

ACCRE

Advanced Computing Center
for Research & Education

Storage @ Vanderbilt

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OSG Storage Forum
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Who are we? (from a grid perspective)

- * Tier 3 associated with CMS
- * One of the largest US Tier 3's
- * Tier 1.x associated with CMS-HI
- * More than 1700 batch slots (and that will very soon be more than 2000 batch slots)
- * One CE (vampire.accre.vanderbilt.edu) that also is our GUMS server; 2 dual-core Opteron CPUs, 8 GB RAM
- * Me personally?
- * I'm a cluster / grid system administrator...
- * I'm not a physicist!

What about storage?

- * Two identical SE's (one production, one test / development)**
- * 2 quad-core Opteron CPU's, 16 GB RAM, 10 Gbit Ethernet**
- * Production SE is sel.accre.vanderbilt.edu**
- * BeStMan**
- * So ... what makes us different?**
- * Our back end storage!**
- * Instead of the standard SAN, NAS, and / or NFS setup, we use storage "depots" via REDDnet**
- * Why?**
- * NSF funded project to develop a tool to break the CMS "data tether"**
- * Locally supported SE that will be used by CMS-HI Tier 1.x**

Where are we with this?

- * We've only recently reintegrated REDDnet as our SE
- * We also recently upgraded to the new more powerful SE listed previously ... and changed it's name - which is not a trivial thing to do
- * Reading / writing to REDDnet via GridFTP and / or SRM commands works!

Vanderbilt_SE
sel.accre.vanderbilt.edu

✓ No issues found for this resource.

SRM V2 Storage Element Service Status

✓ No issues found for this service.

Critical Metrics

✓ **SRMCP Read / Write** ⓘ Reported 59 minutes ago
Attempts to read and write against the SE using srmcp.
Hide Detail
SRM write/read was succesfully tested using SRM protocol 2;
Upload to and download from SRM server succeeded; Received file is valid.
Clean up of test file srm://sel.accre.vanderbilt.edu:6288/srm/v2/server?SPN=
/rsvtestdir/1246030080-storage-probe-test-file-remote.31556 successful.
Metric Data ID: 10677779 Fresh for: 6 hours

✓ **SRM Ping** ⓘ Reported 14 minutes ago
Check if the SRM server responds.
Show Detail

GridFtp Storage Element Service Status

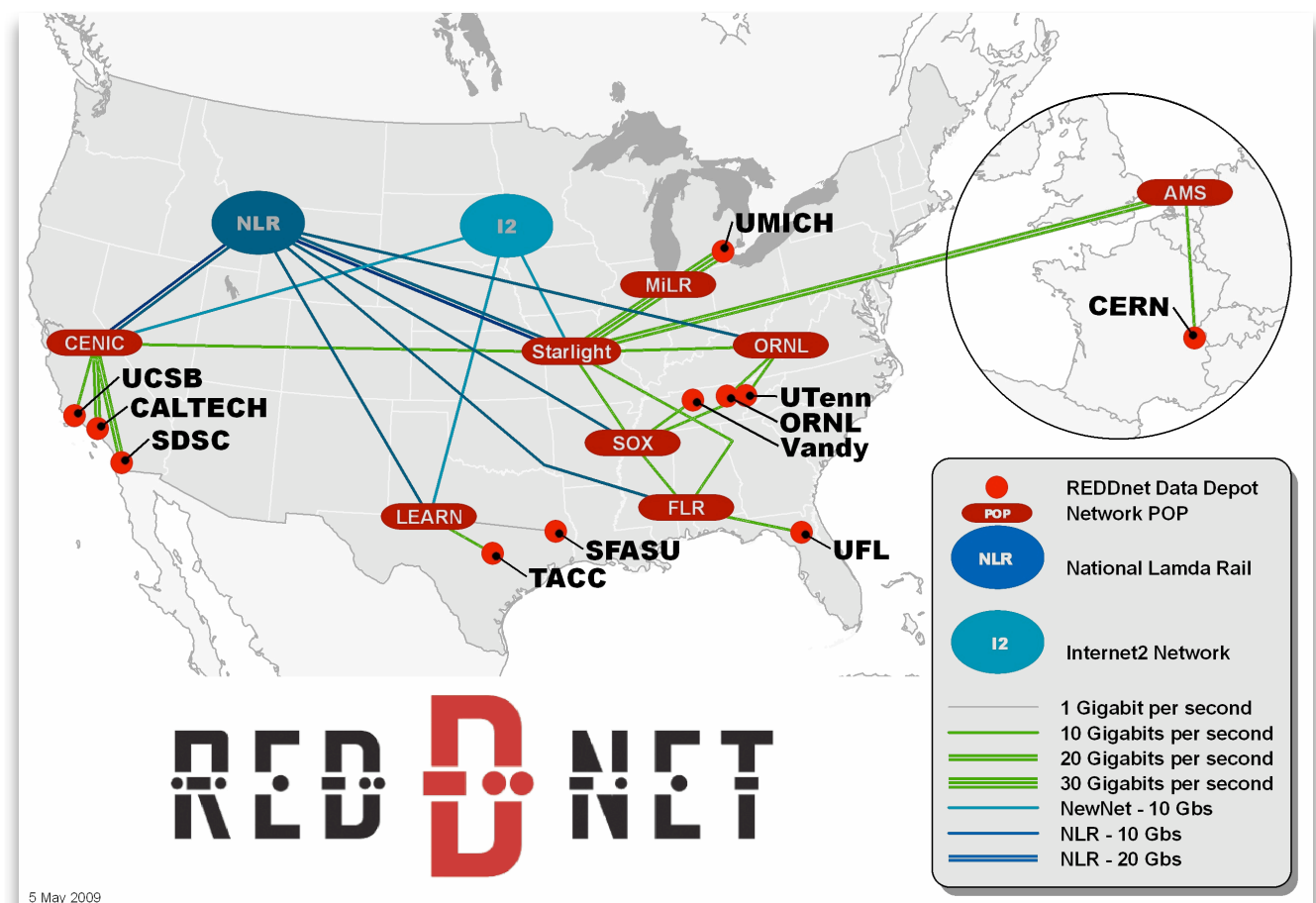
✓ No issues found for this service.

Critical Metrics

✓ **GRID FTP** ⓘ Reported 19 minutes ago
Checks if GridFTP works to and from remote resource.
Hide Detail
Gridftp was succesfully tested! Upload to and download from remote host succeeded;
Received file is valid.
Metric Data ID: 10678571 Fresh for: 6 hours

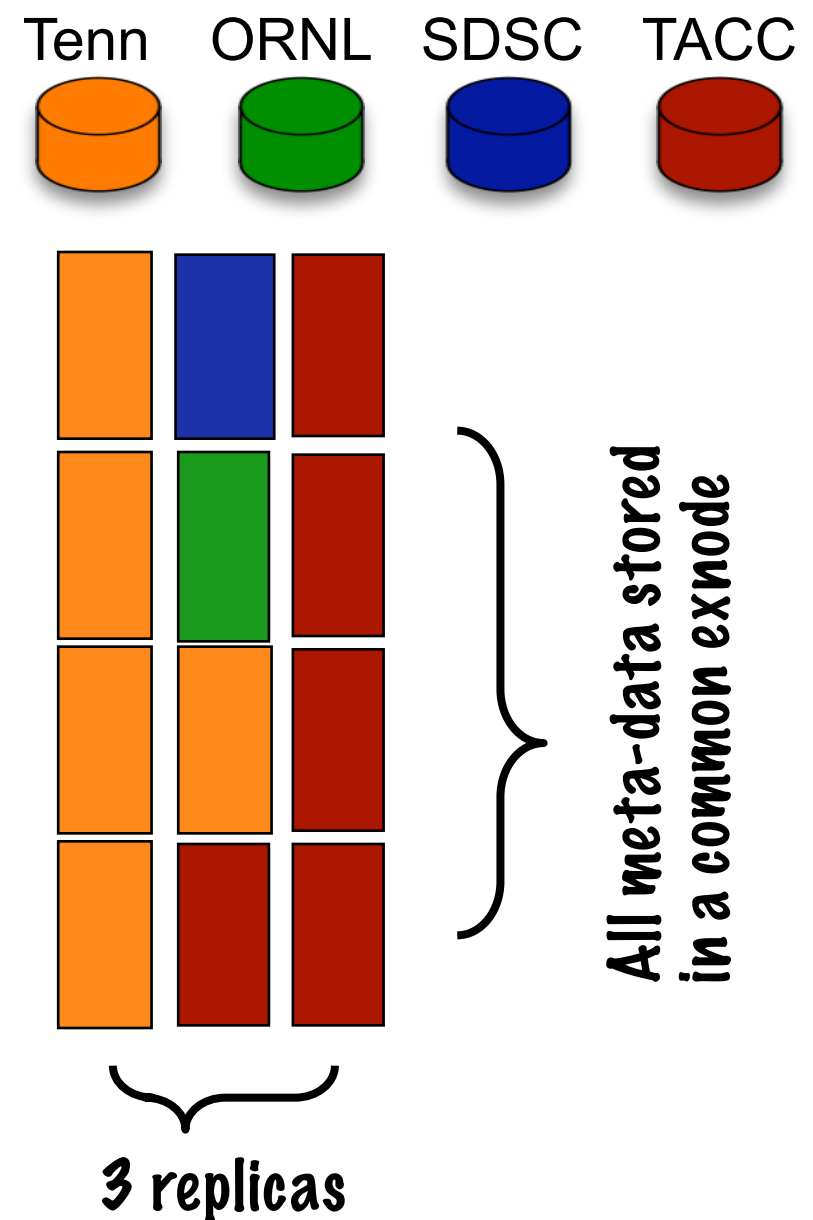
What is REDDnet?

- * Research and Education Data Depot Network
- * NSF Funded
- * “Working storage” - manage the logistics of sharing, moving, and staging large datasets across wide areas and distributed collaborations
- * “Data Pulse” - strongly interested in a data set for a brief period ... then another ... then another ...



REDDnet - Replication

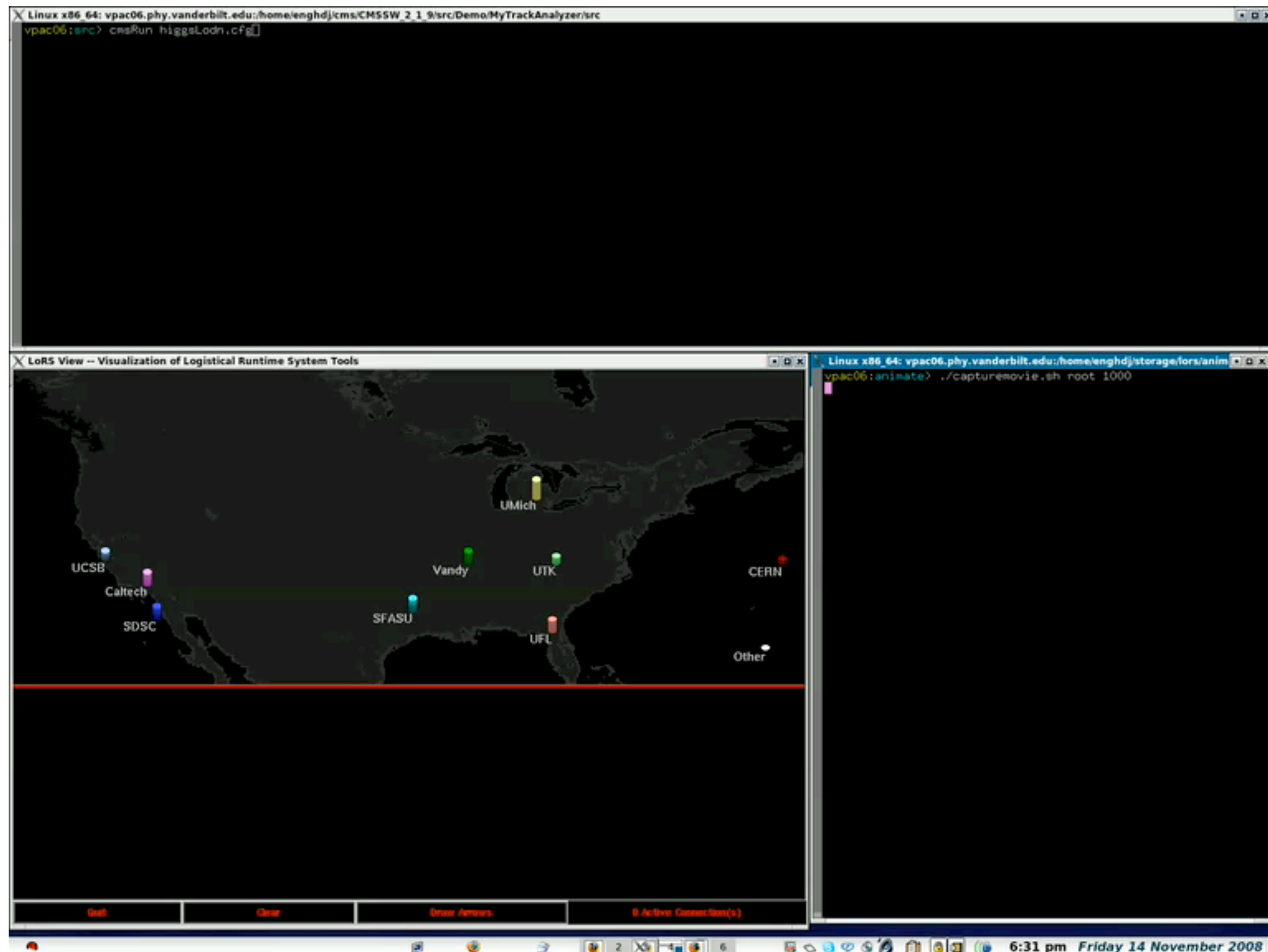
- * File is broken into "slices" of fixed size
- * Can replicate a file or migrate it
- * Replication info is stored in the same exnode as the original file
- * Example: 3 replicas across 4 depots
- * If a depot (or its' network) goes down, you can still access the file (transparently)



- * Can set replication / movement for a directory, sub-directory, or file**
- * A "generic" (non-CMS) REDDnet user may want to upload a file to a local depot at ORNL, then have it moved across the country to their university**
- * A CMS REDDnet user will want to replicate the file and put copies on depots near several collaborators (which addresses the current CMS latency issue)**
- * All of this occurs in the background (automatically) based on policy**
- * Security - all files can be read by anyone who knows the exnode, but to upload a file you have to have a grid certificate or a REDDnet account**

- * Inject data into REDDnet using standard CMS data movement tools (PhEDEx / gridFTP)**
- * Special gridFTP backend then uploads data into REDDnet**
- * The data is then replicated to ensure that copies are near the users' CPUs**
- * Plugin for CMS software - reads directly from REDDnet**
- * All of this is transparent to the user**
- * Demo...**

REDDnet CMS Demo



The screenshot displays a Linux desktop environment with three open windows:

- Top Window:** A terminal window titled "Linux x86_64: vpac06.phy.vanderbilt.edu:/home/enghdj/cms/CMSSW_2_1_9/src/Demo/MyTrackAnalyzer/src". The prompt is "vpac06:src>" and the command "cmsRun higgsLodn.cfg" has been entered.
- Bottom-Left Window:** A map visualization titled "LoRS View -- Visualization of Logistical Runtime System Tools". It shows a map of North America with several locations marked by colored pins: UCSB (blue), Caltech (pink), SDSC (blue), SFASU (cyan), Vandy (green), UMich (yellow), UTK (green), UFL (red), CERN (red), and Other (white). A red horizontal line is visible at the bottom of the map area.
- Bottom-Right Window:** A terminal window titled "Linux x86_64: vpac06.phy.vanderbilt.edu:/home/enghdj/storage/lors/anim". The prompt is "vpac06:animate>" and the command "./capturemovie.sh root 1000" has been entered.

The desktop taskbar at the bottom shows the system clock as 6:31 pm on Friday 14 November 2008.

GridFTP Reliability

- * The graph below shows sustained 1-2 Gbit / second transfers to a REDDnet gridFTP server, 24 x 7 for a full month
- * Transfers attempted to mimic real world usage
- * The first 3 weeks worth of transfers were across campus
- * The last week worth of transfers were from Caltech to Vanderbilt

