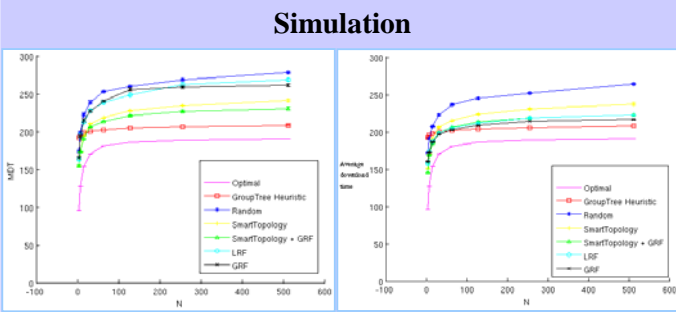
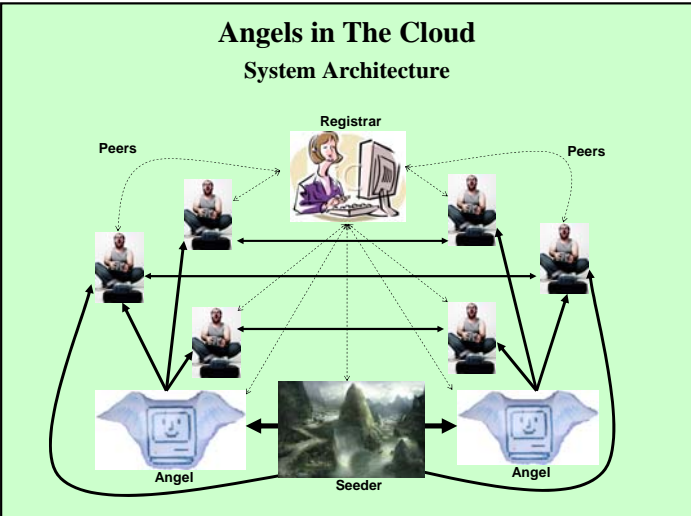


# Angels In The Cloud

## An On-Demand Peer-Assisted Content Distribution Cloud Service

Raymond Sweha  
remos@cs.bu.edu
Vatche Ishakian  
visahak@cs.bu.edu
Azer Bestavros  
best@cs.bu.edu

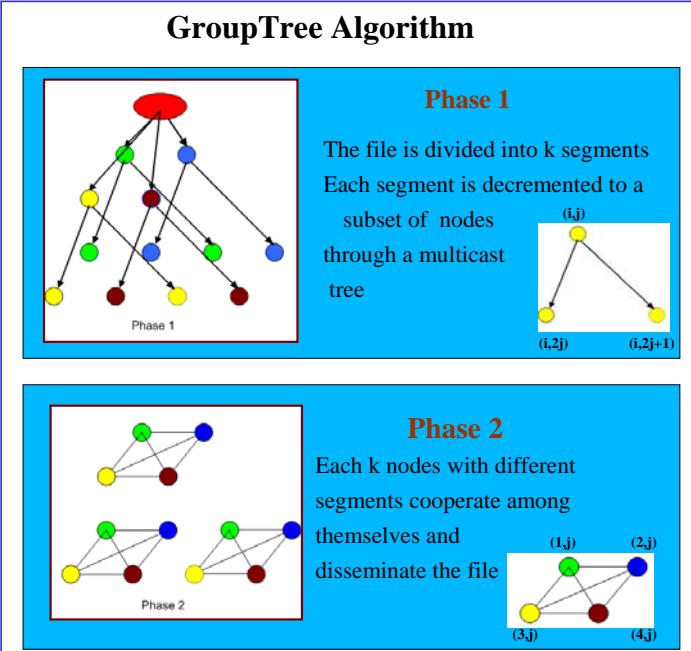
**Abstract**  
 This project develops a Cloud Service for Internet content distribution. Our system assists Seeders (content originators) with the dissemination of content (a file) to a set of nodes using Peer-to-Peer (P2P) concepts so that this dissemination is completed in the minimum time possible. Prior results of ours suggest that minimizing content distribution time may be achieved by adding nodes that are not themselves interested in downloading the content, but rather in assisting other nodes with their download in a prescribed (provably optimal) fashion. We call such nodes Angels. The emerging cloud computing architecture offers the best mechanism to allow such Angels to be created on-the-fly. As seeders request assistance with their file distribution, our service responds by spawning virtual machines that act as Angels. In this work, we describe the design and implementation of our "Angels-on-Demand" cloud service as well as the API for invoking this service.



**Simulation Setup**

- Discrete time simulator built in Java, providing controlled environment to reproduce experiments
- Comparing many heuristics
- Ability to run extensive experiments

**BUT is simulation enough!?**



**Theorem<sup>[1]</sup>:**

*The Minimum Distribution Time of a file of F to a set of Peers L in the existence of a set of Angels H is:*

$$T_{min} = \frac{F}{\min\{b_{min}, a(S), \frac{a(S)+a(L)+a(H)}{|L|} - \frac{a(H)}{|L|^2}\}}$$

- System Building**
- Modified Instrumented Bittorrent Client as our client
  - Divide the file into segments, each segment treated as a s BT file
  - Each node gets an ID (i,j) denoting its position in the GroupTree
  - UnChoking clients depends on our algorithm
  - Instantiate Angels from our Eucalyptus Cloud
  - Run the Registrar on our BU infrastructure which acts as BT Tracker
  - Run the clients on Emulab/planetlab nodes
  - Emulab provides semi-controlled environment with traffic shapers
  - Planetlab provides real-world scenario verification
- See Demo**
- ↓

[1] Ray Sweha, Azer Bestavros, and John Byers. Angels: In-network support for minimum distribution time in p2p overlays. In *Master's Thesis, BU*.