Distributed Algorithms

Assignment 01

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1 Warming Up

a. The difference between a distributed system and a parallel system is that: **A parallel system has a common physical memnory, while computers in a distributed system loosely connect to each other and communicate through message exchange.**

b. A complicated distributed system can be used to check whether an algorithm is reliable. For example, we can use a complicated distributed system to model the real network which can be used to test a certain mechanism in the network. With more complexity, there's a greater change that there would appear a bug.

c. Difference between *Synchronous System Model* and *Asynchronous System Model* is the maximum duration of an action or a message. In *Synchronous System Model*, they are assumed restricted or known. But in *Asynchronous System Model*, their limits are unknown. On the other hand, *Atom Model* is similar to *Synchronous System Model*, but its actions are timeless.

2 Topologies

The number of possible spanning trees that can be generated from a d dimension Hypercube is:

$$c(C(d)) = \prod_{k=2}^{d} (2k)^{\binom{d}{k}} \tag{1}$$

In order to execute the broadcast withour interfering each other. Besides simple broadcast information, we let each node (node U, e.x.) send a node sets U_{send} to the broadcasted node (node V e.x.). So that:

$$V_{receive} = U_{send} = U_{receive} \cup neighbour(U) \tag{2}$$

Which means V won't broadcast the information to the node set $V_{receive}$.

3 Flooding with Achnowledgments

4 Echo Algorithm