

# Preface

Welcome to this book! In it we share our experiences in developing highly efficient and scalable parallel implementations of H.264/AVC video decoding, a state-of-the-art video coding standard. We hope to convince you, the reader, that scalable parallel programming is an art and that substantial progress is still needed to make it feasible for non-expert programmers. We also present a parallel-application-design-process and hope that this design process will make the development of parallel applications easier.

When we were invited by Springer to write a SpringerBrief book because our article “Parallel Scalability of Video Decoders” was among the top-downloaded articles from the Journal of Signal Processing Systems, we accepted the invitation but did not want to simply extend the original article. Instead, we decided to present all or at least most of the work we did on this very exciting topic in order to be able to present a complete picture. This was easier said than done. For one, the work was done over a time span of several years and in several years the state-of-the-art computing systems change dramatically. Because of this, the computing systems used to evaluate the presented implementations may differ in each chapter. Please forgive us for these inconsistencies. If we had had more time and money, we would have done it differently.

This book is targeted at graduate students, teachers in higher education, and professionals who would like to understand what it means to parallelize a real application. While there are many textbooks on parallel programming and parallel algorithms, for understandable reasons of space, very few discuss real applications. It is also targeted at video coding experts who know a lot about video coding but who would like to know how it could be parallelized and which features of modern multi-/many-core architectures need to be exploited in order to develop efficient implementations. When reading this book they will probably smile because we use some of their terms wrongly or in a different context than they usually do. Well, we will smile back at them when they confuse an SMP with a cc-NUMA or vice versa.

This book may be used in several ways. For example, it may be used as a supplement to a parallel programming, parallel computer architecture, or parallel algorithms course. One of the authors uses this material to give two lectures about “The

Art of Parallel Programming - H.264 Decoding as a Case Study” at the end of a course on multicore systems (slides including exercises are available on request). This was also the title we originally had in mind for this book, but Springer thought that this title was too long. We accepted this advice as they are, after all, in the publishing business.

While reviewing this book one of the authors mentioned that we are too negative, that this book might scare away people from parallel programming. This is certainly not our intention, and we have revised the book to make it more positive. On the contrary, by presenting a parallel-application-design-process we hope to interest more people in the art of parallel programming.

This book was mainly written by the first three authors. The other three authors, however, contributed significantly to the articles on which this book is based, and therefore they are rightfully mentioned as co-authors. We especially would like to thank our families (Claudia, Lukas, Leon, Claudia, Luna, Ozana, Alex, Marieke, Alicia, Helena, Martí) for their love and support. This book had to be written partially in our spare times, which should be devoted to them. We would also like to thank Senj Temple, the first author’s Canadian sister-in-law, for proofreading several parts of this book. None of the authors is a native English speaker and her feedback was really helpful. Also thanks to Biao Wang for his help with the encoding of some of the videos used in this book and for providing a nice IDCT example.

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