

MULTI-CORE PROGRAMMING

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UNIT – I INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES

Parallel computer models - Symmetric and distributed shared memory architectures - Performance Issues. Multi-core Architectures - Software and hardware multithreading - SMT and CMP architectures - Design issues - Case studies - Intel Multi-core architecture - SUN CMP architecture - IBM cell processor.

UNIT - II PARALLEL PROGRAMMING

Fundamental concepts – Designing for threads. Threading and parallel programming constructs – Synchronization – Critical sections – Deadlock. Threading APIs.

UNIT- III OPENMP PROGRAMMING

OpenMP - Threading a loop - Thread overheads - Performance issues - Library functions. Solutions to parallel programming problems – Data races, deadlocks and livelocks - Non-blocking algorithms - Memory and cache related issues.

UNIT IV MPI PROGRAMMING

MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V MULTITHREADED APPLICATION DEVELOPMENT

Algorithms, program development and performance tuning.

REFERENCES

1. Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, Tata McGraw Hill, 2003.
2. Shameem Akhter and Jason Roberts, “Multi-core Programming”, Intel Press, 2006.
3. John L. Hennessey and David A. Patterson, “ Computer architecture – A quantitative approach”, Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
4. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware/ software approach” , Morgan Kaufmann/Elsevier Publishers, 2004.
5. Wesley Petersen and Peter Arbenz, “Introduction to Parallel Computing”, Oxford University Press, 2004.
6. University Press, 2004.