COL 730

Parallel Programming 4 credits (3-0-2)

Pre-Req: COL106, COL331

Significant overlap with COL380

Course Template

Parallel computer organization, Parallel performance analysis, Scalability, High level Parallel programming models and framework, Load distribution and scheduling, Throughput, Latency, Memory and Data Organizations, Inter-process communication and synchronization, Shared memory architecture, Memory consistency, Interconnection network and routing, Distributed memory architecture, Distributed shared memory, Parallel IO, Parallel graph algorithms, Parallel Algorithm techniques: Searching, Sorting, Prefix operations, Pointer Jumping, Divide-and-Conquer, Partitioning, Pipelining, Accelerated Cascading, Symmetry Breaking, Synchronization (Locked/Lock-free).

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Course Template Rearranged

Parallel performance analysis, Scalability, Throughput, Latency

Parallel computer organization, Memory and Data Organizations, Inter-process communication and synchronization, Shared memory architecture, Interconnection network and routing, Distributed memory architecture, Distributed shared memory, Parallel IO, Load distribution and scheduling

High level Parallel programming models and framework, Memory consistency, Synchronization (Locked/Lock-free)

Parallel graph algorithms, Parallel Algorithm techniques: Searching, Sorting, Prefix operations, Pointer Jumping, Divide-and-Conquer, Partitioning, Pipelining, Accelerated Cascading, Symmetry Breaking

Course Template Rearranged

Parallel performance analysis, Scalability, Throughput, Latency	COL 106
Parallel computer organization, Memory and Data Organizations, Inter-process communication and synchronization, Shared memory architecture, Interconnection network and routing, Distributed memory architecture, Distributed shared memory, Parallel IO, Load distribution and scheduling	COL 331
High level Parallel programming models and framework, Memory consistency, Synchronization (Locked/Lock-free).	COL 331
Parallel graph algorithms, Parallel Algorithm techniques: Searching, Sorting, Prefix operations, Pointer Jumping, Divide-and-Conquer, Partitioning, Pipelining, Accelerated Cascading, Symmetry Breaking	COL 106

Rough Academic Calendar

Week 1 Aug 1 - Aug 7   Week 2 Aug 8 - Aug 14

Week 3 Aug 15 - Aug 21   Week 4 Aug 22 - Aug 28

Week 5 Aug 29 - Sep 4   Week 6 Sep 5 - Sep 11

Week 7 Sep 12 - Sep 18   Week 8 Sep 19 - Sep 25

Minor exam and mid-term break

Week 9 Oct 10 - Oct 16   Week 10 Oct 17 - Oct 23

Diwali week

Week 11 Oct 31 - Nov 6   Week 12 Nov 7 - Nov 13

Major exam

Tentative Schedule

Parallel performance analysis, Scalability, Throughput, Latency	1 week
Parallel computer organization, Memory and Data Organizations, Inter-process communication and synchronization, Shared memory architecture, Interconnection network and routing, Distributed memory architecture, Distributed shared memory, Parallel IO, Load distribution and scheduling	6 weeks GPU-CUDA pthread, OpenMP, MPI
High level Parallel programming models and framework, Memory consistency, Synchronization (Locked/Lock-free)	2.5 weeks
Parallel graph algorithms, Parallel Algorithm techniques: Searching, Sorting, Prefix operations, Pointer Jumping, Divide-and-Conquer, Partitioning, Pipelining, Accelerated Cascading, Symmetry Breaking	2.5 weeks

Evaluations (3-0-2)

Parallel performance analysis, Scalability, Throughput, Latency	1 week
Parallel computer organization, Memory and Data Organizations, Inter-process communication and synchronization, Shared memory architecture, Interconnection network and routing, Distributed memory architecture, Distributed shared memory, Parallel IO, Load distribution and scheduling 3 programming assignments 50%, minor 20%	6 weeks GPU-CUDA pthread, OpenMP, MPI
High level Parallel programming models and framework, Memory consistency, Synchronization (Locked/Lock-free)	2.5 weeks
Parallel graph algorithms, Parallel Algorithm techniques: Searching, Sorting, Prefix operations, Pointer Jumping, Divide-and-Conquer, Partitioning, Pipelining, Accelerated Cascading, Symmetry Breaking	2.5 weeks major 30%