



CLOUD COMPUTING CONCEPTS

with **Indranil Gupta (Indy)**

P2P SYSTEMS

Lecture A

INTRODUCTION

WHY STUDY PEER-TO-PEER SYSTEMS?

- First distributed systems that seriously focused on scalability with respect to number of nodes
- P2P techniques abound in cloud computing systems
 - Key-value stores (e.g., Cassandra, Riak, Voldemort) use Chord p2p hashing

WHY STUDY PEER TO PEER SYSTEMS?

Napster v2.0 BETA 7

File Actions Help

Home Chat Library Search Hot List Transfer Discover Help

Artist: Find it!

Title: Clear Fields

Max Results: Advanced >>

| Filename | Filesize | Bitrate | Freq | Length | User | Connection | Ping |
|---|-----------|---------|-------|--------|--------------|------------|------|
| incomplete_other_artist\Tito Puentes Golden Latin Jazz Allstars - Oye Como ... | 3,696,640 | 128 | 44100 | 3:51 | bdenzler | DSL | 343 |
| incomplete_other_artist\{Marty Robbins} The Fastest Gun Around.mp3 | 542,304 | 128 | 44100 | 0:39 | bdenzler | DSL | 343 |
| incomplete_other_artist\Flavi Shankar - Chants Of India 04 - Asato Maa.mp3 | 2,449,408 | 128 | 44100 | 2:35 | bdenzler | DSL | 343 |
| other_artist\Engelbert Humperdinck - White Christmas.mp3 | 9,277,648 | 320 | 44100 | 3:52 | bdenzler | DSL | 343 |
| other_artist\Grateful Dead - Franklin's Tower - Reggae Style.mp3 | 4,635,458 | 128 | 44100 | 4:48 | bdenzler | DSL | 343 |
| Unknown Artist - You seriously have to listen to this.mp3 | 462,848 | 318 | 16000 | 0:17 | sam113... | Cable | 383 |
| MP3z\artist - 'The Way Life Is' By Drag-On featuring Case.mp3 | 4,726,784 | 128 | 44100 | 4:54 | burg651 | Cable | 386 |
| MP3z\artist - 'Opposite Of H2O' By Drag-On featuring Jadakiss.mp3 | 3,540,992 | 128 | 44100 | 3:41 | burg651 | Cable | 386 |
| Various Artist - Perfect Day 97.mp3 | 3,722,344 | 128 | 44100 | 3:53 | falkstad | ISDN-128K | 398 |
| Liszt\Liszt - Etude 'Un sospiro' - Czifra-artist.mp3 | 2,752,512 | 128 | 44100 | 2:53 | Iskjdlkjl... | Unknown | 504 |
| Music\Waiting To Exhale - Original Soundtrack Album - Various Artist - Count... | 3,199,083 | 96 | 44100 | 4:26 | Jzfork9 | 56K | 511 |
| Track 03_artist.mp3 | 4,054,332 | 128 | 44100 | 4:13 | immusic... | Cable | 514 |
| Track 02_artist.mp3 | 6,228,974 | 128 | 44100 | 6:26 | immusic... | Cable | 514 |
| Track 01_artist.mp3 | 4,731,426 | 128 | 44100 | 4:54 | immusic... | Cable | 514 |
| Track 04_artist.mp3 | 4,514,505 | 128 | 44100 | 4:41 | immusic... | Cable | 514 |
| Track 05_artist.mp3 | 4,105,323 | 128 | 44100 | 4:16 | immusic... | Cable | 514 |
| mixer in track 01_Artist_0721011750.mp3 | 180,686 | 128 | 44100 | 0:17 | immusic... | Cable | 514 |
| Album\Reflex - Keep In Touch-Artist.mp3 | 7,041,024 | 160 | 44100 | 5:49 | rotimca | 56K | 527 |

Returned 100 results.

Get Selected Songs Add Selected User to Hot List

Online (keyscreen): Sharing 491 files, Currently 740,043 files (2.991 gigabytes) available in 5,873 libraries.

A BRIEF HISTORY

- [6/99] Shawn Fanning (freshman Northeastern University) releases Napster online music service
- [12/99] RIAA sues Napster, asking \$100K per download
- [3/00] 25% University of Wisconsin traffic Napster, many universities ban it
- [00] 60M users
- [2/01] US Federal Appeals Court: users violating copyright laws, Napster is abetting this
- [9/01] Napster decides to run paid service, pay % to songwriters and music companies
- [Today] Napster protocol is open, people free to develop OpenNap clients and servers
<http://opennap.sourceforge.net>
 - Gnutella: <http://www.limewire.com> (deprecated)
 - Peer-to-peer working groups: <http://p2p.internet2.edu>

WHAT WE WILL STUDY

- Widely-deployed P2P Systems
 1. Napster
 2. Gnutella
 3. Fasttrack (Kazaa, Kazaalite, Grokster)
 4. BitTorrent
- P2P Systems with Provable Properties
 1. Chord
 2. Pastry
 3. Kelips