- Discuss the concept of true data dependency and its relevance in the context of parallel computing.
- Discuss the effect that cache memory has on data fetching latencies and provide an example with calculations to exhibit the effect.
- Implement a simple multi-threaded program to illustrate thread synchronization and explain the concept underlying that particular synchronization.
- Discuss the concept of process mapping and illustrate its significance with a simple example. Clearly state all assumptions made in discussion.
- Assuming that a problem is to be solved by finding the minimum number in a linear array, provide an algorithm that makes use of recursive reformulation of the linear search algorithm to solve the problem using a recursive algorithm.
- Discuss the concept behind super-linear speedup and provide an example to illustrate the concept.
- Provide a derivation of the efficiency metric and discuss its significance.
- Discuss the concept of partitioning the iteration space in a for-loop and implement a simple program to illustrate the concept.
- Discuss the concept of nested parallelism and provide a simple example to illustrate the concept.
- Implement a sequential numerical integration scheme that uses the Monte Carlo method to determine the value of the integral $\int_{1.5}^{20} xln(x)dx$. Choose parameter values such that the approximation is accurate within 0.1% relative error to the exact value.
- Extend the solution obtained from the previous problem to make use of parallelism such that performance gains in terms of execution time are obtained.