Peer to Peer Computing

The Evolution of a Disruptive Technology
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This book presents Peer-to-Peer (P2P) as a disruptive technology, organising its evolution into three sections with an excellent research focus in each of them.

<u>Section I</u>: There are four chapters in the first section titled - *Then and Now : Understanding P2P Spirit, Networks, Content Distribution and Data Storage*. The core concepts in P2P networking and content sharing are dealt with in Chapters I and II respectively. The characteristics of P2P networks that lead to the development of the three level model and the various resource management aspects when dealing with information, files, bandwidth, processor cycles and storage have been well documented here with references to research activities in each of them. The architecture and protocol design of four popular P2P systems *Napster*, *Gnutella*, *Fasttrack* and *OpenFT* that were used for content sharing have been described. A comparative study of the above systems based on scalability, anonymity, security, fault tolerance and several other issues is the highlight of this section as it would serve as a guide to designers and developers of P2P systems. The second half of this section deals with management of data and information and is presented in Chapters III & IV respectively. The chapter on data management deals with the design aspects of P2P systems for backup and recovery services and analysis the reliability of P2P systems when used for data management. The existing information storage and discovery systems are broadly classified as *Data Lookup Systems* and *Search Systems*. *Data Lookup Systems* are those that provide guaranteed services in terms of finding the information, if it exists in the system, in a bounded number of hops. The *Search Systems* on the other hand can handle complex queries but provide only loose guarantees for unstructured systems and   strong guarantees for structured systems. Most of the existing *Data Lookup Systems* employ lookup protocols that are based on the *Distributed Hash Tables (DHTs)*. These systems have been well documented while one of them referred to as Squid - a popular P2P information discovery system, has been described in detail.

<u>Section II</u> : titled **Systems and Assets : Issues Arising from Decentralised Networks in Security and Law** consists of four chapters focussing on security aspects ranging from security of the P2P network to the potential security issues related to the database it contains. The issues of security from a standpoint of trust are presented well in chapter VII. The security aspects in P2P systems significantly rely on trust. Building trust into P2P systems by innovative designs and extensions to existing trust and security mechanisms is an active area of research while the discussion on "who owns the P2P systems" could help to trigger future research that would provide fruitful insights on the identity and ownership issues. The section ends with a discussion on the copyright law presenting the complexity in adapting the exiting copyright laws to this new technology that is rightfully titled 'disruptive technology'.

<u>Section III</u> : is titled **P2P Domain Proliferation: Perspectives and Influences of Peer Concepts on Collaboration, Web services and Grid Computing.** There are five chapters in this section which focuses on content sharing from a different perspective. The section begins with the presentation of a new P2P collaborative technology in chapter IX which is based on *object-centric sharing*. The prototype design for this technology and an enhanced *consistency control algorithm* that caters to shared objects has been presented. This is followed by an extensive discussion on the tradeoffs of objects-centric sharing in P2P systems. The focus then shifts to *knowledge sharing* in chapter X. Collaborative systems that support search tools are examples of knowledge sharing systems though they are not sometimes viewed as P2P systems because of their centralised architecture. But the authors claim that *knowledge sharing* in such systems is P2P regardless of the architecture. They propose a framework here putting forth a few criteria that help to determine if *knowledge sharing* systems qualify as P2P systems thus introducing a *Second-Degree Peer-to-Peer* model for *knowledge sharing*. Chapter XI deals with IT resource sharing from a financial perspective. Bandwidth,

computation power, storage and data have been identified as potentially sharable IT resources . This chapter presents a comparative study of IT resource sharing paradigms – Grid Computing, P2P and Cycle harvesting and also presents a frame work that is based on the standard *Capability Maturity Model* to evaluate the capabilities of the IT resource sharing under different environments. The section ends by presenting the applications of web services in bioinformatics as a specialised application of P2P and also proposes a new approach for content delivery by integrating the best of grid computing and P2P. The high level of security that can be achieved in a grid combined with the scalable capabilities of P2P help to build content delivery systems that are reliable, scalable and secure.

This book is content packed with an excellent research focus targeting research and developers of P2P systems.

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Web Information Retrieval

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Paper Submission Due: 30 March 2006
Review and acceptance or revision notification: 30 May 2006
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Publication: Sep. - Dec. 2006

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