Programming skills for GIS represent an urgent educational need for students and professionals. To date, there are only a few books dedicated to this topic. Kang-Tsung Chang wrote one of them. The intention of the author in this second edition is to provide a quick start to programming in ArcObjects. The book is written for ArcGIS users who want to automate workflows and repetitive data processing tasks. A readership limited to ArcGIS users is quite focused, but it seems to be done on purpose. The book follows a task-oriented approach, as Chang believes that is the most efficient way to learn to work with a complex development platform like ArcObjects. He proposes that users transfer their knowledge of ArcGIS step-by-step to programming, and thus they should begin with the elements they are most familiar with.

This second edition has the same organization as the first edition. One newly integrated feature is the Geoprocessor (GP) object, an ArcObject component, which was introduced in ArcGIS 9.x. Additional examples of GP source code written in Visual Basic for Applications (VBA) are provided. This apparently comes at the expense of a formerly announced new chapter, which was to have presented Python language and geoprocessing sample scripts. The book is supplemented by a CD-ROM that contains 95 ArcObjects sample macros and 33 GP sample macros all written in VBA, as well as sample datasets for testing the scripts.

Chapter 1 introduces ArcObjects and the Geodatabase data model. Surprisingly, the introduction to ArcObjects and object-oriented concepts is limited to five pages. The author keeps this chapter rather brief and abstains from more detailed explanations of the core concepts behind object-oriented programming. Chapter 2 provides a quick overview of programming techniques with VBA and how to use the Visual Basic Editor that comes with ArcGIS. This chapter provides a very effective means for the reader to immediately start with some exercises. In Chapter 3, different forms of customizations of the user interface of ArcMap are described to demonstrate the creation of new toolbars, buttons and tools and how to work with Visual Basic forms.

Following these introductory chapters the book dives into the task-oriented approach of working with ArcObjects using VBA. Chapters 4 to 14 are dedicated to selected topics of GIS-related work and maintain a systematic structure. A general introduction to the topic is followed by a short review section of working steps and commands in ArcGIS. Next, the relevant objects, their methods and properties needed to do the same working steps with ArcObjects are described. The remaining sections of each chapter demonstrate the use of these objects in well-explained VBA macros for typical GIS-related tasks. Diagrams illustrate the objects and relationships to other objects, as well as the interfaces that give access to methods and properties.

The set of selected topics can be summarized as follows. The first part focuses on the management of datasets and layers (Chapter 4) as well as tables, fields and attributes (Chapter 5). This is followed by topics of data conversion between common data formats (Chapter 6), coordinate system management (Chapter 7), and data display (Chapter 8). Chapter 9 addresses data exploration such as attribute and spatial queries and describes the cursor object. Vector operations such as buffering, overlay and feature manipulation are described in Chapter 10. The next four chapters focus on raster data management and raster operations (Chapter 11), terrain analysis including geomorphometric and hydrologic functions (Chapter 12), as well as interpolation (Chapter 13). The final chapter addresses binary and index models in vector and raster data.

The strict organization of the individual chapters allows a straightforward approach to become familiar with ArcObjects within a short time and to understand the first principles of how to create macros for specific purposes. The sample macros and datasets provided with the CD-ROM are functional and represent an excellent basis for initial exercises. The reader will understand how to use ArcObjects for streamlining the workflow and automating repetitive tasks. It is important to note that the book gives no information on how the individual tools are implemented in ArcGIS (the book refers to a commercial product).

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There are a few aspects of the book the reader should be aware of. First, programming beginners will have difficulty fully understanding the key concepts of object-oriented programming by reading this book alone. The book would become more valuable if these aspects were addressed in more detail. Second, there is no review of the current state of GIS programming in general, which would allow readers to evaluate alternative solutions. Even though the book is intentionally focused on a particular product, it would greatly benefit from such a review. Third, methods development and implementation exercises, essential topics for a GIS programming textbook, are not covered. The book explains how to use the ArcObjects technology in VBA macros but does not provide insights into the development of new user-specified operators. This could be covered using ArcObjects and VBA or other solutions such as Python to link the Geoprocessor object with an open-source developing environment. Thus, a Python chapter would be an invaluable contribution.

Overall, Chang succeeds in providing a quick and effective starter to programming ArcObjects using VBA. Every ArcGIS user who is interested in quickly learning how to automate GIS tasks will find this book extremely useful, but those with prior knowledge of object-oriented programming will benefit most. With this knowledge base, the reader can make effective use of additional sources of documentation and code exchanges such as the ESRI Developer Network.

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