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LabVIEW Advanced Programming Techniques

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Preface and Acknowledgments

As the power of the standard personal computer has steadily evolved, so have the capabilities of LabVIEW. LabVIEW has simplified the working lives of thousands of scientists, engineers, and technicians, and has increased their productivity. Automation has reduced the costs and increased the manufacturing outputs of factories around the world. Cycle times for product development have been shortened and the quality of many products has steadily improved. LabVIEW does not get credit for all of these improvements, but has without question played a valuable role in accomplishing these goals in many organizations.

In our earlier experiences with LabVIEW, we found that adequate coverage of key topics was lacking. Subjects that are useful to users without a formal background in computer science, such as approaches to software development, exception handling, and state machines, were very difficult to find. In addition, newer areas such as multithreading and ActiveX are even harder to locate, and sometimes documentation is nonexistent. Part of our intent in this book is to cover these topics that are difficult to find in other books on LabVIEW.

The chapters in this book are written in a manner that will allow readers to study the topic of interest without having to read the contents in sequential order. Users of LabVIEW with varying levels of expertise will find this book beneficial.

Proficiency with a programming language requires an understanding of the language constructs and the tools needed to produce and debug code. The first two chapters provide an overview of LabVIEW's Integrated Development Environment, programming constructs, and main features. These chapters are meant to supplement LabVIEW's documentation, and provide good background information for programmers new to the language.

Effective programmers have an understanding of programming techniques that are applicable to a large number of programming problems. Programming tools such as state machines that simplify logic of handling various occurrences, and the use of instrument drivers are two such programming tools. Exception handling is left out of more applications than we want to discuss (including some of our own), but we have included a chapter specifically on exception handling in LabVIEW.

Advanced programmers understand the operation of the language they are working with and how it interacts with the system. We present a chapter on multithreading's impact on LabVIEW. Version 5.0 was LabVIEW's debut into the world of multithreaded-capable programming languages. A number of the issues that occur with multithreading programming were abstracted from the programmer, but a working knowledge of mutithreaded interactions is needed.

Object Oriented Programming (OOP) is commonly employed in languages such as C++ and Java. LabVIEW programmers can realize some of the benefits to such

an approach as well. We define key terms often used in OOP, give an explanation of object analysis, and introduce the application of these concepts within a LabVIEW environment.

Finally, we present two chapters on ActiveX. An explanation of related technologies such as Component Object Model (COM) and Object Linking and Embedding (OLE) is provided, along with the significance of ActiveX. A description on the use of ActiveX in LabVIEW applications is then provided. We follow this up with several useful examples of ActiveX, such as embedding a browser on the front panel, use of the tree view control, and automating tasks with Microsoft Word, Excel, and Access.

This book would not have been possible without the efforts of many individuals. First, we want to thank our friends at National Instruments. Ravi Marawar was invaluable in his support for the completion of this book. We would also like to thank Norma Dorst and Steve Rogers for their assistance.

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