High Performance Computing

Industry and Research-oriented course

Trends in HPC

The last six decades have been witness to the computing revolution spearheaded by supercomputing. By continuously pushing the performance limits, while meeting the energy efficiency objectives, HPC has effectively responded to the academia and industry demands. Through innovations in hardware, system software architectures, the Exa-Flop Supercomputer has become a reality. The Three latest notable trends in HPC are

- Accelerated computing using GPUs
- Energy-efficient computing
- Cloud HPC and Automation

Key Course Highlights

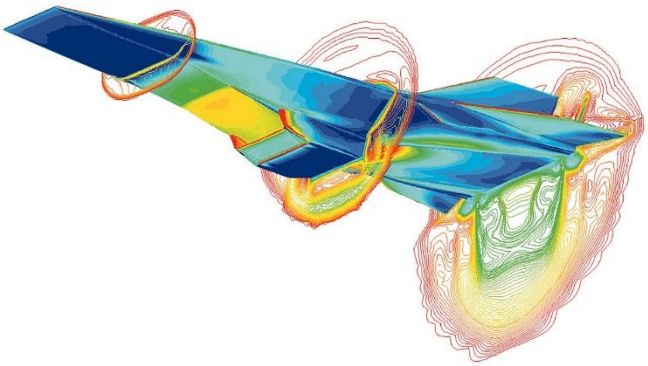
- In addition to standard topics, the course will also cover the latest trends in computing mentioned above
- The forty per cent of the course will include demos, videos from well-known HPC researchers and Hands-on Labs
- Ideal for final year CS/IT students

Course outcome/Benefits to Students

- Students will learn about the state of the art in HPC
- Three credit level course
- Students can apply their learning in their current projects or future research
- By introducing research topics, the course encourages students to pursue HPC Research

Class Schedule for a semester

- 30 x one-hour sessions spread across one semester
- Assignments and evaluations as per university norms
- Teaching mode can be remote online or face-to-face



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Sample Course Topics

- Flynn's Taxonomy and SMT Threads
- Pipelining and Superscalar processors, Memory Hierarchy
- Data Flow and Demand Driven Models
- Accelerated Computing
- IBM Cell BE, Intel Nehalem, Nvidia Tesla, AMD and GraphCore processor architectures
- CUDA programming
- Synchronization
- Workload Scheduling
- Mapping
- Dependency Analysis
- Profiling and Performance Analysis
- Well-known Benchmarks
- Latency, Bandwidth hiding Techniques
- Power-aware Processing Techniques
- Parallel algorithms
- Programming using MPI, OpenMP and CUDA
- Cloud HPC
- AI+HPC Convergence via H/W and S/W

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