

## SERVER CAPABILITIES

Run on Windows

Run on Linux

Deploy in the cloud

Deploy on premises

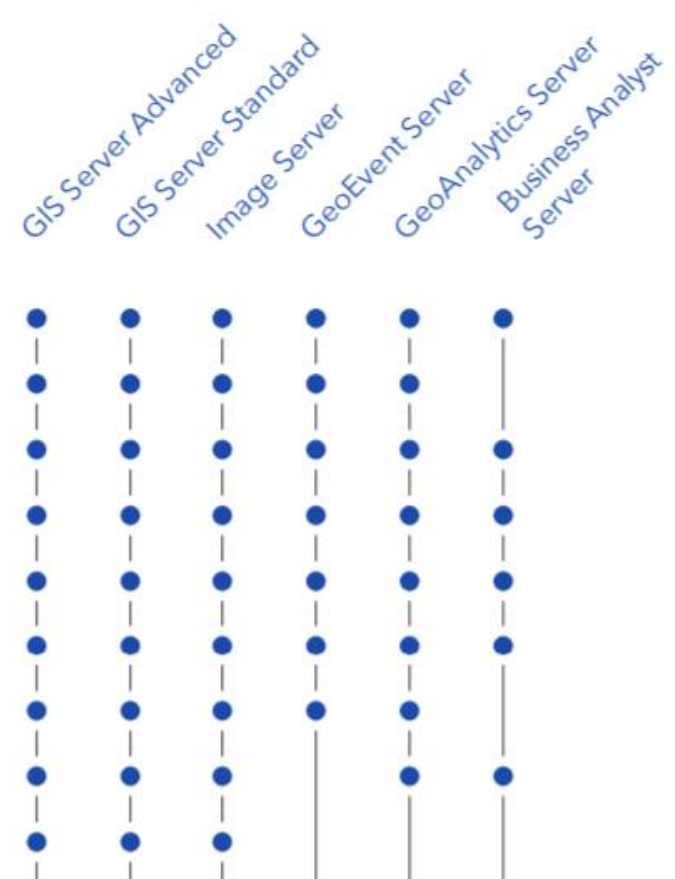
Deploy disconnected from the open Internet

Script and automate workflows

Create analytical models and model chains

Edit data on the web

Create OGC-compliant web services



<https://assets.esri.com/content/dam/esrisites/media/brochures/arcgis-enterprise-functionality-matrix.pdf>

GEOG 482 / 582 : GIS Data Management

# Lesson 12: ArcGIS Server Capabilities

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# Overview

## Learning Objective Questions:

1. What are the ArcGIS Server Services?
2. How is ArcGIS Server packaged?
3. What are three types of geodatabase management platforms?
4. What are limitations of ArcGIS database environments?
5. What is versioning and why is it important for GIS data management?
6. What is archiving and why is it important for GIS data management?
7. How does versioning relate to archiving?
8. What is replication and why is it important for GIS data management?

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## Lesson Preview

Learning objective questions act as the lesson outline.

Questions beg answers.

# Enterprise ArcGIS Services

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## 1. What are the ArcGIS Server Services?

ArcGIS Server (currently known as ArcGIS Enterprise) services are many of the same capabilities provided in ArcGIS Desktop & Pro, but deployed over a WAN, including the Internet.

ArcGIS Server services are useful for Workgroup, Enterprise GIS, and Consortium GIS; that is, when multiuser systems are an advantage for GIS data processing.

ArcGIS Server services provide capabilities as diverse as working with geodatabases, geoprocessing analysis, data entry/update/display for mobile, and web maps plus more

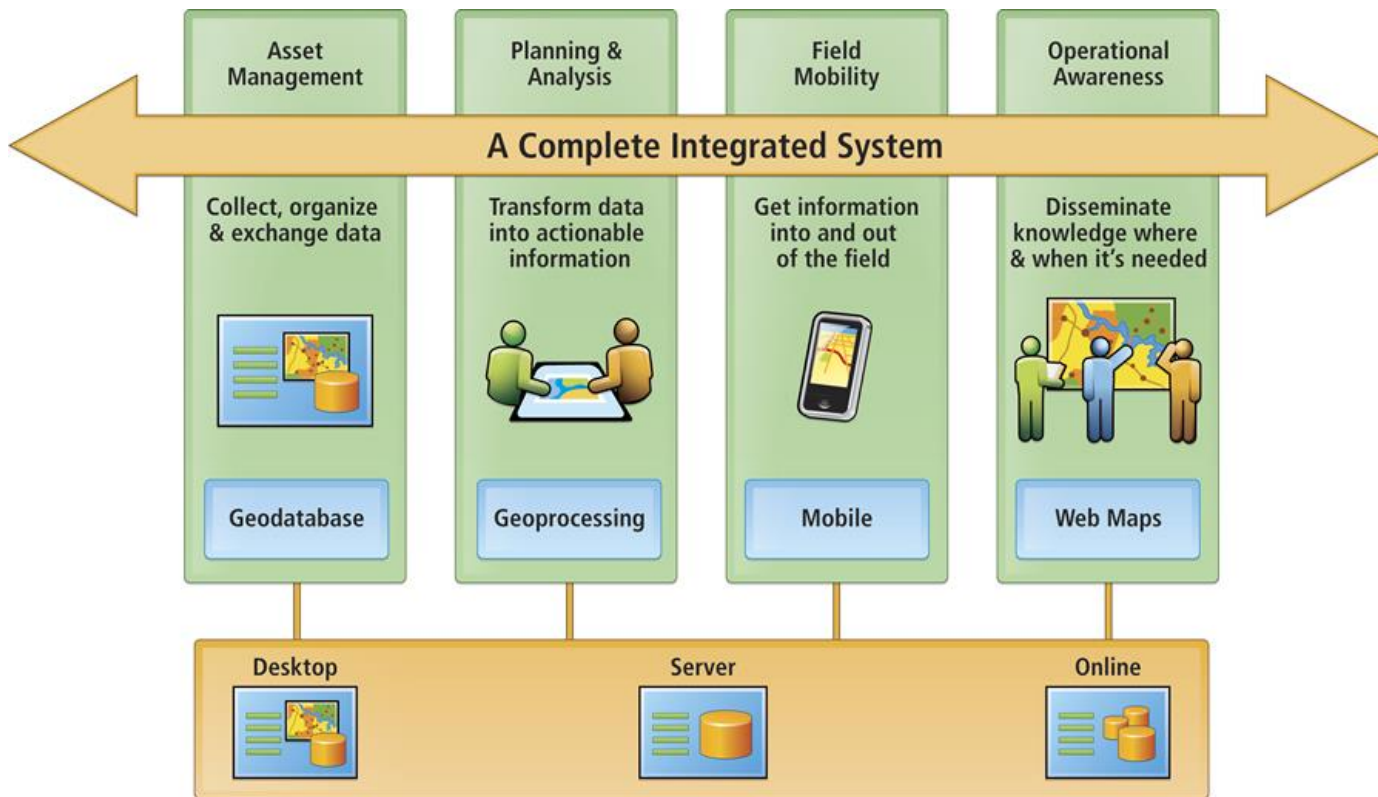
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### **Key terms**

ArcGIS Server

# Enterprise GIS Framework

Services implement the Enterprise GIS framework for fostering collaboration across organization functions through application and data integration



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# ArcGIS Server support for enterprise GIS

**Publish Web maps tailored to an audience**, strengthening business and resource decisions with real-time geointelligence.

**Geographically enable IT investments**, shrinking data and application redundancy, optimizing system configurations, and consolidating enterprise systems.

**Centrally manage geospatial data**, providing better data security and integrity for information assets.

**Simplify access to large volumes of imagery resources**, significantly reducing storage costs and data processing overhead.

**Extend GIS technology to mobile workforce**, increasing the accuracy and value of field data collection projects and asset monitoring, as well as resource and event management.

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# Users supported by ArcGIS Server

**GIS professionals** manage and distribute GIS content and geoprocessing models to mobile and information workers

**Database administrators** work with centralized, scalable storage; and deliver capabilities to Web, desktop, and mobile users.

**Application developers** use application programming interfaces (APIs) to build and deploy Web mapping applications.

**IT administrators** streamline business processes, increase efficiency, automate tasks, and manage GIS Web services.

**Information workers** access data, improve workflows and customer service, and generate reports and analytic maps.

**Mobile workers** view and navigate mobile maps; monitor the location of assets; and collect, edit, and update GIS data.

**Web citizens** explore government data as well as contribute their own maps; share comments, photos, and other information; and participate publically in local, regional, and global decision making.

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## 2. How is ArcGIS Server packaged?

Functionality at multiple levels (editions):

- GIS Server Advanced
- GIS Server Standard
- Image Server
- GeoEvent Server
- GeoAnalytics Server
- Business Analyst

# ArcGIS Enterprise functionality matrix version 10.6.1

Portion of matrix below

## SERVER CAPABILITIES

	GIS Server Advanced	GIS Server Standard	Image Server	GeoEvent Server	GeoAnalytics Server	Business Analyst Server
Run on Windows	●	●	●	●	●	●
Run on Linux	●	●	●	●	●	●
Deploy in the cloud	●	●	●	●	●	●
Deploy on premises	●	●	●	●	●	●
Deploy disconnected from the open Internet	●	●	●	●	●	●
Script and automate workflows	●	●	●	●	●	●
Create analytical models and model chains	●	●	●	●	●	●
Edit data on the web	●	●	●	●	●	●
Create OGC-compliant web services	●	●	●	●	●	●
Convert location information to x,y (geocode)	●	●	●	●	●	●
Visualize data as a schematic diagram	●	●	●	●	●	●
Support disconnected/field editing	●	●	●	●	●	●
Create geoprocessing services from ArcGIS Desktop analysis tools	●	●	●	●	●	●
Create geoprocessing services as web tools	●	●	●	●	●	●

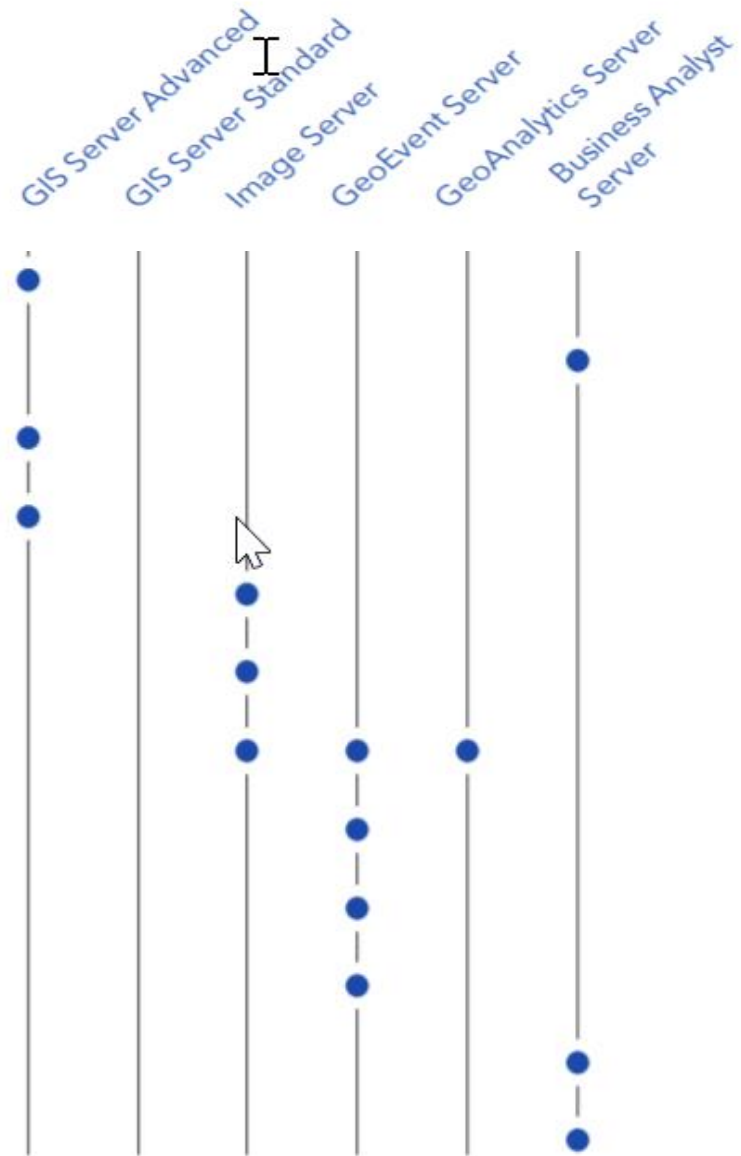


# ArcGIS Enterprise functionality matrix

Portion of matrix below

[Click here for full matrix version 10.6.1](#)

- Serve ArcGIS 3D Analyst tools <sup>1</sup>
- Serve Business Analyst tools and apps
- Serve ArcGIS Geostatistical Analyst tools <sup>1</sup>
- Serve ArcGIS Spatial Analyst tools <sup>1</sup>
- Create image and raster mosaics dynamically
- Display imagery and raster data on the fly
- Process and analyze big data
- Analyze streaming data in real time
- Generate geoenabled alerts
- Create geofences
- Create data-driven infographics
- Enrich data



# Scoping Enterprise Data Management

## 3. What are three types of geodatabase management platforms?

- **Personal** GDB – collection of tables managed in MS Access Jet Engine
- **File** GDB – collection of files managed in a file folder
- **Enterprise (ArcSDE)** GDB - collection of tables managed in a relational database management system for multi-user access

For a comparison of the three, see the table at

[http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html  
#/Types\\_of\\_geodatabases/003n00000007000000/](http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Types_of_geodatabases/003n00000007000000/)

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# Three database environments exist because...

Different organizations have different database needs...

Personal GDB : Microsoft Access

- MS Access Jet Engine available as an embedded technology at no/little cost
- uses Windows operating system, workstation personal users

File GDB : Windows file management system

- ArcGIS software uses Windows operating system folders
- Do not require DBMS software support

Enterprise GDB - IBM Informix, IBM DB2, Oracle, MS SQL Server, PostgreSQL

- Database management technology provided by third party software organization

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## 4. What are limitations of ArcGIS database environments?

A matter of the size of the data management activity...

Personal GDB : Microsoft Access

- MS Access Jet Engine available as an embedded technology using the Windows operating system
- Data storage limited to 2 Gigabyte (GB) database overall, but degrades starting between 250 – 500 MB

File GDB : Windows file management system

- Esri ArcGIS software uses operating system folders
- Data storage limited to 1 Terabyte (TB) for each feature dataset

Enterprise GDB - IBM Informix, IBM DB2, Oracle, MS SQL Server, PostgreSQL

- Provided by third party
- Middleware drivers sit between ArcGIS Modules and the DBMS
- Data storage limited to size of DBMS

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## 5. What is versioning and why is it important for GIS data management?

- Versioning allows multiple users to edit the same data in an Enterprise geodatabase without applying locks or duplicating data.
- Users always access an Enterprise geodatabase through a version.
- Every Enterprise geodatabase has a default version called DEFAULT
- Versioning is always enabled for the geodatabase. It is a fundamental part of how ArcGIS operates and does not need to be installed or configured independently.

Above comes from...versioning help...

[http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/A\\_quick\\_tour\\_of\\_versioning/002700000000r000000/](http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/A_quick_tour_of_versioning/002700000000r000000/)

Additional insight about versioning available (highly recommended) at..

<http://www.esri.com/news/arcuser/0110/versioning101.html>

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# How do versions and versioned edits work?

A geodatabase can have many versions.

- DEFAULT version is the root version and, therefore, the ancestor of all other versions.
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## Creating other versions

- Create a version by creating children or branches from any existing version.
- Create the first version by making a child version of the DEFAULT version.
- When the new version is created, it is identical to the DEFAULT version.

Over time, the versions will diverge as changes are made to the DEFAULT version and to the new version.

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## 6. What is archiving and why is it important for GIS data management?

- Geodatabase archiving introduces a historical version in addition to the existing transactional (default or child) version.
- Users connect to either a transactional version or a historical version. A transactional version allows users to edit the data.
- A historical version (archive) represents the data at a specific moment in time and provides a read-only representation of the geodatabase; a snapshot of the geodatabase.
- One can connect to a historical version using an existing historical marker or a specified moment. A historical marker is a named moment in time that you create, for example, "Completion of Subdivision 158" referencing the date 2:13 PM July 11, 2018.
- Above comes from...geodatabase archiving help...

[http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Geodatabase\\_archiving/002700000045000000/](http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Geodatabase_archiving/002700000045000000/)

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**Key terms**  
Archiving

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## More on archiving...

- Archiving supports all geodatabase data model constructs; e.g., feature classes, feature datasets, tables, relationship classes, networks, topologies, and terrains.
- Archiving requires the data to be registered as versioned. Once archiving is enabled, all changes saved or posted to the DEFAULT version are maintained in the corresponding archive class.
- The archive class is a complete copy of the archive enabled class plus all the edits saved or posted to the DEFAULT version.

### Tools

- History Viewer tool allows users to quickly navigate to specific time for displaying how the data appeared.
- Adding the archive class directly to ArcMap allows users to perform queries to explore how the data has evolved over time, e.g., edits occurring between Jan 18, 2018, and July 1, 2018.



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## 7. How does versioning relate to archiving?

Versioning is performed when multiple users edit a dataset; that is, support for multiple transactions on the data.

Archiving is performed by storing the current transactional version that becomes the historical versions of the transactional data.

Versioning and archiving occur at the feature level of resolution.

Archiving at the dataset level is not necessary.

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**Key terms**  
Versioning

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## 8. What is replication and why is it important for GIS data management?

- Geodatabase replication is designed to support many different systems where you need to distribute data among multiple locations (users); a copy of data is at other locations to improve user access performance.
- Data is distributed as a means to improve data availability and performance by alleviating server contention and slow network access to a central server.
- Data distribution can help an organization balance the load on its geodatabases between users performing edits and those accessing it for reading operations.
- Above comes from...geodatabase replication help...

[http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Working\\_with\\_geodatabase\\_replication/002700000022000000/](http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/Working_with_geodatabase_replication/002700000022000000/)

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**Key terms**  
replication

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# Creating replicas

Determine the best way to create replicas for a system.

- **Determine what replicas are needed**— Many replicas are needed if creating replicas for field crews on field laptops.
- **Decide on the type of replication**—Use two-way replication to synchronize with another office and one-way replication to update your map publishing geodatabase.
- **Tools to create the replicas:**
  - **Create Replica wizard**—Use Create Replica wizard when first creating replicas or if creating a small number of replicas.
  - **Create Replica geoprocessing tool**— Use Create Replica geoprocessing tool when creating replicas on a regular basis.
  - **ArcObjects API**—supports writing code to create replicas in several languages when customization is needed or replicas for complex options are needed on a regular basis.

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# Integrate replication into versioning workflows

- Geodatabase replication is built on top of versioning. At replica creation time, a replica version is defined in both the parent and child replica.
- Since the replica version is the conduit through which changes are synchronized, create a plan to work with the replica versions before creating replicas.
- Run validation on the changes received during synchronization before integrating it into your main workflow.
- Analyze the contents of the replica version after synchronization, then reconcile and post replicate into regular working version. Default version can be used as the replica version.

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# Plan the replica - define the data to replicate

- Geodatabase replication allows you to replicate some or all of the datasets in your Enterprise geodatabase.
- Define the features or rows to replicate using filters and relationship classes. Filters are applied first, then relationship classes are used to append additional features and rows.
- Consider future needs when defining the data to replicate.
- Two-way and one-way replicas are created once and synchronized many times.
- Over time, needs may change to require a larger replica area.
- To maintain data integrity, additional rules apply when replicating complex data types such as geometric networks and topologies.

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# Summary

In this lesson, you learned about...

1. ArcGIS (Enterprise) Server Services
  2. ArcGIS Server packaging
  3. Three types of geodatabase management platforms
  4. Limitations of ArcGIS database environments
  5. Versioning and why it is important for GIS data management
  6. Archiving and why it is important for GIS data management
  7. Versioning in relation to archiving
  8. Replication and why it is important for GIS data management
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Contact me at  
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have questions or  
comments about this  
lesson.

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**END Lesson 12: ArcGIS Server Capabilities**