CI•WATER

Team 1:
Enhance Cyberinfrastructure Facilities Research Platform Hardware

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Utah EPSCoR Projects

- Inter-Campus an Intra-Campus Cyber Connectivity (RII C2)
  - Extending Campus Networks and the Research@UEN Optical Network

- CI-WATER (RII Track 2)
  - Cyberinfrastructure to advance high performance water resources modeling

- iUTAH (RII Track 1)
  - innovative Urban Transitions and Aridregion Hydrosustainability

CI-WATER Proposed Hardware

- Production deployment environment for hosting databases, web services, and web applications (UofU)

- Development and staging environments at BYU and USU to serve as a research platform

- Large scale storage to support HPC and backup of databases and services created

How can we create a research hardware platform that supports diverse cyberinfrastructure needs of CI-WATER?

# CI-WATER Software CI Development Approach

- Where possible, leverage and adopt existing cyberinfrastructure components
- Collaborate with other CI development activities to get needed functionality
- Develop pieces that we need

Required Functionality

- Research platform (CI-WATER EPSCoR)
  - Development, prototyping, and testing of servers, software applications, and services on multiple platforms (e.g., Windows, Linux)
  - Host machines allocated for modeling, analysis, and computational tasks
- Production data service and application hosting platform (iUTAH EPSCoR)
  - Web servers
    - Data web services
    - Web applications
  - Database servers
  - Map servers
  - File servers
  - Data harvesters and automated data processing applications
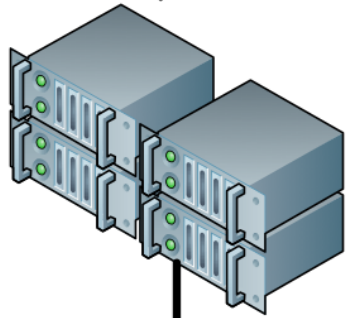
Virtual Server Architecture

VMWare Virtual Machines

File Server   Map Server   Database Server   Web Server
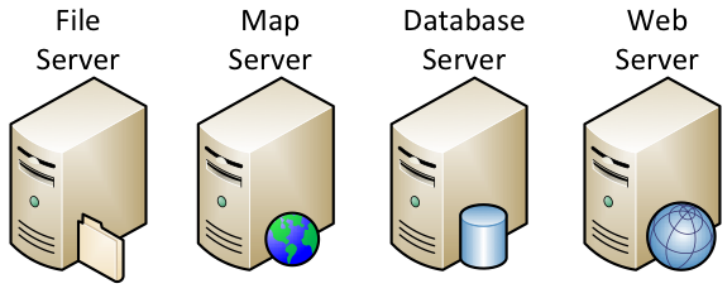
Required servers and software stacks implemented on virtual machines

VMWare Virtual Hosts
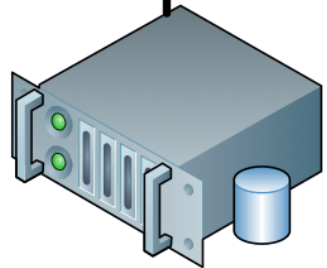
Many virtual machines can be hosted on a single virtual host server

Tiered Storage

Tiered storage
Tier 1 and 2: Databases and operating systems
Tier 3: Lower demand file storage and acces

Capabilities

- Quickly spin up virtual machines that implement different operating systems and platforms (e.g., Windows, Linux)
- Use shared computational and storage resources rather than requiring a physical machine for each purpose
- Create and manage both development and production servers using shared hardware
- Hot-swap virtual machines across physical host machines using virtualization software
  - Ensure failover for production virtual servers
  - Efficiently allocate unused resources to computationally intensive modeling or analysis tasks

Initial Specifications

- 3 virtual host servers using shared storage arrays
  - Dual 8 core processors
  - 128 GB RAM
- 7.2 TB high performance shared storage array
  - Virtual machine operating systems
  - Relational databases
- 72 TB high capacity shared storage array
  - File storage
  - Archival
- Integrated with USU Central IT VMWare infrastructure and enterprise data center

Available storage will be expanded in subsequent years via iUTAH

The Larger Utah EPSCoR Cyberinfrastructure Picture