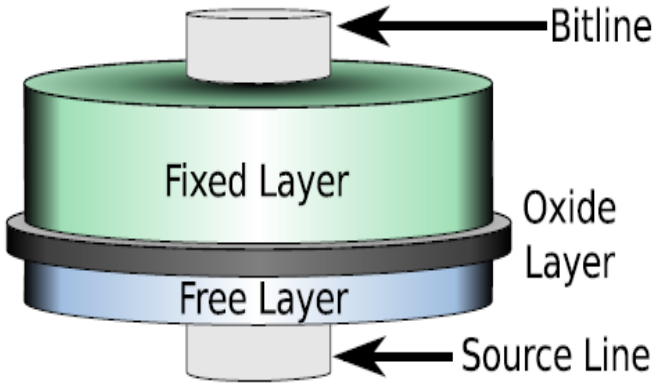

Our group explores issues related to data center architectures, reliable processor design, and energy-efficient memory and storage systems. We have developed new technology to combat energy and reliability problems in computer hardware, performed studies that provide novel insights into real systems, and developed research tools. Our group's graduates work at Google, Microsoft, and Intel.

Computer Architecture Lab

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"To strive, to seek, to find, and not to yield."

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Data Center Architecture

With the growth of web-based applications such as search and social networking and the advent of cloud-based computing and storage models, there has been a significant expansion of data center capacity worldwide. The design and management of both the data center infrastructure and the servers are critical to achieving high performance, dependability, energy-efficiency, and reducing costs. Our research involves studying various aspects of data center operation and developing novel server and infrastructure architectures to meet the demands of future workloads.

Non-Volatile Memory

SRAM, DRAM and rotating magnetic disks have served as the bedrock technologies for designing processor caches, main memory, and storage for msssany years. However, continued use of these technologies poses several challenges with regard to performance, power, density, and scalability. Once way to address these challenges is to use Non-Volatile Memory in lieu of these traditional memory and storage media. We are addressing the inherent challenges associated with non-volatile memory, such as the need for high write currents, slow access times, and limited endurance.

Microprocessor Reliability

Technology scaling, which has paved the way for multicore processors, also gives rise to a variety of silicon reliability problems. These problems include particle-induced soft errors and lifetime reliability phenomena, such as Negative Bias Temperature Instability (NBTI) and process variations. These phenomena threaten to break the abstraction that architecture has traditionally provided to the higher layers of the system as a reliable computing substrate. We are developing techniques to combat these reliability problems while reducing the performance and power overheads to effectively harness the computing power of multicore processors.

RECENT RESEARCH DEVELOPMENTS

- Field-analysis of disk drive failures in production data centers
- Reduced retention STT-RAM to optimize write latency and energy

RECENT GRANTS

- Google - Focused Research Award
- NSF –CAREER-Architectural Techniques and Tools for Adaptive Storage Systems

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