CS: MULTI-CORE CACHE MEMORY

UNIT I : Basic Elements of Large Cache Design

Shared Vs. Private Caches, Shared LLC, Private LLC, Workload Analysis, Centralized Vs. Distributed Shared Caches, Non-Uniform Cache Access, Inclusion.

UNIT II : Organizing Data in CMP Last Level Caches

Data Management for a Large Shared NUCA Cache, Placement/Migration/Search Policies for D-NUCA, Replication Policies in Shared Caches, OS-based Page Placement, Data Management for a Collection of Private Caches.

UNIT III : Policies Impacting Cache Hit Rates

Cache Partitioning for Throughput and Quality-of-Service, Throughput, QOS, Selecting a Highly Useful Population for a Large Shared Cache, Replacement/Insertion Policies, Novel Organizations for Associativity, Block-Level Optimizations.

UNIT IV : Interconnection Networks within Large Caches

Basic Large Cache Design, Cache Array Design, Cache Interconnects, Packet-Switched Routed Networks, the Impact of Interconnect Design on NUCA and UCA Caches, NUCA Caches, UCA Caches, Innovative Network Architectures for Large Caches.

UNIT V : Technology

Static-RAM Limitations, Parameter Variation, Modeling Methodology, Mitigating the Effects of Process Variation, Tolerating Hard and Soft Errors, Leveraging 3D Stacking to Resolve SRAM Problems, Emerging Technologies, 3T1DRAM, Embedded DRAM, Non-Volatile Memories.

Text Books:

1. Multi-Core Cache Hierarchies, Rajeev Balasubramonian, Norman P. Jouppi, Naveen Muralimanohar, 2011, Morgan & Claypool Publishers.
2. Memory Systems, Cache, DRAM, Disk, Bruce Jacob, Spencer W.Ng, David T. Wang, 2008, Morgan Kaufmann publishers.

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