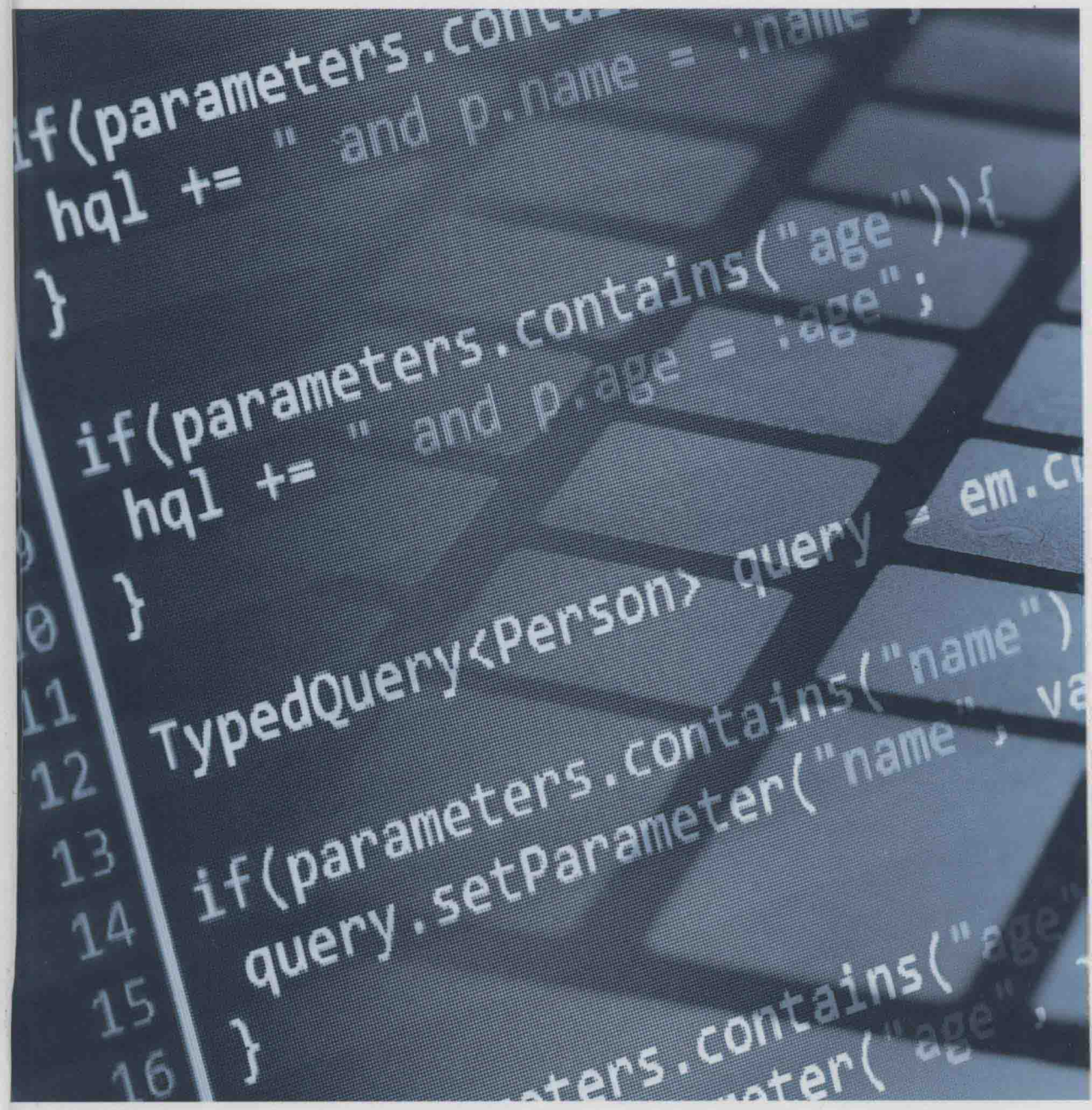
SOFTWARE CONFIGURATION MANAGEMENT HANDBOOK

THIRD EDITION

ALEXIS LEON



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Alexis Leon

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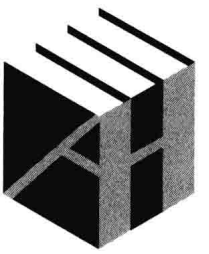

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HOUSE
BOSTON | LONDON
artechhouse.com

Library of Congress Cataloging-in-Publication Data
A catalog record for this book is available from the U.S. Library of Congress

British Library Cataloguing in Publication Data
A catalog record for this book is available from the British Library.

ISBN-13: 978-1-60807-843-1

Cover design by John Gomes

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685 Canton Street
Norwood, MA

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To my parents Leon Alexander and Santhamma Leon
for their love, encouragement, and support

Preface

Configuration management (CM) is the art of identifying, organizing, and controlling modifications to the software being built by a programming team. The goal is to maximize productivity by minimizing mistakes. Practicing CM in a software project has many benefits, including increased development productivity, better control over the project, better project management, reduction in errors and bugs, faster problem identification and bug fixes, and improved customer goodwill. However, a single software CM (SCM) solution is not suited for all projects; while the core SCM objectives and functions remain the same, the SCM system has to be tailored to each project.

Today's software development environment is highly complex and sophisticated. At times, multiple companies join forces to develop a single product. Similarly, even within one company, it might take several geographically separate teams to develop the various subsystems of just one product or system. Managing these projects without any scientific tools could result in costly product recalls or project failures. SCM is the ideal solution for managing the chaos and confusion of software development, as its primary objective is to bring control to the development process.

This book details the SCM discipline, starting with the basics—the definition of SCM and its objectives and functions—and explaining SCM as it should be practiced in the software development process. Further, the book outlines the different phases in the software development life cycle and the role SCM plays in each phase. The book also details the pitfalls of the software development process, including the need, importance, and benefits of SCM, and demystifies the common misconceptions about SCM. In addition, the book clearly explains basic SCM concepts such as baselines, versions, variants, delta storage, branching, merging, and releases and provides in-depth coverage of the four pillars of SCM: identification, control, status accounting, and audits.

After familiarizing readers with basic terminology and concepts, the book exhaustively covers advanced topics, including the following:

- SCM implementation phases;
- Build and release management;
- Interface and subcontractor control;
- Software libraries;
- SCM plans and guidelines for writing good SCM plans;
- SCM standards;
- The role of SCM in software process improvement (SPI) models (e.g., CMM, CMMI, ISO SPICE, BOOTSTRAP, Trillium, ITIL, COBIT, and SWEBOK);

- SCM organization;
- Documentation management and control (DMC);
- Product data management (PDM).

In addition, the book covers the various SCM deployment models, from traditional to software as a service (SaaS). It also describes popular transition strategies and includes a completely new chapter on the latest development in the field of software development in the cloud, source code repositories—detailing their features, advantages, and limitations and describing how to select one that is best suited for an organization.

Subsequently, the book covers SCM tools, one of the most important aspects of SCM, explaining topics like SCM automation, the advantages of SCM tools, and pointers on tool selection so that readers can find the SCM tools best suited for their organization or project. A salient feature of this edition is its comprehensive coverage of the different activities required to plan, design, implement, operate, and maintain a good SCM system. Accordingly, the book thoroughly explains SCM system design, tool selection, implementation, and post-implementation; the operation and maintenance of SCM systems; and how to perform SCM in different scenarios (e.g., very large projects, website management, distributed environments, and integrated development environments).

The book's two appendices—the first detailing SCM resources on the Internet and the second providing a thorough SCM bibliography—will be of immense value for readers who want to further explore the new frontiers of SCM. The book also features an extensive glossary and acronym list to help readers when they encounter unfamiliar terms in the early chapters of the book.

One important aspect of this book is that it does not rely on any specific tool or standard for explaining SCM concepts and techniques. In fact, one of the main objectives of this book is to give the reader enough information about SCM and its mechanics and implementation without being tool- or standard-specific. Accordingly, the book gives information on how to select the right SCM tool for an organization or project and how to implement, manage, and maintain the tool so that the organization can reap the full benefits of SCM.

Changes in the Third Edition

The book has been revised to include the latest developments in the field of SCM. It explains the concepts of SCM, demystifies its myths and misconceptions, and gives an overview of the technologies that work with SCM systems to make organizations work at high efficiencies. The book comprehensively covers the implementation of an SCM system that is best suited for an organization—starting from package selection and continuing through tasks associated with phases such as team selection, implementation plan preparation, implementation, project management and monitoring, training, and post-implementation.

In addition, this edition includes new chapters on implementation challenges, deployment methodologies, transition strategies, and source code repositories and

completely revised and rewritten chapters on SCM tools, SCM implementation, SCM standards, and SCM certifications.

How to Use This Book

The chapters in this book are organized in such a way that the concepts of SCM are developed from the ground up. Ideally, the book should be read from start to finish. However, since such a reading plan will not suit many busy and advanced readers, I have tried to write individual chapters so that they can be read independently. If readers come across a term that is not described in the chapter, they may look it up in the glossary and continue reading. Readers who are not familiar with SCM, or who are novices in this profession, should read the book from the beginning to benefit most greatly from it.

Who Should Read This Book?

This book is written for company managers who must support SCM efforts and software project managers who must plan and design SCM systems for their projects. It is also intended for those professionals who will implement the system and those who will manage and maintain the SCM system, as well as for software developers, testers, quality assurance (QA) personnel, and all who will be affected by the SCM system. The style and approach of the book is intended to be practical rather than theoretical. It is written in an easy-to-understand and jargon-free style, so that it will become an invaluable tool in understanding the discipline of SCM and a useful guide in planning, designing, implementing, managing, and maintaining a good SCM system.

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