
Preface

It has been widely recognized that concepts, techniques, and analytical abilities from the field of computing can be powerful mental tools in general for solving problems, performing tasks, planning, working with others, anticipating problems, troubleshooting, and more. We refer to this mental tool set as *computational thinking* (CT).

This textbook will help readers acquire computational thinking through an understanding of modern computer technologies. Neither programming background nor learning how to program is required. Students just need to bring their curiosity and an open mind to class.

Reading this book can be an excellent way to prepare someone to pursue a rewarding career in computing or information technology. The materials are as much about computing as about sharpening the mind.

Topics and Presentation

The book has an end-user viewpoint. Topics are presented in an interesting and thought-provoking way, keeping the reader engaged and motivated to continue.

Unconventional chapter titles, CT callout boxes, relation to daily living, and connection to well-known events combine to encourage computational thinking and instill agile mental skills. In addition, we introduce a new verb in English, *computize*. To computize is to apply CT. With a little bit of help, everyone can do it.

The CT callout boxes highlight nuggets of computational thinking wisdom worth revisiting from time to time. They can be found easily in the Table of Contents and in the Index.

The user is guided through a well-selected set of topics covering the type of material appropriate for a one-semester course at the college freshman level for students from all different majors. Advanced programs in high schools, and the public in general, may find this book useful and rewarding as well.

Computing and CT

Understanding computing and acquiring CT are two sides of the same coin. By learning about hardware, software, networking, the operating system, security

measures, the Web, digital data, apps, and programming paradigms, we gain valuable knowledge to better take advantage of information technologies.

At the same time, concepts and methods from computing form elements of CT that are applicable outside of computing. CT can make us wiser and more effective in countless ways. CT can help us avoid accidents and mishaps. It can even be life saving.

Chapter-end exercises reinforce topics in each chapter and challenge students to apply CT (to computize) in various situations. Group discussions are encouraged as well.

The CT Website

Throughout the book, concepts, techniques, and technologies are explained with many interesting examples. Hands-on demos for experimentation are online at the book's companion website <http://computize.org>



The site is mobile-enabled and works on both regular and mobile devices. In the text, we refer to it as *the CT website*. The live demos are cross-referenced to in-text descriptions with a notation such as **Ex:UpCounter** that also appears in the book's index.

The CT website offers additional resources, allows you and others to share insights on CT, and provides information updates.

Acknowledgments

I thank my dear wife, Jennifer Wang (葛孝薇), who encouraged me to embark on this project, read all drafts, and provided great feedback, sometimes with specific ideas and wording changes. I am very grateful to her.

In fact, she was the one who asked me to listen to a broadcast of the *Kojo Nnamdi Show* (WAMU/NPR) on November 18, 2008. The show started with an interview of Dr. Jeannette Wing on the topic

“Thinking like a computer scientist.”

Jennifer was so excited and told me over the phone, “You need to listen to this right now, it is what you always talked about.”

Encouraged by Dr. Wing's advocacy, I soon contacted her at the National Science Foundation and invited her to visit our Computer Science Department

at Kent State University to give a talk on CT. The face-to-face interactions with Dr. Wing further convinced me to make a contribution in this important direction. The influence of NPR and Dr. Wing on me cannot be overstated.

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