

HPC Storage Solutions for Research Markets

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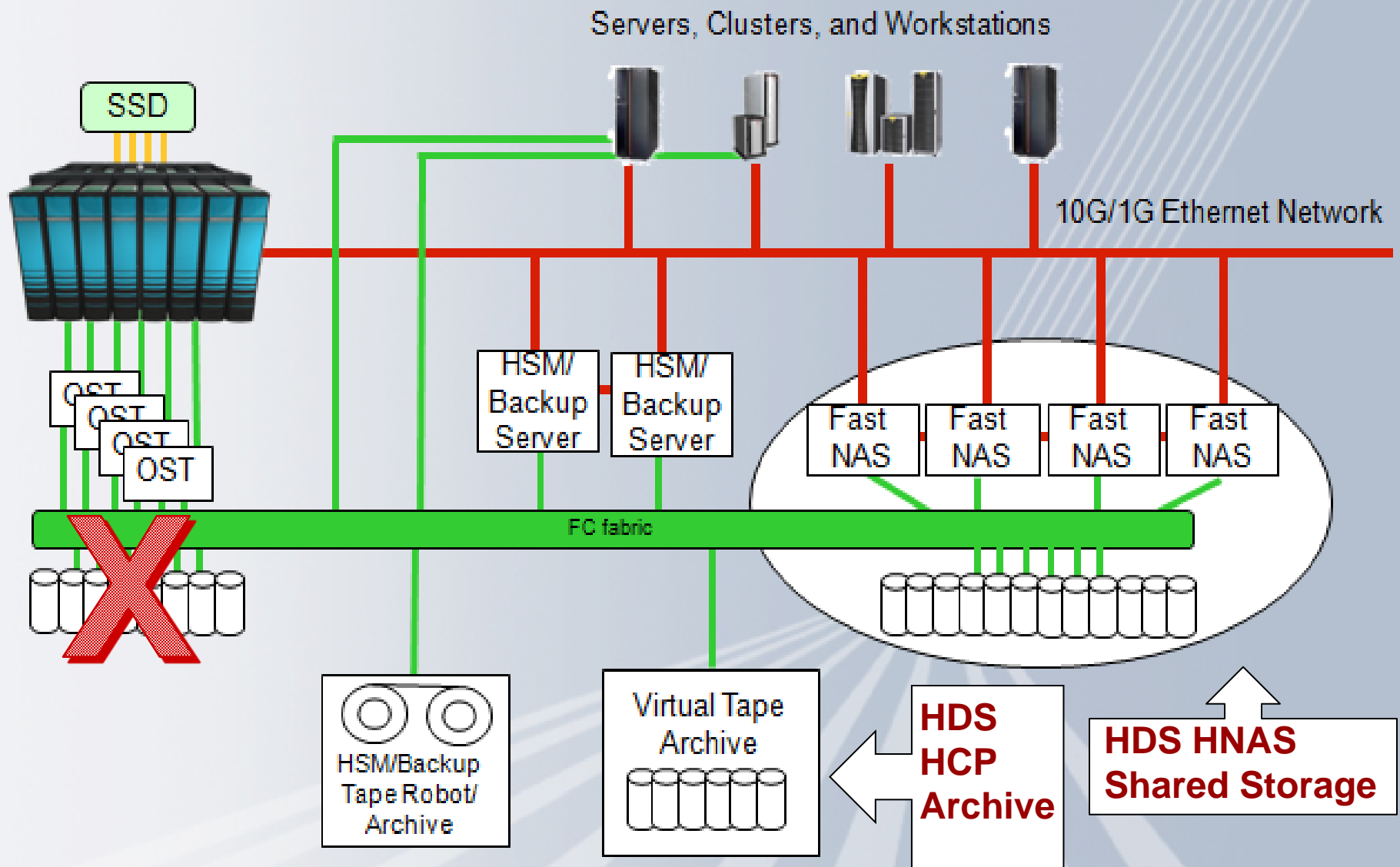


NOT for very large scale scratch space storage

- **HDS is not a fit to provide very high throughput storage for scratch functions for the largest HPC Compute Clusters.**
- **Our Density/Capacity/Throughput ratios are not currently competitive.**
- **We can compete for mid-tier or lower HPC scratch space requirements. (ie 2000 nodes or less)**

Where HDS Fits in Large HPC Compute Architectures

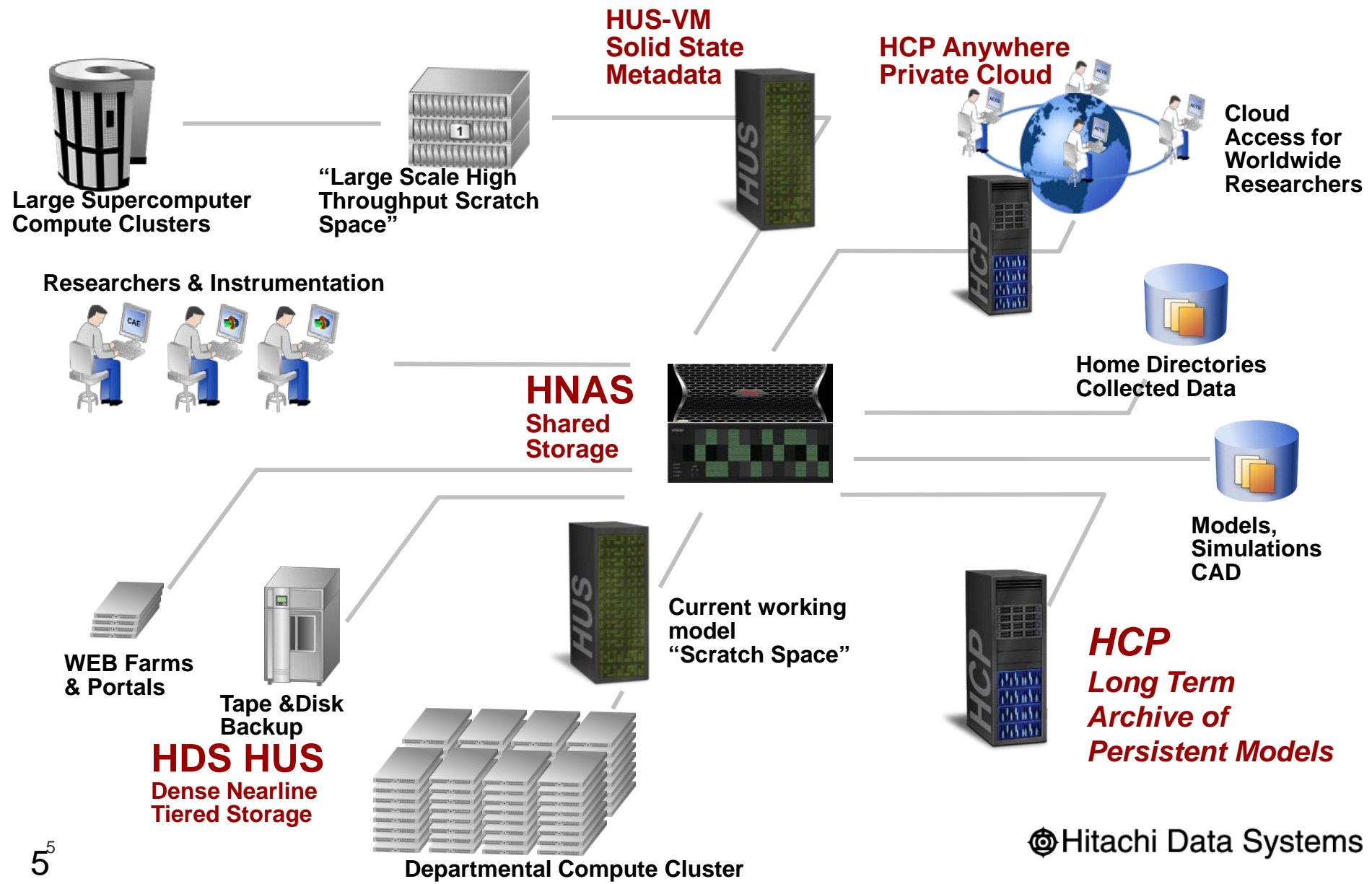
- HNAS - Providing High Performance Shared Storage
- HCP - Long Term Archival of Persistent Models



HPC ancillary systems that require a balance of:

- **High Reliability**
- **High Availability**
- **High Performance; balance of IOPS and throughput**
- **High scalability, Large capacity & File system scalability**
- **Virtualization & Consolidation of storage**
- **Data Sharing, intra and inter organizational (Cloud)**
- **Simple Administration**
- **Long term archival**
- **And a strong set of Enterprise Class storage features**

HDS Research Architecture



HDS Solutions for HPC

Solution	Customers	Challenges
Home File Systems for Research	NCI, NHLBI, NOAA, ORNL, Brookhaven, NIST, NHGRI	Constant balancing of customer workloads, high throughput, high IOPs, capacity, data protection/recovery
External Data Portals & Web Farms	NASA, NOAA, NIST	Handling spikey behavior, large files,
Shared Modeling and Analysis; instrumentation	NASA, ORNL, NCI, NHLBI, NHGRI	handling concurrent access to large scale files, without performance degradations
Mid-Tier Scratch Space	LLNL, DoD, ORNL	Aggregating multiple workloads to balance performance
MetaData Servers	Multiple customer interest	Highly reliable IOPS for data integrity
Object store for Archive of Persistent Data, Models	NARA, multiple customers interest, DoE,	Highly searchable content aware objects, highly protected data, data sharing across networks/cloud, Costs versus traditional tape HSM, backups

Research Markets Customers



- Accelrys
- American College of Radiology
- American Physical Society
- Brookhaven National Laboratory
- BioBase
- Cambridge University
- Claremont McKenna College
- Columbia University
- Cray, Inc.
- Encysive Pharmaceutical
- European Bioinformatics Institute
- European Fusion Development Agreement
- Fermi National Accelerator Laboratory
- Fred Hutchinson Cancer Research Center
- Genentech
- George Washington University
- Harvard University
- HECToR Partners
- Idaho National Laboratory
- Johns Hopkins University
- Kansas University
- Lawrence Livermore National Laboratory
- Massachusetts General Hospital
- Merck & Co.
- Massachusetts Institute of Technology
- Neogenesis Pharmaceuticals
- Penn State University
- Princeton University
- Purdue University
- Rice University
- Roche
- Samaritan Health
- Sandia National Laboratories
- Sanger Institute
- Siemens Magnet Technology
- Southwest Foundation for Biomedical Research
- Stanford University
- The Field Museum
- Tufts University
- University of Minnesota
- Vanderbilt University
- Washington University in St. Louis