Distributed Systems Project Report

Distributed Simulation

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April 14, 2015

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1 Introduction

Distributed simulation involves the execution of a single simulation program on a collection of loosely coupled processors (e.g., PCs interconnected by a LAN or WAN). Distributed simulation is used for a variety of reasons, including:

- Enabling the execution of time consuming simulations, that could not otherwise be performed (e.g., simulation of the Internet), which helps in reducing the model execution time (proportional to the number of processors) and provides the ability to run larger models (with more memory).
- Enabling the simulation to be used as a forecasting tool in time critical decision making processes (e.g., air traffic control), wherein the simulation can be initialized to the current system state, and faster than real-time execution can be achieved for what-if experimentation, as the simulation results may be needed in seconds.
- Creating distributed virtual environments, possibly including users at distant geographical locations (e.g., training, entertainment), providing real-time execution capability, scalable performance for many users and simulated entities.

2 Objectives

The objective of this project is to develop a distributed simulation framework for simulating problems such as random walks in a graph. It includes multiple components, which can be represented by the following points:

- Ensuring a near equal workload distribution among multiple nodes, and distributing the graph in a manner, so as to minimize inter-node communications.
- Developing a reliable, FIFO communication framework among the nodes.
- Developing a well-coordinated framework for message handling and processing using multi-threading.

3 Dataset

- A small synthetic dataset
- A random graph of 100 nodes
- Coauthorship network with 1000 nodes
- Coauthorship network with 100000 nodes

4 Approach

5 Interface Description

6 Results Obtained

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