**Technological Institute of the Philippines**

**938 Aurora Blvd. Cubao, Quezon City**

**College of Computer Studies**

**CS 007 - Parallel and Distributed Computing**

**Prelim Period**

Define the following key terms. Please follow the sample below in defining each term. (20 points)

1. Parallel Algorithm

A parallel algorithm is designed to execute multiple instructions at the same time across different processing units, ultimately combining the individual outputs to generate the final result [1]. The necessity for a parallel algorithm model emerges to comprehend the strategy used for data partitioning and the methods by which this data is processed [2].

1. Concurrent Processing

Concurrent processing is a computing model where multiple processors run instructions at the same time to enhance performance [3]. A concurrent program is composed of multiple sequential programs that run in parallel [4].

1. Multiprocessors

A multiprocessor is a computer equipped with two or more central processing units (CPUs) that have full access to a shared random-access memory (RAM) [5]. The primary goal of using a multiprocessor is to increase the system’s execution speed, with additional objectives including fault tolerance and application compatibility [6].

1. Multicomputers

A multicomputer system is a computing setup consisting of multiple processors linked together to solve a problem [6]. Multicomputers are message-passing systems that use packet switching to exchange data [7].

1. Distributed system

A distributed system consists of computer programs that leverage computational resources from multiple, separate nodes to accomplish a common goal [8]. The independent computers will communicate within the system by sharing resources and files, as well as executing their assigned tasks [9].

1. Time Complexity

The time complexity of an algorithm measures the duration it takes for the algorithm to execute relative to the length of the input [10]. Rather than analyzing the overall execution time, it provides insights into how the execution time changes with variations in the number of operations within an algorithm [11].

1. Data parallelism

Data parallelism involves breaking down a significant task into smaller, independent subtasks that are processed simultaneously in parallel computing [12]. In data parallel operations, the source collection is divided into segments, allowing multiple threads to work on distinct parts simultaneously [13].

1. Hybrid algorithm model

The hybrid algorithm model’s method involves training the prediction model with data gathered from monitoring, subsequently utilizing the model for predictions [14]. It's not just about merging multiple algorithms to address a different problem – many algorithms can be seen as compositions of simpler components – but specifically about merging algorithms that tackle the same problem but vary in other aspects, particularly performance [15].

1. Point-to-Point Communication

In telecommunication, point-to-point communication (P2P) refers to a set connection between two nodes enabling bi-directional communication [16]. Data transmitted through these connections does not traverse the public internet, mitigating risks associated with potential hacker or cyberattack vulnerabilities [17].

1. Hypercube Network

The hypercube network, also known as a binary n-cube multiprocessor, is regarded as a loosely coupled system [18]. Despite its significant contribution to parallel processing development, the hypercube architecture remains relatively less widespread and influential [19].

**References:**

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**Honor Pledge:**

*“I affirm that I have not given or received any unauthorized help on this assignment and that all*

*work shall be my own.”*

<Jose Mari V. Tan>