

Course Name	Networked Storage Systems		
Course No.:	TBD	Credits:	3
		Program:	Graduate
Prerequisite:	-	Co-requisite:	-
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Course Syllabus

1. Introduction to Data Storage Systems and Networks
 - a. Storage history
 - b. Performance trend of disk drives and microprocessors
 - c. Amdahl Law and its implication to storage systems
2. Architecture of Data Storage Systems and Networks
 - a. Architecture of server-centric storage
 - b. Architecture of storage-centric IT Infrastructure
3. Qualitative & Quantitative Metrics in Data Storage Systems and Networks
 - a. Performance (throughput and response time)
 - b. Availability
 - c. Security
 - d. Serviceability
 - e. Scalability
 - f. Provisioning & manageability
 - g. Power and energy
4. Peer to Peer Storage
 - a. Wide-area peer to peer storage
 - b. Datacenter peer to peer storage
5. Advanced Topics in Distributed Storage Systems
 - a. Consistency, availability, partition Tolerance in Distributed Storage Systems
 - b. Replication in distributed storage systems
 - c. De-duplication in distributed storage systems
 - d. Maliciousness and data security in distributed storage systems
 - e. Scalability and fault tolerance in distributed storage systems
 - f. Energy-based distributed storage systems
 - g. Distributed RAID
 - h. Network and scalable file systems
6. Storage Area Network (SAN) and Network Area Storage (NAS)
 - a. SAN and NAS architecture
 - b. SAN and NAS applications
 - c. Connectivity and fabric topology
 - d. Basic components of SAN and NAS
 - e. SAN and NAS configurations
 - f. Fabric security
 - g. Types of zoning (hard and soft zoning)
 - h. Management tools
 - i. A case study: host to storage SAN implementation

7. Introduction to Data Center Design
 - a. Backend and frontend connectivity
 - b. Site components
 - c. Site availability
 - d. Intra- and inter-site networking
8. Cloud Computing
 - a. Why cloud computing?
 - b. Basics of cloud computing
 - c. Virtualization and service isolation
 - d. Core cloud services
 - e. Implementation of cloud computing
 - f. Cloud case studies: Amazon and Eucalyptus
9. I/O Techniques in Distributed Storage Systems (SCSI, iSCSI, Fibre Channel, SAS, FICON, ESCON)
10. Implementation of Advanced Features of Storage systems in Distributed Storage Systems
 - a. Remote mirroring
 - b. Instant copies
 - c. Data migration

Grading

- Midterm: 25%
- Final: 35%
- In-Class presentations: 10%
- Project: 30%

References

1. Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, U. Troppens, R. Erkens, W. Mueller-Friedt, and R. Wolafka, 2nd Edition, John Wiley & Sons Inc., 2009.
2. Storage Networks: The complete Reference. Robert Spalding, TMH, 2003.
3. Storage Area Networks Essentials, R. Barker and P. Massiglia, John Wiley & Sons Inc., 2002.
4. Storage Technologies and Systems, IBM Journal of Research & Development, Special issue, November 2008.
5. Introduction to Storage Area Networks, J. Tate, F. Lucchese, and R. Moore, IBM Redbooks (eBook), July 2006.