Scientific Software Design
The Object-Oriented Way

Damian Rouson
Sandia National Laboratories

Jim Xia
IBM Canada Lab, Markham

Xiaofeng Xu
General Motors Corp.

About the Book
This book concerns software design. Although many current discussions of scientific programming focus on scalable performance, this book focuses on scalable design. The authors analyze how the structure of a package determines its developmental complexity according to such measures as bug search times and documentation information content. The work presents arguments for why these issues impact solution cost and time more than does scalable performance. The final chapter explores the question of scalable execution and shows how scalable design relates to scalable execution. The book’s focus is on program organization, which has received considerable attention in the broader software engineering community, where graphical description standards for modeling software structure and behavior have been developed by computer scientists. These discussions might be enriched by engineers who write scientific codes. This book aims to bring such scientific programmers into discussion with computer scientists. The authors do so by introducing object-oriented software design patterns in the context of scientific simulation.
Praise for the Book

“This book makes a good case for the usefulness of design patterns and object-oriented programming for maintainable code, but disregards runtime performance and scientific libraries … one of those books that I wish I’d read earlier in my programming career.”

– Ramses van Zon, Computing in Science and Engineering, Jan/Feb 2012

Key Features

• This book discusses object-oriented programming in Fortran 2003 and C++

• This text is designed to help students and professionals solve complex computer problems

• Each chapter has a set of exercise problems

Contents