T3 (Full day, 6 November 2005)

Emerging Peer-to-peer Technology

(Prof. Dr.) Ralf Steinmetz, Darmstadt Univ. of Technology

Target audience and prerequisite knowledge and experience

Target Audience

- Researchers interested in a broader notion of what Peer-to-Peer means
- Computer Scientist interested in a more detailed picture going beyond the ordinary file sharing
- Practitioners who like to know either where this technology is applicable or what the potential of this paradigm is.

Basics of computer science and networking are useful prerequisites in order to better follow all details.

Abstract

Roughly 10 years ago the advent of the World Wide Web with the related browsers and tools started to change our Perception of the Internet. Multimedia research and development strongly influenced this technology push. Since 2000 we encounter an increasing interest in the so called Peer-to-Peer technology. Peer-to-Peer Internet applications have recently been popularized through file sharing applications like Napster, Gnutella, FreeNet, KaZaA and others. Within these applications the Peer-to-Peer concept is mainly used to share files, i.e. the exchange of diverse media data, like music, movies and programs. The growth in the usage of these applications is enormous and even more rapid than the growth of the World Wide Web. Even well established business models of e.g. the music industry have to be rethought or adapted. While most of the attention has been focused on the copyright issues of the shared content, the concept of Peer-to-Peer architectures offers many other interesting issues. At some point of time they may even be more significant than the pure share of files. It is the purpose of this tutorial to work out these challenges and allow the participants to further understand the potential of this emerging technology.

We will therefore (1) review well known peer-to-peers applications and systems, (2) provide a common notion of what peer-to-peer is, (3) present distributed search mechanisms used for peer-to-peer, (4) discuss peer-to-peer intrinsic issues (like overlay networks), and (5) identify crucial challenges of peer-to-peer in research and development.

Namely, this tutorial will address

- Novel Peer-to-Peer applications and systems
- Napster, Gnutella, Seti@home, FreeNet,
- Peer-to-Peer service development
- Peer-to-Peer infrastructure and overlay networks
- Protocols for locating discovering, management and/or scheduling of resources
- Measurements issues and performance behavior of Peer-to-Peer systems

- Dependability and reliability in P2P networks (fault tolerance, scalability, availability, accessibility, security)
- Anonymity and anti-censorship
- Workload characterization for Peer-to-Peer systems
- Peer-to-Peer mechanisms using other resources than data

The increasing number of research efforts in the area of Peer-to-Peer indicate that there is an enormous interest in and potential for Peer-to-Peer research.

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About the Speaker:

Since early 1996, Dr. Ralf Steinmetz has been a professor at the dept. of Electrical Engineering and Information Technology as well as at the dept. Computer Science of the Darmstadt University of Technology, Germany. There he is in charge of a chair position as managing director of the "Multimedia Communications Lab". From late 1996 until late 2001 he directed the Fraunhofer (former GMD) Integrated Publications and Information Institute IPSI. In 1999 he founded the Hessian Telemedia Technology Competence Center (httc e.V.). On whose board he has since served as chair. As dean of the department since 2002 he manages the department.
His research interests cover networked multimedia issues with the vision of "seamless multimedia communications"; i.e. network dependability and security (e.g. gateways, firewalls), quality of service (e.g. network engineering), content distribution networks (e.g. streaming), context aware communications (e.g. peer-to-peer mechanisms), media semantics (e.g. ontology enrichment, metadata). At Darmstadt he relates these research issues often very closely to mobility, Internet telephony and telemedia learning.

He has been the editor and co-author of a multimedia course, which reflects the major issues of the first (updated in several versions) in-depth technical book on multimedia technology. He has worked as an editor of various IEEE, ACM and other journals. He has served as chair, vice-chair and member of numerous program and steering committees of communications and multimedia workshops and conferences. He is a member of the GI and VDE-ITG. He was awarded as ICCC Governor, the honour of Fellow of both, the IEEE and the ACM.

Tel: 49.6151.16.6151 fax: 49.6151.16.6152 mailto:Ralf.Steinmetz@KOM.tu-darmstadt.de
http://www.KOM.tu-darmstadt.de
Multimedia Communications Lab,
Dept. of Electrical Engineering & Information Technology
Darmstadt Univ. of Technology, Merckstr. 25, D-64283 Darmstadt, Germany