

LEVEL 1:

1. Differentiate between SIMD and MIMD? Explain.

SIMD or Single Instruction stream Multiple Data stream and MIMD or Multiple Instruction stream Multiple Data stream are two different parallel computing that it uses multiple processors and/or multiple computers to process data. These two SIMD and MIMD they perform similar basic functions, but they have a difference in both practically and technically. So, in technically SIMD and MIMD are different, because SIMD processors are usually simpler, smaller, cheaper and faster than MIMD processors, but MIMD is proficient for more complex operations. MIMD operations can accomplish to take more time with SIMD. SIMD processors perform operations sequentially, while the MIMD processors can do this concurrently. To understand more, SIMD is typically used for problems needing lots of computations with processors performing the same operation in parallel and perform single action instantaneously on multiple data pieces, like calculating or retrieving. MIMD is regularly used for problems that break down algorithms into separate and independent parts, with each part assigned to a different processor for simultaneous solution.

2. What are the performance metrics of parallel systems? Explain each.

The performance metrics of parallel system are the Speedup, Efficiency, Execution Time, Total Parallel Overhead and Scalability. Speedup is a measure that captures the relative benefit of solving problem or the ratio between the sequential execution time and parallel execution time, in short speedup is a measure of performance. Efficiency is a measure of the fraction of time which is processing element is usefully working, and also a measure of the usage of the computational capacity. It measures the ratio between performance and ratio capacity. Total Parallel Overhead is the total time cooperatively spent by all the processing elements over and above that obligatory by the known sequential algorithm for solving the same problem on a single processing element. Scalability is a measure of its capacity to increase speedup in amount to the number of processing elements. Also, it is a measure of its capacity to effectively utilize an increasing number of processors. Execution Time the performance of a parallel algorithm is determined by scheming its speedup. Speedup is defined as the ratio of the worst-case execution time of the fastest known sequential algorithm for a particular problem to the worst-case execution time of the parallel algorithm.

3. Explain what is pipelining is.

Pipeline is the continuous and somewhat overlapped movement of instruction to the processor or in the arithmetic steps taken by the processor to perform an instruction. It allows storing and executing instructions in an orderly process. Pipelining is a design for CPUs in which more than one instruction can be straggled by the CPU at once by treating the instruction stream as something like an assemblage line. While one instruction is in the execute phase, another instruction can be decoding, while another is being fetched. Without a pipeline, a computer processor gets the first instruction from memory, performs the operation it calls for, and then goes to get the next instruction from memory, and so on.

LEVEL 2:

1. How does parallel programming/computing works? What do you think will be the advantage of utilizing parallel approach?

Parallel computing uses multiple computer cores to attack several operations at one like the programmer has to figure out how to disruption the problem into pieces, and has to figure out how the pieces relate to each other. For example, a parallel program to play chess might look at all the possible first moves it could make. Each different first move could be traveled by a different processor, to see how the game would continue from that point. At the end, these results have to be united to figure out which is the best first move. Essentially, the condition is even more complex, because if the program is watching ahead several moves, then different starts can end up at the same board position. To be efficient, the program would have to keep track of this, so that if one processor had already assessed that position, then others would not waste time duplicating the effort. The advantage of using the Parallel approach is that it executes code more efficiently that saves time, allowing the execution of applications in a shorter wall-clock time and it is suited to modeling and simulating real-world phenomena.

2. In a right triangle, the square of the length of one side is equal to the sum of the squares of the lengths of the other two sides. Write a program that prompts the user to enter the length of the three sides of a triangle and then outputs a message indicating whether the triangle is a right triangle.
3. Write a program that will display all numbers divisible by 3, 4 and 5 from 1 – 50.

LEVEL 3:

1. Differentiate between Multiprocessing and Multithreading. Explain.

The difference between of that two is that Multithreading process multiple threads to increase the computing speed of a system and it execute multi threads simultaneously. By creating a thread, it is an economically as threads belonging to the same process share the belongings of that process and it improves the reliability of the system. Whereas, Multiprocessing it allows a system to have more than two CPUs to the system and it executes multi processes simultaneously. And by creating a process it can consume time and even exhaust the system resources. Also, multiprocessing classified into symmetric and asymmetric multiprocessing whereas, multithreading is not classified and also multiprocessing it runs parallel.

2. Explain the differences between Serial Computing and Parallel Computing.

Serial Computing is a type of processing in which one task is accomplished at a time and all the tasks are performed by the processors in an order. The process has to complete all the tasks, but it complete one task a time and it transfer data in a bit-by-bit form which is it takes more time to process. While the other tasks wait until the processor complete the current task. So, in short Serial Computing all the task are processed sequentially. Parallel Computing a type of processing in which multiple tasks are completed at a time by different processors. Each processor executes the task assigned simultaneously. The processors are the bus to communicate with each other and to access the main memory or operators on its data. Parallel Computing increases the output as well as improves reliability.

LEVEL 4:

1. Write a program that will generate 100 3-digit random numbers and store it in a list. The program should display the following:
 - a. All elements in the list
 - b. All numbers grouped by odd and even numbers
 - c. All numbers divisible by 9.
 - d. All prime numbers
 - e. All numbers that contain the digit 9 (e.g., 29, 91, 393, 961)

LEVEL 5:

1. Flatten the given Linked List
Sorting must be performed during the flattening of the linked list.

		7	
10	1	3	9
	8	4	5
2	6		