**ABSTRACT**

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**PRESENTATION** **TITLE**: High Performing Computers across India

**SCHOOL**: Amrita school of Engineering

**Section**: CSE-E

Introduction:

**High performance computing** (HPC) is the ability to process data and perform complex calculations at high speeds. To put it into perspective, a laptop or desktop with a 3 GHz processor can perform around 3 billion calculations per second. While that is much faster than any human can achieve, it pales in comparison to HPC solutions that can perform quadrillions of calculations per second.

An HPC cluster, is a combination of specialized hardware, including a group of large and powerful computers, and a distributed processing software framework configured to handle massive amounts of data at high speeds with parallel performance and high availability.

HPC is playing a significant role in processing and computing huge amount of data in the domains like **Aerospace, Engineering, Healthcare, Biosciences, Electronic Design, Environment and Weather, Finance and Business, Geographic Information, Media and Film, Urban planning, Forecasting Weather**. The number of supercomputers deployed across India shows the varied problem areas that are been addressed, the Government of India has taken initiative to provide HPC system researchers and the application domain expertise a common platform where the two can complement their field work.

**Database Guidance:**

As HPC has progressed massively in recent decades, we are gathering all the information of HPC clusters across INDIA (complete information of total HPC clusters, location and it’s configuration) in our database management system.

This follows the basic relations and attributes associated with them:

* **Cluster Computers**: Rank, Location, System id (primary key), System Name, Owners, Year, Cluster Operating System, Cores, power, Storage.
* **Cluster Architecture**: System id (foreign key), Cluster Nodes, Nodes id switch or node interconnect, Communication Protocols, Network switching hardware, Applications, Tools used.
* **Cluster Components**: Nodes id, Processors, Memory and Cache, Disk and I/O, System Bus, Cluster Interconnect.
* **Cluster Classification**: Nodes id, Application Target, Node Ownership, Node OS, Node Hardware, Node Ownership, Levels of Clustering.
* **Cluster Users**: System id, customer id, customer name, customer email-id, feedback.

Conclusion:

In India some of the grand challenge areas like Education, R & D, Biotechnology, Weather forecasting, Computational Structural Mechanics, Astrophysics, Computational Fluid Dynamics are being addressed with inclusion of High-Performance computing. While in many of the critical areas like Agriculture, oil and gas, seismic data processing, financial modelling, space sciences etc. requires a huge scientific and monetary contribution in developing high end computational infrastructure.

Rapid increase of HPC in Academic institutes at a nascent stage will promotes high-end research at academic level along with generating a huge HPC man power base for addressing the largescale challenges. Students at academic level should be encouraged to compile and present papers on the research activities undertaken, which will help in spreading the research work. Today these has become the integral part of many product-based Industries in such a scenario widening the HPC parameter in Academia would help in bridging the Academic-Industry interactions through which industries can enhance the product quality, cost and their competitive dimensions while academia would be benefitted by the knowledge of industry professionals which enhance and broadens the curriculum and its perspective. In the process of enhancing the capacity and capability building in High Performance Computing India requires to create a pool of public and private sector alliances to address the national level issues.

* The supercomputer centers are located in sites working on diverse areas including weather and climate, biology, CFD, aerospace, lattice and QCD, mathematics, chemistry, oceanography, meteorology and defense.

Bio-sciences and the human genome: Drug discovery, disease detection/prevention

✓ Computer aided engineering (CAE): Automotive design and testing, transportation, structural, mechanical design

✓ Chemical engineering: Process and molecular design

✓ Digital content creation (DCC) and distribution: Computer aided graphics in film and media

✓ Economics/financial: Wall Street risk analysis, portfolio management, automated trading

✓ Electronic design and automation (EDA): Electronic component design and verification

✓ Geosciences and geo-engineering: Oil and gas exploration and reservoir modelling

✓ Mechanical design and drafting: 2D and 3D design and verification, mechanical modeling ✓ Defense and energy: Nuclear stewardship, basic and applied research

✓ Government labs: Basic and applied research

✓ University/academic: Basic and applied research

✓ Weather forecasting: Near term and climate/earth modelling

 Rmax and Rpeak are scores used to rank supercomputers based on their performance using the LINPACK Benchmark. A system's Rmax score describes its maximal achieved performance; the Rpeak score describes its theoretical peak performance. Values for both scores are usually represented in [teraFLOPS or petaFLOPS](https://kb.iu.edu/d/apeq).

1.HPC CLUSTERS:

* System id (PK)
* Rank
* System Name
* Model
* State
* Installation Date

2.CLUSTERS DETAILS:

* System ID (FK)
* Vendor-OEM (Original Equipment Manufacturer)
* Vendor-Bidder
* Site Name
* City
* Cost
* Year to built
* Memory (Storage)

3.CLUSTER ARCHITECTURE:

* System ID (FK)
* Cluster OS
* Core
* Processor
* Interconnect
* Socket
* Nodes (CPU/ GPU)

4.CLUSTER COMPONENTS:

* System ID (FK)
* Core Frequency
* RMAX
* RPEAK
* Network
* Scheduler
* Partitions

5.CLUSTER USAGE DETAILS:

* System id (FK)
* Locations
* Dedicated For
* Purpose (Used For)