Understanding Servers
IT4GIS
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What is a server?
• Desktop
• Workstation
• Server

Functional Roles
• Data Storage
• Application Host
• GeoProcessing
• Spatial Data Management
• Website Host
• E-mail
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?

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

Data Storage: The Way Fault Tolerance Works!
Data Storage: RAID and RAIS

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

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?

Application Host

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

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 fast)
• In some cases, a server will not be faster if a good graphics card is not available
Spatial Data Management

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

Web Server

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

ArcGIS for Server
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)

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

Applying Security to Your Server

• Reactive:
  – TCP/IP exclusion
• Proactive
  – Service packs
  – Updating anti-virus dictionaries
  – Disabling and uninstalling FTP
  – Firewalls
Security (cont’d)

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

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**.

A Tour of the Server Room

(in under 2 minutes)
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)

Professional Hints and Tips

- Email is not a text SMS...

Questions...Assignment

Get ready for the 2-minute write