Suggested Teaching Guidelines for

Storage and Backup Management – PG-DHPCSA September 2023

Duration: 24 class room hours + 26 Lab hours

Objective: To introduce Storage and Backup Management of HPC.

Prerequisites: Knowledge of Computer Networks

Evaluation method: CCEE Theory exam– 40% weightage

Lab exam (Case Study based) – 40% weightage

Internal exam – 20% weightage

List of Books / Other training material

Course Ware:

No specific courseware for modules, faculty may share some course materials

Reference:

- Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems by Marc Farley

Note: Each session mentioned is for theory and of 2 hours duration. Lab assignments are indicatives, faculty need to assign more assignments for better practice.

Session 1
Lecture:

- Types of Storage
- Protocols
- Components of a disk drive
- Physical disk and factors affecting disk drive performance

Session 2
Lecture:

- RAID level performance and availability considerations
- Components and benefits of an intelligent storage system

Session 3
Lecture:

- DAS architecture, SAN architecture, attributes, components, topologies, connectivity options and zoning

Session 4
Lecture:

- FC protocol stack, addressing, flow control, and classes of service, storage replication & HSM

Session 5
Lecture:

- Network Attached Storage (NAS) components, protocols, IP Storage Area Network (IP SAN), iSCSI, FCIP and FCoE architecture

Assignment:

- Use of standard storage allocation strategies: 1 Static allocation 2. Stack allocation

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Session 6
Lecture:

- Logical Volume Manager
- Physical volumes
- Volume groups
- Logical volumes

Assignment:

- Making logical volumes

Session 7
Lecture:

- Introduction to Parallel File Systems
- Types of Parallel File Systems

Session 8
Lecture:

- PVFS2 architecture, installation, configuration and benchmarking

Session 9
Lecture:

- Lustre architecture, installation, configuration and benchmarking
- Overview of BeeGFS

Session 10
Lecture:

- GPSF architecture, installation, configuration and benchmarking
- comparison of Parallel File Systems, Optimization

***Assignment:**

- Case study and Installation of Parallel File System on Linux Environment (Lustre)

Session 11
Lecture:

- Introduction to Backup
- Backup tools (Amanda, Bacula)
- Types of backup

Session 12
Lecture:

- Backup policies
- Backup optimization
- Archive
- Retrieve and Restore
- Backup media (LTO)
- Tape library

Assignment:

- Integrating the features of Backup, Restore and Disaster Recovery within a single matrix management, making the assignment of resources to different operating environments versatile

Assignment –Lab:

- RAID level configuration
- DAS configuration
- NAS configuration
- SAN configuration
- PVFS2 installation, configuration and benchmarking
- Lustre installation, configuration and benchmarking
- GPFS installation, configuration and benchmarking