Review of the book

Real-Time Systems and Programming Languages (4th Edition)

Authors - Alan Burns and Andy Wellings

Publisher Addison Wesley Longmain

Book Review by Pat Rogers, AdaCore
207 Charleston, Friendswood, TX 77546
Email: rogers@adacore.com Phone: +1-281-648-3165

There are a number of excellent books on the topic of real-time systems. Few, if any, address the breadth of relevant topics covered by this book, much less to the depth and quality exhibited here. I have each of the three previous editions of this book and this latest is, once again, worth every penny.

One of the reasons I hold such a high opinion of the book is that it is written by people who not only know what they are talking about, but can do so with clarity and precision. As leading contributors to real-time systems research and the real-time programming facilities of Ada and Java, Alan Burns and Andy Wellings are internationally recognized experts on real-time systems and programming languages. The text's depth reflects that fact, but it is also clear, concise, and a pleasure to read.

Another reason I recommend the book is that it has a good balance between theory and practice. Make no mistake, the necessary theory is covered extensively, but it is then illustrated with concrete examples using programming languages that are in wide-spread use today: Ada, C, and Java. As neither C nor Java were explicitly designed for concurrent real-time systems, the necessary language extensions are used. For C, the POSIX real-time profile is used. For Java, the Real-Time Specification for Java (RTSJ) is used. When necessary, examples are provided in other languages.

In fact these three programming languages form the underlying context for much of the book. They are not themselves the subjects of the book, however, and those readers seeking an introduction to these languages should look elsewhere. Instead, the programming languages are used to explore the distinct nature of real-time systems and the requirements for developing applications in that domain. The code examples thus provide a means of illustrating the topic at hand, but also provide a means for comparing the strengths and weaknesses of the real-time facilities of the languages. The authors are principal contributors to the Ada 2005 Real-Time Systems Annex and the RTSJ for Java, a fact reflected in the detailed critical analysis provided.

New material includes additional schedulability analysis theory and material on multi-processor and multi-core architectures. With respect to programming languages, the new material includes extensive coverage of the real-time systems programming additions to Ada 2005, the latest version of the RTSJ, and the new real-time POSIX profile enhancements for C. As for removals, the introductory material on the programming languages is no longer present. This change was a necessity for the sake of brevity, but the result is a better overall focus. Also removed is the chapter on distributed systems. I was sorry to see that go, but the primary points have been moved to other chapters. Discussions of other programming languages, such as occam2, are also removed for the sake of brevity but are available on the book's web site.

I should point out that this is not just a "timing" book. For example, real-time systems typically have reliability requirements as well as timeliness requirements. Reliability is thus covered extensively. Similarly, real-time systems often involve low-level programming and that topic is also included.

In summary, I am a real-time systems engineer with over 30 years of professional development, industry lecturing, and occasional university lecturing experience. Based on that combination, I give this book my highest recommendation to both professionals and students alike. The field of real-time systems is not for beginners, but professional developers (and managers), as well as more advanced university students, will definitely benefit. Both will find a text they can use to learn the latest in the field.