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
    (http://giscenter.isu.edu)
- ArcGIS for Server
  - Serving maps

ArcGIS for Server

- Geo-Processing capabilities even through the Web!
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 measures 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)

Questions…Assignment

Get ready for the 2-minute write