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Department of Computer Engineering

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SUBJECT : High Performance Computing (HPC)
CLASS: Fourth Year Engineering DIV - A SEMESTER: - 8th
ASSIGNMENT NO.: - DATE OF SUBMISSION:
NAME OF STUDENT: - Koustabh Khara ROLL NO. - 37
TOPIC: - Basics of High Performance computing
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Summary/Abstract/Review:

High Performance Computing (HPC) refers to the use of powerful computing resources and techniques to solve complex computational problems quickly and efficiently. The basics of HPC:-

1. Parallel Computing - HPC relies on parallel computing, where multiple processors or computing units work together to perform computations simultaneously.
2. Supercomputer and clusters - HPC system often consist of supercomputers or clusters of interconnected computers. Supercomputers are specialized machine designed for high-speed processing and large-scale simulations. Clusters are collections of interconnected computers that work together to solve complex problem.
3. High-performance Interconnects - HPC systems utilize high-speed interconnects, such as InfiniBand or Ethernet, to enable fast data transfer and communication between computing nodes in a cluster. Low-latency and high-bandwidth interconnects are crucial for efficient parallel processing.



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4. Distributed Memory Architecture - HPC systems typically employ a distributed memory architecture, where each computing node has its own memory.
5. Scalability - HPC systems should exhibit scalability, which means they can handle larger problem size by efficiently utilizing additional computing resources. Scalability ensures that as the problem complexity or size increases, the HPC systems can effectively distribute and process the workload across multiple nodes.
6. High-performance File systems - HPC systems often incorporate high performance file systems, such as Lustre or GPFS, to provide fast and reliable storage for large amounts of data.
7. Application of HPC - HPC finds application in various fields, including scientific research, weather forecasting, climate modeling, computational fluid dynamics, bioinformatics, financial modeling, and simulations for engineering and manufacturing.

Conclusion:-

High Performance Computing (HPC) utilize parallel computing, supercomputers and clusters to efficiently solve complex problems. It enables fast data transfer, scalability and drives scientific advancement across diverse fields, integrating with AI and big data analytics.

Name & Sign of Subject In-charge:

Marks: