COP5615 Project Report

Pastry Protocol

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Run Syntax:

Run : dotnet fsi --langversion:preview proj3.fsx <numofNodes> <numofRequests>
Example : dotnet fsi --langversion:preview proj3.fsx 100 40

What's Working:

Pastry is a type of self organizing overlay routing protocol. Each participating node maintains a routing table and helps route messages to their destination. Pastry is implemented as an overlay network where each node is assigned an unique identifier. The assigned identifiers (nodeid) are 128 bits long and have a range from 0 to 2^{128}-1. For the purpose of routing, these nodeids are considered as sequences of digits in base 2^b where b = 4. The nodeids are randomly generated when a node joins the network and are arranged in circular modulo fashion. The nodeids are distributed uniformly across the nodeid range and are organized based on numerical closeness of nodeids. Every node in the implementation has a routing table, leafset and a neighborhood set. Routing table consists of $\log_{16}N$ where N is the number of nodes in the network. Leafset consists of the nodes numerically closest to the node, half of which are greater and the rest smaller than the node. The neighborhood set maintains redundancy by holding data that tracks nodes that are close in terms of network locality.

When a message arrives, a node checks its key and then looks at its leafset to locate the node closest to the key, it forwards the message directly to the particular node. If it cannot find a node closest to the key, it checks its routing table and does a prefix match and forwards it to the matched node.This process is continued until the node closest to the key is located. Therefore, the routing of the message takes at most $\log_{16}N$ steps for any given message in the id space.

Largest Network:

The largest network we managed to deal with is a network of 10000 nodes and 100 requests

Results:

Number of Nodes	Number of Requests	Average Number of Hops
50	15	1.956
100	40	2.29125
300	120	2.88725
500	200	3.13944
1000	300	3.54613
2000	500	3.943742
3000	1000	4.184323
3500	1200	4.289222
10000	100	4.952315

Plot: