Parallel Computing Algorithms & Applications (PCAA-99)
Technical Program of PCAA-99 Workshop
(June 21-25, 1999)

Workshop Coordinator: Dr.VCV.Rao, NPSF, C-DAC, Pune

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	**Registration**		
8:45~ 9:00	**Welcome Address**: C-DAC Programme Co-ordinator, NPSF	P. K. Sinha	C-DAC
9:00~ 9:50	**Keynote Address:** Parallel Computing overview	V. Raja Raman	IISc, B'lore
9:50~10:40	**Classroom Lecture**: 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	**Tea break** at C-DAC		
11:00~11:50	**Classroom Lecture**: 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	**Classroom Lecture**: 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	**Lunch** at C-DAC		
14:00~14:50	**Classroom Lecture**: 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	**Tea break** at NPSF		
15:15~17:45	**Hands-on Session (**Module1): Point-to-point & Global communications, Global Summation by various methods, prefix sum, Numerical integration		NPSF, C-DAC
17:45~18:00	**Tea break** at NPSF		
18:00~18:45	**Invited Lecture**: Parallel Computing in Molecular Modeling	Rajendra Joshi	Pune Univ.
18:45~19:30	**Break**		
19:30	**Dinner** at C-DAC		

Tuesday June 22, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	**Invited lecture:** 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	**Tea break at C-DAC**		
11:00~11:50	**Classroom Lecture:** Benchmarks: NAS and ScaLAPACK, Case studies on PARAM 10000; **Parallel Libraries – ScaLaPACK, PetSc**(**P**ortable **e**xtended **t**ool kit for **S**parse **c**omputation), Sun Performance libraries, Case studies on PARAM 10000.	Chetan Kumar	C-DAC
12:00~12:50	**Classroom Lecture**: 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	**Lunch** at C-DAC		
14:00~14:50	**Classroom Lecture**: 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	**Tea break** at NPSF		
15:15~17:45	**Hands on Session (**Module 2) : 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	**Tea break** at NPSF		
18:00~18:45	**Invited Lecture**: Trends in Cluster Computing	Nitin Parab	CDAC

18:45~19:30	**Break**		
19:30	**Dinner** at C-DAC		

Wednesday June 23, 1999

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

Thursday June 24, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	**Invited Lecture** : Parallel Computing in Computational Fluid Dynamics	Sanjay Mittal	IIT-Kanpur
9:50~10:40	**Classroom Lecture**: Fast Fourier Transform, Parallel FFTs, Performance issues	S. S. Kadam	C-DAC
10:45~11:00	**Tea break** at C-DAC		
11:00~11:50	**Classroom Lecture**: Sorting Algorithms: Issues in sorting algorithms, Efficient implementation of parallel sample sort algorithms and performance issues	VCV. Rao	C-DAC
12:00~12:45	**Invited Lecture** : Parallel Computing in Seismic Data Processing	Dheeraj Bhardwaj	C-DAC
12:45~14:00	**Lunch at CDAC**		
14:00~15:30	**Parallel Sessions**: Presentation & Demonstration on PARAM 10000 at NPSF • Molecular Modeling (AMBER) / Chemistry (INDMOL) • Finite Element Analysis and Composites (FEMCOMP) • Flow Visualization Tool kit (**FLOWVIS**) • Genetic Algorithms (**GA)** • Weather Simulation **(WEATHER**) • PArallel Unstructured MEsh Technology(**PAUMET**) • Seismic Data Processing (WAVES) • Computational Fluid Dynamics Applications (CFD)		NPSF, C-DAC
15:30~15:45	**Tea break** at NPSF		
15:45~18:15	**Hands on Session (**Module 4): Independent set computations, Graph Coloring, Shortest path problems, Sample sort algorithm		C-DAC
18:15~19:00	**Invited Lecture**: Supercomputing research activities in educational institutions	N. Balakrishnan	IISc
19.00~19.30	**Break**		
19:30	**Banquet Dinner at Hotel Pride**		

Friday June 25, 1999

Time	Title/Activity	Speaker	Institute
9:00~ 9:50	**Invited Lecture**: High Performance Computing at TIFR	N. Karmarkar	TIFR-Pune
10:00~10:45	**Invited Lecture**: Parallel Computing Requirements in Space Technology	Pradeep Kumar	VSSC
10:45~11:00	**Tea break** at C-DAC		
11:00~11:50	**Invited Lecture**: Application of Parallel Computing in Atmospheric Studies	Ravi Nanjundiah	IISc
12:00~13:00	**Invited Lecture:** Trends in Parallel Unstructured Mesh Computations	VCV. Rao	C-DAC
13:00~14:00	**Lunch** at C-DAC		
14:00~14.45	**Invited Lecture**: Performance in CFD applications on PARAM 10000	Chaman S Verma	C-DAC
15:00~15:45	**Invited Lecture**: Parallel Computing in Computational Fluid Dynamics	T. S. Prahlad	NAL
15:45~16:30	**Concluding remarks** and **discussion** with participants	R. K. Arora	C-DAC
16:30~17:00	High Tea and closing at C-DAC		

17:00~18:45	**Spare time for any specific activity of Workshop** or **Hands-on Session:** Solution of PDEs by Finite Difference and Finite Element methods, Performance of applications on C-DACs MPI-AM (Myrinet) & MPI on Fast Ehernet		NPSF, C-DAC
18.45 ~19.30	**Break**		
19:30	**Dinner** at C-DAC		