

Program

Grid and HPC5+ workshop

24-30, Bahman 1391

	9.00-9.45	9.45-10.30	Break	11.00-11.45	11.45-12.30	Lunch	14.00-17.00 Workshop
Tuesday	Rouhani Opening	Karimi IPM_Grid		MosalmanTabar Advanced Linux	Karimi Introduction to CA		G+MMT+K CA+Linux Workshop
Wednesday	Gerami HPC Architecture	Gerami gLite		MosalmanTabar Advanced Linux	Koochakie Cluster Admin		G+MMT+K CA+Linux Workshop
Thursday	Gerami gLite	Gerami gLite		MosalmanTabar Data Management	Koochakie Cluster Admin		G+MMT+K CA+Linux Workshop
Friday	Off						
Saturday	Nedaaee Introduction to HPC	Nedaaee Parallel Programming		MosalmanTabar EMI	Nedaaee Parallel Programming		Workshops Parallel Programming, CUDA, Rocks, Testing
Sunday	Nedaaee Parallel Programming	Nedaaee Parallel Programming		Karimi Rocks	Nedaaee Floating Point Arithmetic		
Monday	Zareie GPU+CUDA	Zareie GPU+CUDA		Karimi Testing	Gerami Security in distributed Systems		

Workshop Timetable

(G+MMT+K+ Speakers)

	Lunch	14.00-15.00	15.00-16.00	16.00-17.00
Tuesday		certification, UI, Job submission	Advanced topics in Linux	Advanced topics in Linux
Wednesday		certification, UI, Job submission	Advanced topics in Linux certification, UI, Job submission	certification, UI, Job submission
Thursday		certification, UI, Job submission	Admin , Data Management	Admin , Data Management
			off	
Saturday		Parallel Programming	Parallel Programming	Parallel Programming
Sunday		Parallel Programming	Parallel Programming	Parallel Programming, Rocks
Monday		GPU+CUDA	GPU+CUDA	GPU+CUDA

Organizing Committee:

"Ehsan Nedaaee" <nedaaee@gmail.com>

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"Shahin Rouhani" <srouhani@sharif.edu>,

Speakers:

Speaker	Session	Topic	Workshop
Gerami	3	gLite	X
Gerami	1	HPC Architecture	
Gerami	1	Security in Distributed System	
Karimi	1	Introduction to IPM-Grid	X
Karimi	1	Testing	X
Karimi	1	CA	X
Karimi	1	Rocks Cluster Manager	X
Koochakie	2	Cluster Admin	
Mosalmantabar	2	Advanced Linux	X
Mosalmantabar	1	EMI	
Mosalmantabar	1	Data Management	X
Nedae	1	Introduction to HPC	
Nedae	1	Floating Point Arithmetic	
Nedae	4	Parallel Programming	X
Rouhani	1	Opening and Report	
Zareie	2	GPU + CUDA	X
SUM	24/24		

Contents

Gerami- “gLite”

- **Introduction to GRID computing**
 - Computing resources concepts
 - Server
 - Cluster
 - High Performance Computing (HPC)
 - GRID
 - Clouds
 - GRID as a model for distributed computing

- **GRID infrastructures and projects**
- **GRID Middleware**
 - UMD
 - gLite
 - ARC
 - UNICORE
- **gLite**
 - Resource Management
 - Information services
 - Security
 - Authentication and authorization
- **Virtual Organizations (VO)**
- **Workload management**
 - Job submission
 - Advanced job types
 - gLite services
 - Workload Management System (WMS)
 - User Interface (UI)
 - Storage Element (SE)
 - CREAM
 - ...

Gerami -“HPC Architecture”

- Computer system architecture
- Hardware architecture
- Software architecture
- CPU Architecture
- Architecture workstation/server
- Workstation& Server CPUs Architecture
- Intel & AMD Architecture
- Multicore CPU Architecture
- Intel Xeon Architecture

Version Final

- Multiprocessing system with shared memory
- Distributed Systems
- Cluster Architecture
- Grid Computing

Gerami -“**Distributed Systems Security**”

- Overview of security techniques
- Physical security
- Security of protocols and application
- Cryptographic algorithms
- Remote Access Security
- Grid Computing Security

Karimi-“**Introducing IPM-Grid**”

- Why grid
- What is IPM-grid
- How to use IPM-Grid
- >> Registration
- >> Job Management
- How to use our GUI?

Karimi-“**Topics in Testing**”

- Challenges in Testing of HPC and Grid Systems
- Functional vs. Structural Testing
- Tools and Services
- Aspects of QA in Grid Environments

Karimi- “**Certification Authority**”

- The importance of the establishment of security mechanisms in Grid Computing
- How to create a secure infrastructure in Grid
- Introduction to PKI
 - Digital Certification
- Introduction to Certification Authority
 - Main components
 - The Responsibilities of Registration Authority
 - The Responsibilities of Certification Authority Manager
- Introduction to IR-Grid certification Authority
- The procedure of issuing digital Certification for users and host in Grid

Karimi-“**Rocks Cluster Manager**”

- Overview of Rocks Cluster Manager
- Rocks Cluster’s Architecture
- Installing a Rocks Cluster Manager

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- Defining and Modifying Attributes
- Administration Examples
- Rocks Rolls
- Submitting Job with SGE

Koochakie-**“Topics in Linux HPC Administration”**

- Basic components of a Linux HPC cluster
- Torque PBS resource manager
 - Structure of Torque PBS
 - Advanced configuration of the queue system
 - OpenMPI/MPICH integration
- Maui job scheduler
 - Basic configuration and general strategies
 - Throttling policies
 - User fair-share policy
 - Advanced configuration of job prioritization and backfill strategies
- Monitoring an HPC cluster
 - Maui diagnostic commands
 - Ganglia monitoring system
 - Automation of monitoring/administrative tasks

MosalmanTabar- **“Linux”**

- introduction to Linux
- Linux Vs Windows
- Structure (file system)
- OS major definitions
- simple commands
- Advanced operations
- Chroot
- Raw & Cooked Mode
- LVM
- The Cron System
- Performance Tuning
- KERNEL

MosalmanTabar- **“EMI”**

- What is European Middleware Initiative?
- The big four middleware
- How these 4 Middle wares works and Helps!
- Why immigration to EMI?
- Custer monitoring

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- Ganglia monitoring as an example

MosalmanTabar-“Data Management”

- Storage elements in Grid
- What is Logical File Catalogue
- LFC in Terms
- How it works
- Detail on Some Commands

Dr. Ehsan Nedaaee-“Parallel Programming, Introduction to HPC ”

- **Introduction to High Performance Computing (HPC)**
 - Computer architecture, an introduction.
 - A brief introducing Assembly and machine language
 - Memory hierarchy and its rule in HPC
 - Efficiency and Performance:
 - Evaluating the Performance
 - Monitoring and Profiling
 - Memory Locality And Its Effect on Performance
 - Memory Cache
 - Optimization Techniques
 - Types of Optimization Techniques
 - Improving Memory performance
 - Improving CPU performance
 - Compiler Role in HPC
- **Floating Point Arithmetic**
 - How to represent numbers on computers.
 - IEEE floating point formats
 - Floating point arithmetic
 - Few misconception about FP
 - Pitfalls of FP arithmetic
 - Role of the compilers
 - Some final tips to avoid (known) problems
- **Parallel Computing**
 - An introduction to Parallel Computing
 - level of parallelization
 - Shared Memory and distributed Memory models
 - GPU a new device for parallelization

- Shared Memory parallelization Using OpenMp
 - Introduction
 - Pros and Cons of OpenMP
 - Compiling and Running OpenMP
 - Basics
 - Loop Construction
 - Reduction operations
 - Parallel overhead
 - Optimization: Scheduling
- Distributed memory parallelization Using MPI
 - MPI, an introduction
 - Applications of MPI
 - Some Goals of MPI
 - What is included in MPI
 - Versions Of MPI
 - Point to Point (PTP) Communications in MPI
 - Blocking PTP communications
 - Non-Blocking PTP Communications
 - Collective Communications

Zareei-“GPU and CUDA”

- Introduction
 - Graphical Processing Units (GPU)
 - Compute Unified Device Architecture (CUDA)
- CUDA C Programming
- Threads in CUDA
- Memories in CUDA
 - Global Memory - Shared Memory - Constant Memory
- Performance
- Atomics in CUDA
- Thrust Library
- Sample Program using CUDA C