

Heterogeneous Computing with OpenCL

Revised OpenCL 1.2 Edition

Benedict R. Gaster

Lee Howes

David R. Kaeli

Perhaad Mistry

Dana Schaa



AMSTERDAM • BOSTON • HEIDELBERG • LONDON
NEW YORK • OXFORD • PARIS • SAN DIEGO
SAN FRANCISCO • SINGAPORE • SYDNEY • TOKYO

Morgan Kaufmann is an imprint of Elsevier



Contents

Foreword to the Revised OpenCL 1.2 Edition	vi
Foreword to the First Edition	viii
Preface	xi
Acknowledgments	xiii
About the Authors	xiv
CHAPTER 1 Introduction to Parallel Programming	1
CHAPTER 2 Introduction to OpenCL	15
CHAPTER 3 OpenCL Device Architectures	39
CHAPTER 4 Basic OpenCL Examples	65
CHAPTER 5 Understanding OpenCL's Concurrency and Execution Model	85
CHAPTER 6 Dissecting a CPU/GPU OpenCL Implementation	121
CHAPTER 7 Data Management	147
CHAPTER 8 OpenCL Case Study: Convolution	161
CHAPTER 9 OpenCL Case Study: Histogram	183
CHAPTER 10 OpenCL Case Study: Mixed Particle Simulation	195
CHAPTER 11 OpenCL Extensions	209
CHAPTER 12 Foreign Lands: Plugging OpenCL In	233
CHAPTER 13 OpenCL Profiling and Debugging	243
CHAPTER 14 Performance Optimization of an Image Analysis Application	263
Index	285