كلية الهندسة بحلوان

Dept. : computer and systems Engineering
Academic level: Fourth **Semester:** 2021/22
Course code & title: parallel and distribution System
Instructor: Dr. Shahira M. Habashy
Total mark: 100 mark **Time allowed:** 3 hrs

جامعة حلوان

Answer the following questions

Question 1 (Mark 40)

a) Consider the problem of adding n numbers on n processors (hypercube connected). Initially, each processor is assigned one of the numbers to be added and, at the end of the computation; one of the processors stores the sum of all the numbers. Calculate the parallel communication time, speedup and the cost.

b) Discuss the Routing Mechanisms in Static Network.

c) The parallel run time of a parallel implementation of an algorithm on a hypercube with P processors is given by

$$T_p = \frac{n}{P} + 2 \log P$$

For an input sequence of length n. Calculate the minimum parallel execution time.

d) Show the method of mapping matrices into parallel processing system.

e) Consider the problem of sending a message (m words) to all the processors in a parallel processing system - store and forward Routing- calculate parallel run time in case of the parallel processing system configuration is

I. Ring

II. Hypercube

f) Draw the bitonic sorting network for an input sequence n=8 inputs. Show the mapping of that bitonic sorting network into hypercube. Calculate the parallel run time.

Question 2 (Mark 40)

a) Describe precisely what is meant by a scalable system.
b) Scalability can be achieved by applying different techniques. Explain these techniques?

c) Give an example of a self-managing system in which the analysis component is completely distributed or even hidden.
d) Describe techniques used to improve quality of Service in stream communication.
e) The distribution of a name space across multiple name servers affects the implementation of name resolution. Compare between recursive and iterative name resolution.
f) Explain how DNS can be used to implement a home-based approach for locating mobile hosts.
g) Write a server program using Java API that processes a line of input received from the client, and then sends it back to the client in a UDP datagram message.

Question 3 (Mark 20)

a) Write MPI code that accomplish the **integration** of $f(t)= t * [\cos(t^2)]$ on the interval [-100,100] across multiple processors, the number of processors is specified by the user.
b) Write MPI program that calculate π value using Monte Carlo Simulation.

Good Luck