Centre for Development of Advanced Computing

(A Scientific Society of the Ministry of Communications and Information Technology)
Pune University Campus, Pune 411 007

Workshop on
Parallel Computing –
Optimizing Performance of Parallel Programs PCOPP –2002
June 03, 2002 (Monday) ~ June 06, 2002 (Thursday)
Workshop Co-ordinator :Dr.VCV.Rao
Registration on June 02, 2002 (Sunday)

Time (Hrs)	Activity
20:00 Hrs – 21:00 Hrs: Dinner at C-DAC Roof-Top Pavilion	
14:00 ~ 21:00	Registration at C-DAC

Workshop: Day 1 - June 03 (Monday)

Time (Hrs)	Activity
08:15 Hrs ~ 08:45 Hrs: Breakfast at C-DAC Roof-Top Pavilion	
08:30 ~ 08:45	Registration at C-DAC Auditorium
08:45 ~ 09:00	Inauguration and the overview of PCOPP-2002 workshop **(RK.Arora/VCV.Rao)**
09:00 ~ 09:45	Introduction to MPI: MPI Basics, features of MPI, Point-to-Point and Collective Communication library calls, Using MPI in simple programs **(Subba)**
10:00 ~11:00	Trends in Serial Processor Computing; Features of the memory sub-system hierarchy; Managing Memory overheads; Optimization techniques to ease the memory access; **(VCV.Rao)**
11:00 Hrs ~11:15: Hrs Tea break at C-DAC Roof-Top Pavilion	
11:15~12:00	Explicit Parallelism: Shared Memory Programming – Introduction to OpenMP **(Manisha)**
12:15~13:00	Basic Compiler Techniques: What an Optimizing Compiler does to get maximum performance of your code? Compiler role in loop optimization techniques; Summary of performance of application with/without compiler optimizations on PARAM 10000 **(Kalyan)**
13:00 Hrs ~ 14:00 Hrs: Lunch Break at C-DAC Roof-Top Pavilion; 16:30 Hrs ~ 16:45 Hrs and 18:30 Hrs ~ 18:45 Hrs: Tea Break at C-DAC Roof-Top Pavilion/NPSF	
14:00~18:30	**Hands-on Session** (Day1): Performance of selective FORTRAN/c programs on *uni-processor of PARAM 10000 with/ without compiler optimization features; using code restructuring techniques loop un-rolling, loop fission, loop fusion, loop distribution, loop interchange and loop optimization techniques to ease the memory access, Performance of parallel programs using tuned math libraries and their impact on performance, Programming using OpenMP* on PARAM 10000.
	19:30 Hrs ~ 20:30 Hrs : Dinner at C-DAC Roof-Top Pavilion

Workshop: Day 2 - June 04 (Tuesday) Morning Session

Time (Hrs)	Activity
08.30 Hrs ~09:00 Hrs: Registration at Auditorium and Breakfast at C-DAC Roof-Top pavilion	
09:00~09:45	Single processor optimization techniques - code restructuring techniques such as loop optimizations techniques (Loop collapsing; Loop alignment, Loop fission, Loop distribution, Loop unrolling; Loop interchange, and Loop fusion) Uni-Processor Benchmarks; Performance of tuned mathematical libraries for matrix computations such as BLAS I, II, and III **(VCV.Rao)**
10:00~11:00	Models of Parallel Computers, An overview of PARAM 10000 and Performance of Parallel Computers **(Sandeep)**
11:00 Hrs ~11:15 Hrs: Tea break at C-DAC Roof-Top Pavilion	
11:15~12:00	Explicit Parallelism: Shared Memory Programming –Pthreads **(kalyana)**
12:15~13:00	Types of Performance requirements, Basic Performance metrics; Workload Speed Metrics; Performance of Parallel Computers – Computational Characteristics; Parallelism and interaction overheads; Overhead Quantification and measurement methods; Performance of parallel programs; Performance metrics; Scalability &Speed-up Analysis **(dheeraj)**
13:00 Hrs ~ 14:00 Hrs: Lunch Break at C-DAC Roof-Top Pavilion	

Workshop: Day 2 - June 04 (Tuesday) (After Noon Session)

Time (Hrs)	Activity
16:30 Hrs ~16:45 Hrs: Tea Break at C-DAC Roof-Top Pavilion/NPSF	
14:00~18:30	**Hands-on Session (**Day 2): Performance *of serial programs* for matrix computations using math libraries BLAS I, BLAS II, BLAS III; *Performance of f90 programs* using Sun-Performance libraries and Compliers*; Parallel MPI Fortran 77/C/f90 programs* on vector-vector, matrix-vector and matrix-matrix multiplication algorithms; Solution of matrix system of linear equations by Direct/Iterative Methods*; Parallel Programs* for Partial differential equations using different MPI library calls and performance issues; Demonstration of benchmarks on PARAM 10000
18:30 Hrs ~18:45 Hrs: Tea Break at C-DAC Roof-Top Pavilion	
19:45 ~20:15	**Banquet Dinner talk:** Grid Computing
20:30 Hrs~ 22:00 Hrs: Banquet Dinner	

Workshop: Day 3 – June 05 (Wednesday)

Time (Hrs)	Activity
08.30 Hrs ~09:00 Hrs: Registration and Breakfast at C-DAC Roof-Top pavilion	
09:00~09:45	Explicit Parallelism: Data Parallel Programming –f90/f95/HPF **(Sudhakar)**
09:45~10:15	Explicit Parallelism: Message Passing Programming – Advanced Features of MPI; **(subba)**
10:15~10:45	Parallel Paradigms and Programmability; Programming Models - Implicit Parallelism **(VCV.Rao)**
10:45~11:00	Dr.S.C.Purohit's address to participants
11:00 Hrs ~11:15 Hrs: Tea break at C-DAC Roof-Top Pavilion	
11:15~12:00	Explicit Parallelism: Shared Memory Programming – Advanced Features of OpenMP; and mixed mode programming MPI-OpenMP **(Ravi)**
12:00~13:00	An overview of Application and System Benchmarks on PARAM 10000 **(VCV.Rao)**
13:00 Hrs ~ 14:00 Hrs: Lunch Break at C-DAC Roof-Top Pavilion 16:30 Hrs ~ 16:45 Hrs and 18:30 Hrs ~ 18:45 Hrs: Tea Break at C-DAC Roof-Top Pavilion/NPSF	
14:00~18:30	**Hands-on Session (**Day 3): *Performance of selective FORTRAN/c programs* on PARAM 10000 using Pthreads, OpenMP and MPI on vector-vector, matrix-vector, matrix-matrix multiplication and Sparse matrix vector multiplication algorithms; Solution of matrix system of linear equations by Direct/Iterative Methods; *Performance of parallel programs* using combination of Pthreads and MPI; OpenMP and MPI; *Exampl programs* on matrix computations using different programming models –Pthreads, OpenMP, and MPI
18:30 Hrs ~18:45 Hrs: Tea Break at C-DAC Roof-Top Pavilion	
19:30 Hrs ~ 20:30 Hrs: Dinner at C-DAC Roof-Top Pavilion	

Workshop: Day 4 - June 06 (Thursday)

Time (Hrs)	Activity
08.30 Hrs ~09:00: Hrs Registration and **Breakfast at C-DAC Roof-Top pavilion**	
09:00~10:00	Principles of Algorithms design - Decomposition techniques; Static and Dynamic load balancing features; Overheads in algorithm design and performance Issues **(VCV.Rao)**
10:00~ 10:45	Performance Visualization tools for Parallel Programs and case studies **(kalyana)**
10:45~11:00	Filling Feed-Back forms
11:00 Hrs~11:15 Hrs: Tea break at C-DAC Roof-Top Pavilion	
11:15~12:15	An overview of Performance of Parallel Programs on Parallel Computers **(VCV.Rao)**
12:15~13:00	**Open Session, Feedback and Conclusions –Dr. P.K. Sinha and Shri S.P.Dixit**
1300 Hrs ~14:00 Hrs: Lunch Break at C-DAC Roof-Top Pavilion 16:30 Hrs ~ 16:45 Hrs and 18:30 Hrs ~ 18:45 Hrs: Tea Break at C-DAC Roof-Top Pavilion/NPSF	
14:00~14:45	**Popular Lecture:** High Performance Computing in Bio-Informatics at C-DAC Auditorium
1400~19:00	**Hands-on Session** (Day 4): *Performance of parallel programs* using combination of Pthreads and MPI; OpenMP and MPI; *Performance of MPI parallel programs* for matrix computations using different decomposition techniques from algorithm point of view; *Demonstration of MPI parallel programs* using parallel visualization tools; *Demonstration of MPI parallel programs* to measure communication overheads on clusters using MPI; *Demonstration of Performance for selective application and system benchmarks (*NAS, ScaLAPACK, LINPACK) on PARAM 10000 using different networks (Fast Ethernet), C-DAC High Performance Computing Software (HPCC)
19:30 Hrs ~ 20:30 Hrs: Dinner at C-DAC Roof-Top pavilion	