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ENERGY-EFFICIENT DISTRIBUTED COMPUTING SYSTEMS

Edited by

Albert Y. Zomaya • Young Choon Lee

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Cover Image: Baris Simsek/iStockphoto

Published by John Wiley & Sons, Inc., Hoboken, New Jersey
Published simultaneously in Canada

Library of Congress Cataloging-in-Publication Data:

Zomaya, Albert Y.
Energy-efficient distributed computing systems / Albert Y. Zomaya, Young Choon Lee.
p. cm.
ISBN 978-0-470-90875-4 (hardback)
1. Computer networks–Energy efficiency. 2. Electronic data processing–Distributed processing–Energy conservation. 3. Green technology. I. Lee, Young Choon, 1973– II. Title.
TK5105.5.Z66 2012
004′.36–dc23

2011042246

Printed in the United States of America

ISBN: 9780470908754

10 9 8 7 6 5 4 3 2 1

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To our families for their help, support, and patience.

PREFACE

The scope of energy-efficient computing is not limited to main computing components (e.g., processors, storage devices, and visualization facilities), but it can expand to a much larger range of resources associated with computing facilities, including auxiliary equipment, water used for cooling, and even physical and floor space that these resources occupy. Energy consumption in computing facilities raises various monetary, environmental, and system performance concerns.

Recent advances in hardware technologies have improved the energy consumption issue to a certain degree. However, it still remains a serious concern for energy-efficient computing because the amount of energy consumed by computing and auxiliary hardware resources is affected substantially by their usage patterns. In other words, resource underutilization or overloading incurs a higher volume of energy consumption when compared with efficiently utilized resources. This calls for the development of various software energy-saving techniques and new algorithms that are more energy efficient.

This book, *Energy-Efficient Distributed Computing Systems*, seeks to provide an opportunity for researchers to explore different energy consumption issues and their impact on the design of new computing systems. The book is quite timely since the field of distributed computing as a whole is undergoing many changes. Vast literature exists today on such energy consumption paradigms and frameworks and their implications for a wide range of distributed platforms.

The book is intended to be a virtual roundtable of several outstanding researchers, which one might invite to attend a conference on energy-efficient computing systems. Of course, the list of topics that is explored here is by no means exhaustive, but most of the conclusions provided here should be extended to other computing platforms that are not covered here. There was a decision to limit the number of chapters while providing more pages for contributing

authors to express their ideas, so that the book remains manageable within a single volume.

We also hope that the topics covered in this book will get the readers to think of the implications of such new ideas on the developments in their own fields. The book endeavors to strike a balance between theoretical and practical coverage of innovative problem-solving techniques for a range of distributed platforms. The book is intended to be a repository of paradigms, technologies, and applications that target the different facets of energy consumption in computing systems.

The 26 chapters were carefully selected to provide a wide scope with minimal overlap between the chapters to reduce duplications. Each contributor was asked that his/her chapter should cover review material as well as current developments. In addition, the choice of authors was made so as to select authors who are leaders in their respective disciplines.

ALBERT Y. ZOMAYA
YOUNG CHOON LEE

ACKNOWLEDGMENTS

First and foremost, we would like to thank and acknowledge the contributors to this volume for their support and patience, and the reviewers for their useful comments and suggestions that helped in improving the earlier outline of the book and presentation of the material. Also, I should extend my deepest thanks to Simone Taylor and Diana Gialo from Wiley (USA) for their collaboration, guidance, and most importantly, patience in finalizing this handbook. Finally, I would like to acknowledge the efforts of the team from Wiley's production department for their extensive efforts during the many phases of this project and the timely manner in which the book was produced.

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