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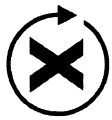

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Multimedia Systems

With 172 Figures

Springer

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Preface

Multimedia Applications and Systems are an increasingly common part of our everyday lives—emerging mobile terminals which can display pictures and video data, DVD players in the home, downloadable games, streaming in the Internet, radio stations on the World Wide Web—are just a few examples. These applications and systems are becoming an integral part of our heterogeneous computing and communication environment. Over the last decade, we have experienced an explosive growth of multimedia computing, communication, and applications (World Wide Web, conferencing, digital entertainment, etc.) which provide not just text and images but also video, audio, and other continuous media. In the future, all computers and networks will contain multimedia devices. They will also require appropriate processing and communication support to provide seamless and ubiquitous services and protocols for the relevant multimedia applications.

This book is one of three closely related volumes which aim to cover the whole area of multimedia technology and its applications: The first volume (*Ralf Steinmetz, Klara Nahrstedt, "Multimedia Fundamentals Volume 1: Media Coding and Content Processing", Prentice-Hall, 2002*) deals mainly with the fundamentals of media per se, and covers media-specific considerations such as individual media characteristics, media processing, and optical storage, content analysis, and processing. It includes coding, compression, and a detailed discussion of optical storage. The third volume (*Ralf Steinmetz, Klara Nahrstedt, "Multimedia Applications", Springer-Verlag 2004*) discusses multimedia database and document issues, programming of multimedia applications, multimedia security, human-computer interfaces, multimedia learning,

design and different types of applications. Taken together, our three books are intended to be the standard reference books on "multimedia fundamentals".

Do the individual volumes contain sufficient information which readers might need to make the most out of reading this book?

The present volume can be read (and understood) without detailed knowledge of media coding and content processing. However, a basic grasp of the notion of compression would certainly be very useful. Furthermore, it is of crucial importance that the readers have an introductory background in the areas of operating systems and networking systems.

In this book, we emphasize multimedia systems and networking to provide fundamental understanding what are the underlying concepts, mechanisms and frameworks that multimedia applications stand on. Chapter 2 on quality of service provides the basic definitions and concepts (1) to explain quality differentiation and quality-aware resource management, and (2) to present one of the most fundamental building blocks of multimedia systems. Chapter 3 on multimedia operating systems touches upon fundamentals in processor soft-real-time scheduling, based on earliest deadline first and rate-monotonic scheduling policies, as well as in memory and device management. Chapter 4 continues the discussion of multimedia operating systems and presents media servers, one of the most researched domains in multimedia operating systems. Topics range from multimedia file structure, file placement, overall storage organization, to disk management, disk scheduling, and caching policies. Chapter 5 describes basic concepts for multimedia transmission at the physical and Medium Access Control layers, presenting past and existing networking technologies (e.g., Gigabit Ethernet, ATM) that embed appropriate algorithms, protocols and services for multimedia communication. Chapter 6 on multimedia communication is the core chapter for multimedia-enabled protocols executing at the network IP and transport layers. The readers will find discussion on existing protocols, that have been modified to assist in multimedia communication such as the TCP protocol, as well as on new protocols such as IPv6 and RTP protocols. Chapter 7 continues the discussion of multimedia-enabling concepts in the protocol stack and presents group communication services and protocols at the session layer. Chapter 8 is the glue of the whole book because it describes the synchronization concepts and mechanisms across the whole multimedia system architecture. It ties together synchronization mechanisms at the operating system and network levels with synchronization mechanisms at the application and user levels to deliver the overall goal of a multimedia system—the best perceptual quality of multimedia data to the user.

Overall, the book covers a wide scope of multimedia system and networking concepts, due to its intended purpose of serving as a reference, or as an introductory book in an undergraduate multimedia systems class. It evolved from the third edition of

our book on multimedia technology, published in German in 2000 [Ste00]. (Figures from this book have been reused with the permission of Springer-Verlag). However, several sections of the English text depart from the corresponding material in the German edition. The present volume can be used by computer professionals who are interested in multimedia systems, or by instructors as a textbook for introductory multimedia courses in computer science and related disciplines.

To help instructors use this book, additional material is available on our Web site: `http://www.kom.tu-darmstadt.de/mm-book/`. Please enter `mm_book` and `mm_docs` for user name and password, respectively.

Many people have helped us to prepare this book: R. Ackermann, M. Bräuer, D. Dimitriu, J. Dittmann, A. El Saddik, M. Farber, S. Fischer, J. Geißler, N. Georganas, C. Griwodz, T. Hollmer, T. Kamps, T. Kunkelmann, J. Liang, A. Mauthe, A. Meissner, K. Reichenberger, J. Schmitt, K. Schork-Jakobi, C. Seeberg, A. Steinacker, N. Streitz, P. Tandler, H. Thimm, D. Tietze, M. Wessner, L. Wolf. Thank you!

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