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Peer-to-Peer Systems and Applications

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This book is dedicated to our children:

Jan, Alexander,
Felix, Lena, Samuel & Julius

Foreword

Ion Stoica (University of California at Berkeley)

Starting with Napster and Gnutella, Peer-to-Peer systems became an integrated part of the Internet fabric attracting millions of users. According to recent measurements of several large ISPs, Peer-to-Peer traffic exceeds Web traffic, once the dominant traffic on the Internet. While the most popular Peer-to-Peer applications continue to remain file sharing and content distribution, new applications such as Internet telephony are starting to emerge.

Not surprisingly, the popularity of Peer-to-Peer systems has fueled academic research. In a very short time, Peer-to-Peer has evolved into an exciting research field which brings together researchers from systems, networking, and theory. During the past five years, Peer-to-Peer work has appeared in the proceedings of virtually all top system and networking conferences.

However, while the huge popularity of the Peer-to-Peer systems and the explosion of Peer-to-Peer research have created a large body of knowledge, there is little structure to this body. Surveys on Peer-to-Peer systems and books providing comprehensive coverage on the Peer-to-Peer technologies are few and far apart. The fact that Peer-to-Peer is still a rapidly evolving field makes the relative lack of such materials even more critical.

This book fills this void by including a collection of representative articles, which gives an up-to-date and comprehensive snapshot of the Peer-to-Peer field. One of the main challenges that faces any book covering such a vast and relatively new territory is how to structure the material. This book resolves this conundrum by dividing the material into roughly three parts.

The first part of the book covers the basics of Peer-to-Peer designs, unstructured and structured systems, and presents a variety of applications including e-mail, multicast, Grid computing, and Web services. The book then goes beyond describing traditional systems, by discussing general aspects of the Peer-to-Peer systems, namely the self-organization nature of the Peer-to-Peer systems, and the all-important topic of evaluating these systems. In addition, the book illustrates the broad applicability of Peer-to-Peer by discussing the impact of the Peer-to-Peer technologies in two computer-science areas, namely searching and information retrieval, and mobile computing. No Peer-to-Peer book would be complete without discussing the business model, accounting, and security. This book touches on these topics in the last part.

With this book, Steinmetz and Wehrle have made a successful attempt to present the vast amount of knowledge in the Peer-to-Peer field, which was accumulated over the last few years, in a coherent and structured fashion. The book includes articles on most recent developments in the field. This makes the book equally useful for readers who want to get an up-to-date perspective on the field, as well as for researchers who want to enter the field. The combination of the traditional Peer-to-Peer designs and applications and the discussion of their self-organizing properties and their impact on other areas of computer science make this book a worthy addition to the Peer-to-Peer field.

Berkeley, July 20th, 2005 Ion Stoica

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