ArcGIS Enterprise: Architecting Your Deployment

Highlights in this version (October 2019 update):

- Added Notebook Server and deployment strategies
- Revised GeoAnalytics Server section to include supported site sizes
- Added newly supported analysis output storage options for GeoAnalytics Server
- Added option to designate an image hosting server
- Added detail to section outlining the functionality of an ArcGIS Enterprise base deployment
- Added that ArcGIS Monitor is now generally available
- Added shared instances information for ArcGIS Server 10.7+
- Added scope for the spatiotemporal big data store to include Tracker for ArcGIS and more
- Added section for Additional Deployment Patterns and Considerations
- Various updates and edits

Assumptions and prerequisites

This document assumes you are, or work as, a System Architect or an IT Administrator and that you are responsible for architecting and/or installing ArcGIS Enterprise software for your organization.

Before You Begin

Before architecting an ArcGIS Enterprise deployment, you should have a basic understanding of what ArcGIS Enterprise is—the overall capabilities of the software as well as the software components themselves.

All the software components that make up ArcGIS Enterprise existed in previous generations (pre-10.5) of the software. Any familiarity you have in working with these components (installing, configuring, etc.) should help you understand how to architect ArcGIS Enterprise. However, be aware that some best practices and recommended architectural patterns change over time. It is important that you always refer to the latest version of the [help documentation](#) for updates, deprecations, and other changes regarding the software.

Architecting your deployment

There are many considerations to make when preparing to deploy ArcGIS Enterprise. A successful and efficient ArcGIS Enterprise deployment has an architecture that has been designed with considerations for:

- The capabilities your organization requires.
- How you anticipate your organization will utilize ArcGIS Enterprise.
- The number and type of users you expect for your deployment.
- Clear expectations around service-level agreement (SLA) requirements.

These considerations should be reviewed and revisited at each phase of planning your deployment, from initiation to scaling for growth. Though it may seem like a daunting task, **don't panic**.

This document is designed to guide your decision-making and expand your product knowledge so that you can design and build the best possible ArcGIS Enterprise deployment for your organization.

.

ArcGIS Enterprise introduction

Before diving into the architecture, it is helpful to understand what capabilities ArcGIS Enterprise provides and the value it can bring to your organization.

ArcGIS Enterprise is your foundational GIS, providing data management, mapping and visualization, and analysis capabilities—from the simple to the complex. With ArcGIS Enterprise, you can create, edit, and share your data, and, as desired, make it available to any device, anywhere, at any time.

ArcGIS Enterprise runs on your infrastructure, whether in the cloud or on premises, and can be deployed to support high availability and disaster recovery.

Each deployment begins with what is called an ArcGIS Enterprise base deployment and can expand modularly to meet additional organizational needs. This may include support for imagery, real-time, big data, or data science workflows—the choice is yours.

For more information, resources, and customer stories, visit esri.com/enterprise.

Software components of ArcGIS Enterprise

ArcGIS Enterprise is comprised of four software components:
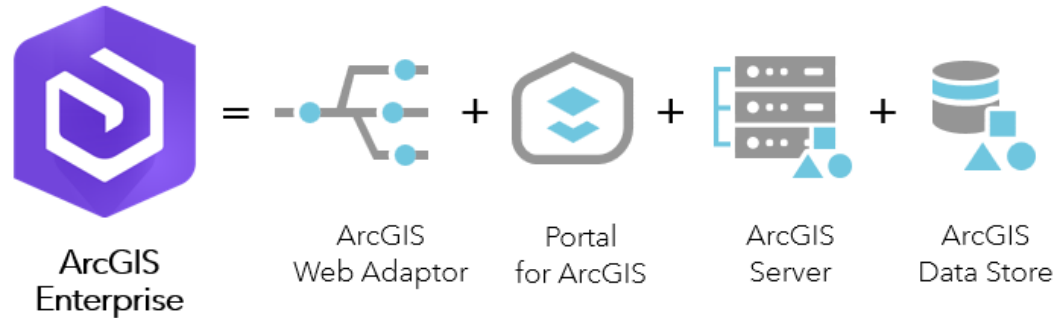
Portal for ArcGIS: The component that powers the ArcGIS Enterprise portal, the front-end interface where users create, manage, organize, and share maps, apps, data, and information.

ArcGIS Server: The engine that powers your GIS services and processes user requests such as zooming into a map, finding a location, running an analysis tool, etc. ArcGIS Server can also be licensed to unlock additional capabilities for imagery, big data, real-time data, and more.

ArcGIS Data Store: A data repository, fully managed by ArcGIS, that provides storage for hosted layers and 3D scene caches. There are three types of ArcGIS Data Store: relational, tile cache, and spatiotemporal.

ArcGIS Web Adaptor: An Esri built software load balancer that appropriately directs network traffic, serves as a reverse proxy, and enables web-tier authentication such as IWA and PKI.

ArcGIS Data Store (relational)

The relational data store is not a replacement for or in competition with enterprise geodatabases that you have configured and administer (RDBMSs such as SQL Server, Oracle, or PostgreSQL.) Enterprise geodatabases provide a level of control and wealth of functionality that is not exposed with ArcGIS Data Store. For more information, visit this resource: [Data in ArcGIS: User Managed and ArcGIS Managed](#)

6

Server capabilities

You can extend ArcGIS Enterprise beyond a base deployment to include capabilities geared towards specific workflows, like big data, data science, real-time tracking, and more. As of ArcGIS Enterprise 10.7.1, five server capabilities are available:

- **GIS Server:** licensed on top of ArcGIS Server (always part of a base ArcGIS Enterprise deployment)
- **Image Server:** licensed on top of ArcGIS Server
- **GeoEvent Server:** licensed on top of ArcGIS Server + GeoEvent Server setup
- **GeoAnalytics Server:** licensed on top of ArcGIS Server
- **Notebook Server**: licensed on top of ArcGIS Notebook Server setup

This document will include architectural considerations for GIS Server, Image Server, GeoEvent Server, GeoAnalytics Server, and Notebook Server.

The base ArcGIS Enterprise deployment

The base ArcGIS Enterprise deployment – or, simply, base deployment – is the minimum software configuration needed to run ArcGIS Enterprise. The base deployment consists of the following software components:

- Portal for ArcGIS
- ArcGIS Server, which has been licensed as a GIS Server, federated with Portal for ArcGIS, and designated as the hosting server
- Two ArcGIS Web Adaptors: one for ArcGIS Server and one for Portal for ArcGIS
- ArcGIS Data Store configured as the relational and tile cache types and registered as the managed data store with ArcGIS Server

Logical architecture of the base deployment
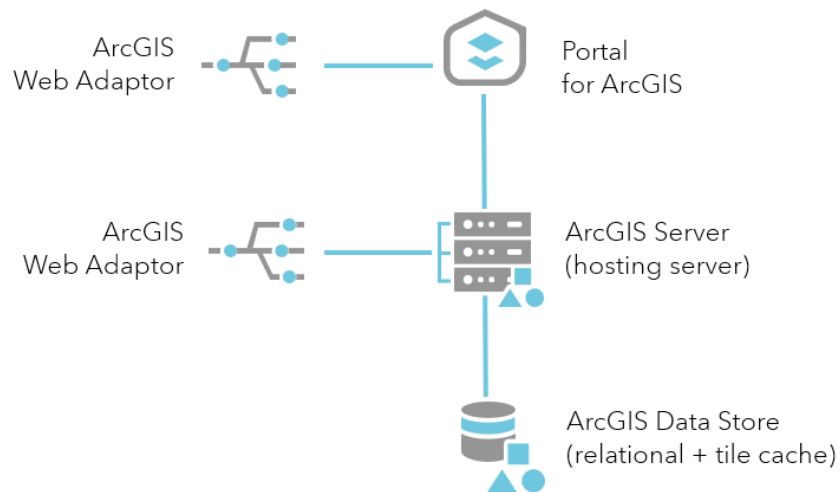
Base Deployment Configuration

The base deployment can be configured in one of two ways:

- With all components on a single machine as an all-in-one deployment.

- With the components installed on multiple machines as a multi-tier deployment.
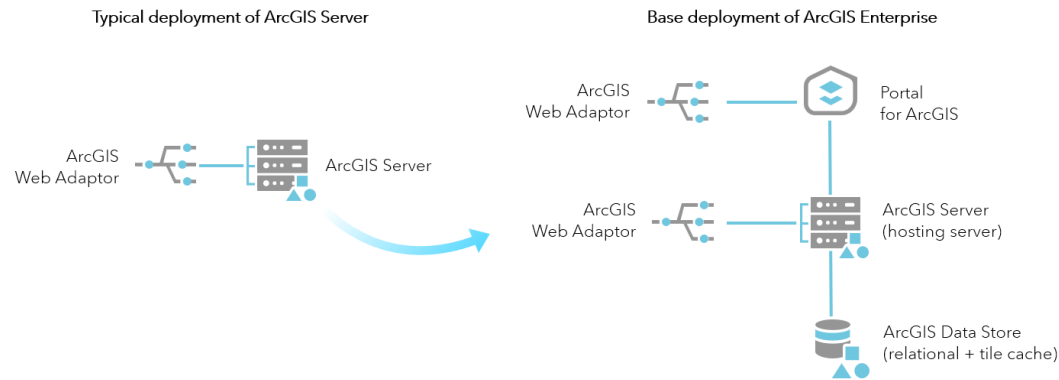
Functionality of the base deployment

A base deployment of ArcGIS Enterprise provides many capabilities, including the ability to:

- Map, visualize, and spatially analyze data in a browser.
- Manage, organize, tag, and categorize all your organization's content.
- Publish map services, feature services, and geoprocessing services, with content referencing a user managed data source, such as an enterprise geodatabase or file-based data (file geodatabases, shapefiles, etc.).
- Leverage hosted layers to do self-service mapping and analysis.
- Share and collaborate on data, maps, and apps with members of your organization, as well as other ArcGIS Enterprise deployments and ArcGIS Online.
- Build and tailor websites and pages using ArcGIS Enterprise Sites to provide users a customized gateway to access data, maps, and apps.
- Tell your story through customized applications built using Story Maps, Web AppBuilder, and other configurable web application templates.
- Use GIS services in custom apps that you build using the ArcGIS API for JavaScript and ArcGIS Runtime SDKs.
- Access and utilize a rich collection of Esri provided data from the Living Atlas.

Migrating from ArcGIS Server to ArcGIS Enterprise

If you are an existing ArcGIS Server deployment ready to migrate to ArcGIS Enterprise, you will need to upgrade your ArcGIS Server and ArcGIS Web Adaptor before adding the remaining components required for an ArcGIS Enterprise base deployment.

Typical deployment of ArcGIS Server

Base deployment of ArcGIS Enterprise

ArcGIS Web Adaptor

Portal for ArcGIS

ArcGIS Web Adaptor

ArcGIS Server

ArcGIS Web Adaptor

ArcGIS Server (hosting server)

ArcGIS Data Store (relational + tile cache)

Base deployment configuration – quick steps

1. Acquire SSL certificates and configure HTTPS for your web server.
2. Install, license, and configure ArcGIS Server.
3. Install, license, and configure Portal for ArcGIS.
4. Configure the web adaptors (one for ArcGIS Server and one for Portal for ArcGIS).
5. Install and configure ArcGIS Data Store and register it with ArcGIS Server.
6. Federate ArcGIS Server with Portal for ArcGIS and designate it as the hosting server.

For reference: Tutorial: Set up a base ArcGIS Enterprise deployment

When possible, use automation tools to make your install and setup easier. To install an ArcGIS Enterprise base deployment on a single machine, you can use ArcGIS Enterprise Builder to quickly get up and running.

Beginning at 10.6, ArcGIS Enterprise Builder can also be used to upgrade deployments installed using Builder.

Choosing a pattern for your base deployment

An ArcGIS Enterprise base deployment can be configured with all components on a single machine in what's known as a *single-machine* or *all-in-one* deployment pattern.

Alternatively, you can separate the components onto different machines in a *multi-tier* deployment pattern. These two patterns provide the same functionality; however, the multi-tier deployment is better suited to supporting ArcGIS Enterprise deployments that are larger and/or distributed.

There are three tiers to consider when deciding which pattern will be the best foundation for ArcGIS Enterprise in your organization: the app tier (Portal for ArcGIS), the server tier (ArcGIS Server), and the data tier (ArcGIS Data Store). Each of these tiers roughly aligns to a component of ArcGIS Enterprise. For each tier, you should think about anticipated usage, load, SLA expectations, and any policy or requirement that would influence the number of machines you should use in your base deployment.
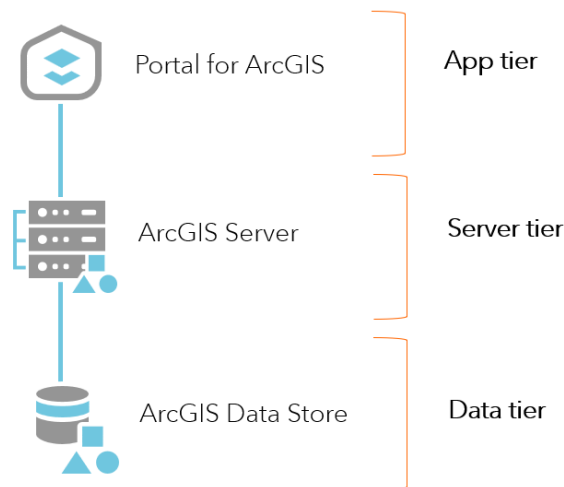
See also Architecting the ArcGIS Platform: Best Practices for guidance on workload separation and additional architecture advice.

Portal for ArcGIS — App tier

ArcGIS Server — Server tier

ArcGIS Data Store — Data tier

Scaling the base deployment

Scaling your ArcGIS Enterprise portal

You may need to scale out the web tier of your base deployment (the Portal for ArcGIS software component). Instead of adding new machines to handle the anticipated load on the portal, it is recommended that you add resources (CPU and/or RAM) to the existing machine. Using multiple machines to run Portal for ArcGIS is reserved for setting up a highly available deployment, in which case two machines are advised – a primary machine and a secondary machine to prevent a single point of failure.

Whether or not you create a highly available deployment, you should monitor CPU and memory usage on your machine running Portal for ArcGIS to see if/when you need to add resources.
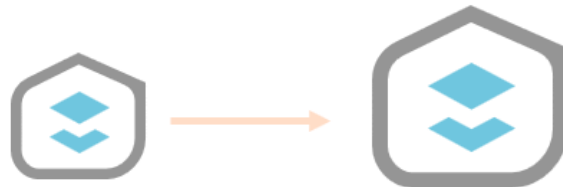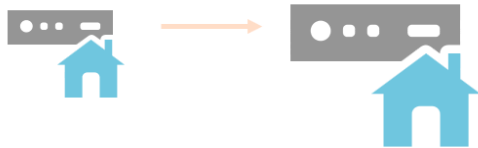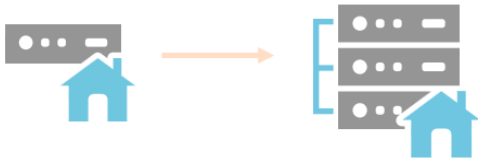
Scaling your Hosting Server

The hosting server site is an ArcGIS Server site that has been licensed as a GIS Server, federated with your ArcGIS Enterprise portal, and designated as your hosting server. Your hosting server site—whether it is made up of one or many machines—is what powers your base deployment. It allows your users to publish hosted layers and perform spatial analysis.

When it comes time to scale the hosting server site, you can either:

- Add more resources to existing machines:

- Or, add more machines to the site:

Some organizations choose to use the hosting server site as both a hosting server and a traditional GIS Server. If you choose to use your hosting server as a double-duty server, monitoring CPU and memory usage becomes even more important, and you may need to scale your server site sooner.

It is advisable that you implement workload separation and maintain one server site to serve as the hosting server and set up one or more other server sites to handle other GIS workflows.

To more closely track system performance, health, and monitor for bottlenecks, consider using Esri's ArcGIS Monitor.

Factors that may cause you to need to scale your hosting server site (even if you are using workload separation) include the following:

- Your users are making heavy use of the built-in analysis tools within the ArcGIS Enterprise portal or spatial analysis tools in ArcGIS Pro that are powered by your hosting server.
- You have a large number of Insights for ArcGIS users, as Insights for ArcGIS will leverage your base ArcGIS Enterprise deployment.

Scaling the ArcGIS Data Store

The ArcGIS Data Store component can be configured as three types:

- **Relational:** Used for storing hosted feature layer data (created by choice, such as when publishing from ArcGIS Pro, or by default when copying data when publishing from ArcGIS Pro, uploading a CSV to the Enterprise portal and publishing a layer, the result of spatial analysis in the portal, and other workflows).
- **Tile Cache:** Used for storing the 3D tile caches that power hosted scene layers for 3D visualization.
- **Spatiotemporal Big Data Store:** Used for storing large volumes of records streamed using GeoEvent Server, locations recorded through Tracker for ArcGIS, analysis results from GeoAnalytics Server tools.

Only two of these, the relational and tile cache data stores, are used in the base deployment. It is important to note that all ArcGIS Data Store types (relational, tile cache, and spatiotemporal) are always registered with the *hosting server site* of the base deployment.

The relational and tile cache data stores can be scaled by adding resources to existing data store machines (scaling vertically). Like the other software components of the base deployment, it is important to monitor ArcGIS Data Store infrastructure—in particular, CPU, memory, disk space, and disk I/O.

Deployment scenarios that may require scaling the relational and tile cache ArcGIS Data Store include the following:

- Many users requesting data concurrently from many different hosted services may cause disk I/O to become a bottleneck. Adding memory is often helpful because it allows the data store to more efficiently cache heavily used data and avoid continuously reading the data from disk.
- Many concurrent requests to hosted services. In this scenario you may see CPU usage become a bottleneck.
- Use of Insights for ArcGIS. This will consume data tier resources for many operations to boost performance.

The spatiotemporal big data store is not required for an ArcGIS Enterprise base deployment. It is designed to store large volumes of tabular and vector data and is specific to deployments using GeoAnalytics Server, GeoEvent Server, and Tracker for ArcGIS. It is typically recommended to install the spatiotemporal big data store on separate infrastructure than that used for your base deployment. More on the spatiotemporal big data store will be covered in later sections.

Note: ArcGIS Data Store in versions prior to 10.5.1 did not always handle out-of-disk-space conditions gracefully. If using a pre-10.5.1 version of the software, be sure to carefully monitor the disk space on the machine and volume where your relational data store is running.

Expanding beyond the base deployment

So far, this document has focused on the ArcGIS Enterprise base deployment, but there are multiple reasons and ways to expand beyond the base deployment.

Adding GIS Server sites can provide workload separation by isolating the hosting server from traditional GIS Server duties. When considering workload separation, equally important to isolating the hosting server is separating out the GIS Server instances to support specific high-demand functionality or services—for example, mapping/visualization and heavyweight services such as geoprocessing services.

Besides adding GIS Server sites, you can expand the base deployment by adding server capabilities, such as Image Server, GeoEvent Server, GeoAnalytics Server, and Notebook Server.
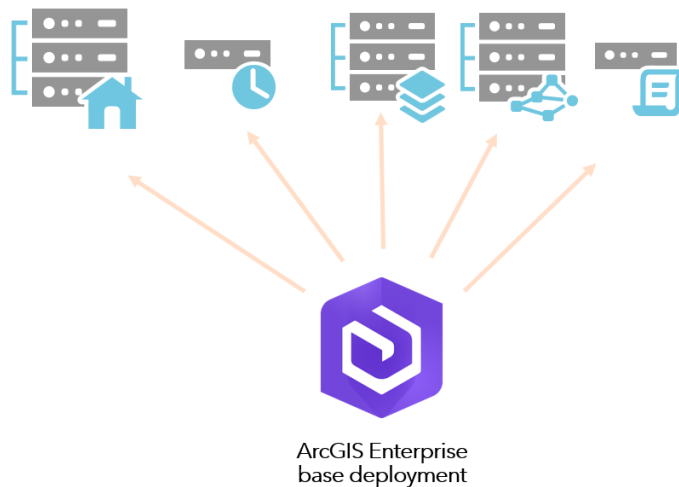
Good to know

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

- Different server roles have different recommendations and restrictions. For example, you can have up to three machines in your GeoAnalytics Server site, but you can only have one site designated for GeoAnalytics.


ArcGIS Enterprise
base deployment

Adding GIS Server sites to your deployment

You already have a GIS Server site as part of the base deployment—it is acting as your hosting server site, which can be made up of one or more machines. However, depending on your deployment and usage scenario, you may need additional sites to achieve optimal performance. You can add as many sites as make sense for your deployment, per workload separation recommendations.

Types of workload/services that typically benefit from having a separate site include the following:

- Highly used dynamic map services
- Heavyweight geoprocessing services
- CPU-intensive routing services
- Mission-critical services that have different SLAs than other services

The following is a sample logical architecture for an ArcGIS Enterprise deployment with multiple GIS Server sites.
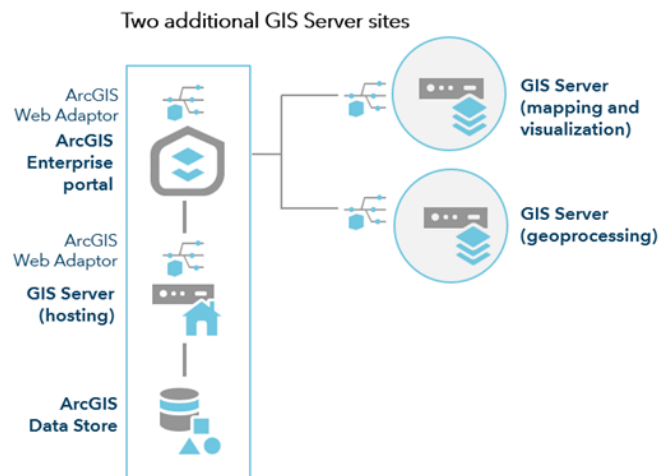
Adding Image Server to your deployment

ArcGIS Image Server provides two distinct capabilities:

- Dynamic image services from your own mosaic datasets
- Raster analytics

Dynamic image services allow you to serve large collections of imagery and rasters with dynamic mosaicking and on-the-fly image processing. When Image Server is used for publishing and serving dynamic image services, you can have any number of Image Server sites.

Starting at 10.6.1, you can choose to designate a site as an *image hosting server* site, which hosts your image services and results of raster analytics. If an image hosting server is not defined, the results of raster analytics will be published on your raster analytics server. At 10.7.1 and up, to publish image layers from data store items, you will need an image hosting server site.

Raster analytics enables deep learning raster analysis and provides the ability to perform distributed processing and analysis of image and raster datasets. You can choose to have a separate site for raster analytics (recommended) or use one site for both dynamic image services and raster analytics.

Here is an example of an architecture that includes separate sites – one for the image hosting site, one for raster analysis, and one for serving dynamic image services:
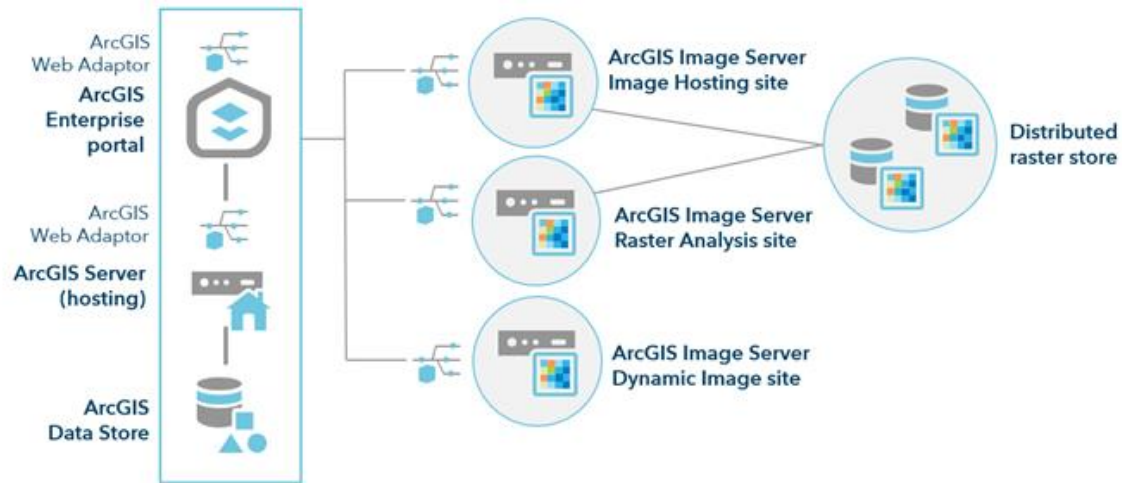
Adding GeoAnalytics Server to your deployment

ArcGIS GeoAnalytics Server brings big data analytics to your organization. It comes with a distributed computing framework that can quickly process and analyze large volumes of vector and tabular data.

Within your ArcGIS Enterprise deployment, you can have only one site designated as the GeoAnalytics Server site. To unlock GeoAnalytics Server capabilties, you will need to license ArcGIS Server as GeoAnalytics Server. Designate your GeoAnalytics Server site in the Enterprise portal.

You will need to configure one or more machines with the spatiotemporal big data store, registered with your hosting server site to use GeoAnalytics Server. You can use the spatiotemporal big data store as the output of your analysis tools, and you can register other data sources such as HDFS, Hive, cloud storage, and folders as the output.

If you are using the spatiotemporal big data store to store your output, you should have an equal or greater number of machines running the spatiotemporal big data store as you have number of machines running GeoAnalytics Server.

Note that there are two supported site sizes for GeoAnalytics Server:

- One machine running GeoAnalytics Server
- Three machines running GeoAnalytics Server

Configurations outside of these are not supported. For more information, reference the [Best practices for GeoAnalytics Server sites help topic](#).

Good to know

When sizing your spatiotemporal big data store, you will want a machine with at least 16 GB of memory.

Keep in mind that the spatiotemporal big data store can use 50% or more of available memory even when idle.

When thinking about sizing and scaling GeoAnalytics, there are many variables to consider that may impact system performance:

- **Type of data input and output** – File-based, hosted feature layers, big data file share (Hive, HDFS, etc.)
- **Location of the data** – Local (low latency), network (potential latency).
- **Characteristics of your LAN** – 100 mbps vs. 1 gbps, latency between machines and data source.
- **Characteristics of the machine's data storage system** – Affects disk I/O.
- **Size of Data** – Megabytes vs gigabytes, millions of records vs. trillions.
- **Ratio of CPU cores to amount of memory per core** – Ability to write result data as fast as it is being generated.

Due to these variables, more machines, more cores, or more memory may not always mean a faster processing time.
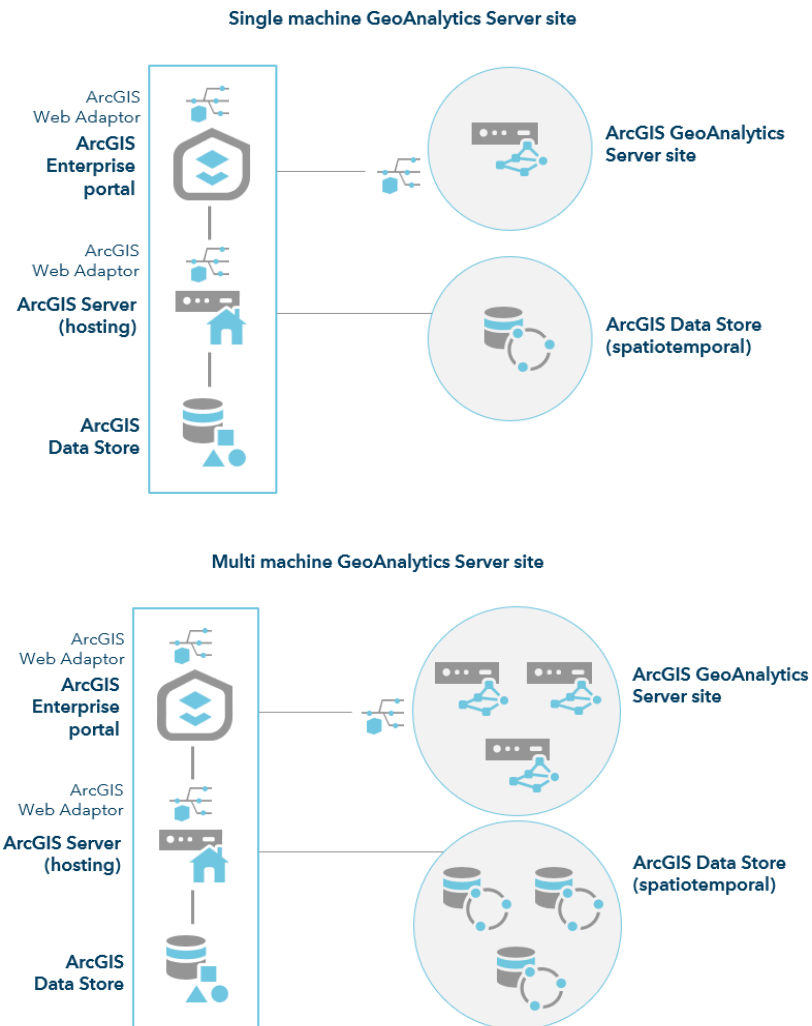
At a minimum, you will need three machines to support an ArcGIS Enterprise deployment with GeoAnalytics Server: one for the base deployment, one for GeoAnalytics Server, and one for the spatiotemporal big data store.

When you are ready to scale your GeoAnalytics Server site, rather than add another site, simply add machines or resources to the existing machine in your GeoAnalytics Server site. Many workflows can benefit immensely just from a single machine site that has been resourced appropriately. However, if you plan to add machines, add two machines for a three-machine site.

If you are writing your analysis results to the spatiotemporal big data store, you will need to scale it along with your GeoAnalytics server by having an equal or greater number of machines configured with the spatiotemporal big data store as you have machines running GeoAnalytics Server.

Remember: only one or three-machine GeoAnalytics Server sites are supported. It is highly recommended to use ArcGIS Enterprise 10.7 or higher to take advantage of stability improvements in GeoAnalytics Server.

Below are sample logical architectures for adding GeoAnalytics Server to your base deployment:

Single machine GeoAnalytics Server site

ArcGIS Web Adaptor
ArcGIS Enterprise portal

ArcGIS Web Adaptor
ArcGIS Server (hosting)

ArcGIS Data Store

ArcGIS GeoAnalytics Server site

ArcGIS Data Store (spatiotemporal)

Multi machine GeoAnalytics Server site

ArcGIS Web Adaptor
ArcGIS Enterprise portal

ArcGIS Web Adaptor
ArcGIS Server (hosting)

ArcGIS Data Store

ArcGIS GeoAnalytics Server site

**ArcGIS Data Store (spatiotemporal)**

Adding GeoEvent Server to your deployment

ArcGIS GeoEvent Server gives you the ability to ingest, analyze, display, and alert on real-time streaming data from practically any type of sensor. Configurable filters and location-based analytics automatically refine and focus real-time data on events that matter most to you.

Your configuration of GeoEvent Server depends on the velocity, size, and type of your data stream or streams (fields, geometry of your data, etc).

To scale GeoEvent Server, it is not recommended to add machines to an existing GeoEvent Server site. Instead, you should use additional, separate GeoEvent Server sites, which will allow you to scale your solution horizontally, sending different data streams to instances of GeoEvent Server dedicated to handling event records from those streams.

See the following example of logical architecture for a scaled out GeoEvent Server deployment with multiple single-machine sites and the spatiotemporal big data store to store accumulated data.
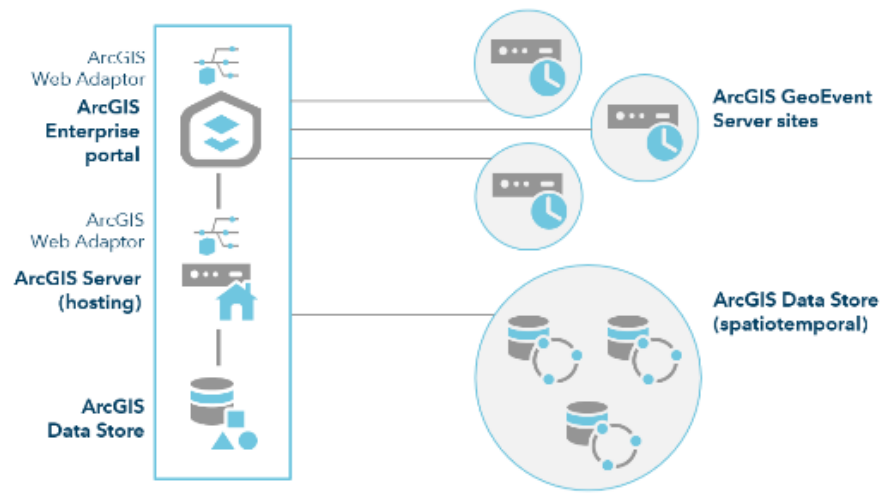
It is strongly recommended that you use only single-machine sites for GeoEvent Server.

If you plan to implement a multiple-machine GeoEvent Server site at any version, collaborate with Esri Professional Services to help plan and implement your architecture.

Each machine that runs GeoEvent Server must be powerful enough to handle peak throughput for the total number of event records ingested. Depending on the number of event records you anticipate ingesting and processing each second, you may need to add resources (CPU/RAM) to the machines in your existing site. Visit the help documentation for [GeoEvent system requirements](#).

If you want to accumulate data, you can use a traditional relational database as storage for lower event velocity and volume (e.g. a few hundred events per second). Higher event velocity and volumes may require the spatiotemporal big data store, as depicted above in the architectural diagram.

To enforce workload separation, do not colocate your GeoEvent Server infrastructure with any other components.

Adding Notebook Server to your deployment

Introduced at 10.7, ArcGIS Notebook Server brings together GIS and data science, centered around the notebook format. Notebooks are living data science documents, combining code, visualization, and documentation in a transparent, collaborative way, and ArcGIS Notebooks add the power of Esri's Python resources to the mix.

ArcGIS Notebook Server provides an infrastucture where you can host, edit, and share ArcGIS Notebooks with others in your organization. This integration means that your users' notebooks can draw on layers, maps, and analysis tools available in ArcGIS Enterprise as well as ArcPy, the ArcGIS API for Python, and open source data science libraries.

Administrators can also take advantage of Notebook Server, using Python to automate workflows like creating members, cloning items, and more.

Notebooks are implemented using Docker containers, virtualized operating systems that provide an isolated environment for each notebook author. Because of this, resources for specific notebook authors can be scaled independently based on each author's needs.

ArcGIS Notebook Server must be federated with your existing ArcGIS Enterprise base deployment. The operating system you use for Notebook Server does not have to be the same operating system you use for your ArcGIS Enterprise base deployment, however, for the best experience, it is highly recommended to run Notebook Server on Linux. If your cloud provider of choice is Amazon Web Services, note that only Ubuntu machines are supported.

10.7.1 is the first release to support multi-machine sites; prior to 10.7.1, only single machine sites were supported. Note that multi-machine sites are not supported in Microsoft Azure.

Notebook Server requires at least 8 GB of memory per machine and a minimum of 50 GB of available disk space.

Below is an example of an ArcGIS Enterprise deployment that includes Notebook Server:
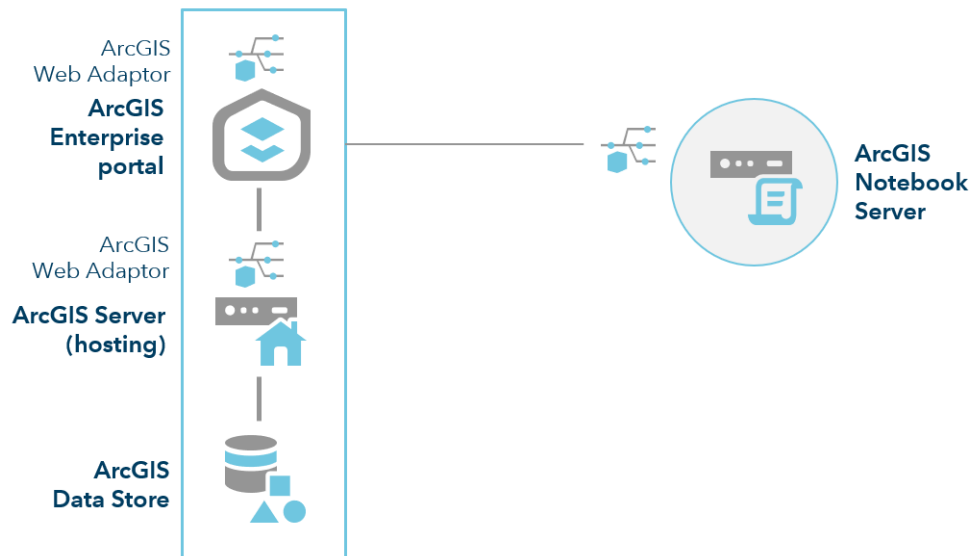
Visit the help documentation for [system requirements for Notebook Server](#).

Recap: adding capabilities to your deployment

GIS Server

- As many sites as needed, following workload separation recommendations
- Licensed on top of ArcGIS Server

Image Server

- As many sites as needed for dynamic image services
- One site for Raster Analytics
- Recommended to not colocate Image Server and Raster Analytics
- Licensed on top of ArcGIS Server

GeoAnalytics Server

- Only one site per deployment
- The site can have either one or three machines
- Scale spatiotemporal big data store machines as needed
- Licensed on top of ArcGIS Server

GeoEvent Server

- As many sites as needed
- Scale by adding multiple single-machine sites
- Requires ArcGIS Server + GeoEvent installation

Notebook Server

- Only one site per deployment
- Can use multiple machines beginning at 10.7.1
- Uses Docker to isolate work
- Separate Notebook Server installation

Additional deployment patterns and considerations

Adding capability-based servers is not the only way to extend and grow your deployment.

Extensions and applications

You can add extensions and applications to your deployment, like ArcGIS Insights (application), ArcGIS Data Interoperability extension (server extension), and much more to solve specific problems and workflows.

High availability:

Deploy ArcGIS Enterprise as highly available within a single data center or cloud region to protect against individual components becoming unavailable and causing system downtime.

Disaster recovery:

Replicate your deployment across multiple geographic regions or locations so that if your primary deployment fails or becomes inaccessible, you can fail over to the standby deployment.

Distributed collaboration:

Use distributed collaboration to share content (layers, maps, apps, and more) across ArcGIS Enterprise deployments, and with ArcGIS Online. Collaboration can extend the reach of your data so that you can work more effectively with other departments and organizations.

Automating your deployment

Deploying ArcGIS Enterprise does not need to be challenging, nor does it need to be a manual process. A suite of free-to-use tools will help you jump-start your deployment. For more information on automation tools, see the section in the [ArcGIS Enterprise Functionality Matrix](#).

ArcGIS Enterprise Builder

ArcGIS Enterprise Builder is a wizard that installs and configures a base ArcGIS Enterprise deployment on a single machine. ArcGIS Enterprise Builder is available for download from My Esri.

Cloud Tools

If you are deploying in the cloud on Amazon Web Services (AWS) or Microsoft Azure, Esri provides machine images and builders that will install and configure the ArcGIS Enterprise software and spin up the underlying infrastructure of your choice. These tools can be found on each cloud provider's respective marketplace and follow a bring-your-own license model.

Chef

Chef is an open-source scripting language for automation. Chef is a great choice for automating the installation and configuration of larger and more advanced (multi-tier) deployments. The ArcGIS Enterprise development team has created several Chef cookbooks and recipes available on the [Esri GitHub repository](#) to help you get started.

Windows PowerShell DSC

Windows PowerShell Desired State Configuration (DSC) is a configuration management platform built into Windows that is based on open standards that enables you to manage your IT and development infrastructure with configuration as code. For more information, see the [GitHub landing page](#).

Updating best practices

It is always important to review the product documentation, even if you are/were familiar with a previous release of the product. Several key updates have been made to best practices and architecting recommendations, including those that may be contrary to previous practices.

For example:

Do not use unfederated siloed ArcGIS Server sites for general purpose setups.

- Esri has made significant improvements in the performance and stability of multimachine sites since ArcGIS 10.3.1; also, siloed sites do not work in the federated model.

Do federate your ArcGIS Server sites.

- Federation between ArcGIS Server and the Enterprise portal is required to set up the base deployment and provide a single sign-on security experience. Unfederated sites are designed for pure data dissemination workflows via raw REST web services.

Do not use clusters.

- The use of clusters on any version of the software is discouraged. Support for clusters has been officially deprecated as of 10.5.1 and was removed at 10.7.

Do not unfederate your ArcGIS Server sites when upgrading.

- Unfederating ArcGIS Server sites is an irreversible process that is not needed during ordinary workflows. When upgrading, follow the upgrading workflow listed in the documentation.

Do use ArcGIS Web Adaptor.

- The ArcGIS Web Adaptor simplifies a lot of configuration that would otherwise have to be done manually. Unless you have a good technical reason not to, always use the web adaptor (one for ArcGIS Server and one for Portal for ArcGIS).

Dispelling old myths

Just as best practices are updated, there are certain beliefs about the software that are no longer true:

Myth: *"Windows can only run approximately 250 service instances."* (referring to SOC processes)

Truth: This is a Windows imposed limitation that can be lifted by changing a setting within the Windows registry. Remember! You must still have enough system resources (memory and CPU) to power all these services. Unless you have at least 50 GB RAM available for running services, you are unlikely to be impacted by this.

See this technical article for more information and specific steps: support.esri.com/technical-article/000001218

Myth: *"ArcGIS Server web services are memory intensive."*

Truth: Shared instances, introduced at 10.7, greatly reduces memory usage and the number of unused service instances (ArcSOC processes) for compatible ArcGIS Pro-based map services.

Myth: *"ArcGIS Data Store is replacing enterprise geodatabases."*

Truth: ArcGIS Data Store, as part of an ArcGIS Enterprise base deployment, can and should be used in conjunction with your own storage – whether cloud, enterprise geodatabases, or more. The ArcGIS Data Store was not designed to replace your existing data storage. It is up to your organization to determine what storage to use based on your business requirements.

Key takeaways

- Stay up-to-date on best practices—they change over time.

- ArcGIS Enterprise is designed using the federated server model. Features that require federation include the following:
  - Raster Analytics (Image Server)
  - GeoAnalytics Server
  - Notebook Server
  - Using the spatiotemporal big data store

- Understand the base deployment and the capabilities it provides.

- Don't overcomplicate things unnecessarily—small to medium sized organizations can often use a single machine running ArcGIS Enterprise in production. If this meets your organization's needs, consider using the ArcGIS Enterprise Builder as an easy way to get up and running quickly.

- Understand the individual server roles and the recommendations and requirements of each—they are not all the same!

- And remember, **don't panic!**