INFOSOFT IT SOLUTIONS

Training | Projects | Placements

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Linux Cluster

Introduction to Cluster Computing

- Overview of Cluster Computing
- Advantages and Challenges of Cluster Computing
- Types of Clusters (High Performance Computing, High Availability, Load Balancing, etc.)
- Cluster Components and Architecture

Linux Fundamentals

- Introduction to Linux Operating System
- Basic Linux Commands and Navigation
- File System Management in Linux
- User and Group Management
- Permissions and Security in Linux

Networking for Clusters

- Networking Fundamentals

- TCP/IP Networking Essentials
- Configuring Network Interfaces in Linux
- Network File Systems (NFS) and Remote File Access
- Network Services: DNS, DHCP, NTP

Cluster Hardware and Software Setup

- Hardware Requirements for Cluster Nodes
- Selecting and Configuring Cluster Hardware
- Installing and Configuring Linux on Cluster Nodes
- Cluster Middleware: MPI, OpenMP, MPICH
- Setting up Cluster Communication and Interconnects

Cluster Management

- Introduction to Cluster Management Frameworks (e.g., OpenHPC, Rocks)
- Cluster Resource Management and Job Scheduling (e.g., Slurm, PBS, Torque)
- Monitoring and Performance Tuning Tools for Clusters
- High Availability (HA) and Failover Mechanisms
- Backup and Disaster Recovery Strategies

Parallel Programming on Clusters

- Introduction to Parallel Computing
- Parallel Programming Paradigms (MPI, OpenMP, Pthreads)

- Writing and Compiling Parallel Programs
- Debugging and Profiling Parallel Applications
- Performance Optimization Techniques

Security in Cluster Environments

- Understanding Security Risks in Clusters
- Authentication and Authorization Mechanisms
- Network Security: Firewalls, VPNs, SSH
- Data Security: Encryption, Access Controls
- Best Practices for Securing Linux Clusters

Advanced Topics in Cluster Computing

- Distributed File Systems (Lustre, GlusterFS)
- Virtualization and Containerization for Clusters (Docker, Kubernetes)
- Cloud Integration with Clusters
- GPU Computing in Cluster Environments
- Emerging Trends and Future Directions in Cluster Computing

Case Studies and Real-World Applications

- Case Studies of Successful Cluster Implementations
- Real-World Applications of Cluster Computing
- Hands-On Exercises and Labs with Cluster Setup and Configuration
- Troubleshooting Common Cluster Issues

Project Work and Presentations

- Participants work on a Cluster Project individually or in groups

- Project Topics can include Setting up a Specific Cluster Application, Optimizing Performance, or Solving a Real-World Problem using Cluster Computing

- Participants present their Projects to the class, demonstrating their understanding and skills acquired during the training