

# Understanding Servers

IT4GIS  
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## What is a server?

- Desktop
- Workstation
- Server



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## Functional Roles

- Data Storage
- Application Host
- GeoProcessing
- Spatial Data Management
- Website Host
- E-mail

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## Data Storage

- The role of hardware
  - NAS (network attached storage)
  - SAN (storage area network)
  - DAS (direct attached storage)
  - [other]
- Your role
  - Delete unnecessary data
  - Apply best data type to each attribute (tables) and raster file format/pixel depth)

Grid or GeoTIFF?

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## Data Storage: Fault Tolerance

- RAID=Redundant Array of Inexpensive Disks
- Hardware or software implementation
- Level 0,1,5,10
- Minimum four disks on server
- Hard disk types
  - SCSI, IDE, etc.
  - Hot-swappable

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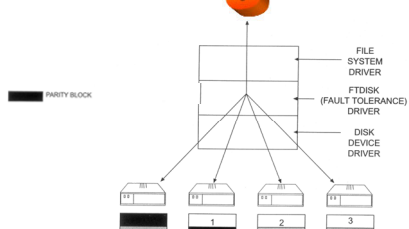
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## Data Storage: The Way Fault Tolerance Works!



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## Data Storage: RAID and RAIS

- Redundant Array of Inexpensive Disks
- Redundant Array of Inexpensive Servers

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## Hints and Tips: The 5-nines

- 99.999% of the time...
- Servers are operational and functioning
- How much down-time does this allow?
  - 5 minutes!
  - No longer even a goal!
  - Why?
- Today this requires mirrored/redundant servers

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## Application Host

- GIS software-host server (application server)
- GIS software license server



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## GeoProcessing

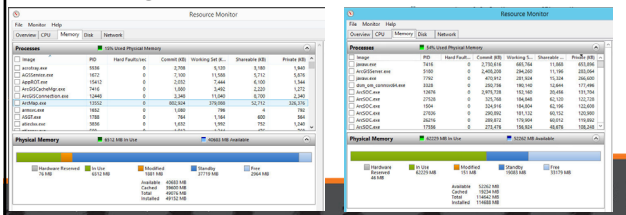
- ArcGIS for Server software resides on server with GeoProcessing Services running
- Clients have the desktop or workstation application installed
- Large tasks are processed by the server via web interface
  - Can more fully utilize available processors and RAM

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## Why are Servers Faster?

- More RAM and more CPU cores (yes)
- But more importantly, a different architecture in RAM and CPU usage/allocation



## GPU Processing

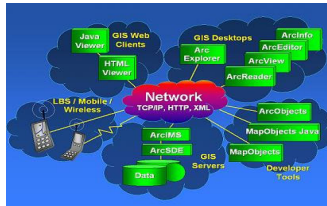
- Graphical Processing Units
- nVidia leads, but it all started with the demand for smooth video rendering by the gaming industry
- Graphics cards and processing
  - Processing graphics is an intensive Floating-point Operation (FLOP) **that must be done quickly**
  - Geoprocessing can also be an intensive FLOP (but does *not* need to be done quite so quickly)
- BTW, in some cases, a server will not be faster if a good graphics card is not available

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## Spatial Data Management

- SDE=Spatial Database Engine
- Requires RDBMS
- ArcSDE
- Spatial library organized with a RDBMS



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## Web Server

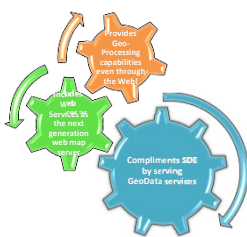
- IIS
  - Overview of structure on host server
  - Client access (<https://giscenter.isu.edu>)
- ArcGIS for Server
  - Serving maps



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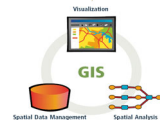
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## ArcGIS for Server



### ArcGIS Server Key Features

ArcGIS Server offers Web Mapping services that support 2D viewing and online map creation in 3D. ArcGIS Server also supports the management and distribution of spatial data and services.



ArcGIS Server includes tools and services that support 2D viewing and online map creation in 3D. ArcGIS Server also supports the management and distribution of spatial data and services.

ArcGIS Server offers Web Mapping services that support 2D viewing and online map creation in 3D. ArcGIS Server also supports the management and distribution of spatial data and services.

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## Types of Server Hardware

- Glorified desktops
- Standard Rack-based
- Blade
  - Rack based, but not limited to 42 Units
  - Can contain more than CPUs
- ISU's Research Data Center (RDC)

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## Professional Tips

- Data folder for clients
- Data liability policy
- Use of Temp folders
- System Administration:
  - Do not allow write access from remote clients anywhere on your system!
- Security
  - Web access is principal security threat
  - FTP is a primary avenue for intrusion
  - Dynamic IP addressing

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## Applying Security to Your Server

- Reactive:
  - TCP/IP exclusion
- Proactive
  - Service packs
  - Updating anti-virus dictionaries
  - Disabling and uninstalling FTP
  - Firewalls

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## Security (cont'd)

- Backup your data
  - Mission critical
  - Critical
  - Non-critical data
- Difference between **Backup** and **Archive**

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## A Tour of the Server Room (in under 2 minutes)



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## Keep the Servers Cool

- Cool aisle and hot aisle approach
- Liquid cooling (e.g., INL C3)
  - Better approach but much more expensive
  - ROI good on larger data centers (INL C3)
  - ROI poor on smaller data centers (ISU RDC)

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## Key Concepts

- A server is best defined by its **Functional Role**.
- You should now know several roles for GIS servers.
- Fault tolerance addresses **data integrity** (information assurance).
- Proactive security measure address **data security**.

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## Professional Hints and Tips

- Email is not a text SMS...

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## Questions...Assignment



Get ready for the 2-minute write

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