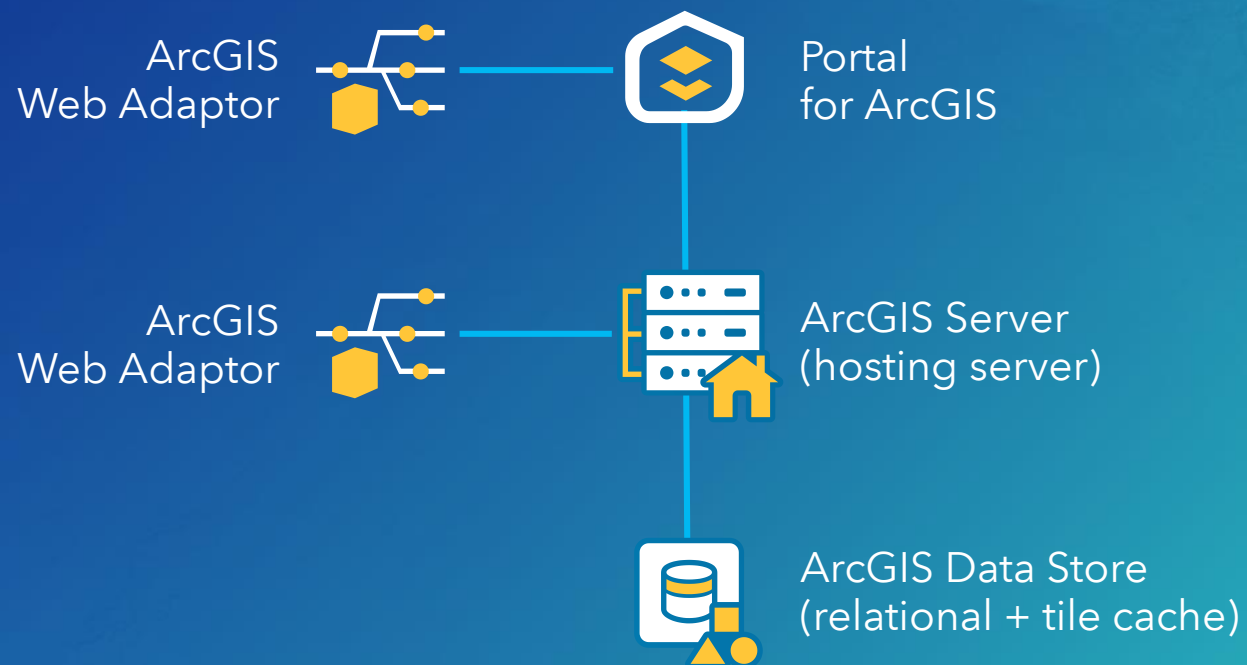*ArcGIS Server*

ArcGIS
Web Adaptor

Portal
for ArcGIS

ArcGIS
Web Adaptor

ArcGIS Server
(GIS Server role
as hosting server)

ArcGIS Data Store
(relational + tile cache)

Base Deployment Logical Architecture

ArcGIS
Web Adaptor ———— Portal
for ArcGIS

ArcGIS
Web Adaptor ———— ArcGIS Server
(hosting server)

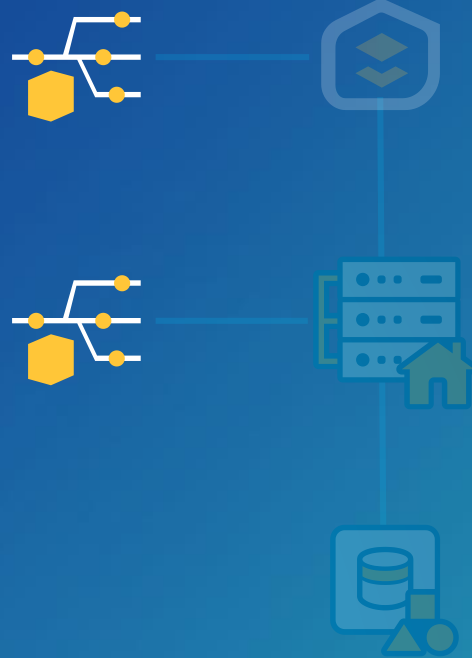ArcGIS Data Store
(relational + tile cache)

Base Deployment Logical Architecture

ArcGIS Web Adaptor

Integrates with your organization's existing web server to provide a single endpoint that distributes incoming requests and enables you to use web-tier authentication.

Base Deployment Logical Architecture

Portal for ArcGIS

The software component that enables the ArcGIS Enterprise portal. Portal for ArcGIS is the web frontend and API backend that supports a user's interaction and overall experience with your Web GIS.

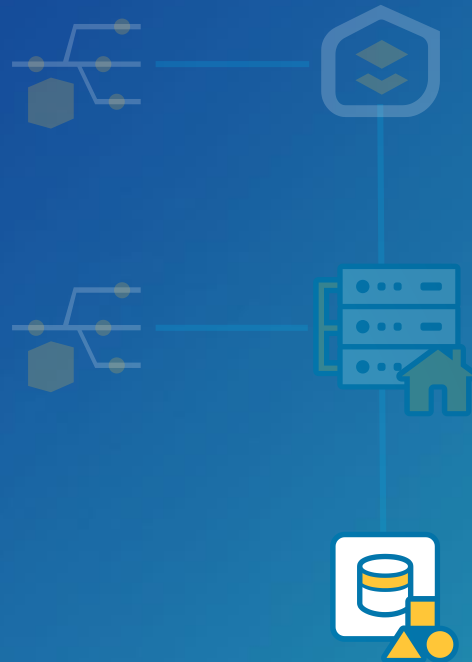# Base Deployment Logical Architecture

ArcGIS Server

In a base deployment ArcGIS Server should be configured with a GIS Server licensing role and as the hosting server. In this capacity it gives you the ability to publish and share maps and layers from ArcGIS Pro using your own business databases and by copying data to the server.
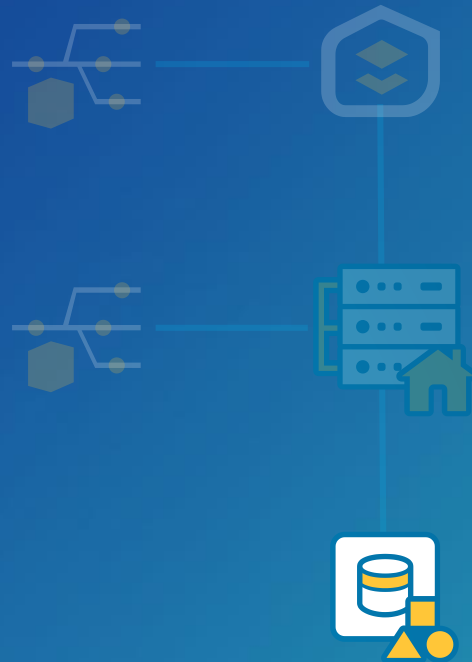
Base Deployment Logical Architecture

ArcGIS Data Store

The ArcGIS managed data repository that stores the Portal's hosted content. It is not a replacement for your enterprise geodatabases.

Base Deployment Logical Architecture

ArcGIS Data Store

- Relational
- Tile Cache
- Spatiotemporal

Portal for ArcGIS

Home   Use   **Administer**

Introducing ArcGIS Enterprise

- What is ArcGIS Enterprise?

- **Base ArcGIS Enterprise deployment**

- Tutorial: Set up a base ArcGIS Enterprise deployment

- Additional server deployment

- About ArcGIS Server licensing roles

Introducing Portal

Base ArcGIS Enterprise deployment

ArcGIS 10.5 on Windows | Other versions ▾

- Single-machine deployment
- Multitiered deployment
- Highly available deployment
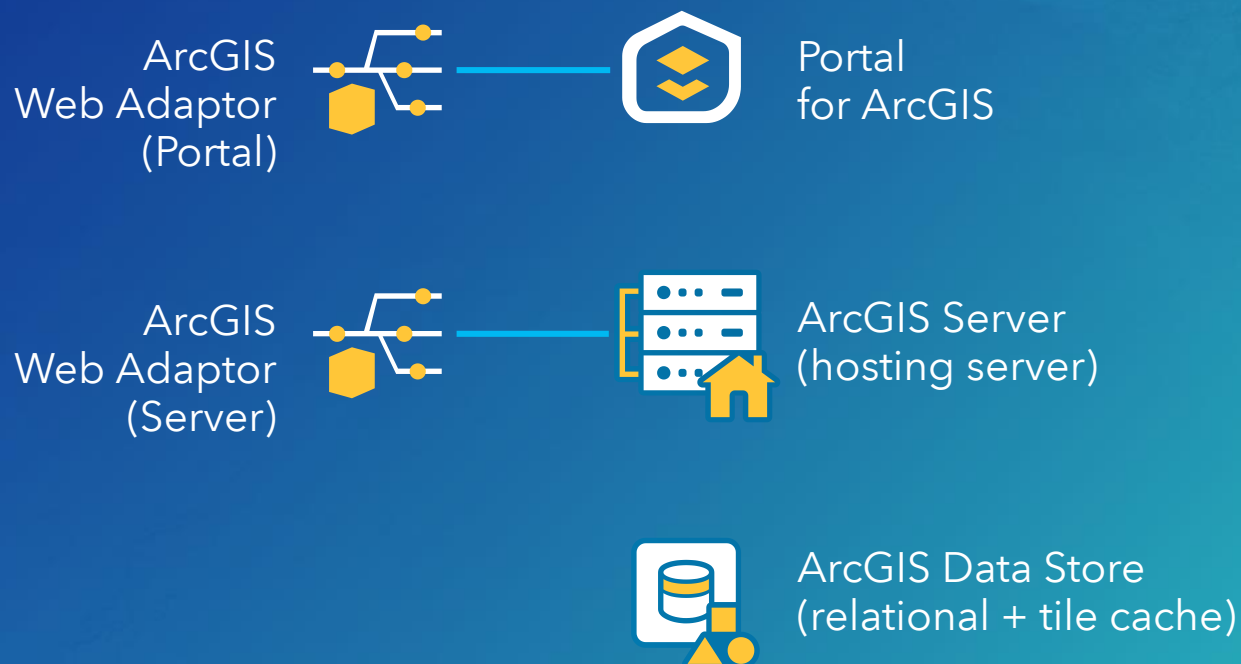- Scaling the base ArcGIS Enterprise deployment

ArcGIS Enterprise includes several software components that are designed to work together. A foundational setup of ArcGIS Enterprise consists of a number of these components configured in a certain way; this is called a base ArcGIS Enterprise deployment. The base deployment consists of the following:

- ArcGIS Server—This ArcGIS Server must be licensed as ArcGIS GIS Server Standard or ArcGIS GIS Server Advanced and configured as the hosting server for your portal.
- Portal for ArcGIS.

Functionality of the base deployment

- **Everything from traditional ArcGIS Server**
  - Ability to publish map services, feature services, network services, geoprocessing services, geocoding services, and much more.
  - Ability to publish content from referenced data sources such as file-based data (file geodatabases, shapefiles) as well as enterprise geodatabase and other spatially enabled databases.

- **Ability to give users option to do self-service mapping**
  - Publishing hosted data where users do not need access to enterprise geodatabase or trusted file shares- they can copy data to the system in a seamless fashion similar to the experience from ArcGIS Online

- **Story maps and other configurable app templates**

- **Web AppBuilder for quickly creating customized web apps**

- **Full suite of Esri apps and other custom apps built on the ArcGIS API for Javascript and ArcGIS Runtime SDKs**

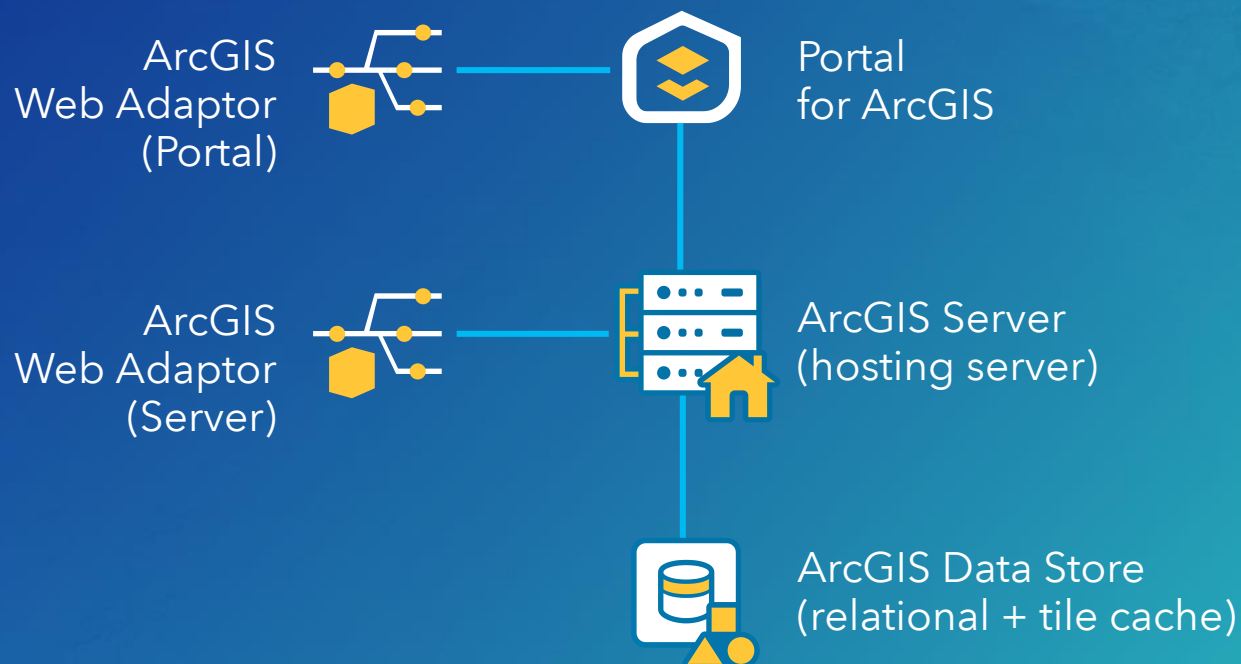# Base Deployment Configuration Quick Steps

ArcGIS
Web Adaptor
(Portal)

Portal
for ArcGIS

ArcGIS
Web Adaptor
(Server)

ArcGIS Server
(hosting server)

ArcGIS Data Store
(relational + tile cache)

1 configure Web Adaptors

Base Deployment Configuration Quick Steps

ArcGIS
Web Adaptor
(Portal)

Portal
for ArcGIS

ArcGIS
Web Adaptor
(Server)

ArcGIS Server
(hosting server)

ArcGIS Data Store
(relational + tile cache)

2 configure the data store and register with server

Base Deployment Configuration Quick Steps

ArcGIS Web Adaptor (Portal)

Portal for ArcGIS

ArcGIS Web Adaptor (Server)

ArcGIS Server (hosting server)

ArcGIS Data Store (relational + tile cache)

3 federate server with the portal and designate as hosting server

Portal for ArcGIS

Home   Use   **Administer**

Introducing ArcGIS Enterprise

What is ArcGIS Enterprise?

Base ArcGIS Enterprise deployment

Tutorial: Set up a base ArcGIS Enterprise deployment

Additional server deployment

About ArcGIS Server licensing roles

Introducing Portal

Tutorial: Set up a base ArcGIS Enterprise deployment

ArcGIS 10.5 on Windows | Other versions ▾

This tutorial provides an overview of setting up a single machine base ArcGIS Enterprise deployment. This configuration is commonly used for testing and prototyping purposes. It enables self-service mapping and can be used with ArcGIS Pro, ArcMap, and other client applications. Although this configuration can be used in a production system, your performance, system architecture, and other requirements will dictate the deployment pattern your production deployment follows.

The resulting deployment will include the following:

■ An ArcGIS Server machine licensed as ArcGIS GIS Server and used as a hosting server

Base Deployment | Choosing a pattern

- **Choosing a base deployment pattern**
  - **All-in-one single machine deployment**
  - **Multi-tier deployment**

- **Three tiers to consider:**
  - **Portal for ArcGIS (web tier)**
  - **ArcGIS Server (app tier)**
  - **ArcGIS Data Store (data tier)**

Portal
for ArcGIS

ArcGIS Server
(hosting server)

ArcGIS Data Store
(relational + tile cache)
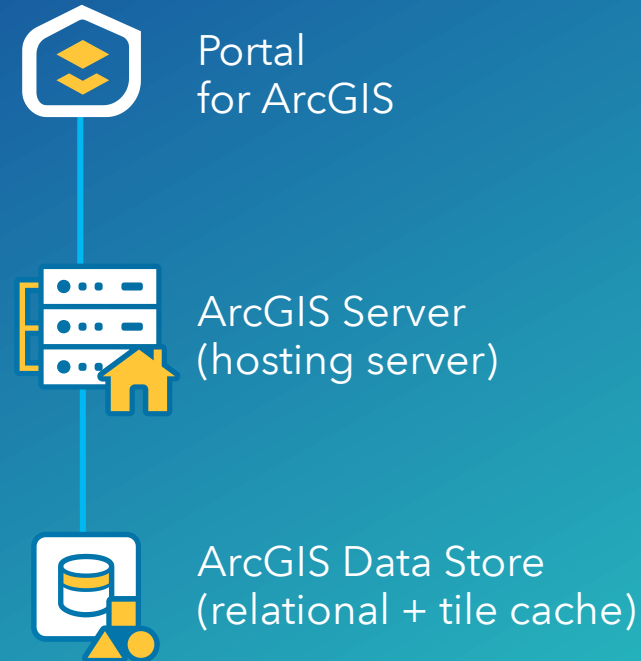
Scaling and expanding the base deployment

- **When do you need to scale out the Portal for ArcGIS tier?**
  - **Rarely!**
  - **Provide more resources for your existing machine(s)**
    - **Note: Use two machines with Portal for ArcGIS for high availability purposes *not* for scaling**
  - **Monitor CPU and memory usage to see if you need more resources**

Scaling and expanding the base deployment

- When do you need to scale out the ArcGIS Server hosting server site?
  - If your hosting server is performing double duty:
    - Hosted services
    - Traditional services published from ArcMap or ArcGIS Pro
  - Consider setting up a separate ArcGIS Server site for this purpose!

  - If your users are making heavy use of the built-in analysis tools via the map viewer or ArcGIS Pro
  - If you have a lot of Insights for ArcGIS users

OR

Scaling and expanding the base deployment

- **When do you need to scale out the ArcGIS Data Store tier?**
  - Two different types of data stores in the base deployment

- **Relational Data Store**
  - **Hosted feature layers**
  - **Insights for ArcGIS**

- **Tile Cache Data Store**
  - **Scene Layers (3D)**

Note: the spatiotemporal big data store is not part of the base deployment. It supports GeoEvent Server and GeoAnalytics Server workflows covered in later slides.

When to scale relational data store:
- Lots of users requesting data concurrently from many different hosted services: more memory often helpful
- Lots of concurrent requests: CPU can become a bottleneck

- **Monitor for bottlenecks!**
  - **Consider ArcGIS Monitor (new product coming late 2017)**
    - Known as System Monitor from Esri Professional Services previously.

- **CPU, memory, disk I/O are all important**

- **Pre-10.5.1 versions do not always handle out of disk space conditions gracefully. Avoid running out of disk space!**

Expanding out from the base deployment

A couple of starting points:

- **You can have any number of federated ArcGIS Server sites within your ArcGIS Enterprise deployment**

- **Different server roles have different recommendations and restrictions**

Expanding out from the base deployment

- **Multiple reasons and ways to add to the base deployment**

1. **Adding additional GIS Server sites**
   - Isolate hosting server site from traditional GIS Server duties
   - Have dedicated GIS Server sites for various purposes: heavily used map services, geoprocessing services, …
2. **Adding additional capabilities**
   - Image Server
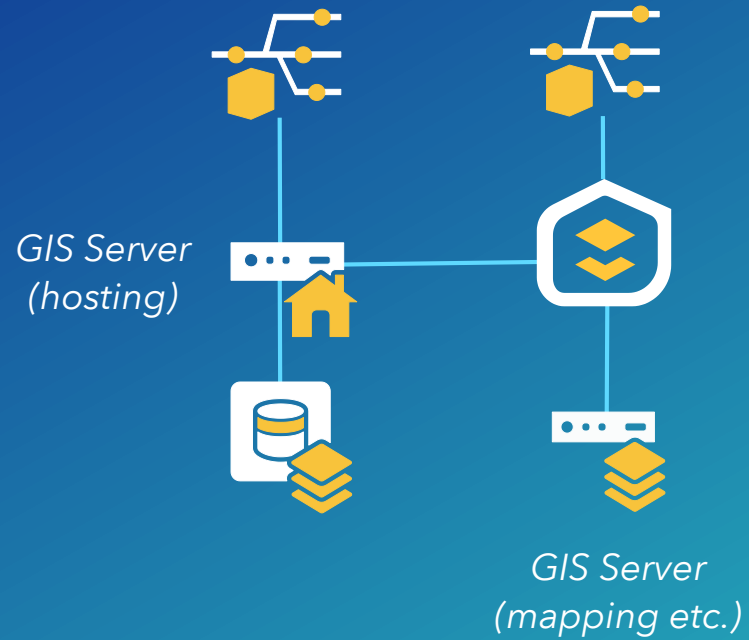   - GeoEvent Server
   - GeoAnalytics Server

GIS Server

Adding additional GIS Server sites to your deployment
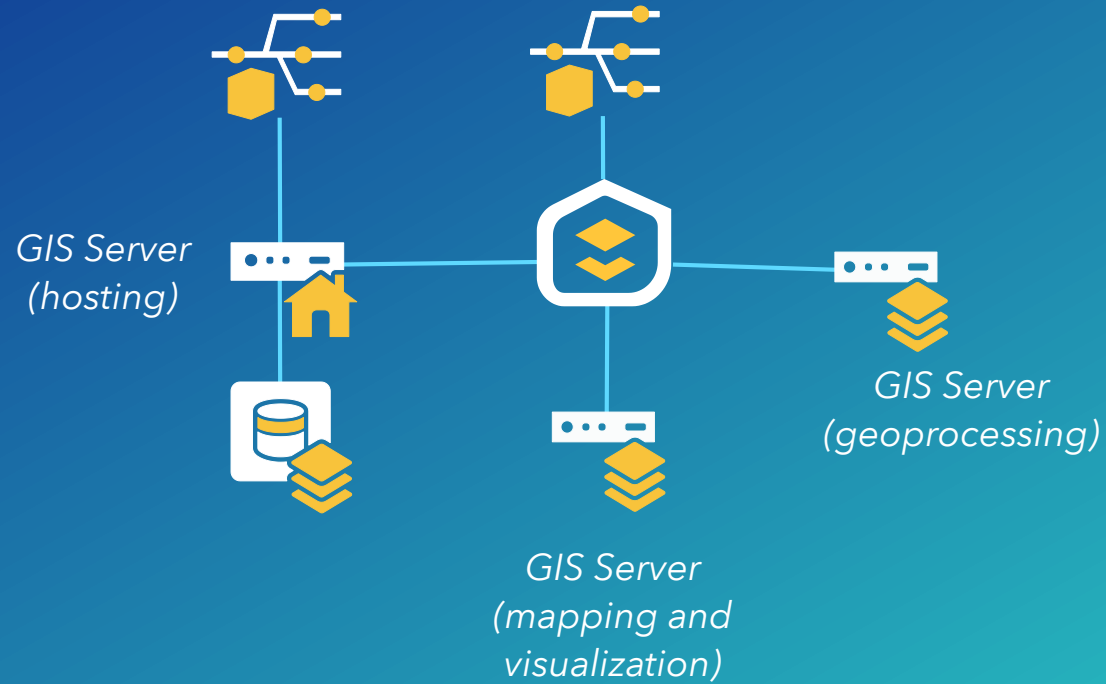

- **GIS Server**
    - You already have a GIS Server site as part of the base deployment
    - Consider if you need additional sites- you can setup as many sites as make sense for your particular deployment following workload separation recommendations
    - Common workloads that benefit from separate site(s):
        - Highly used sets of dynamic map services
        - Heavy-weight geoprocessing
        - CPU-intensive routing services
        - Mission critical services that have different SLAs than other services

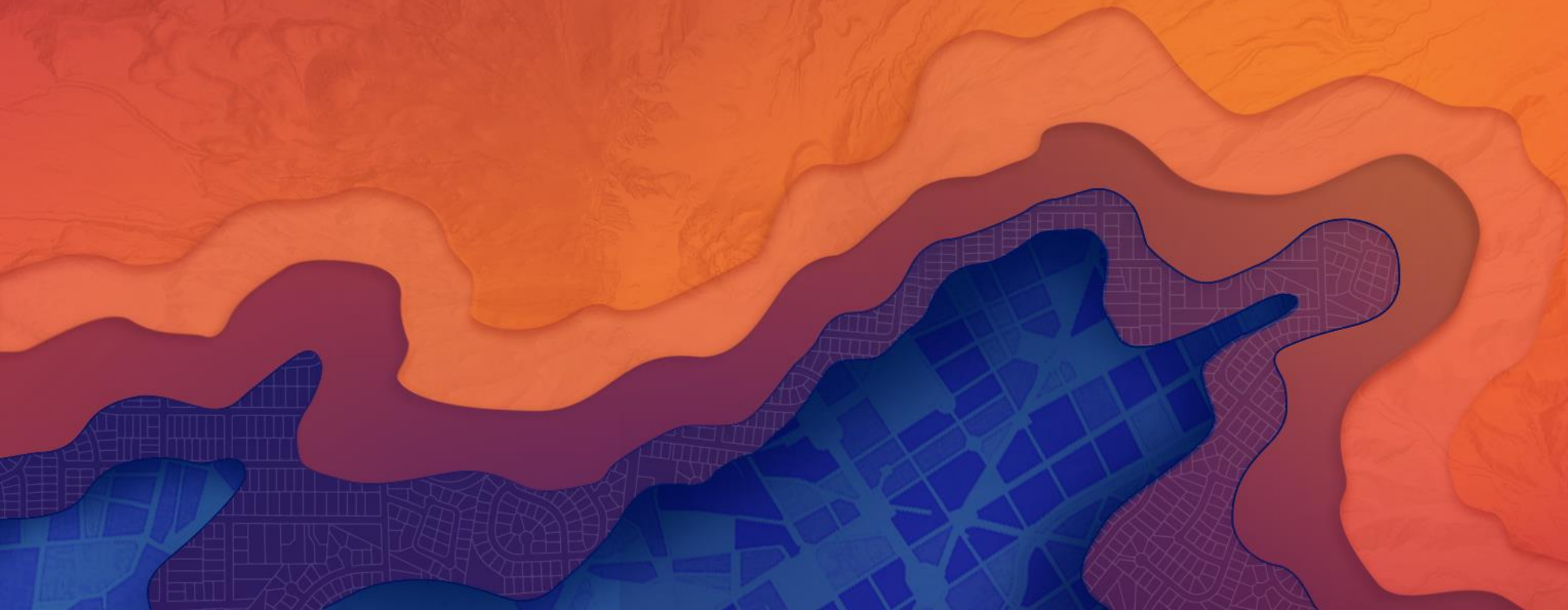# Adding additional GIS Server site to your deployment

GIS Server
(hosting)

GIS Server
(mapping etc.)

Adding additional GIS Server site to your deployment

GIS Server (hosting)

GIS Server (mapping and visualization)

GIS Server (geoprocessing)
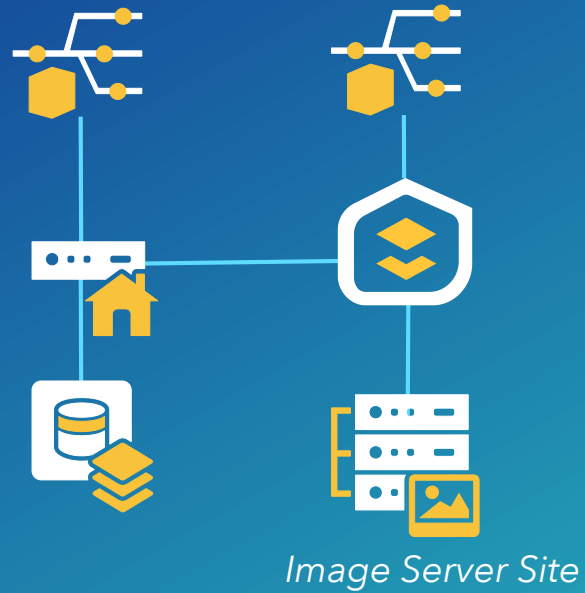
Image Server

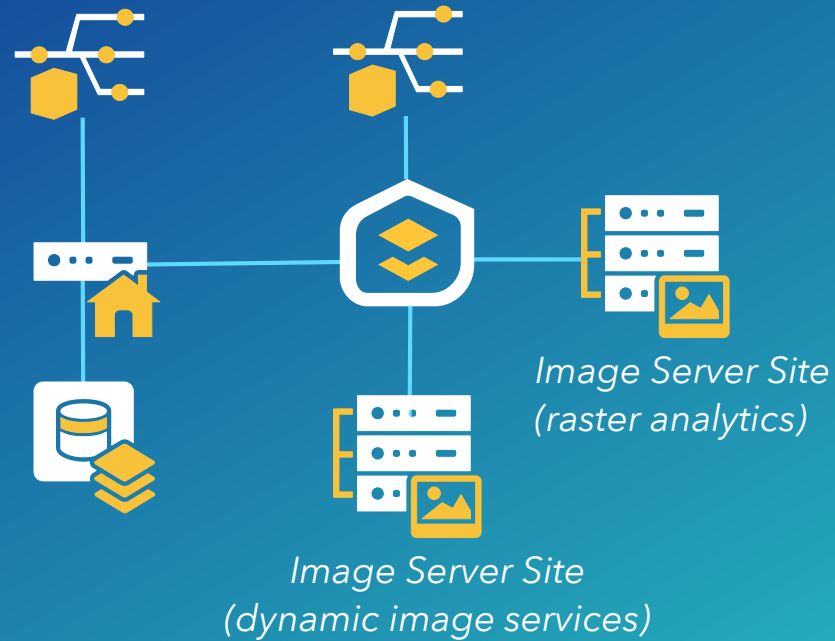# Adding Image Server to your deployment

- **Image Server provides two distinct capabilities**
  - Dynamic image services from your own mosaic datasets
    - Serve large collections of imagery and rasters with dynamic mosaicking and on-the-fly processing
    - *N* number of sites
  - Raster Analytics
    - Extracting information from imagery- distributed processing and analysis of imagery and rasters creating new persisted output at full source resolution
    - Only *1* site can do raster analytics
    - Choose whether to have separate site for raster analytics or one site for both traditional dynamic image services and raster analytics. At 10.5 the results of raster analytics will always be hosted out of the raster analytics site (this will change in future releases!)

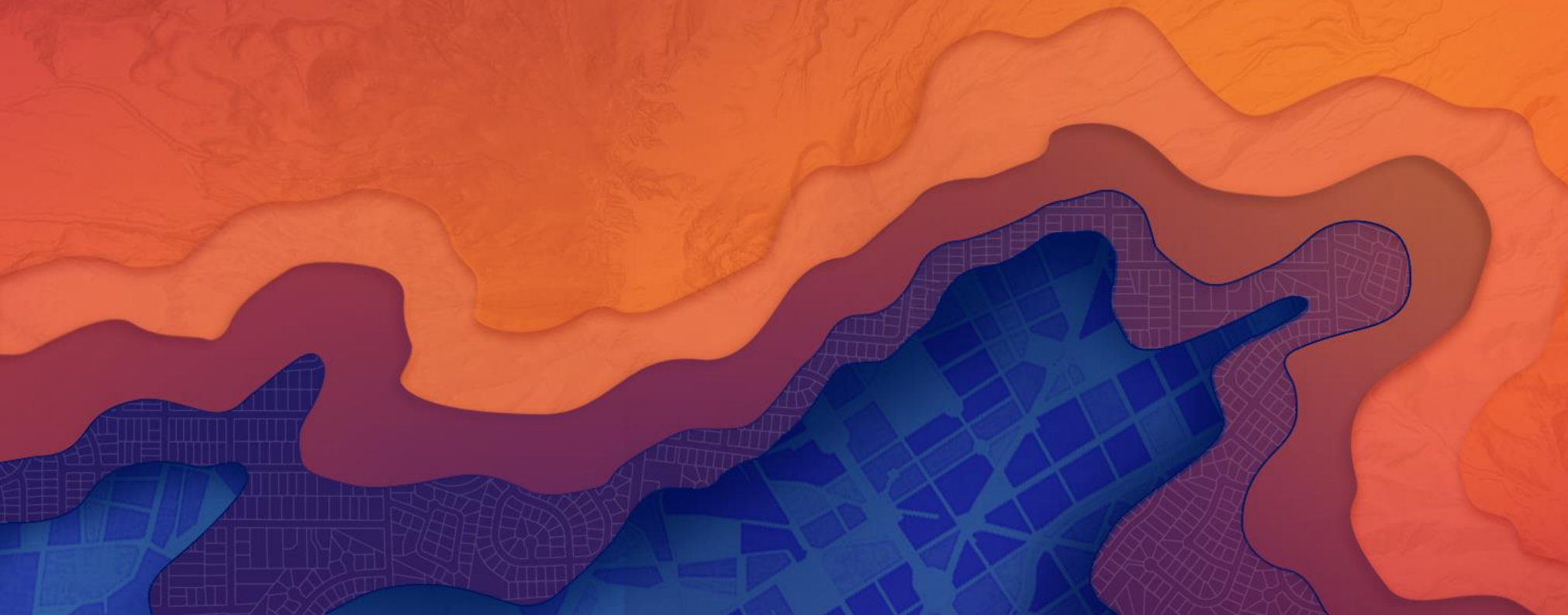# Adding Image Server to your deployment

Image Server Site

One Image Server site for both capabilities

Adding Image Server to your deployment

Image Server Site
(raster analytics)

Image Server Site
(dynamic image services)

Separate Image Server sites for each capability

GeoAnalytics Server

Adding GeoAnalytics Server to your deployment

- **GeoAnalytics Server provides distributed computing infrastructure for processing large volumes of vector and tabular data**
  - **One site for GeoAnalytics Server**
  - **Requires spatiotemporal big data store to be configured with the base deployment**
    - **Note: ArcGIS Data Store (relational, tile cache, spatiotemporal) is always configured with *the hosting server site***
    - **Provide at least 16 GB memory and at most 64 GB for spatiotemporal big data store**

  - **Many variables go into sizing multi-machine deployment**
    - **More machines or more cores or more memory does *not* always mean faster processing!**

GeoAnalytics Server performance considerations

- **Variables that affect performance**
  - Type of data: file-based (CSV, shapefiles) vs. web-based (feature service) vs. big data store (HDFS, Hive)
  - Location of data: local (low latency) vs. on network (higher latency)
  - LAN characteristics: 100 mbps vs. 1 gbps, latency between machines and data source
  - Characteristics of data storage system: SSD vs. traditional HDD (disk I/O)
  - Size of data: tens of MB vs. hundreds of MB vs. gigabytes vs. terabytes
  - Ratio of CPU cores to amount of memory per core
  - Ability to write result data as fast as it is being generated (scale spatiotemporal big data store too!)
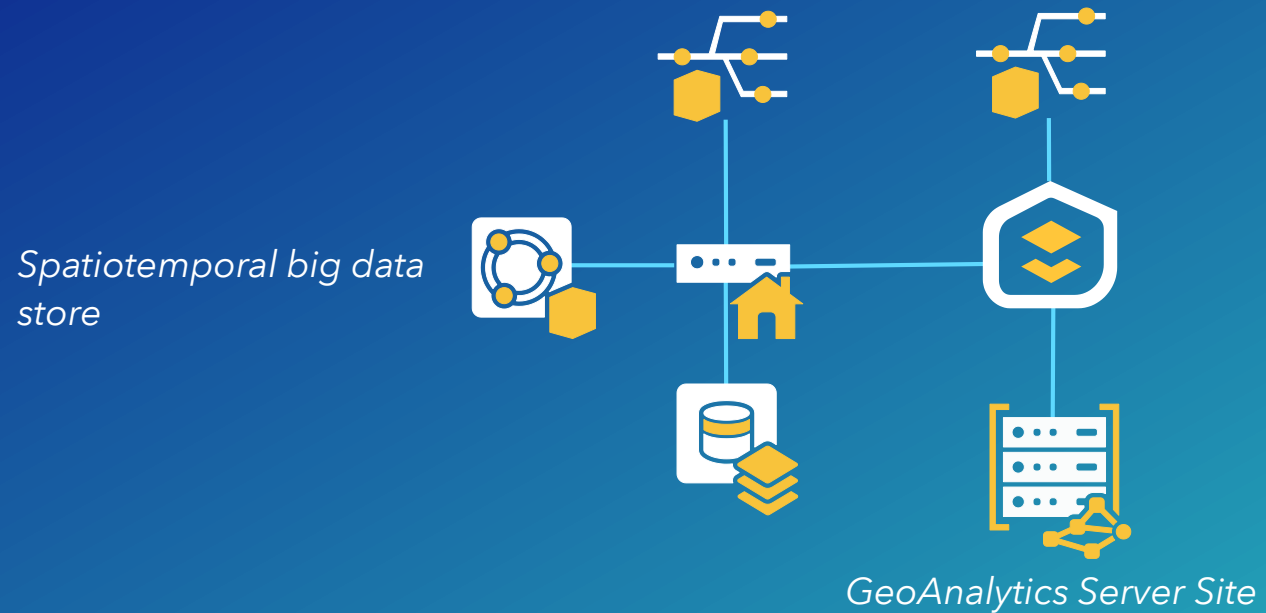 - Likely many more..

Prototype deployment using your own data and workflows

Adding GeoAnalytics Server to your deployment

Spatiotemporal big data store

GeoAnalytics Server Site
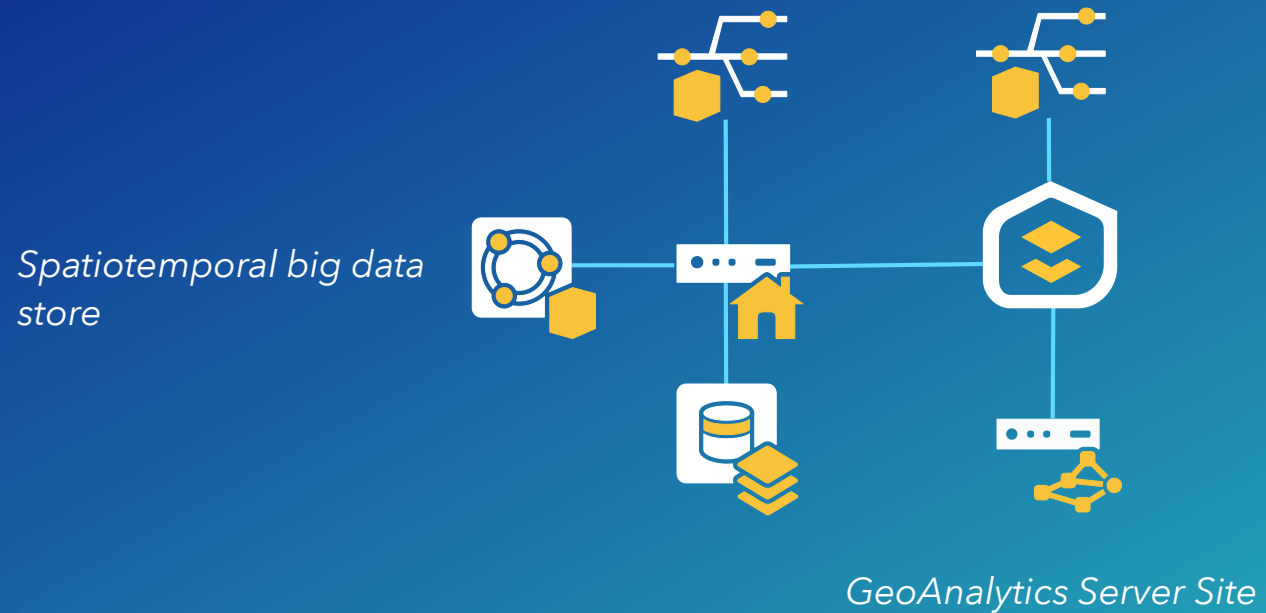
Minimum 3 machines to support GeoAnalytics; scale massively beyond that

Adding GeoAnalytics Server to your deployment

Spatiotemporal big data store

GeoAnalytics Server Site

Remember to scale spatiotemporal big data store with additional nodes when adding additional GeoAnalytics Server machines

GeoEvent Server

Adding GeoEvent Server to your deployment

- **GeoEvent Server provides the ability to create GeoEvent services to process real-time data ingestion and processing**

    - At GeoEvent Server 10.5 and prior the strong recommendation is to use *single machine* sites
    - Each machine must be powerful enough to handle peak throughput for the combined set of GeoEvent services (scale up!)
    - To handle multiple input stream that go beyond a single machine: use additional separate GeoEvent Server sites
    - Archiving large volumes of data: use spatiotemporal big data store

Adding GeoEvent Server to your deployment

GeoEvent Server site

Adding GeoEvent Server to your deployment

Spatiotemporal big data store

GeoEvent Server site

Adding GeoEvent Server to your deployment

Spatiotemporal big data store

GeoEvent Server site

GeoEvent Server site

...

Use multiple single machine sites to scale; don't use multi-machine sites for GeoEvent Server 10.5.x and prior

Recap: expanding out from the base deployment

- **GIS Server**
  - as many sites make sense for your particular deployment following workload separation recommendations
  - E.g. separate sites for different sets of map services, separate sites for heavy-weight geoprocessing, separate sites for CPU-intensive routing services, ..

- **Image Server**
  - as many sites make sense for your particular deployment of *dynamic image services*
  - *there can only be* one *site for raster analytics*

- **GeoAnalytics Server**
  - *there can only be one site for GeoAnalytics Server*

- **GeoEvent Server**
  - as many sites as makes sense for your particular deployment
  - *at 10.5 and prior: strong recommendation to use single machine sites*

Deploying

How to deploy

It's not all about deploying components by hand anymore!

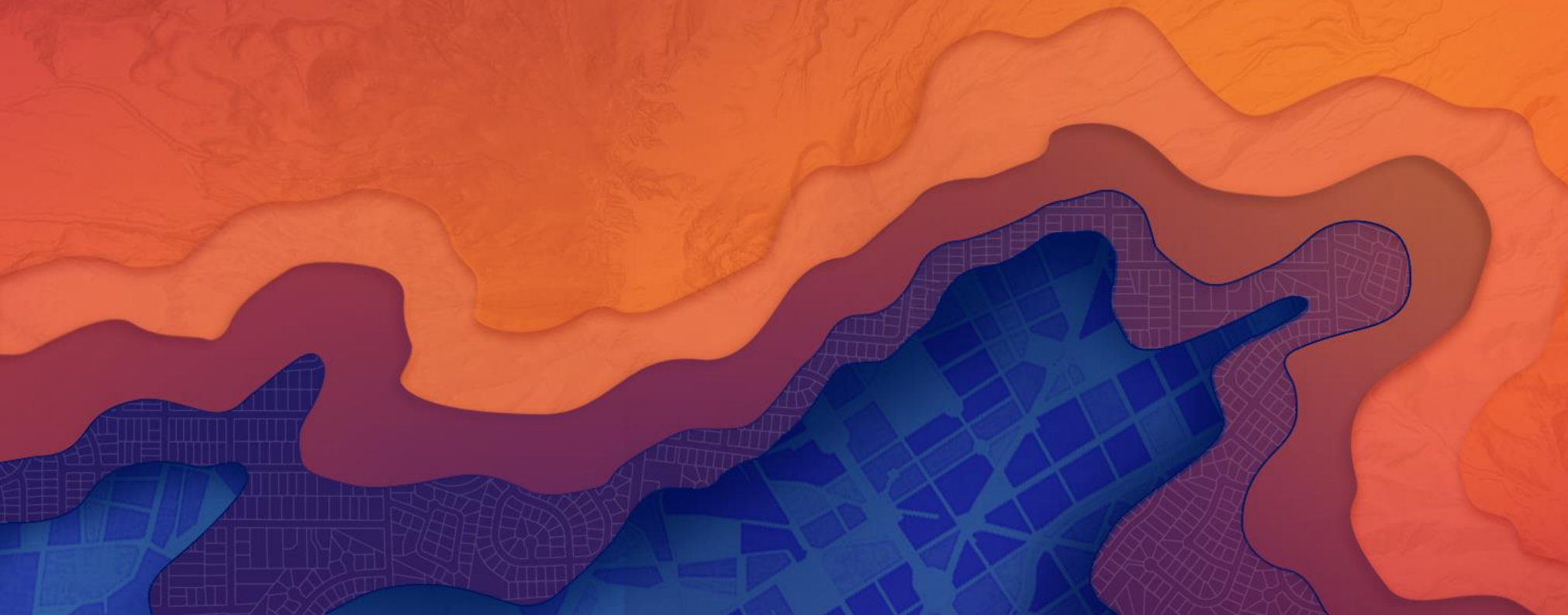| For GIS professionals	For those who want to deploy in the cloud	For those with DevOps
ArcGIS Enterprise Builder	**Machine Images**	**Chef**
A wizard that installs and configures ArcGIS Enterprise on a single machine.	Easily deploy and configure ArcGIS Enterprise in the two most popular public cloud environments.	Automate installation and configuration in your infrastructure.

Other important topics

Dispelling old myths and updating best practices

- **Do *not* use silo'ed ArcGIS Server sites!**
  - Significant improvements in multi-machine site performance and stability in 10.3.1+
  - Silo'ed sites do not work in the federated model and with ArcGIS Pro
- **Do *not* use clusters!**
  - Discouraged on any version. Officially deprecated as of 10.5.1. Will *go away* within next couple of releases!

- ***Do* federate your ArcGIS Server sites**
  - Required for the modern deployment patterns
- ***Do* use the web adaptor unless there's a good technical reason not to**
  - Simplifies a lot of configuration that otherwise has to be done manually.

Dispelling old myths and updating best practices

- **"Windows can only run ~250 service instances (SOC processes)"**
  - This is a Windows imposed limitation that can be lifted by changing Windows settings
  - Edit the registry: http://support.esri.com/technical-article/000001218

- "**Linux can only run 250 service instances (SOC processes)"**
  - Upgrade to 10.4 or higher

Takeaways

- **Stay up to date on best practices. They change over time!**
- **ArcGIS Enterprise is designed for the federated server model**
  - Features that require the federated server model:
    - ArcGIS Pro publishing
    - Raster Analytics and GeoAnalytics
    - Archiving large volumes of data from GeoEvent Server
    - …
- **Understand the base deployment**
- **Understand the individual server roles and the recommendations and requirements of each- they're not all the same!**

Don't panic!

esri | THE SCIENCE OF WHERE