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by

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For Leslie ♡

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Preface

This book is an updated version of my Ph.D. dissertation, *The AND/OR Process Model for Parallel Interpretation of Logic Programs.* The three years since that paper was finished (or so I thought then) have seen quite a bit of work in the area of parallel execution models and programming languages for logic programs. A quick glance at the bibliography here shows roughly 50 papers on these topics, 40 of which were published after 1983. The main difference between the book and the dissertation is the updated survey of related work.

One of the appendices in the dissertation was an overview of a Prolog implementation of an interpreter based on the AND/OR Process Model, a simulator I used to get some preliminary measurements of parallelism in logic programs. In the last three years I have been involved with three other implementations. One was written in C and is now being installed on a small multiprocessor at the University of Oregon. Most of the programming of this interpreter was done by Nitin More under my direction for his M.S. project. The other two, one written in Multilisp and the other in Modula-2, are more limited, intended to test ideas about implementing specific aspects of the model. Instead of an appendix describing one interpreter, this book has more detail about implementation included in Chapters 5 through 7, based on a combination of ideas from the four interpreters.

One of the implementation methods is an algorithm for generating multiple results in nondeterministic programs during parallel execution. The algorithm in the dissertation had a flaw, in that it fails to generate all possible results in certain situations. The flaw was first pointed out to me by Jung-Herng Chang. Also, N. S. Woo and K-M Choe were kind enough to send me a preprint of their improved algorithm. The algorithm presented here in Chapter 6 does not have the same flaw. It was developed in the context of the Modula-2 implementation of parallel AND processes, and differs from the other two in several respects.

Other than the updated survey and the incorporation of recent implementation methods into the main text, and some minor changes in presentation that will hopefully make some topics more clear, this work is basically the

same as the dissertation.

I would again like to thank my Ph.D. advisor, Dennis Kibler, for his outstanding support and encouragement during my career as a graduate student. Also, I still remember the thoughtful comments of Bruce Porter, Paul Morris, Jim Neighbors, and Steve Fickas. More recently, Paul Bloch, Dave Meyer, Nitin More, Don Pate, and Tsyuoshi Shinogi have all made contributions to the continuing project and the book. I have also benefited from my association with Al Davis and his group at Schlumberger Palo Alto Research, Gary Lindstrom, and Doug DeGroot. In fact, Doug is mostly responsible for the existence of this book. The Department of Computer and Information Science at the University of Oregon provided the resources to format and print the laserscript and to carry out the research described in the last chapter.

Finally, I would like to express my appreciation to my wife Leslie; her love, patience, support, and interest have made this task much easier than it otherwise would have been.

JC