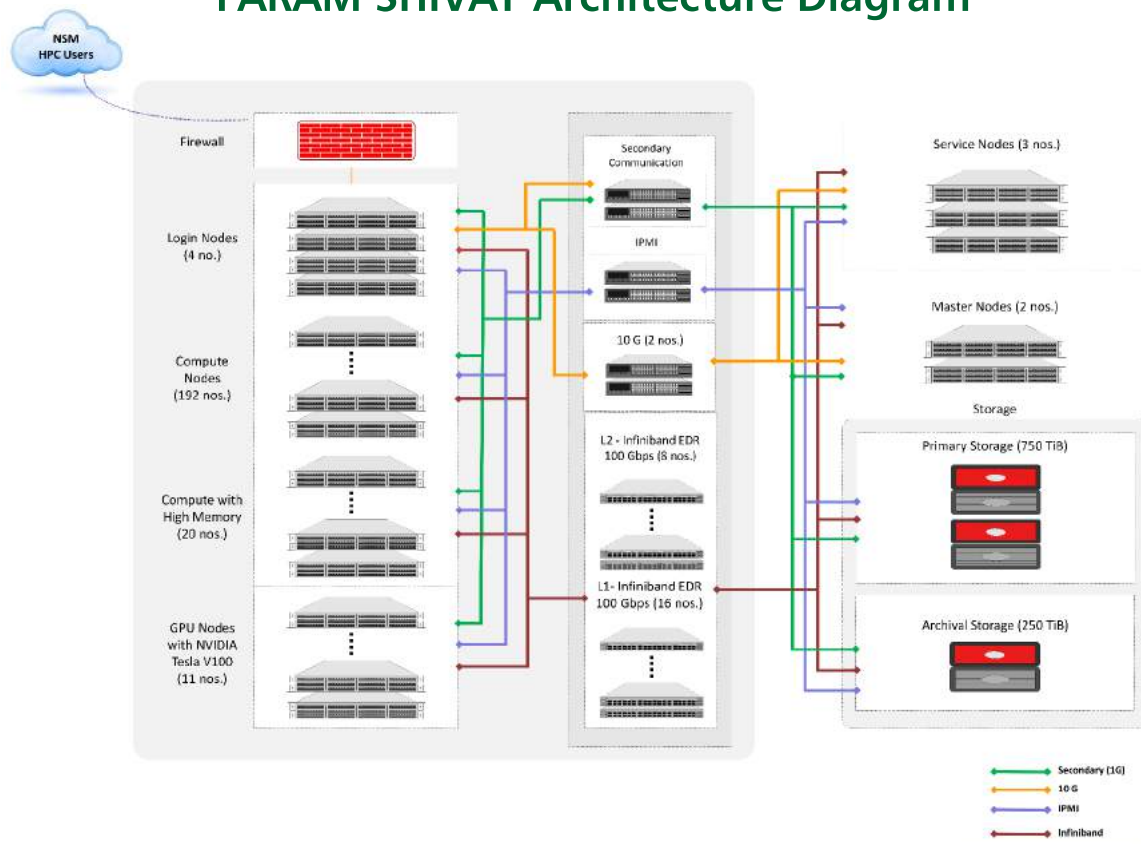




PARAM SHIVAY

परम शिवाय

PARAM SHIVAY Architecture Diagram



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

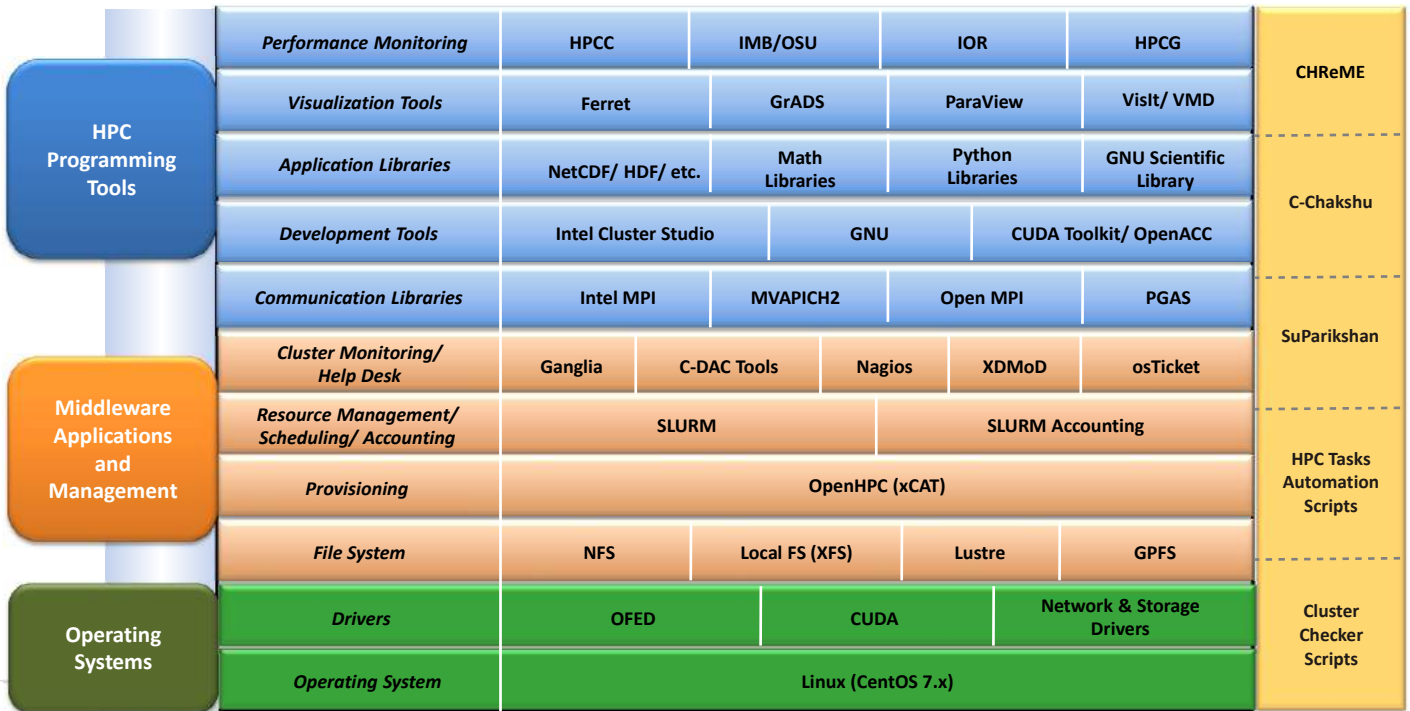
High Memory Compute Nodes

- ✦ 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

C-DAC HPC System Software Stack



PARAM Shivay Applications

- Weather : WRF, RegCM, MOM, ROMS
- CFD : OpenFOAM, SU2, Nektar + +, FDS, RapidCFD
- Molecular Dynamics : Gromacs, LAMMPS, NAMD
- Bioinformatics : ClustalW, mpiBLAST, MUMMER, Phylip, HMMER, Bowtie2
- Deep Learning Framework: Tensorflow, Theano, cuDNN, Keras, pytorch
- Visualization Tools : GRADS, VMD, VisIt, ParaView
- Computational Chemistry : CP2K, Quantum Espresso
- Material Modelling : Abinit
- Computational Chemistry : Nwchem
- Astrophysics : Athena
- Electromagnetics : Meep
- Intel Python, Intel Parallel Cluster Studio