

CIS 5346 Storage Systems

Catalog Description

Introduction to file and storage systems, storage system components, storage architecture, devices, trends and applications, performance, RAID storage, Flash-based storage (SSDs), file-systems, I/O scheduling, distributed storage, and storage management.

Prerequisites

COP 4610 (Operating Systems Principles) or equivalent.

CDA 4101 - Computer Organization or equivalent

Type

Elective for CS Master and PhD students

Course Objectives

In this class, we examine storage systems in detail, starting from its individual components to how large-scale storage systems are built. We will learn how to manage storage systems, how they relate to the rest of the computer system, and how to design storage solutions for both general and specific applications. To learn about storage systems, we will use the Linux operating system as a concrete evaluation case-study throughout the course.

This class will be part instruction and part seminar-style learning based on reading, understanding, evaluating, and presenting both classic and current research in storage systems. Each student will need to extensively prepare for and lead the discussion for 1 research paper to the entire class during the semester. In addition, each student will also submit 4 paper summaries and participate significantly in the other paper readings. Paper readings will be assigned for most of the weeks ahead of time and requires each student to have read the paper prior to class.

Each student will also work on a individual warm-up project and a semester project (as part of a group). Projects will be of a research orientation having the potential to eventually lead to a research publication. Deliverables related to the semester project are a formal Project Proposal, Mid-term Project Report, and a Final Project Presentation and Document.

Topics

- * Introduction to Storage Systems
- * Storage Devices
- * Storage System Architecture
- * Storage Interconnects and Interfaces
- * Disk Drive Architecture
- * Disk Profiling
- * RAID Systems
- * Flash-based Storage (Solid-state Drives)

- * Storage System Quality of Service
- * File-systems
- * Operating Systems Storage Management
- * Storage Area Networks and Network-Attached Storage
- * Large-scale Storage Systems
- * Emerging Storage Technologies and Future Trends

Textbooks

Basic material will be provided by the instructor. Advanced material will be mostly from recent research papers in the area of Storage Systems. The following reference books will also be used:

1. Linux Kernel Development, Third Edition, Robert Love, Addison Wesley
2. Operating System Concepts, Seventh Edition, Avi Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons, Inc.
3. Computer Architecture: A Quantitative Approach, Hennessy and Patterson Morgan Kaufmann; 3rd edition (May 15, 2002)

Last Update

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