

Introduction:

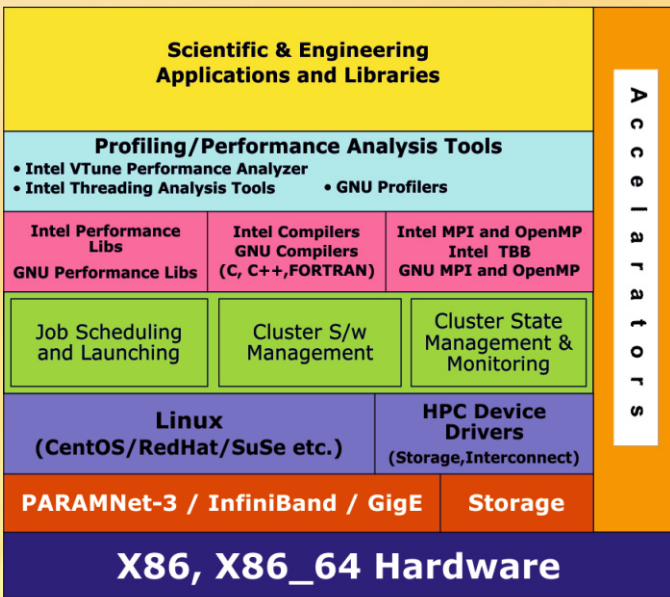
Science and engineering has penetrated into every possible sector, and has helped make our lives easier, safer, and more comfortable than those of our forefathers. And through these several achievements, scientists and engineers seek only one objective: scientific and technological utopia. This can be achieved only by empowering our scientists and engineers with powerful and effective tools, and encouraging them to come up with inventions and innovations at a rapid rate. One significant development of our times is the application of High Performance Computing (HPC).

A number of key issues and trends in HPC will impact the delivery of breakthrough science and engineering in the future. For instance, modeling and simulation are playing a greater role in all areas of scientific and engineering discipline from understanding the molecular processes in cells to designing next-generation batteries for hybrid vehicles. For many disciplines, computation is not only the fastest and most cost-effective tool for discovery, it is the only one.

To meet this anticipated demand, C-DAC has created an effective and versatile solution for today's scientific and engineering students, called Onama.



Target Beneficiaries
Faculties
Students
Research Scholars



Hierarchical Diagram

ONAMA Features:

- A well selected set of parallel as well as serial applications and tools across various disciplines
- Provides application execution interfaces with workflows for several applications
- Efficient and clean allocation of cluster resources by allowing job submissions from applications execution interface only through integrated job scheduler
- ONAMA provides the tools that have close affinity with practical simulation, hence making the learning process a lot more applied.
- Application tutorials
- Consists of number of accelerator (GPGPU/Intel Phi) enabled applications from several domains like molecular dynamics, bioinformatics, computational physics etc.
- Access to various parallel libraries, performance libraries and mathematical libraries

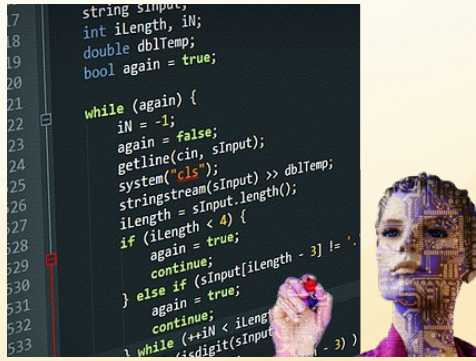
Onama Benefits:

- A sound platform which forms the basic building block for initiating and developing HPC culture
- A well-run and visible HPC infrastructure is an asset to the engineering colleges/Institutes in attracting aspiring students across several fields of engineering.
- HPC infrastructure can be used extensively for modelling and simulation of scientific and engineering applications for final year engineering projects as well as research purposes.
- Enhanced employability in the industry through creation of HPC skilled manpower.
- HPC Symposiums



Professional Opportunity Areas in HPC:

- Development in hardware technologies
- System software development
- Application software development
- System integration
- HPC facility operation and management
- Systems and echo-system solution architects
- Training and education.



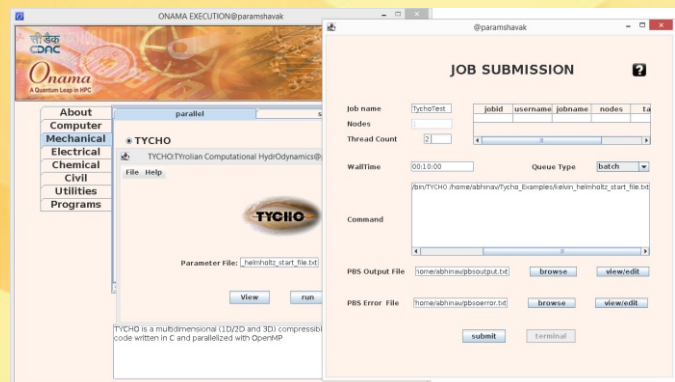
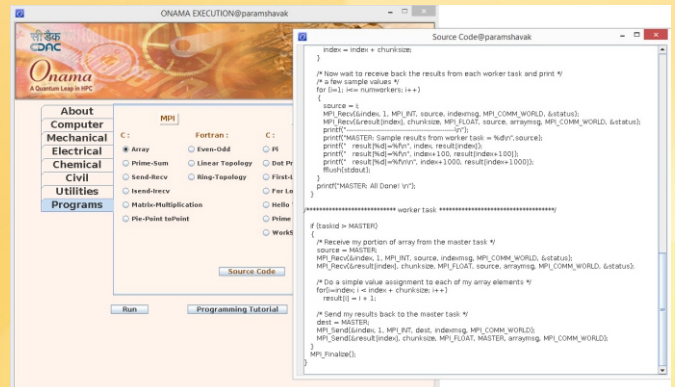
Application Domains:

Computer science, mechanical, civil, electrical & electronics, chemical, parallel computing and so on.

The applications and tools spawn across diverse domains providing a vast array of functions such as numerical computations, neural networks development, data mining, digital circuit simulation, signal processing, CFD, structural analysis, finite element analysis, molecular dynamics, general parallel programs and so on.

Glimpse of Applications & Tools:

- **Parallel Programs** - example codes based on
 - › OpenMP, MPI
 - › Mathematical libraries such as BLAS LAPACK, FFT
 - › Accelerator
 - › Problems of Laplace, Poisson etc.
- **Tycho** - a multi-dimensional compressible hydrodynamics code written in C and parallelized with OpenMP, can be used to solve CFD problems
- **OOFEM** - a finite element code
- **Scilab** - software for numerical computation providing a powerful computing environment for engineering and scientific applications
- **RedMD** - software to perform molecular dynamics simulations for coarse-grained models of proteins, nucleic acids and their complexes
- **Octave** - a high-level interpreted language, primarily intended for numerical computations such as for linear and nonlinear problems, and for performing other numerical experiments
- **Weka** - a collection of machine learning algorithms for data mining tasks



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