

PARAM SHIVAY Software Environment



SUM

Superikshan

CHReME



Geo-spatial



CFD CSM & SDP



Computational Biology



Earth Sciences

HPC Applications



Defining Extreme Science & Engineering



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परम Ψ
शिवाय Ψ PARAM Ψ
SHIVAY Ψ

PARAM SHIVAY System Configuration

System Specifications	
Theoretical Peak Floating-point Performance Total (Rpeak)	837 TFLOPS
Sustained Performance (Rmax)	425 TFLOPS (CPU only Nodes) + 100 TFLOPS (GPU Nodes)
Base Specifications (Compute Nodes)	2 X Intel Xeon Skylake 6148, 20 Cores, 2.4 GHz, Processors per node, 192 GB Memory, 480 GB SSD
Master/Service/Login Nodes	10 nos.
CPU only Compute Nodes (Memory)	192 nos. (192GB)
High Memory Nodes	20 nos. (768GB)
GPU Compute Nodes	11 nos. (22 Nvidia V100 PCIe)
Total Memory	54.3 TB
Interconnect	Primary: 100Gbps Mellanox Infiniband Interconnect network 100% non blocking, fat tree topology Secondary: 10G/1G Ethernet Network Management network: 1G Ethernet
Primary Storage	Lustre based Primary storage 750 TiB usable with 25 GB/Sec write throughput
Archival Storage	Archival Storage 250 TiB usable capacity based on DDN Gridscaler (GPFS) with 1GB/sec write throughput

CPU only Compute Nodes

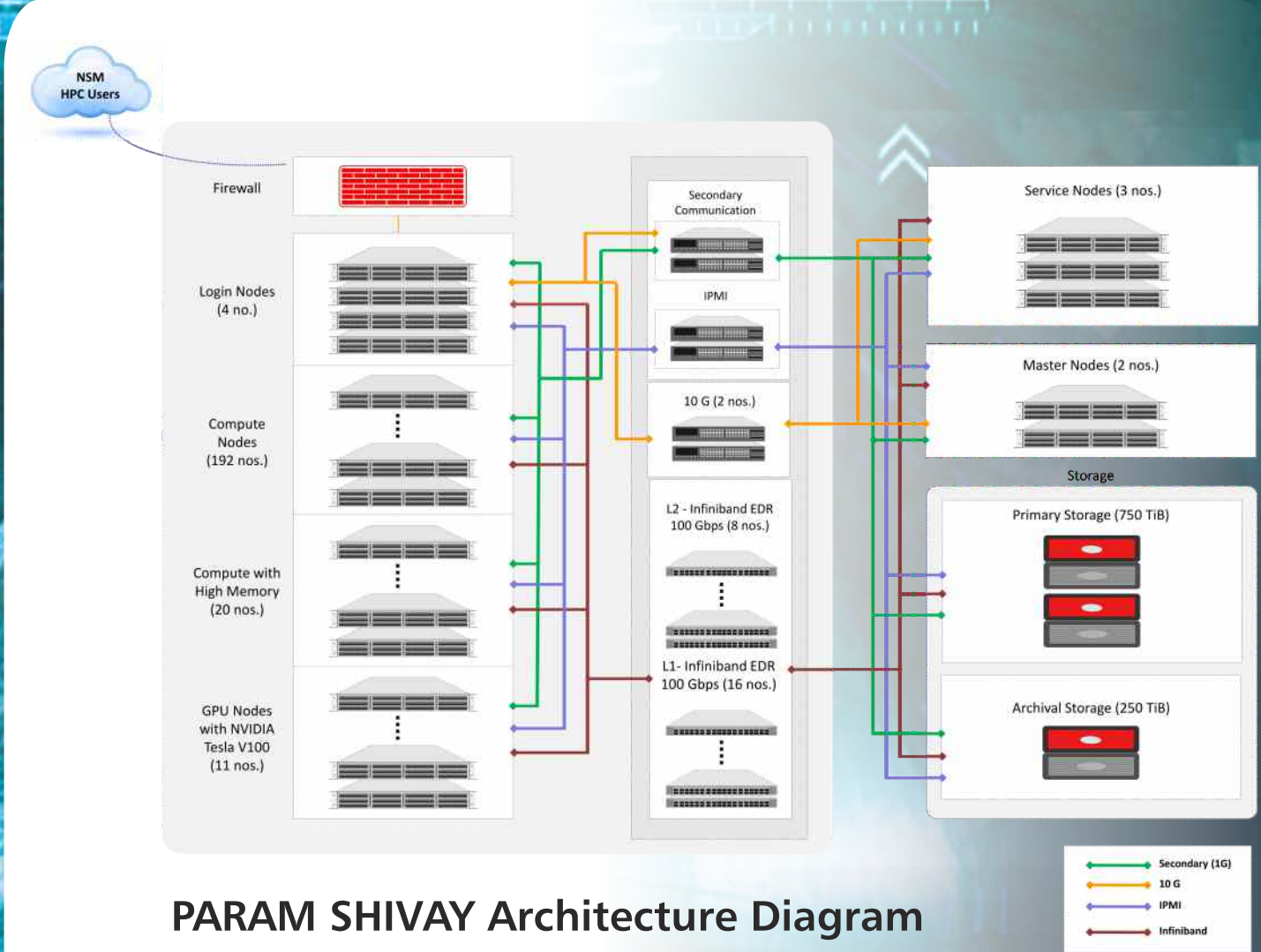
- 192 Nodes
- 7680 Cores
- Compute power of Rpeak 589 TFLOPS
- Each Node with
 - 2 X Intel Xeon Skylake 6148, 20 cores, 2.4 GHz, processors
 - 192 GB memory
 - 480 GB SSD

High Memory Compute Nodes

- 20 Nodes
- 800 Cores
- Compute power of Rpeak 61 TFLOPS
- Each Node with
 - 2 X Intel Xeon Skylake 6148, 20 Cores, 2.4 GHz, Processors
 - 768 GB Memory
 - 480 GB SSD

GPU Compute Nodes

- 11 Nodes
- 440 CPU cores
- Compute power of Rpeak 187 TFLOPS
- Each Node with
 - 2 X Intel Xeon Skylake 6148, 20 Cores, 2.4 GHz, Processors
 - 192 GB Memory
 - 480 GB SSD
 - 2xNvidia V100 PCIe accelerator cards each with 5120 CUDA cores, 16 GB HBM2



PARAM SHIVAY Architecture Diagram

Category	Performance Monitoring	HPCC	IMB/OSU	IOR	HPCG		
HPC Programming Tools	Visualization Tools	Ferret	GrADS	ParaView	Visit/ VMD	C-DAC tools IDE, CAPC	
	Application Libraries	NetCDF/ HDF/ etc.	Math Libraries	Python Libraries	GNU Scientific Library	CHReME	
	Development Tools	Intel Cluster Studio	GNU	CUDA Toolkit/ OpenACC			
	Communication Libraries	Intel MPI	MVAPICH2	Open MPI	PGAS	C-Chakshu	
Middleware Applications and Management	Cluster Monitoring/ Help Desk	Ganglia	C-DAC Tools	Nagios	XDMoD	osTicket	SuParikshan SUM
	Resource Management/ Scheduling/ Accounting	SLURM			SLURM Accounting		HPC Tasks Automation Scripts
	Provisioning	OpenHPC (xCAT)					
	File System	NFS	Local FS (XFS)	Lustre	GPFS		
Operating Systems	Drivers	OFED	CUDA	Network & Storage Drivers		Cluster Checker Scripts	
	Operating System	Linux (CentOS 7.x)					

C-DAC HPC System Software Stack