



**Four-Days Technology Workshop on  
Performance Enhancement on Multi-Core Processors & GPUs  
(PEMG-2010)**

*Organized by*

**C-DAC, Pune and C-DAC Juhu, Mumbai, & Electronics City, Bengaluru  
Technical Programme**

**Date: June 21-24, 2010**

**Venue: C-DAC, 68-Electronics City (Phase-1), Off-Hosur Road, Bengaluru-560 100**

**Mode-1: Day 1: June 21, 2010 (Monday)**

Break-fast : 08:30 AM - 09:00 AM		Coffee & Tea Break: 10:45 AM - 11:00 AM	
8:45 AM ~ 9:15AM	– PEMG-2010 Break-fast & Registration		
9:15 AM ~ 9:45AM	<b>Welcome &amp; Inauguration Ceremony</b> – <b>Prof. S. Sadagopan</b> , <i>Founder Director, Indian Institute of Information Technology, Bengaluru</i> – <b>Dr.VCV.Rao</b> ; PEMG-2010 Workshop Co-ordinator		
9:45 AM ~10:00 AM	<b>Overview of PEMG-2010 :</b> (Mode-1 : Multi-Core Processors) & Mode-2 (GPGPUs /GPU Computing ) Lab Session Overview <b>Speaker: C-DAC</b>		
10:00 AM ~10:45 AM	<b>Keynote talk (Industry):</b> Scaling Performance – Application Perspective : Intel Multi-Core Processors <b>Speaker: Mr.Sachan Om P, Intel</b>		
11:00 AM ~12:45 PM	<b>Keynote talk &amp; Demonstration (Industry) :</b> Parallelizing Application – Threading Methodology – Intel Multi-Core processors – Demonstration <b>Speaker: Mr.Sachan Om P, Intel</b>		
12:45 PM ~1:00 PM	<b>Hands-on Overview (Mode-1) Part-I :</b> Performance Enhancement through Software Threading) Tuning & Performance on Multi-Core Processors – Feedback Session		
<b>Lunch: 1:00 PM ~ 2:00 PM</b>		<b>Coffee &amp; Tea Break: 4:00 PM - 4:15 PM</b>	
2:00 PM ~ 4:00 PM	<b>Laboratory Session:</b> Programming on Multi-core Processors - Programming Examples based on Shared Memory Prog. - Pthreads, OpenMP3.x, Intel TBB, Performance Issues		
4:15 PM ~ 6:00 PM	<b>Laboratory Session:</b> Performance Issues: Programming on Numerical & Non-numerical Computations using Pthreads; OpenMP, MPI-OpenMP, Java Concurrent APIs, MPI-Pthreads		

**Mode -1: Day 2: June 22, 2010 (Tuesday)**

8:30 AM ~ 9:00 AM: Break-fast		Coffee & Tea Break: 10:45 AM – 11:00 AM	
9:15 AM ~ 9:30 AM	<b>Hands-on Overview (Mode-1) - Part-II:</b> Performance Enhancement through Software Threading) Tuning & Performance on Multi-Core Processors – Feedback Session		
9:30 AM ~ 10:00 AM	<b>Classroom Lecture: Part-I:</b> Performance Enhancement through Software Threading) Tuning & Performance on Multi-Core Processors – Programming Environment; Common Errors in thread Programming on Multi-Core Processors <b>Speaker: C-DAC, Pune</b>		
10:00 AM ~ 10:45 AM	<b>Classroom Lecture: Part-II:</b> Performance Enhancement through Software Threading) Tuning & Performance on Multi-Core Processors- System Overview of Threading- Memory Allocators & Performance Issues of I/O; Benchmarks <b>Speaker: C-DAC, Pune</b>		
11:00 AM ~11:45 AM	<b>Invited talk (Academia /R&amp;D) Application:</b> I/O Performance issues - Multi-Core Processors <b>Speaker: Dr. Pallav Baruah, Sri Sathya Sai Institute, Puttaparthi A.P</b>		
11:45 AM ~ 12:30 PM	<b>Classroom Lecture: Part-III:</b> Performance Enhancement through Software Threading A Case Study – Producer consumer model – Programming Paradigms <b>Speaker: C-DAC, Pune</b>		
<b>Lunch: 1:00 PM ~2:00 PM</b>		<b>Coffee &amp; Tea Break: 4:00 PM - 4:15 PM</b>	
2:00 PM ~ 4:00 PM	<b>Laboratory Session:</b> Part-II: System Overview of Threading & Performance Issues; Programs based on Pthreads, OpenMP3.x, Intel TBB, tools & libraries - Performance Issues		
4:15 PM ~ 5:30 PM	<b>Laboratory Session:</b> Performance Issues: Prog. on Numerical & Non-numerical computations using Pthreads; MPI, TBB; MPI-OpenMP, Java Concurrent APIs, MPI-Pthreads, Benchmarks, Memory Allocators, I/O threading		
5:30 PM ~ 6:00 PM	Open Source Software on Multi-Core Processors – Programming Environment /Benchmarks <b>Speaker:C-DAC, Pune</b>		



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**Mode-2: Day 3: June 23, 2010 (Wednesday)**

<b>8:30 AM ~ 9:00 AM: PEMG-2010 Registration</b>		<b>Coffee &amp; Tea Break: 10:45 AM - 11:00 AM</b>	
8:30 AM ~ 9:00 AM	PEMG-2010 Break-fast & Registration for Mode-2 Programme		
9:00 AM ~ 9:30AM	<b>Mode-2 (GPGPU/GPU Comp.) Overview :</b> Theoretical & Lab Session Overview		
9:30 AM ~ 10:00 AM	<b>Classroom Lecture: Part-I: An Overview of GPU Computing</b> <b>Speaker: C-DAC, Pune</b>		
10:00 AM ~ 10:45 AM	<b>Keynote Talk – Industry Topic:</b> High Performance Computing : GPU computing - CUDA enabled NVIDIA GPUs <b>Speaker: Girish Bharambe, NVIDIA</b>		
11:00 AM ~ 12:00 PM	<b>Keynote Talk – Industry Topic:</b> High Performance Computing : Performance – GPU Computing - CUDA enabled NVIDIA GPUs <b>Speaker: Girish Bharambe, NVIDIA</b>		
12:00 PM ~ 1:00 PM	<b>Keynote Talk - Industry Topic:</b> GPU Computing – Image Processing – Performance Issues <b>Speaker: Prof. Sachin Patkar, IIT-Mumbai</b>		
<b>Lunch: 1:00 PM ~ 2:00 PM</b>		<b>Coffee &amp; Tea Break: 4:00 PM - 4:15 PM</b>	
2:00 PM ~ 4:00 PM	<b>Hands-on Session &amp; Demonstration:</b> CUDA enabled NVIDIA GPUs - Programming on GPGPUs & CUDA Programming (NVIDIA) - Numerical Computations - CUDA Debugging		
4:15 PM ~ 6:30 PM	<b>Hands-on Session &amp; Demonstration:</b> Hybrid Computing: Programming Examples MPI & GPU - CUDA APIs; TBB & GPUs Programming using NVIDIA-GPU Computing - CUDA Programming; CUDA enabled NVIDIA GPUs - CUDA Programming (NVIDIA) - Numerical Computations - CUDA Debugging; NVIDIA OpenCL Programming		

**Mode-2: Day 4: June 24, 2010 (Thursday)**

		<b>Coffee &amp; Tea Break: 10:45 AM - 11:00 AM</b>	
9:00 AM ~ 9:30 AM	<b>Hands-on Overview (Mode-2) - Part-II:</b> Performance Enhancement GPUs – Feedback		
9:30 AM ~ 10:00 AM	<b>Classroom Lecture:</b> GPU Programming - Performance Issues - AMD - Stream Computing – SDK – OpenCL		
10:00 AM ~ 10:45 AM	<b>Keynote Talk - Industry Topic:</b> AMD: The Road to Commodity Based Heterogeneous Computing <b>Industry Speaker :</b> Mantor, Michael, AMD, USA		
11:00 AM ~ 11:45 AM	<b>Keynote Talk - Industry Topic:</b> AMD: The Road to Commodity Based Heterogeneous Computing <b>Industry Speaker :</b> Mantor, Michael, AMD, USA		
11:45 AM ~ 12:30 PM	<b>Keynote Talk - Industry Topic:</b> AMD - Heterogeneous Computing - OpenCL <b>Industry Speaker :</b> AMD VizExperts		
12:45 PM ~ 1:00 PM	<b>Concluding Remarks</b>		
<b>Lunch: 1:00 PM ~ 1:30 PM</b>		<b>Coffee &amp; Tea Break: 4:00 PM - 4:15 PM</b>	
2:00 PM ~ 4:00 PM	<b>Hands-on Session &amp; Demonstration:</b> Prog. on GPUs - AMD-ATI Stream Computing SDK Hybrid Computing: Programming Examples MPI & GPU - CUDA APIs; TBB & GPUs Prog. using CUDA enabled NVIDIA-GPUs; AMD-GPU Stream Comp.– SDK & OpenCL		
4:15 PM ~ 6:00 PM	<b>Hands-on Session &amp; Demonstration:</b> Heterogeneous computing with OpenCL; Programming Examples on CPU (MPI & TBB) and GPU - CUDA APIs; NVIDIA-GPU OpenCL CUDA Programming; AMD-ATI-Stream Computing SDK OpenCL Programming		