PARAM Shavak - Supercomputing Solution in a Box param shavak machine

Overview

PARAM Shavak is a high-performance computing (HPC) solution designed to meet the computational needs of research organizations and academic institutions. It comes pre-loaded with essential system software and applications from various scientific domains, making it a ready-to-use tool for organizations adopting HPC culture. PARAM Shavak is a ready-to-use platform for scientific and engineering applications. It is a supercomputing in a box solution.

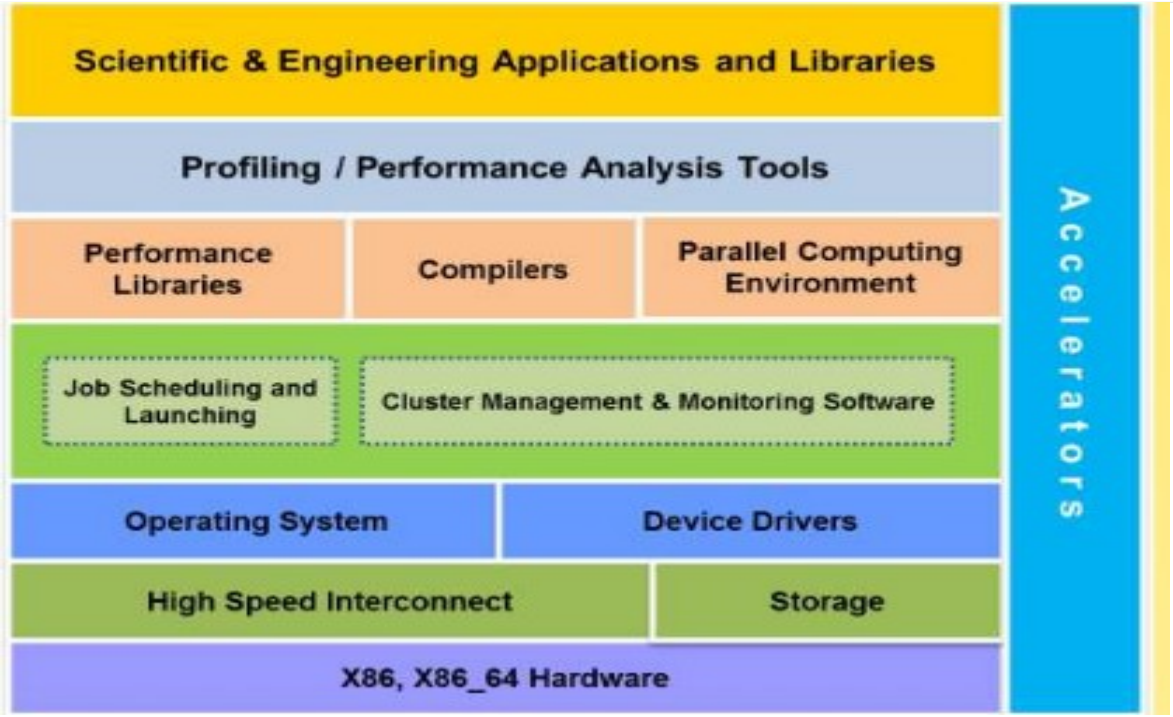
- Provides application development and system management environment similar to large supercomputing systems.
- Pre-loaded with parallel applications from different domains.
- Easy to deploy solution with minimal data centre infrastructure.

Objectives

- **Capacity Building:** Provide computational resources with advanced technologies for high-end computations in scientific, engineering, and academic programs.
- Create an HPC-aware skilled workforce and promote research by integrating emerging technologies at the grassroots level.
- **Affordability:** Address the increasing computational needs of colleges and universities at an affordable cost.
- To serve HPC aware users with modest requirements.
- Users familiar with the HPC environment required to solve their problems often do not have access to even modest HPC systems to significantly speed up their work.

PARAM Shavak Machine Architecture

- **System Configuration:** 2 multicore CPUs (minimum 12 cores each) with two accelerator cards, all in a single server tabletop model.
- **Infrastructure Requirements:** Unlike traditional HPC systems, it doesn't require specific support infrastructure like precision air-conditioning or controlled humidity.
- **Noise Level:** Acceptable sound level, reducing infrastructure costs.



Salient Features

- **Supercomputer in a Box:**
  - Tabletop model.
  - Powered by 2 multicore CPUs (minimum 12 cores each) and 2 accelerator cards.
  - 3 Tera-Flops peak computing power with 8 TB of storage.
- user friendly web based GUI to access various HPC resources.
- Simplified and secure access to the HPC resources from the remote machine.
- Secure credential specific access on web through https.
- Optimum utilization of HPC system's resources and resource reservation.
- Creation, submission, monitoring and management of jobs through GUI. Jobs are submitted through industry standard.
- cluster schedulers at the backend.
- Personalized job list and job status information.
- Graphical representation of the cluster resources and jobs.

- Timely e-mail notification regarding job status.

- Portal provides a layer of abstraction to the end users by freeing them from the command line mode of execution in addition to providing benefits to the end users to focus on their scientific domain areas

- **Easy Deployment:**
  - No additional data center infrastructure required.
  - Pre-loaded with parallel programming development tools and libraries.
- **Built-in Applications:**
  - Bio-informatics: mpiBLAST
  - Molecular Dynamics: GROMACS
  - Materials Science: Quantum Espresso
  - Quantum Chemistry: NWChem, ABINIT
  - Atmospheric and Ocean Modeling: WRF, MOM
  - CFD: Open FOAM
- **Customizable and Scalable:**
  - Customizable hardware and software configurations.
  - Scalable model with Accelerator (GPGPU/MIC) enabled parallel applications.
- **Access to National Param Supercomputing Facility:** Utilize C-DAC PARAM Yuva II for larger scale computations per NPSF usage policy.
- **Support for Reconfigurable Computing System:** Speed up applications through hardware.
- **Training and Workshops:** Resource for parallel programming training and workshops.

Need

- Growing global recognition of HPC as a key resource for computational simulation and modeling.
- PARAM Shavak addresses the need for affordable supercomputing solutions, contributing to the nation's R&D activities.

Indigenous Tools

Onama

- Designed for scientific and research institutions to introduce HPC into the education curriculum.
- Promotes high-end research at the academic level by providing HPC-enabled open source and freeware tools in the engineering domain.

CHReME

- Enables users to access Linux-based HPC environments through an intuitive GUI.
- Provides a layer of abstraction, shielding users from the complexity of accessing HPC resources.
- Web Interface for easy management and monitoring of clusters.

HPC Environment

- **Pre-installed Environment:**
  - PARAM Shavak comes with all necessary software, including compilers (GNU, Intel Compilers, CUDA environment), SLURM scheduler, and pre-compiled HPC applications from different scientific domains.

SLURM (Simple Linux Utility for Resource Management)

- Open-source, fault-tolerant, and highly scalable cluster management and job scheduling system.
- Allocates computational tasks among available resources, suitable for large and small Linux clusters.
- Use cases: Submitting large jobs, unattended job completion, and receiving program output only upon completion.

Monitoring Tools

- **Included Monitoring Tools:**
  - Tools for monitoring and managing the cluster resources, jobs, and timely email notifications regarding job status.

Conclusion

PARAM Shavak is a comprehensive solution that provides powerful HPC capabilities in a compact and cost-effective package. It is designed to empower academic and research institutions, fostering a culture of high-performance computing and advancing scientific and engineering research.