ECEN 5673 - Distributed Systems (Fall 2016)

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Project Proposal

Objective:
To implement a **Peer to Peer Distributed System** for data communication between the peers to achieve file sharing / video streaming. We would attempt to identify the issues in the existing implementations and propose/develop ways to solve them. Also, we intend to work on load balancing for DHT (Distributed Hash Table)-based Peer to Peer systems.

Features/Issues to address:

- Load balancing (Bandwidth / Capacity / Proximity based) in P2P systems [1].
- Security Issues.
- Non-Transitivity between peers [3].
- Designing a Fault Tolerant system.
- Handling nodes running behind NAT or Firewall [2].

Initial Plans of the Project:

- Implementation of Peer to Peer Distributed System with DHTs (Distributed Hash Table) using open-source openDHT / TomP2P software frameworks.
- Implement Load Balancing Strategies in Distributed P2P systems.
- Identify security issues in P2P systems concerning the application chosen (file sharing / video streaming).
- Explore Cloud Computing - lease cloud instances online to act as stable nodes in the P2P system.

Proposed Methodology for Evaluation:

- Latency measurements and file Integrity.
- Ability to handle heavy load situations.
- Simulate faults by taking down nodes and test the system functionality.
- Measure Jitter in case of Real-Time application like video streaming to assess Quality of Service (QoS).

References:

1. Yingwu Zhu and Yiming Hu. Efficient. Proximity-Aware Load Balancing for DHT-Based P2P Systems. IEEE Transactions on Parallel and Distributed Systems, April 2005.
2. Raul Jiminez, Flutra Osmani and Bjorn Knutsson. Connectivity Properties of Mainline BitTorrent DHT Nodes. IEEE P2P'09 - Sept 9-11, 2009.
3. Michael J. Freedman, Karthik Lakshminarayanan, Sean Rhea, and Ion Stoica. Non-Transitive Connectivity and DHTs. Proceedings of the Second Workshop on Real, Large Distributed Systems (WORLDS '05).