582615: Overlay and peer-to-peer Networks, Autumn 2011

Exercise 3

Instructions:
• The exercises are to be done in the groups assigned on the lecture, or individually
• Answer the questions 1-2 and return your answers by email to petri.savolainen ät hiit.fi
• Due date 13.10.2011 at 10:15, before the exercise session
• Accepted formats: plain text e-mail, PDF, ODT, DOC, DOCX, or RTF.
• Please include all the names and student numbers of all the group members in the submission.
• Groups/individuals will be picked randomly to present their answers at the exercise session
• The practical exercise 3 should not be returned electronically. The practical exercise is submitted by demonstrating the running software and answering the questions related to the practical exercise at the exercise session.

Questions

1. Answer the questions a) and b) based on the article "The Impact of DHT Routing Geometry on Resilience and Proximity "
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.6.5914&rep=rep1&type=pdf

a) What are the main geometry types addressed in the article? Be prepared to draw and explain an example of routing in each geometry type on the blackboard at the exercise session. (3p)

b) What are PNS and PRS? Why only certain geometries can utilize both PNS and PRS? (3p)

2. BitTorrent mainline DHT is a widely deployed Kademlia-based DHT with millions of concurrent users.

a) Explain how would you measure/estimate the number of concurrent users in BitTorrent mainline DHT. Note: take into account the vast size of the network. (3p)
b) Give pseudocode for measuring/estimating the number of concurrent users in BitTorrent mainline DHT. (3p)
c) How many messages would be sent and received when executing your measurement algorithm? How long time would executing your algorithm *at least* take if running it over a connection of 512Kbit/s upload and 1MBit/s download capacity? You can make the conservative assumptions that each message is sent in its own UDP packet and the size of each UDP packet is 256 bytes. (3p)

You can refer to http://www.bittorrent.org/beps/bep_0005.html for the specification of BitTorrent mainline DHT.

Practical exercise

3. Implement the algorithm that you designed in 2 b) in the Kademlia-simulator of OverSim. Test the algorithm with 3 different network sizes, log the accuracy of your network size estimation and the number of UDP packets your algorithm sends/receives for each network size (9p).