ArcGIS Enterprise: The What, Why and How

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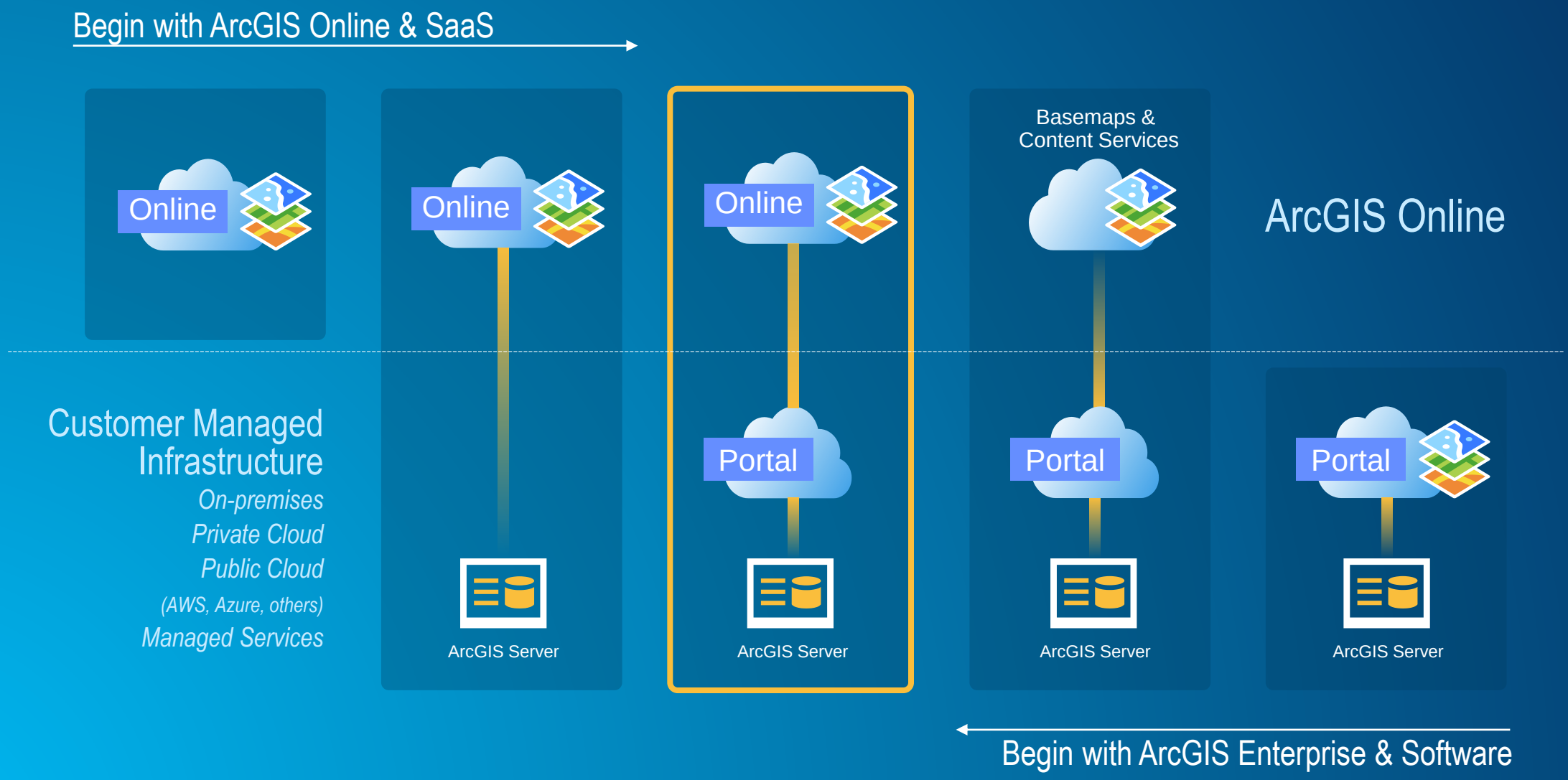
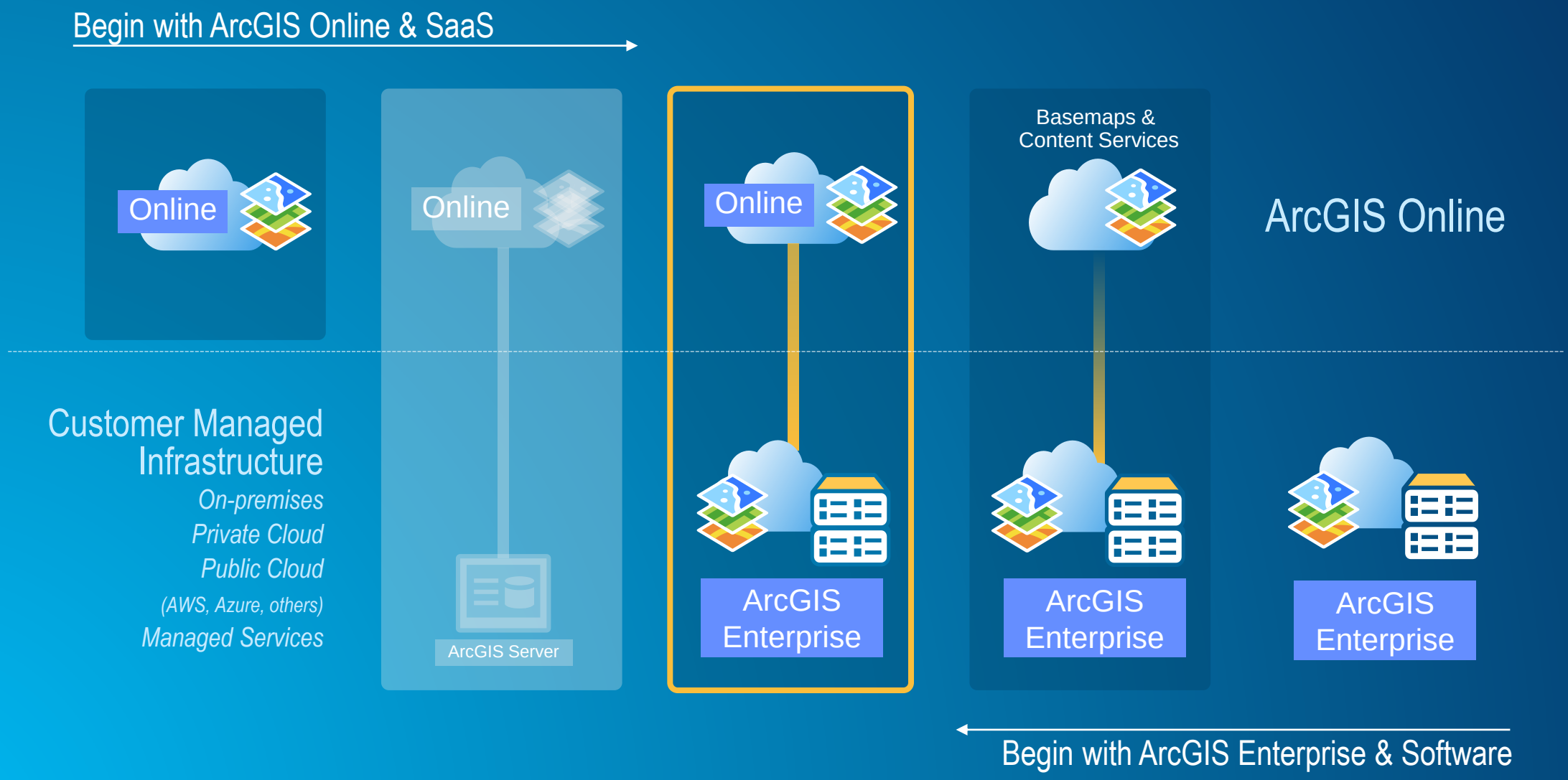
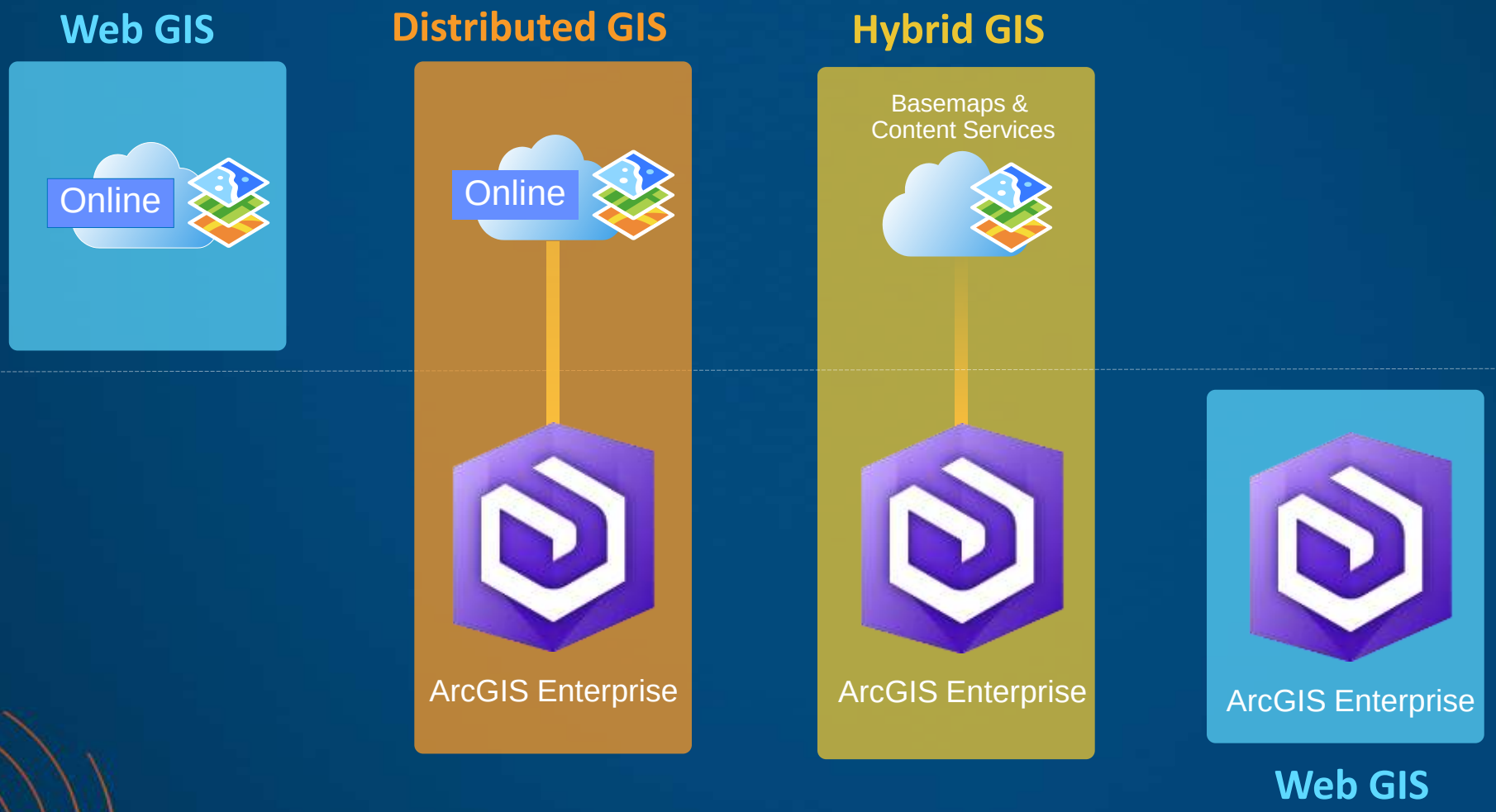
ArcGIS Enterprise | Web and Distributed GIS Pattern Evolution



ArcGIS Enterprise | Web and Distributed GIS Pattern Evolution



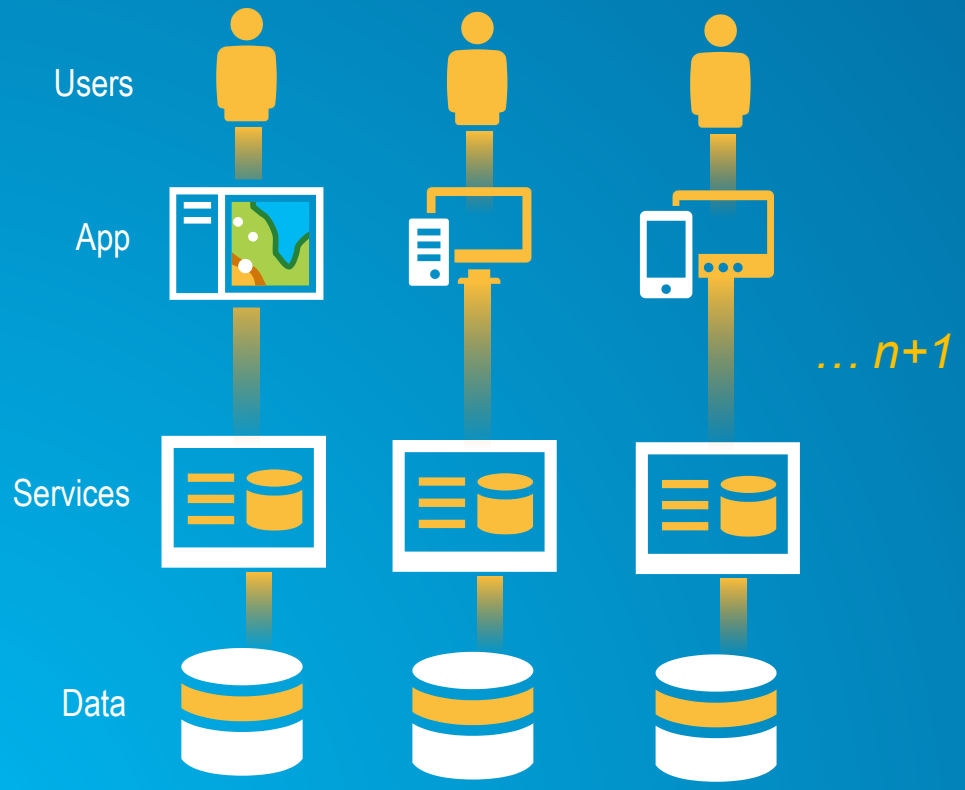
Deployment Pattern | Pattern Types



ArcGIS Enterprise | Server GIS vs. Web GIS

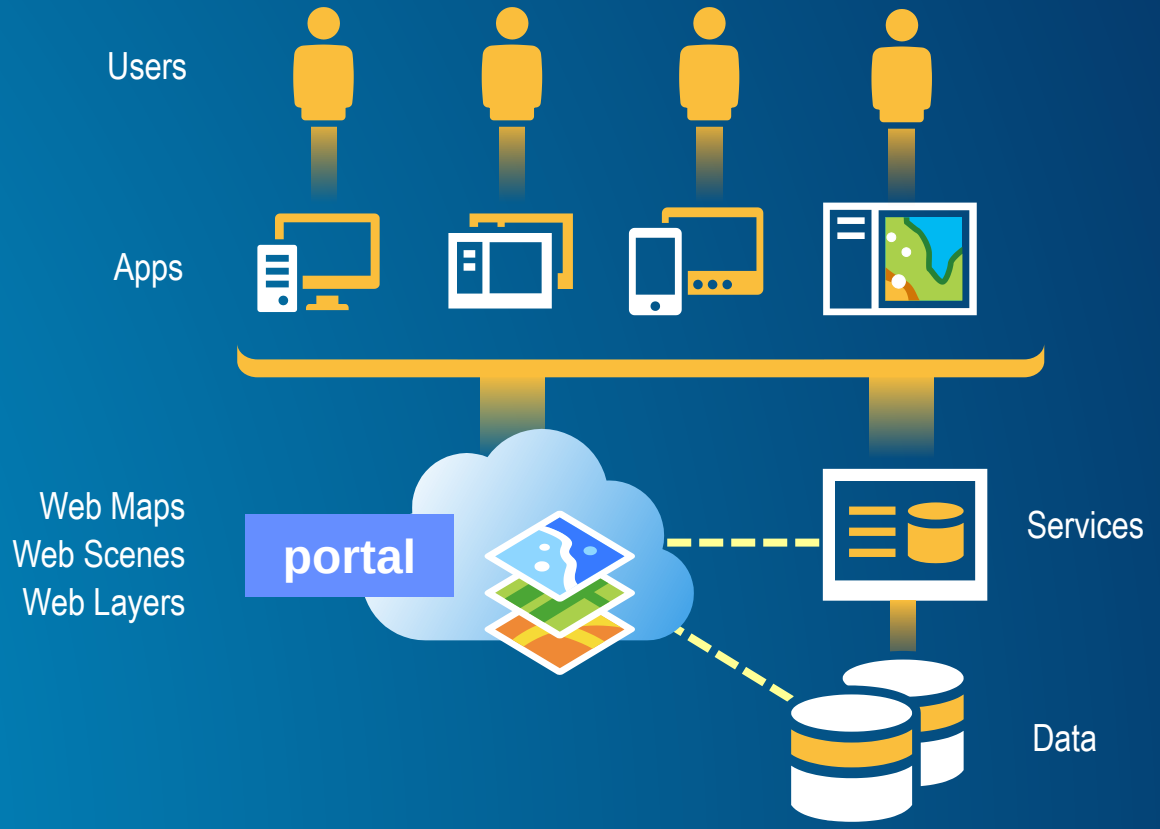
Server GIS

Silo'd use of GIS services within custom applications



Web GIS

Pervasive use of web layers, scenes, and maps within all of the ArcGIS apps



Standalone ArcGIS Server supported for backwards compatibility

- **Standalone ArcGIS Server sites are absolutely still supported with 10.5**
- **We do not want to break any existing deployments**
  - ***Any* ArcGIS Server setup from 10.1 and higher can upgrade directly to 10.5 without changes (other than getting new license files)**
- **New deployments are strongly encouraged to follow the federated model as ArcGIS Enterprise**
  - **Not recommended to architect new deployment using old patterns**

What is ArcGIS Enterprise | Software Components

ArcGIS Enterprise

=

ArcGIS
Web Adaptor

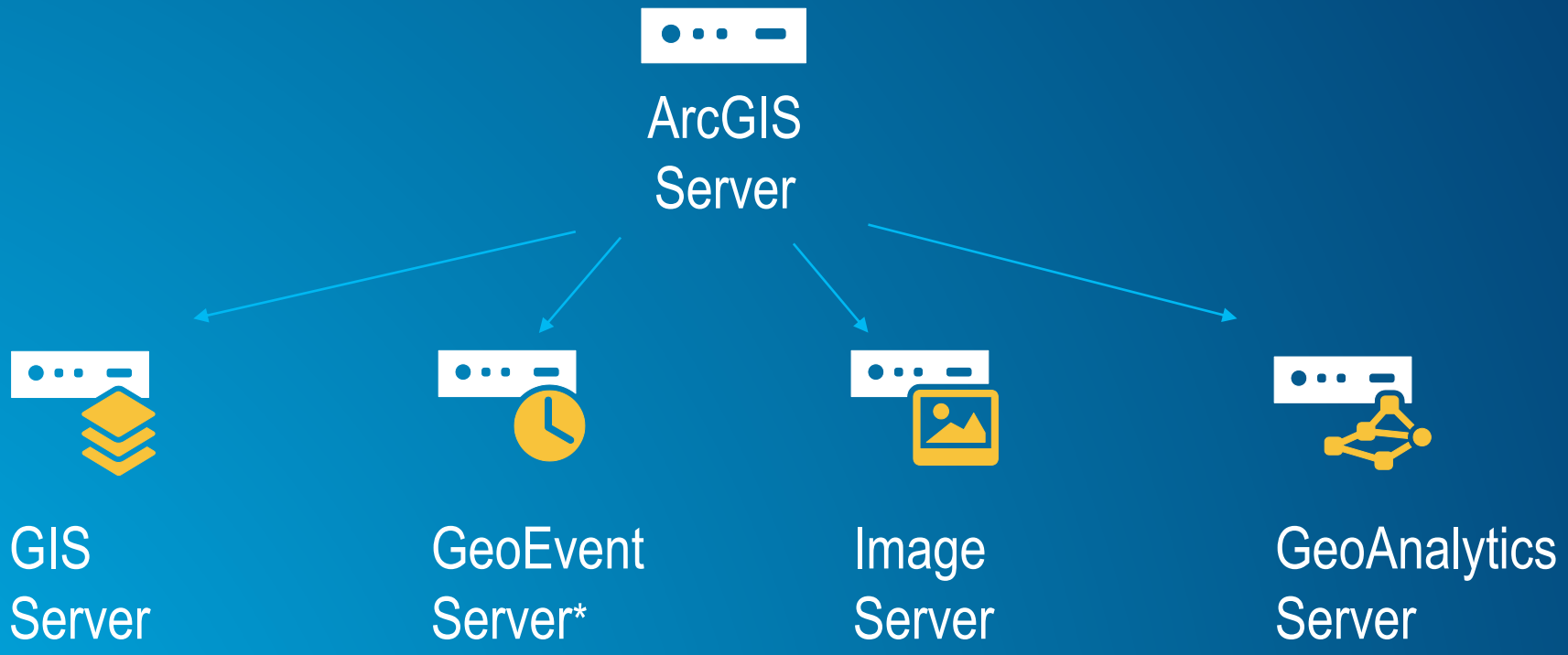
Portal
for ArcGIS

ArcGIS
Server

ArcGIS
Data Store

All of these components existed in the software pre-10.5

ArcGIS Enterprise | Server Roles



One software component, multiple server roles

ArcGIS Enterprise | Base Deployment

ArcGIS Server

Portal for ArcGIS

ArcGIS Data Store

ArcGIS Web Adaptor

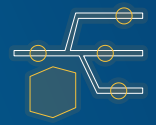
ArcGIS Enterprise | Components of the base deployment

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.

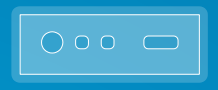
Portal for ArcGIS

ArcGIS Data Store



ArcGIS Web Adaptor

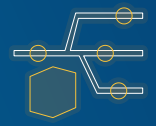
ArcGIS Enterprise | Components of the base deployment



ArcGIS Server

Portal for ArcGIS

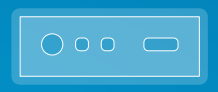
ArcGIS Data Store



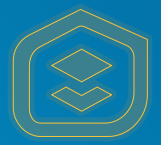
ArcGIS Web Adaptor

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



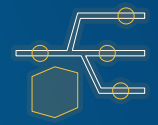
ArcGIS Server



Portal for ArcGIS

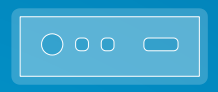
ArcGIS Data Store

The Esri managed data repository that stores the spatial content that has been shared to Portal.

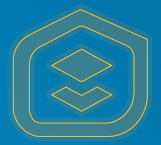


ArcGIS Web Adaptor

ArcGIS Enterprise | Components of the base deployment



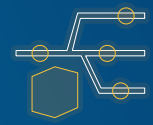
ArcGIS Server



Portal for ArcGIS

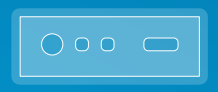
ArcGIS Data Store

- Relational
- Tile Cache
- Spatiotemporal

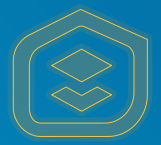


ArcGIS Web Adaptor

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.

Base ArcGIS Enterprise deployment

ArcGIS 10.5 on Windows | Other versions

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.

ArcGIS Enterprise | Why you should consider moving

- **Functional Considerations**
- **Non-Functional Considerations**

Non-Functional Deployment Considerations

Driven by *Your* Business Needs and Requirements and May Indicate Multiple Patterns

- ✓ **Security**
  - Policy
  - Identity and Authentication
  - Content Sensitivity
- ✓ **Service Level Expectations**
  - Performance
  - Reliability
  - Scalability
  - Computing Environments - Production, Staging, Development
- ✓ **Workforce Requirements**
  - Sharing and Collaboration on Information Products
  - Workflows
  - Access
- ✓ **Application Development and Enterprise System Integration**

Functional Deployment Considerations

- ✓Visualization
- ✓Analytics
- ✓Hosting
  - ✓Features, tiles scenes
  - ✓Content
- ✓Portal Capabilities
- ✓Editing
- ✓Geocoding and Services
- ✓Printing

- ✓Or … You Require The Expanded Capability Roles of Enterprise
  - GIS Server
    - Geodatabase management
    - Schematic diagrams
    - Custom geoprocessing models
    - Dynamic Map services
  - Image Server
    - Raster & Image Analysis
  - GeoEvent Server
    - Geo-enabled alerting
    - Stream services
  - GeoAnalytics Server
  - Business Analyst Server

Functionality Requiring Server Federation with Portal

- Enterprise Logins (SAML 2.0) (since 10.3)
- Publishing 3D scene layers (since 10.3.1)
- Publishing from ArcGIS Pro (since 10.4)
- Standard Analysis tools in the portal (since 10.4)
- Publishing vector tile layers (since 10.4)
- High volume archiving from GeoEvent (use of spatiotemporal big data store) (since 10.4)
- Raster Analytics (since 10.5)
- GeoAnalytics (since 10.5)

Hosting Server – Federated and Hosted

Configure one of your federated GIS Server sites to be a hosting server for your portal to allow portal members to do the following:

- Publish hosted tile layers to the portal.
- Publish hosted feature layers to the portal.
- Publish hosted WFS layers to the portal.
- Publish scene layers to the portal (ArcGIS Data Store tile cache data store required).
- Share layers and maps from ArcGIS Maps for Office (ArcGIS Data Store relational data store required).
- Add a zipped shapefile, CSV file, or GPS Exchange Format file to the portal map viewer.
- Batch geocode addresses from a CSV file.
- Perform feature analysis or big data analytics in the portal map viewer or through Insights for ArcGIS or ArcGIS Pro (ArcGIS Data Store relational data store required).
- Perform raster analysis from the portal map viewer or ArcGIS Pro (ArcGIS Data Store relational data store required)

Why Enterprise?

Some other thoughts

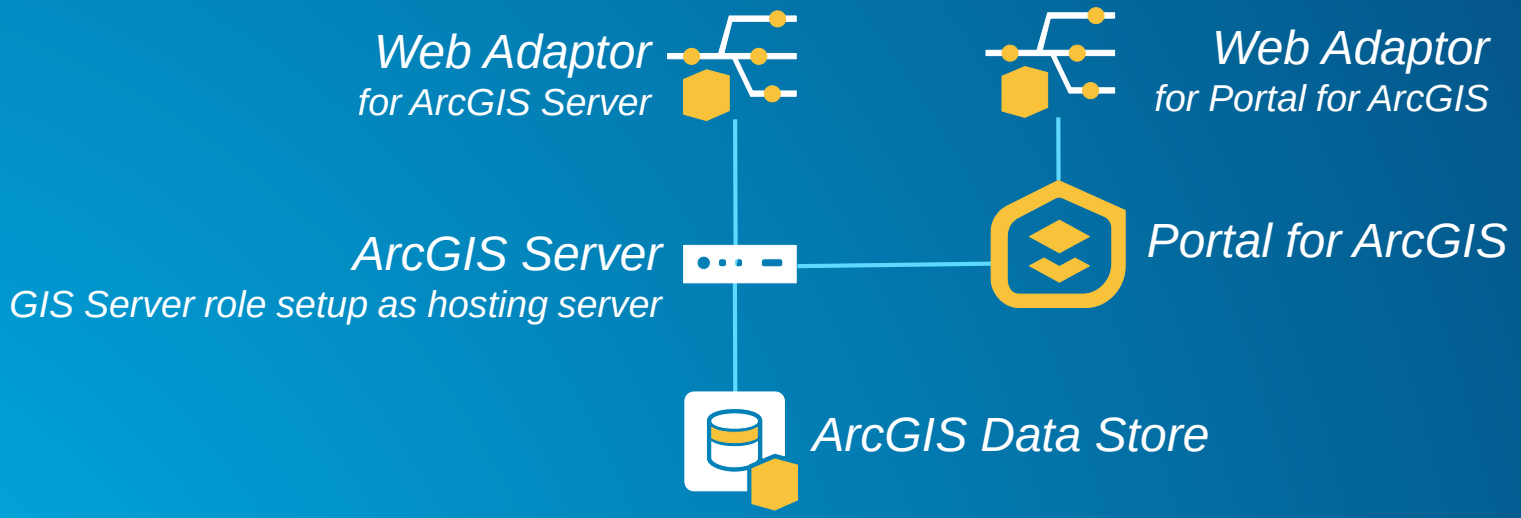
- Sharing to Everyone (internally)
- Provide analysis capabilities without credit consumption
- Provide ability to store data without incurring credit costs
- Highly secure data
- Insights for ArcGIS
- Collaborations (Replication between your infrastructure and ArcGIS Online)
- Web AppBuilder Custom Widgets (coming soon!)

ArcGIS Enterprise | Base Deployment | Choosing a pattern

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

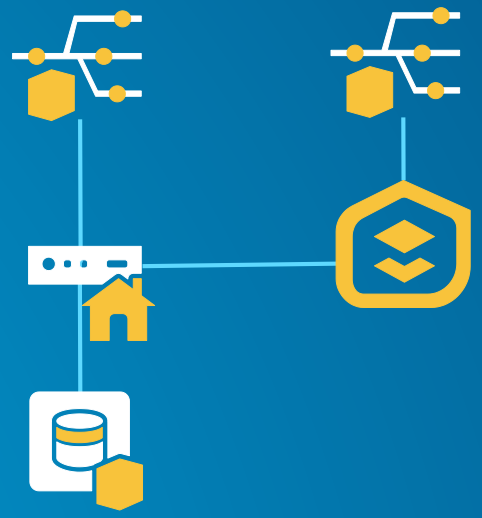
- Three tiers to consider:
  - Portal for ArcGIS
  - ArcGIS Server
  - ArcGIS Data Store

ArcGIS Enterprise | Base Deployment | Logical Architecture

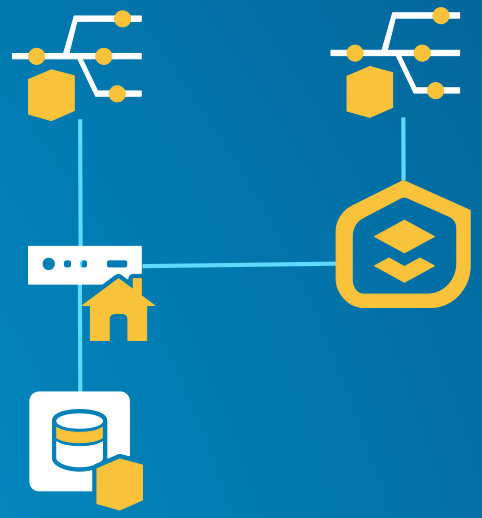


ArcGIS Enterprise | Base Deployment | Logical Architecture

Don’t forget to designate your GIS server as the hosting server.



ArcGIS Enterprise | Base Deployment | Logical Architecture



Configure your data store

Base deployment contains relational data store and tile cache data store

Tutorial: Set up a base ArcGIS Enterprise deployment

ArcGIS 10.5 on Windows | Other versions

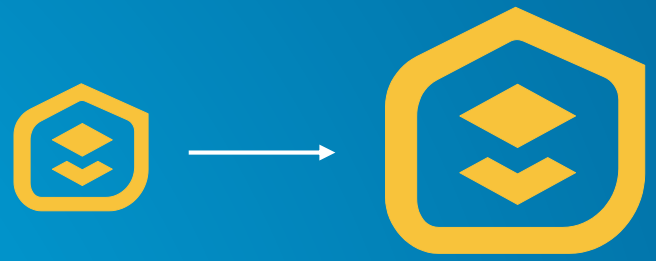
This tutorial provides an overview of setting up a single machine base ArcGIS Enterprise deployment. This configuration is commonly used for testing and prototyping purposes. It enables self-service mapping and can be used with ArcGIS Pro, ArcMap, and other client applications. Although this configuration 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

ArcGIS Enterprise | Scaling and expanding the base deployment

- When do you need to scale out the Portal for ArcGIS tier?
  - Rarely!
  - Use two machines with Portal for ArcGIS for high availability purposes not for scaling



ArcGIS Enterprise | 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
  - 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

ArcGIS Enterprise | 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)

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!

ArcGIS Enterprise | 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



ArcGIS Enterprise | Expanding out from the base deployment

- You can have any number of federated ArcGIS Server sites within your ArcGIS Enterprise deployment
- Different server roles have different recommendations and restrictions

ArcGIS Enterprise | 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*

ArcGIS Enterprise | 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!)**

ArcGIS Enterprise | Adding Image Server to your deployment

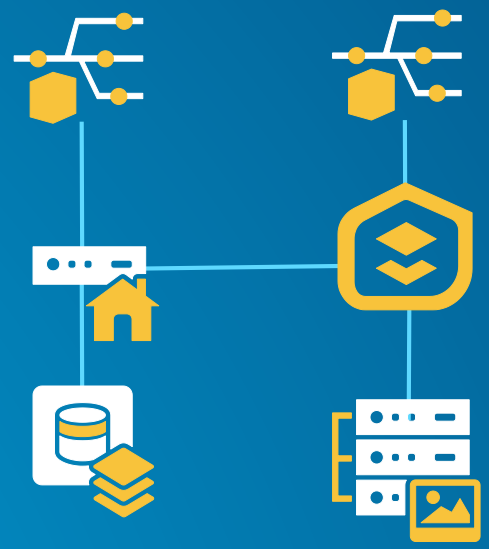
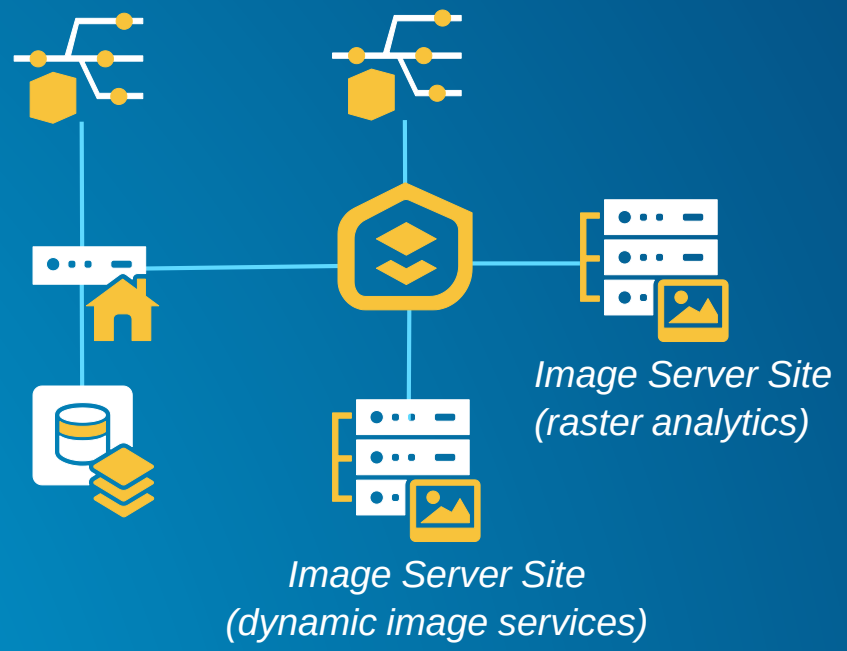


Image Server Site

ArcGIS Enterprise | Adding Image Server to your deployment

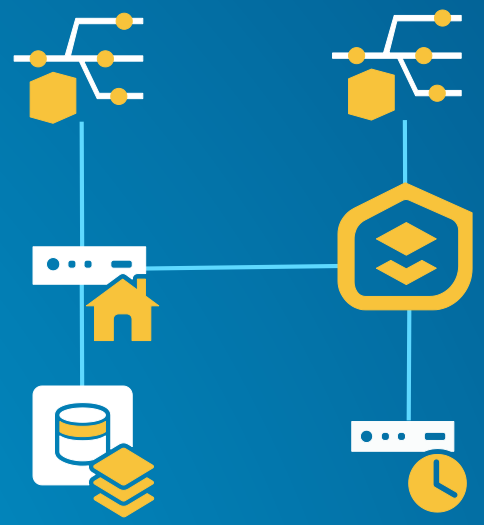


ArcGIS Enterprise | Adding GeoEvent Server to your deployment

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

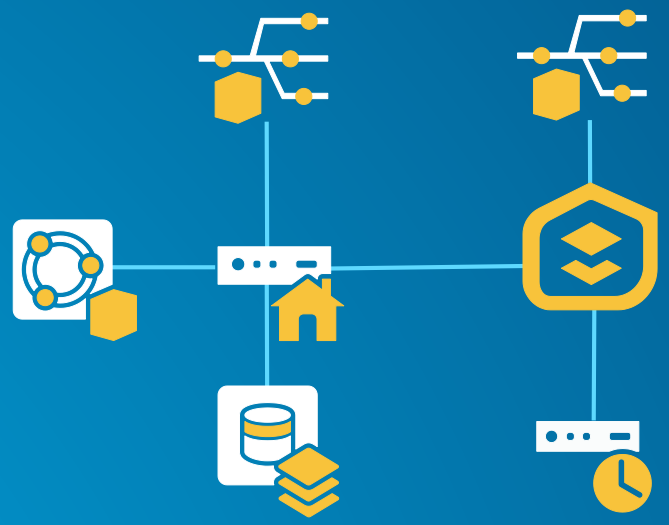
  - **At GeoEvent Server 10.5 and prior the strong recommendation is to use *single machine* sites**
  - **Each machine must be powerful enough to handle peak throughput for the combined set of GeoEvent services (scale up!)**
  - **To handle multiple input stream that go beyond a single machine: use additional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

ArcGIS Enterprise | Adding GeoEvent Server to your deployment



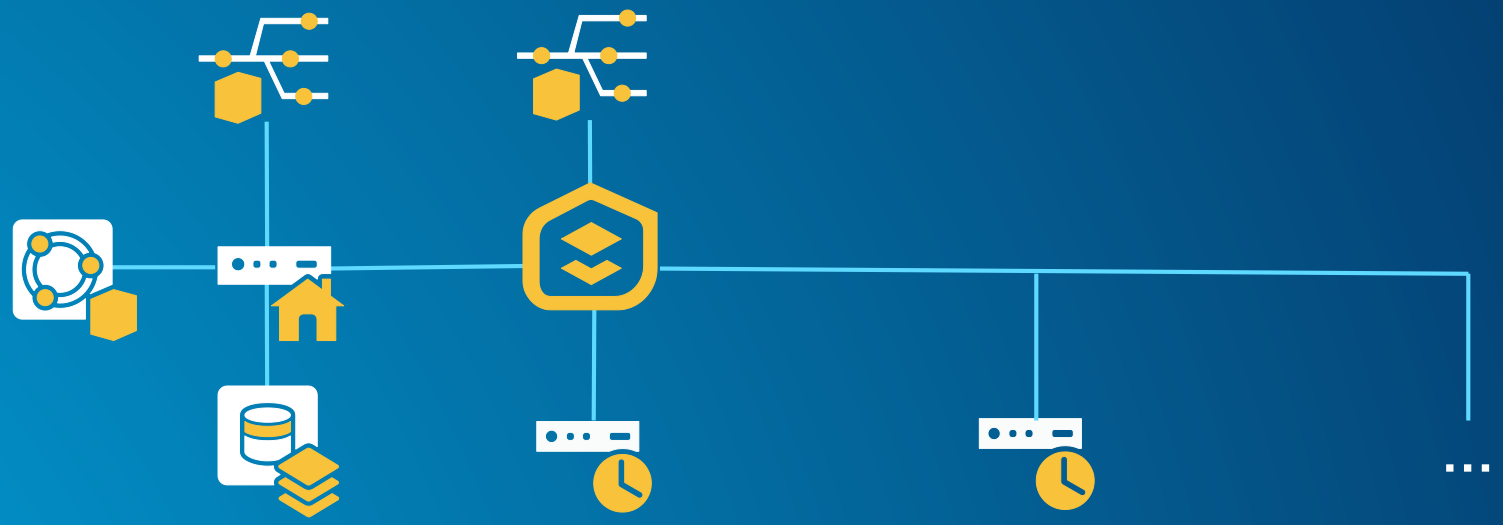
GeoEvent Server site

ArcGIS Enterprise | Adding GeoEvent Server to your deployment



GeoEvent Server site

ArcGIS Enterprise | Adding GeoEvent Server to your deployment

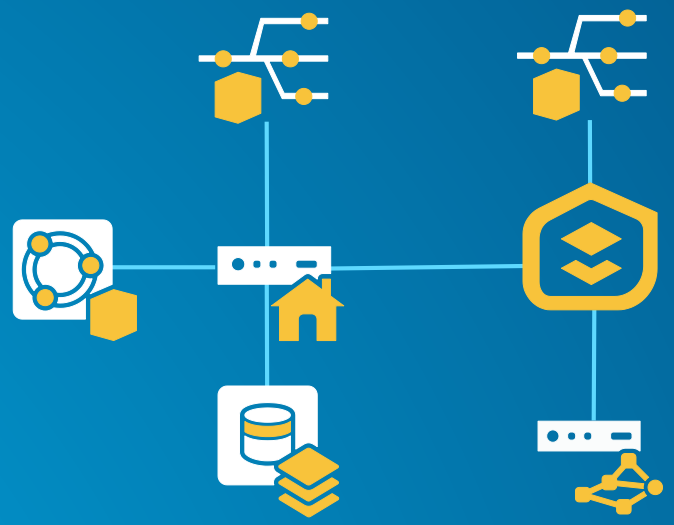


ArcGIS Enterprise | Adding GeoAnalytics Server to your deployment

- **GeoAnalytics Server provides distributed computing infrastructure for processing large volumes of vector and tabular data**

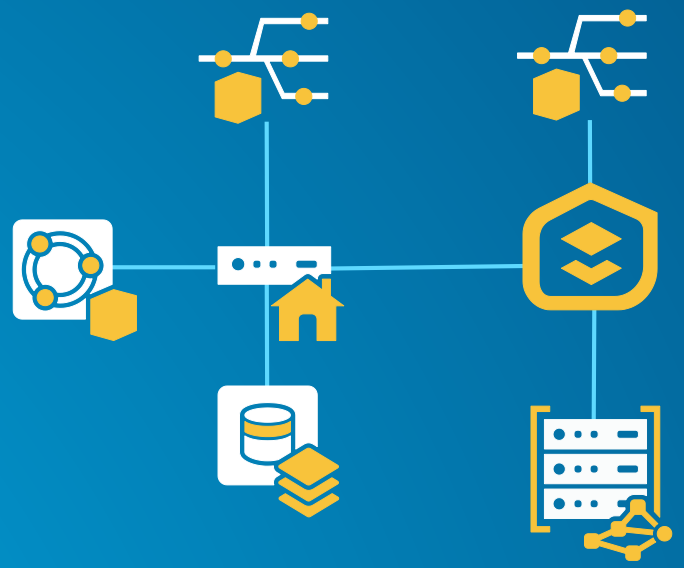
  - **One site for GeoAnalytics Server**
  - **Requires spatiotemporal big data store to be configured with the base deployment**
    - **Note: ArcGIS Data Store (relational, tile cache, spatiotemporal) is always configured with *the hosting server site***
    - **Provide at least 16 GB memory and at most 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!**

ArcGIS Enterprise | Adding GeoAnalytics Server to your deployment



GeoAnalytics Server Site

ArcGIS Enterprise | Adding GeoAnalytics Server to your deployment



GeoAnalytics Server Site

Key takeaways

- 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!

Using Chef to Automate Installation/Scaling

- Chef Cookbooks for ArcGIS
- **Install a single-machine stack with one command**

ArcGIS Enterprise Base Deployment on one single machine

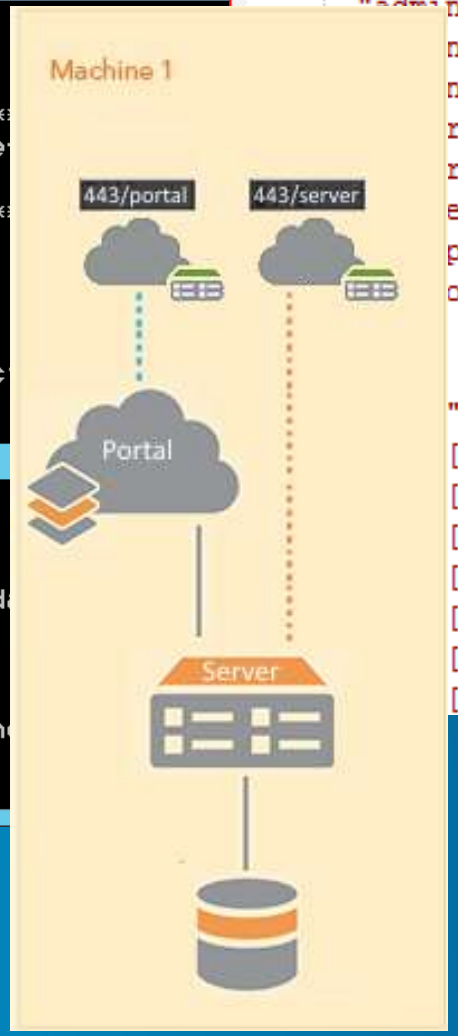
Administrator: Command Prompt

```
c:\chef>chef-solo -j C:\chef\roles\webgis-windows-metro.json
{:config_missing=>true}
[2016-01-06T14:03:44-08:00] WARN: **********
[2016-01-06T14:03:44-08:00] WARN: Did not find config file: C:\che
ng command line options.
[2016-01-06T14:03:44-08:00] WARN: **********
Starting Chef Client, version 12.3.0
Compiling Cookbooks...
Converging 28 resources
Recipe: arcgis::system
  * arcgis_server[Verify ArcGIS for Server system requirements] ac
```

```
    - execute the ruby block Wait until portal is available
Recipe: arcgis::federation
  * arcgis_portal[Federate Server] action federate_server (up to d

Running handlers:
Running handlers complete
Chef Client finished, 53/91 resources updated in 1514.903011 secon

c:\chef>
```




```
    "setup" : "\\\\metro\\ArcGIS_Server10.5\\Setup.exe",
    "authorization_file":"\\\\metro\\ArcGIS_Automation\\Authoriza
  },
  "portal":{
    "admin_username":"admin",
    "admin_password":"esri.agp",
    "admin_email":"admin@mydomain.com",
    "security_question":"Your favorite ice cream flavor?",
    "security_question_answer":"vanilla",
    "content_dir":"C:\\arcgisportal\\content",
    "setup":"\\\\metro\\Portal_for_ArcGIS10.5\\Setup.exe",
    "authorization_file":"\\\\metro\\ArcGIS_Automation\\Authoriza


    ":[
    [arcgis-server::webgis_validate]",
    [arcgis-server::webgis_uninstalled]",
    [arcgis-server::clean]",
    [arcgis-server::system]",
    [arcgis-server::iis]",
    [arcgis-server::server]",
    [arcgis-server::server_wa]",
```

Other Points of Interest

- Highly recommend getting a CA signed SSL certificate for your deployment
  - Even if you are staying with standalone ArcGIS Server for now
- Install a test environment to familiarize yourself with the stack (try Chef!)

Federated model is the recommended pattern

- **ArcGIS Enterprise is designed for the federated model**
  - **All ArcGIS Server sites are *federated* with the base deployment**

- **Features that explicitly requires the federated model**
  - **Enterprise Logins (SAML 2.0) (since 10.3)**
  - **Publishing 3D scene layers (since 10.3.1)**
  - **Publishing from ArcGIS Pro (since 10.4)**
  - **Standard Analysis tools in the portal (since 10.4)**
  - **Publishing vector tile layers (since 10.4)**
  - **High volume archiving from GeoEvent (use of spatiotemporal big data store) (since 10.4)**
  - **Raster Analytics (since 10.5)**
  - **GeoAnalytics (since 10.5)**
  - **etc.**

Multiple clusters in a single ArcGIS Server site is not recommended

- Multiple cluster functionality in ArcGIS Server will not be supported in the future
- *Do not use* for new deployments
- Replacement for cluster: use multiple ArcGIS Server sites instead

Server Roles

- **Follow best practices on workload separation and assign only *one* server role per ArcGIS Server site**

- **It is *possible* to combine multiple server roles in a single site; not recommended in the documentation nor should we recommend to customers unless well-considered**
  - ***Be careful* combining GIS Server role with other server roles**
  - ***Be careful* combining Image Server role with other server roles**
  - ***Avoid* combining GeoEvent Server role with other server roles**
  - ***Never* combine GeoAnalytics Server role with any other server role**

Key points

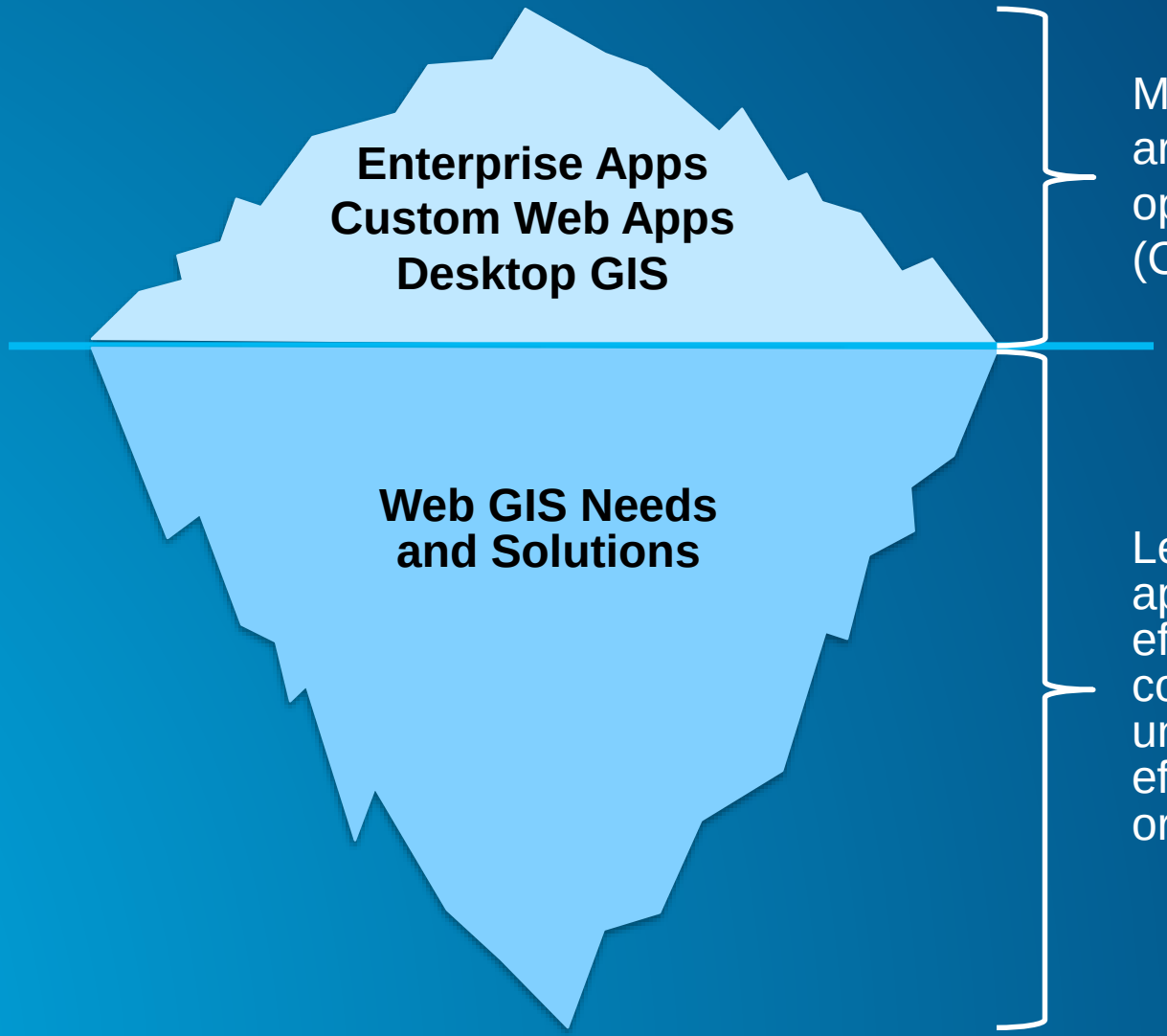
- **Main new concept: base ArcGIS Enterprise deployment**
  - **Portal for ArcGIS with a hosting server that has ArcGIS Data Store (relational + tile cache)**
- **The federated model is now the recommended pattern**
  - **All ArcGIS Server sites are assumed to be *federated* with a Portal for ArcGIS installation that has the base deployment characteristics**
- **Use of ArcGIS Data Store (relational + tile cache) is required for newer functionality**

Summary

Don’t panic!

Web GIS enables every employee and contractor in your organization to easily discover, use, make, and share maps from any device, anywhere, any time.

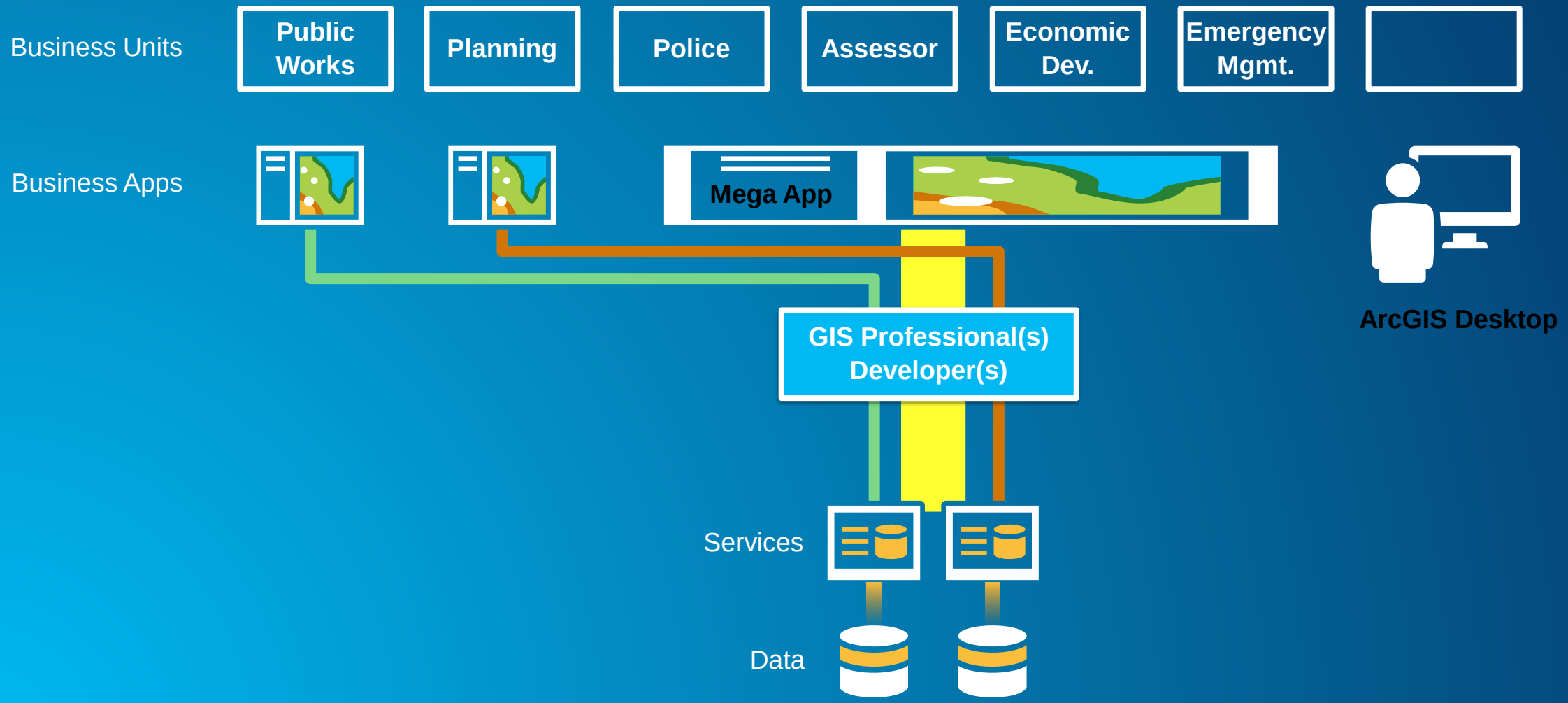
Business needs and solutions (related to geography)



Mission-critical apps that are essential for the operation of organization (City, County)

Less obvious, but helpful apps that improve efficiency, communication, understanding and effectiveness of the organization

Meeting Business Needs with GIS (Server GIS paradigm)



Limitations of historic approach to meeting business needs

- **Not scalable**
  - Limited GIS Professionals and Developers limits the number of apps that can be built
- **Not effective**
  - Mega-apps that attempt to meet too many needs
  - Mega-apps that are confusing, not intuitive, too complex
  - Expecting non-GIS users to learn ArcGIS Desktop
  - Many business needs are not met, or users go elsewhere to meet business needs
    - Multiple apps that do not use authoritative data
- **Does not take advantage of users' ability to meet their own business needs**
- **Limited resources to meet ALL the app needs required by business needs**
- **Only members of the "Secret Club" can access authoritative data and create their own maps and apps ("Secret Club" = GIS Professionals / GIS Skills)**

Meeting Business Needs with Web GIS

Portal: ArcGIS Online or ArcGIS Enterprise

Web GIS enables users to:

- **Discover authoritative data related to their business needs**
- **Use this authoritative data to meet their specific business needs**
- **Create apps – using off-the-shelf apps, template apps, or app builders**
- **Share these apps with colleagues, decision makers, and constituents**

Does Web GIS matter?

“Everyone”:

- Works with spatial data
- Uses apps to access data
- Needs access to authoritative data
- Can use Web GIS to:
  - Discover authoritative data,
  - Create their own maps and apps, and
  - Share these maps and apps

HOME » SSPTV » WEB GIS EXPLAINED: UNDERSTANDING YOUR SYSTEM OF ENGAGEMENT

SSPTV Web GIS Explained: Understanding Your System of Engagement

Skye Perry

http://sspinnovations.com/ssptv/webgis-explained#.WeuEwtenFPZ

User Success Stories

Oakland County, Michigan

https://tinyurl.com/OaklandCountyMI

Pinellas County, Florida

https://tinyurl.com/PinellasCountyFL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