NSF Campus Cyberinfrastructure PI and Cybersecurity Innovation for Cyberinfrastructure PI Workshop

September 23 – 25, 2019 | Minneapolis, MN

NSF Program (either CC or CICI): CC*

Program Area: CC* Storage **Award Number:** 1659169

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Project Title: *Implementation of a Distributed, Shareable, and Parallel Storage Resource at San Diego State University to Facilitate High-Performance Computing for Climate Science*

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Quad Chart for:

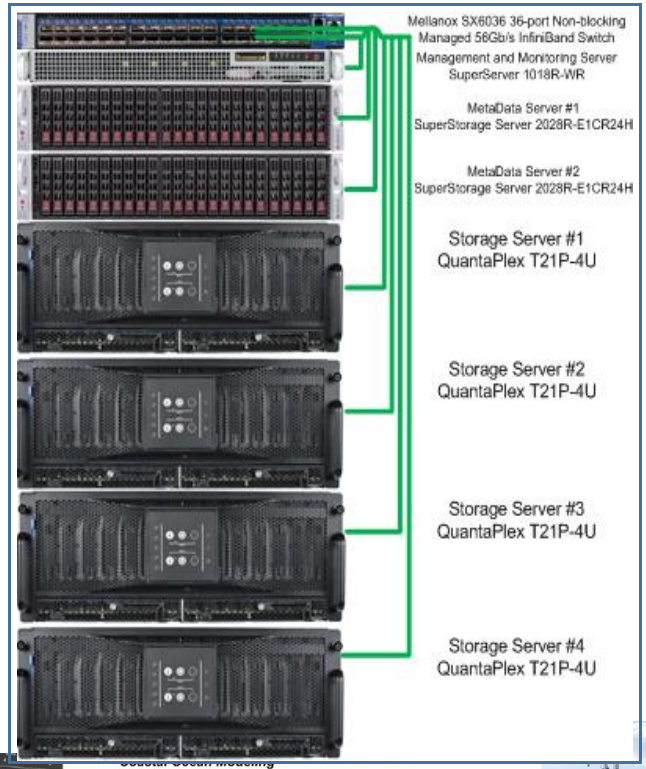
CC Storage: Implementation of a Distributed, Shareable, and Parallel Storage Resource at San Diego State University to Facilitate High-Performance Computing for Climate Science*

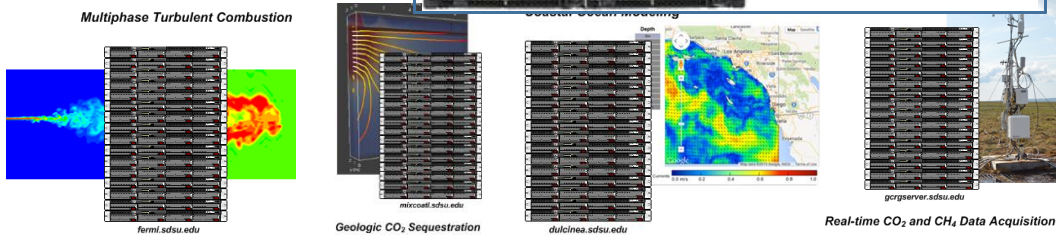
Challenge Project Seeks to Address:

- Atmosphere, ocean, and subsurface numerical modeling applications can generate tera- and petascale datasets
- Time required to write data is often the determining factor in the time required to complete a simulation, rather than microprocessor speed
- "I/O bound" applications require high performance storage to reduce computational runtime

Solution(s):

- Runtime performance of I/O bound numerical simulations can be improved using a parallel file system
- Distributed processes simultaneously perform read and write operations
- SDSU has deployed a two-petabyte BeeGFS parallel storage cluster





BeeGFS® developed by Fraunhofer

Scientific Impact:

- *Geologic CO_2 Sequestration*: simulation of (100µm) microfracture evolution during CO_2 injection in km-scale reservoirs
- *Coastal Ocean Modeling*: Nonhydrostatic large eddy simulation (LES) model with high-resolution (meter) grids
- *Real-time CO_2 and CH_4 Data Acquisition*: real-time carbon flux measurements from array of fast response (10 Hz) three-dimensional sonic anemometer-thermometer instruments and open path gas analyzers installed in towers across the north slope of Alaska along a 300 km transect from Barrow to Ivotuk

Metadata tag:

- *Publication pending: Effects of charged solute-solvent interaction on reservoir temperature during subsurface CO_2 injection; C. Paolini, J. Matthews, J. Castillo, and D. Trebotich*