COL819: Andvanced Distributed System, II Semester 2016-17

Assignment 1

January 24, 2017

Problem

Consider a network of N nodes. Each node has its own message queue. Furthermore, it can send or receive messages to/from other nodes. Simulate the Pastry and Chord algorithms for a network of nodes. Implement all the necessary functions required for the simulation. A code template has been provided to you. You are welcome to modify it within the constraints of the assignment. Please note that the code for each node needs to run as a separate thread, and the code needs to be *thread-safe*.

Simulate the addition, and deletion of nodes, and process of looking up keys. Run long simulations (till the results stabilize).

Plot the following graphs:

- The average number of messages (or hops) vs the number of nodes for each operation type.
- The probability distribution function (pdf) of the number of hops traversed.

Show us some additional insights regarding the working of the routing table, neighborhood table, leaf nodes and finger table. How many accesses into the tables results in successes, and so on? Essentially, any other data that you can show that will convince us about the correctness of your implementation.

Conduct careful experiments to evaluate the behavior of your system under different scenarios such as fault injection. Change the value of different parameters to study when the system will succeed or fail. Report any insights, if any, from your experiments, as to which strategies succeed the best.

Documents to be Submitted

- Submit your assignment in the form of a zip file on Moodle.

- Each program must work correctly and be documented. The zip file you upload on Moodle should contain:
- The source files implemented with clear in-line documentation and indentation.
- A separate pdf document describing the overall design, description of how your program works, design tradeoffs results with plots and diagrams.
- Have two sections: One for Pastry and one for Chord. Draw at least one diagram for Pastry and one for Chord. It should show the working of some algorithm such as node addition/deletion or lookup.

Important Notes

1. Work in groups of two for the lab assignment.
2. Write the document in LaTeX.
3. **Draw** diagrams using Inkscape (www.inkscape.org). Save your drawings in svg/pdf.
4. **Plot** graphs using Matplotlib (www.matplotlib.com)
5. You can be creative with the assignment. The purpose of this assignment is to familiarize you with DHTs: Pastry and Chord. Use the message queues that we have provided in the stub code (with appropriate modifications).
6. Each part of the assignment (documents, programs and viva) carry certain marks. The assignment will be judged on the basis of the viva.
7. **If we think you have not done your assignment by yourself or you lack proper understanding. You will be penalized (even if the code works perfectly).**
8. Moreover, the marks for the group members can be different. It depends on the subjective perception of the TA.