

# Final Program of PCAA-99 Workshop (June 21-25, 1999)

**Venue : C-DAC, Pune**

**Invited Lectures & Classroom Lectures : C-DAC**

**Hands on Session: National PARAM Supercomputing Facility (NPSF), C-DAC**

## Monday June 21, 1999

Time	Title/Activity	Speaker	Institute
8:30~ 8:45	<b>Registration</b>		
8:45~ 9:00	<b>Welcome Address:</b> C-DAC Programme Co-ordinator, NPSF	P. K. Sinha	C-DAC
9:00~ 9:50	<b>Keynote Address:</b> Parallel Computing overview	V. Raja Raman	IISc, B'lore
9:50~10:40	<b>Classroom Lecture:</b> Model of Parallel Computers and Architecture – SIMD and MIMD machines; PE characteristics; Symmetric multi processors; Case studies; Concepts of SAN and current trends in Clusters	Atul Bodas	C-DAC
10:45~11:00	<b>Tea break</b> at C-DAC		
11:00~11:50	<b>Classroom Lecture:</b> Communication Architecture – Design issues, Scalability; Kshipra communication architecture – Interconnection networks, Myrinet and ParamNet; Active Messages; Case studies; Basic Communication Operations	Nitin Parab	C-DAC
12:00~12:50	<b>Classroom Lecture:</b> Performance and Scalability of Analysis - (Performance metrics, Performance of Parallel Programs, Speed up, Efficiency, Scalability, Isoefficiency metric and Scalability analysis; Case studies	VCV. Rao	C-DAC
13:00~14:00	<b>Lunch</b> at C-DAC		
14:00~14:50	<b>Classroom Lecture:</b> Programming Models - Introduction to MPI, Point-to-Point, Global and Collective Communications; Communicators and Topologies, Optimized MPI for SMPs, CDAC-MPI and its features, Case studies	Sharath Kumar B.	C-DAC
15:00~15:15	<b>Tea break</b> at NPSF		
15:15~17:45	<b>Hands-on Session (Module1):</b> Point-to-point & Global communications, Global Summation by various methods, prefix sum, Numerical integration		NPSF, C-DAC
17:45~18:00	<b>Tea break</b> at NPSF		
18:00~18:45	<b>Invited Lecture:</b> Parallel Computing in Molecular Modeling	Rajendra Joshi	Pune Univ.
18:45~19:30	<b>Break</b>		
19:30	<b>Dinner</b> at C-DAC		

## Tuesday June 22, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	<b>Invited lecture:</b> PARAM 10000 – Advanced Parallel Computing System	P. K. Sinha	C-DAC
9:50~10:40	PARAM 10000 – HPCC (High Performance Computing and Communication); Compilers – F90, HPF; Tools and debuggers; Case studies on PARAM 10000	Rajalakshmi M.	C-DAC
10:45~11:00	<b>Tea break</b> at C-DAC		
11:00~11:50	<b>Classroom Lecture:</b> Benchmarks: NAS and ScaLAPACK, Case studies on PARAM 10000; <b>Parallel Libraries – ScaLaPACK, PetSc</b> (Portable extended tool kit for Sparse computation), Sun Performance libraries, Case studies on PARAM 10000.	Chetan Kumar	C-DAC
12:00~12:50	<b>Classroom Lecture:</b> Principles of parallel algorithms and design (Concurrency, Types of Parallelism, Decomposition methods; Algorithmic paradigms; Programmability issues; Static and Dynamic load balancing techniques)	VCV. Rao	C-DAC
13:00~14:00	<b>Lunch</b> at C-DAC		
14:00~14:50	<b>Classroom Lecture:</b> Parallel Matrix Computations- Strip/Checkerboard partitioning, Solution of a system of linear equations (direct methods), Issues in parallel formulation, Performance analysis for matrix computations	Dheeraj Bhardwaj	C-DAC
15:00~15:15	<b>Tea break</b> at NPSF		
15:15~17:45	<b>Hands on Session (Module 2) :</b> Matrix vector Multiplication and Matrix-Matrix multiplication, Infinity Norm of the matrix (Self Scheduling algorithm, Row-wise partitioning, and Checkerboard partitioning)		NPSF, C-DAC
17:45~18:00	<b>Tea break</b> at NPSF		
18:00~18:45	<b>Invited Lecture:</b> Trends in Cluster Computing	Nitin Parab	CDAC
18:45~19:30	<b>Break</b>		
19:30	<b>Dinner</b> at C-DAC		

## Wednesday June 23, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	<b>Invited Lecture:</b> Parallel Computing in Spectral Methods	Pravir Dutt	IIT-Kanpur
9:50~10:40	<b>Classroom Lecture:</b> Issues in Iterative methods, Efficient Implementation of Sparse Matrix vector Computations, Performance and Scalability issues	VCV. Rao	C-DAC
10:45~11:00	<b>Tea break</b> at C-DAC		
11:00~11:50	<b>Classroom Lecture:</b> Graph Algorithms: Parallel minimum spanning tree algorithms, parallel shortest path algorithms, Parallel Search Algorithms and Performance issues	Chaman S Verma	C-DAC
12:00~12:50	<b>Invited Lecture :</b> Numerical Weather Simulation studies on PARAM 10000	Akshara	C-DAC
13:00~14:00	<b>Lunch</b> at C-DAC		
14:00~14:50	<b>Classroom Lecture:</b> Graph Algorithms: Parallel Graph Coloring & Performance issues	VCV Rao	C-DAC
15:00~15:15	<b>Tea break</b> at NPSF		
15:15~17:45	<b>Hands on Session (Module 3) :</b> Parallel Gaussian elimination method to solve system of equations, Sparse Matrix Computations, Iterative methods.		NPSF, C-DAC
17:45~18:00	<b>Tea break</b> at NPSF		
18:00~18:45	<b>Invited Lecture:</b> Parallel Computing in Genetic Algorithms	V. Sundararajan	C-DAC
18:45~19:30	<b>Break</b>		
19:30	<b>Dinner</b> at C-DAC		

## Thursday June 24, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	<b>Invited Lecture :</b> Parallel Computing in Computational Fluid Dynamics	Sanjay Mittal	IIT-Kanpur
9:50~10:40	<b>Classroom Lecture:</b> Fast Fourier Transform, Parallel FFTs, Performance issues	S. S. Kadam	C-DAC
10:45~11:00	<b>Tea break</b> at C-DAC		
11:00~11:50	<b>Classroom Lecture:</b> Sorting Algorithms: Issues in sorting algorithms, Efficient implementation of parallel sample sort algorithms and performance issues	VCV. Rao	C-DAC
12:00~12:45	<b>Invited Lecture :</b> Parallel Computing in Seismic Data Processing	Dheeraj Bhardwaj	C-DAC
12:45~14:00	<b>Lunch</b> at CDAC		
14:00~15:30	<b>Parallel Sessions:</b> Presentation & Demonstration on PARAM 10000 at NPSF <ul style="list-style-type: none"> <li>• Molecular Modeling (AMBER) / Chemistry (INDMOL)</li> <li>• Finite Element Analysis and Composites (FEMCOMP)</li> <li>• Flow Visualization Tool kit (<b>FLOWVIS</b>)</li> <li>• Genetic Algorithms (<b>GA</b>)</li> <li>• Weather Simulation (<b>WEATHER</b>)</li> <li>• PArallel Unstructured MEsh Technology(<b>PAUMET</b>)</li> <li>• Seismic Data Processing (WAVES)</li> <li>• Computational Fluid Dynamics Applications (CFD)</li> </ul>		NPSF, C-DAC
15:30~15:45	<b>Tea break</b> at NPSF		
15:45~18:15	<b>Hands on Session (Module 4):</b> Independent set computations, Graph Coloring, Shortest path problems, Sample sort algorithm		C-DAC
18:15~19:00	<b>Invited Lecture:</b> Supercomputing research activities in educational institutions	N. Balakrishnan	IISc
19:00~19:30	<b>Break</b>		
19:30	<b>Banquet Dinner</b> at Hotel Pride		

## Friday June 25, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	<b>Invited Lecture:</b> High Performance Computing at TIFR	N. Karmarkar	TIFR-Pune
10:00~10:45	<b>Invited Lecture:</b> Parallel Computing Requirements in Space Technology	Pradeep Kumar	VSSC
10:45~11:00	<b>Tea break</b> at C-DAC		
11:00~11:50	<b>Invited Lecture:</b> Application of Parallel Computing in Atmospheric Studies	Ravi Nanjundiah	IISc
12:00~13:00	<b>Invited Lecture:</b> Trends in Parallel Unstructured Mesh Computations	VCV. Rao	C-DAC
13:00~14:00	<b>Lunch</b> at C-DAC		
14:00~14.45	<b>Invited Lecture:</b> Performance in CFD applications on PARAM 10000	Chaman S Verma	C-DAC
15:00~15:45	<b>Invited Lecture:</b> Parallel Computing in Computational Fluid Dynamics	T. S. Prahald	NAL
15:45~16:30	<b>Concluding remarks and discussion</b> with participants	R. K. Arora	C-DAC
16:30~17:00	High Tea and closing at C-DAC		
17:00~18:45	<b>Spare time for any specific activity of Workshop or Hands-on Session:</b> Solution of PDEs by Finite Difference and Finite Element methods, Performance of applications on C-DACs MPI-AM (Myrinet) & MPI on Fast Ethernet		NPSF, C-DAC
18.45 ~19.30	<b>Break</b>		
19:30	<b>Dinner</b> at C-DAC		