PARAM SHAVAK
A Compact & Power Efficient Supercomputing Solution from C-DAC
Inaugurated by Hon’ble Minister for Communications and Information Technology Shri. Ravishankar Prasad during Good Governance day
Objectives

- Create a pool of skilled professionals for pursuing research and development in the area of HPC.
- Promote use of HPC systems and parallel programming in several application domain areas
  - By providing all the development and management tools and environment.
- Facilitate use of this product for various scientific and engineering applications.
Salient Features

- HPC system in a table top model
- Easy to deploy solution
- Equipped with C-DAC indigenously developed software technologies
- Pre-loaded with CPU and Accelerator (GPGPU/MIC)
- Useful for academic, scientific and research institutions that are in the verge of adopting HPC culture, in terms of
  - Affordability and maintenance
  - Reduced learning curve with ready-to-use solution
  - Exposure to latest technologies
Salient Features (Cont...)

- Customizable as per the user hardware and software requirement
- Scalable hardware model
- Access to C-DAC PARAM Yuva-II
- Support for C-DAC's Reconfigurable Computing System technology
- Resource for parallel programming training and workshops
Supercomputer in a Box solution in a table top model
- Powered with 2 multicore CPUs each with at least 12 cores with provisioning for one or two numbers of accelerator cards (Intel Xeon Phi or Nvidia)
- More than 2 Tera-flops of computing power with min. 8 terabytes of storage
- Easy to deploy solution with minimum datacenter infrastructure.
- Pre-loaded with parallel programming development tools and libraries
- Preinstalled scheduling and resource management tools
Tutorials, learning material, videos and user manuals, etc.
Built-in selected Scientific & Engineering Applications across several HPC application domains.
Indigenous award winning ONAMA (Manthan Award 2013) and CHReME (IDC Award at SC 2011) software tools.
Applications on PARAM Shavak
Multidisciplinary applications from various domains
Applications from various domains

- Bio-informatics : mpiBLAST
- Molecular Dynamics : GROMACS, NAMD, LAMMPS
- Materials Science : Quantum Espresso
- Quantum Chemistry : NWChem, ABINIT
- Atmospheric & Ocean Modeling : WRF, MOM
- CFD : OpenFOAM
Intel Tools

- Intel® Parallel Studio XE 2015 Cluster Edition consists of the following components:
  - Intel® Advisor XE
  - Intel® C++ Compiler XE
  - Intel® Fortran Compiler XE
  - Intel® Inspector XE
  - Intel® Integrated Performance Primitives (Intel® IPP)
  - Intel® Math Kernel Library (Intel® MKL)
  - Intel® MPI Benchmarks
  - Intel® MPI Library
  - Intel® Threading Building Blocks (Intel® TBB)
  - Intel® Trace Analyzer and Collector
  - Intel® VTune™ Amplifier XE
  - GNU* Project Debugger (GDB*) (GPL licensed)
Libraries

- SDK: Netbeans
- Job Scheduler: Torque
- Monitoring Tool: Ganglia
- Data Visualization and Analysis tools: Ferret, GrADS, ParaView etc.
- Libraries: Tcl, Netcdf, zlib etc
Benchmarks on PARAM Shavak

NAMD

Speed up

1 Node Run

CPU

CPU+MIC
Benchmarks on PARAM Shavak

CPU Benchmark

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- MPIBlast
- ABNIT
- NWCHM

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C-DAC Indigenous Tools on Param Shavak
CHReME
C-DAC’s HPC Resource Management Engine

- Efficient and easy usage and management of resources of HPC systems

- Job submission, management and monitoring tool
- Timely E-mail notification regarding job status;
- Personalized job list and job status information
- Secure credential specific access on web through https
- Allows users to configure their execution environment through compilers and libraries selection, scheduling parameters etc.
- Scientific & Research Applications specific portals
ONAMA

With a mission of “Equipping Premier Academic Institutions with top of the class HPC solutions from C-DAC packaged with open source software and world class services. This would enable the Premier Academic Institutions to benefit in terms of service delivery and affordability.”

- An integrated package which opens new door to future technocrats, providing them a Quantum leap in developing a firm understanding through HPC in several engineering disciplines.
- Comprises of a well selected set of parallel & serial applications and tools across various engineering disciplines.
- **Parallel Programs**: examples codes based on OpenMP, MPI, Co-processor enabled, use of scientific and engineering Library functions such as BLAS, LAPACK, FFT, to solve Laplace, Poisson problems etc.

- **Tycho** CFD code

- **OOFEM** a finite element code

- **Scilab** software for numerical computation

- **RedMD**: Molecular Dynamics simulations for coarse-grained models of proteins, nucleic acids and their complexes

- **Octave** is a high-level interpreted language, primarily intended for numerical computations such as for linear and nonlinear problems

- **Weka** is a collection of machine learning algorithms for data mining tasks
Recent Deployments

- Assam University
- Tezpur University
- Assam Engineering College
- PSG College of Technology
- NIT Agartala
- NIT Delhi
- NIT Manipur
- NIT Meghalaya
In Pipeline

- NIT Arunachal Pradesh
- NIT Mizoram
- NIT Nagaland
- Mizoram University
- DTE Assam
PARAM Yuva II System
Thank You