Enterprise Master Data Management
An SOA Approach to Managing Core Information
By Dreibelbis, Hechler, Milman, Oberhofer, van Run, Wolfson

The Only Complete Technical Primer for MDM Planners, Architects, and Implementers
An authoritative, vendor-independent MDM technical reference for practitioners: architects, technical analysts, consultants, solution designers, and senior IT decision makers. Written by the IBM data management innovators who are pioneering MDM, this book systematically introduces MDM’s key concepts and technical themes, explains its business case, and illuminates how it interrelates with and enables SOA.

An Introduction to IMS
By Barbara Klein, et al.

IBM's Definitive One-Stop Guide to IMS Versions 12, 11, and 10: for Every IMS DBA, Developer, and System Programmer
Over 90% of the top Fortune® 1000 companies rely on IBM’s Information Management System (IMS) for their most critical IBM System z® data management needs: 50,000,000,000+ transactions run through IMS databases every day. What’s more, IBM continues to upgrade IMS: Versions 12, 11, and 10 meet today’s business challenges more flexibly and at a lower cost than ever before. In An Introduction to IMS, Second Edition, leading IBM experts present the definitive technical introduction to these versions of IMS.

Sign up for the monthly IBM Press newsletter at ibmpressbooks.com/newsletters
The Art of Enterprise Information Architecture

By Godinez, Hechler, Koenig, Lockwood, Oberhofer, Schroeck

Architecture for the Intelligent Enterprise: Powerful New Ways to Maximize the Real-time Value of Information

In this book, a team of IBM’s leading information management experts guide you on a journey that will take you from where you are today toward becoming an “Intelligent Enterprise.”

Drawing on their extensive experience working with enterprise clients, the authors present a new, information-centric approach to architecture and powerful new models that will benefit any organization. Using these strategies and models, companies can systematically unlock the business value of information by delivering actionable, real-time information in context to enable better decision-making throughout the enterprise—from the “shop floor” to the “top floor.”

Dynamic SOA and BPM

By Marc Fiammante

Achieve Breakthrough Business Flexibility and Agility by Integrating SOA and BPM

Thousands of enterprises have adopted Service Oriented Architecture (SOA) based on its promise to help them respond more rapidly to changing business requirements by composing new solutions from existing business services. To deliver on this promise, however, companies need to integrate solid but flexible Business Process Management (BPM) plans into their SOA initiatives. Dynamic SOA and BPM offers a pragmatic, efficient approach for doing so.
### Executing SOA
**A Practical Guide for the Service-Oriented Architect**

By Bieberstein, Laird, Jones, Mitra  

This book follows up where the authors’ best-selling Service-Oriented Architecture Compass left off, showing how to overcome key obstacles to successful SOA implementation and identifying best practices for all facets of execution—technical, organizational, and human. Among the issues it addresses: introducing a services discipline that supports collaboration and information process sharing; integrating services with preexisting technology assets and strategies; choosing the right roles for new tools; shifting culture, governance, and architecture; and bringing greater agility to the entire organizational lifecycle, not just isolated projects. Executing SOA is an indispensable resource for every enterprise architect, technical manager, and IT leader tasked with driving value from SOA in complex environments.

<table>
<thead>
<tr>
<th>Book Title</th>
<th>Author(s)</th>
<th>ISBN-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executing SOA</td>
<td>Bieberstein, Laird, Jones, Mitra</td>
<td>978-0-13-235374-8</td>
</tr>
<tr>
<td>The Business of IT</td>
<td>Ryan, Raducha-Grace</td>
<td>978-0-13-700061-6</td>
</tr>
<tr>
<td>Viral Data in SOA</td>
<td>Fishman</td>
<td>978-0-13-700180-4</td>
</tr>
<tr>
<td>Disciplined Agile Delivery</td>
<td>Ambler, Lines</td>
<td>978-0-13-281013-5</td>
</tr>
<tr>
<td>Outside-in Software Development</td>
<td>Kessler, Sweitzer</td>
<td>978-0-13-157551-6</td>
</tr>
</tbody>
</table>

Sign up for the monthly IBM Press newsletter at ibmpressbooks.com/newsletters
This page intentionally left blank
Patterns of Information Management
This page intentionally left blank
Patterns of Information Management

Mandy Chessell
Harald C. Smith

IBM Press
Pearson plc

Upper Saddle River, NJ • Boston • Indianapolis • San Francisco
New York • Toronto • Montreal • London • Munich • Paris • Madrid
Cape Town • Sydney • Tokyo • Singapore • Mexico City

ibmpressbooks.com
Some day, on the corporate balance sheet, there will be an entry which reads, “Information”; for in most cases, the information is more valuable than the hardware which processes it.

—Rear Admiral Grace Hopper

To my family and friends who have supported and encouraged me over the years, with love:
Sarah, Jane, Ray, Terri, Ben, Ella, Ian, Kay, Keith, Dan, and Chris.

—Mandy Chessell

To my family: Mary, Rebecca, Cecilia, and Paul
and my parents: Clyde and Ellen
For their love and support now and over the years.

—Harald Smith
Contents at a Glance

Foreword by Rob High xxi
Preface xxiii
Acknowledgments xxviii
About the Authors xxix

Chapter 1 Introduction 1
Chapter 2 The MCHS Trading Case Study 25
Chapter 3 People and Organizations 69
Chapter 4 Information Architecture 99
Chapter 5 Information at Rest 235
Chapter 6 Information in Motion 395
Chapter 7 Information Processing 449
Chapter 8 Information Protection 533
Chapter 9 Solutions for Information Management 577

Appendix 1 Glossary 643
Appendix 2 Summary of MCHS Trading’s Systems 649
Appendix 3 Related Pattern Languages 651
Appendix 4 Bibliography 653
Patterns Index 663
Index 669
Table of Contents

Chapter 1  Introduction 1
  Islands of Information 1
  Introducing MCHS Trading 2
  Improving an Organization’s Information Management 4
  Patterns and Pattern Languages 7
  Basic Components in the Pattern Language 11
  Information Integration and Distribution 12
  Pattern Language Structure 15
  Summary 22

Chapter 2  The MCHS Trading Case Study 25
  Introduction 25
  Building an Information Strategy 26
  Creating Management Reports 28
  Creating a Single View of Product Details 30
  Creating a Single View of Customer Details 37
  Understanding the Status of Orders 44
  Delivering Information Quality Improvements 47
  Connecting MCHS Trading into a B2B Trading Partnership 51
  Exploiting Predictive Analytics 55
  Summary of Case Study 67

Chapter 3  People and Organizations 69
  Information Centric Organization Patterns 70
    Information Centric Organization 73
    Information Management Obligation 78
    Information Management Strategy 81
    Information Management Principle 83
    Information Governance Program 88
  Information User Patterns 91
    Information User 92
    Variations of the Information User Pattern 95
  Summary 97

Chapter 4  Information Architecture 99
  Information Element Patterns 100
    Information Element 101
  Entity-Level Information Elements 106
    Information Asset 107
    Information Activity 110
    Information Event 113
Contents

- Information Processing Variables
- Information Summary
- Message-Level Information Elements
- Information Payload
- Attribute-Level Information Elements
  - Information Link
  - Information Metric
  - Information Code
- Summary of Information Elements
- Information Identification Patterns
  - Information Identification
- Defining Which Information to Manage and How
  - Subject Area Definition
  - Valid Values Definition
  - Information Configuration
- Defining How Information Is Structured
  - Information Model
  - Information Schema
- Locating the Right Information to Use
  - Information Location
  - Semantic Tagging
  - Semantic Mapping
- Different Reports About Information
  - Information Values Report
  - Information Values Profile
  - Information Lineage
- Summary of Information Identification
- Information Provisioning Patterns
- Information Provisioning
  - Localized Provisioning
    - User Private Provisioning
    - Application Private Provisioning
  - Process-Level Provisioning
    - Daisy Chain Provisioning
  - Service-Level Provisioning
    - User Shared Provisioning
    - Service Oriented Provisioning
    - Linked Information Provisioning
    - Cache Provisioning
  - Collection-Level Provisioning
    - Snap Shot Provisioning
    - Mirroring Provisioning
    - Peer Provisioning
    - Event-Based Provisioning
<table>
<thead>
<tr>
<th>Contents</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery Provisioning</td>
<td>197</td>
</tr>
<tr>
<td>Summary of Information Provisioning</td>
<td>199</td>
</tr>
<tr>
<td>Information Supply Chain Patterns</td>
<td>199</td>
</tr>
<tr>
<td>Information Supply Chain</td>
<td>200</td>
</tr>
<tr>
<td>Variations of the Information Supply Chain Pattern</td>
<td>209</td>
</tr>
<tr>
<td>Cascading Information Supply Chain</td>
<td>211</td>
</tr>
<tr>
<td>Hub Interchange Information Supply Chain</td>
<td>215</td>
</tr>
<tr>
<td>Single View Information Supply Chain</td>
<td>219</td>
</tr>
<tr>
<td>Consolidating Information Supply Chain</td>
<td>223</td>
</tr>
<tr>
<td>Hierarchical Information Supply Chain</td>
<td>225</td>
</tr>
<tr>
<td>Peer Exchange Information Supply Chain</td>
<td>230</td>
</tr>
<tr>
<td>Summary of Information Supply Chains</td>
<td>232</td>
</tr>
<tr>
<td>Summary</td>
<td>232</td>
</tr>
<tr>
<td><strong>Chapter 5 Information at Rest</strong></td>
<td>235</td>
</tr>
<tr>
<td>Information Service Patterns</td>
<td>236</td>
</tr>
<tr>
<td>Information Service</td>
<td>238</td>
</tr>
<tr>
<td>Information Service Implementation Patterns</td>
<td>243</td>
</tr>
<tr>
<td>Local Information Service</td>
<td>243</td>
</tr>
<tr>
<td>Remote Information Service</td>
<td>246</td>
</tr>
<tr>
<td>Triggering Information Service</td>
<td>250</td>
</tr>
<tr>
<td>Summary of Information Services</td>
<td>253</td>
</tr>
<tr>
<td>Information Collection Patterns</td>
<td>253</td>
</tr>
<tr>
<td>Information Collection</td>
<td>254</td>
</tr>
<tr>
<td>Location of Information</td>
<td>259</td>
</tr>
<tr>
<td>Physical Information Collection</td>
<td>260</td>
</tr>
<tr>
<td>Virtual Information Collection</td>
<td>263</td>
</tr>
<tr>
<td>Usage of an Information Collection</td>
<td>266</td>
</tr>
<tr>
<td>Master Usage</td>
<td>267</td>
</tr>
<tr>
<td>Reference Usage</td>
<td>271</td>
</tr>
<tr>
<td>Hybrid Usage</td>
<td>274</td>
</tr>
<tr>
<td>Sandbox Usage</td>
<td>277</td>
</tr>
<tr>
<td>Scope of an Information Collection</td>
<td>279</td>
</tr>
<tr>
<td>Complete Scope</td>
<td>280</td>
</tr>
<tr>
<td>Local Scope</td>
<td>282</td>
</tr>
<tr>
<td>Transient Scope</td>
<td>284</td>
</tr>
<tr>
<td>Coverage of an Information Collection</td>
<td>285</td>
</tr>
<tr>
<td>Complete Coverage</td>
<td>285</td>
</tr>
<tr>
<td>Core Coverage</td>
<td>286</td>
</tr>
<tr>
<td>Extended Coverage</td>
<td>286</td>
</tr>
<tr>
<td>Local Coverage</td>
<td>287</td>
</tr>
<tr>
<td>Summary of Information Collections</td>
<td>287</td>
</tr>
<tr>
<td>Information Entry Patterns</td>
<td>288</td>
</tr>
<tr>
<td>Information Entry</td>
<td>289</td>
</tr>
</tbody>
</table>
Chapter 6  Information in Motion 395
Information Request Patterns 396
Information Request 396
Variations of the Information Request Pattern 398
Summary of Information Requests 401
Information Flow Patterns 401
Information Flow 403
Routing Information Flows 406
Staged Routing 407
Partitioned Routing 410
Buffered Routing 413
Filtered Routing 416
Summarized Routing 418
Consolidating Information Flows 420
Synchronized Consolidation 421
Filtered Consolidation 424
Ordered Consolidation 427
Independent Consolidation 429
Distributing Information Flows 432
Synchronized Distribution 433
Partitioned Distribution 436
Ordered Distribution 439
Independent Distribution 441
Broadcast Distribution 444
Summary of Information Flow Patterns 446
Summary 447
Chapter 7  Information Processing 449
Information Trigger Patterns 450
Information Trigger 450
Variations of the Information Trigger Pattern 453
Manual Information Trigger 453
Scheduled Information Trigger 455
Information Service Trigger 458
Information Change Trigger 460
External Sensor Trigger 462
Summary of Information Triggers 465
Information Process Patterns 465
Information Process 466
Business Processes 469
Bespoke Application Process 471
Packaged Application Process 472
Agile Business Process 474
Foreword by Rob High

In the early history of humans—when we were barely distinguishable from other animals—we protected ourselves with the construction of shelters made from branches, leaves, and mud. To suggest that these structures had architecture is being generous. But to the extent that their architectural style could be discerned at all, at best you could argue their architecture was forged from necessity and practicality. Dried mud helped keep the leaves secured and leakproof. Branches provide strength across broad spans. Leaves knitted everything together. Eons of experience and mistakes drove practices—often varying substantially from one region to another based on the available materials and climate conditions of each region. Form strictly followed function. No one, at that time, ever stopped to draw out their shelter design—critiquing it for its style and propitiousness.

Likewise, the early years of information systems implementation were driven out of necessity—leveraging the materials and practices that were available to us. Barely discernable architectures were more derived than prescribed. But, as with our ancestral laborers, we found the need to build more sophisticated and ever-larger answers to our problems. And, as before, we discovered that with a little planning, engineering, and standardized construction techniques, we could handle the task more easily. We could adapt to new functions, and we could apply form and aesthetics to the things we constructed. The results are not only more pleasing, but they are more reliable, more efficient, more economical, and more adaptable to changing conditions. There is not only derived architecture, but we can employ architecture to coerce solutions to better meet our needs.

At the heart of architecture are patterns that shape and style the materials we work with and the techniques that inform the practices of pattern adoption. Patterns form the building blocks of construction. Techniques tell us how best to select and assemble those building blocks to achieve the results we are seeking.

The idea of using patterns and techniques in the construction of information management is exactly what this book is about. Information patterns form the basis of a whole new architectural approach to systems design that, like its analog in the construction industry, is essential to assuring durability, usability, flexibility, and utility of IT solutions. The patterns presented here
are not hypothetical, but rather have been forged from decades of experience in the field. They capture the bittersweet results of literally thousands of person-years of effort—trying different approaches, abandoning the ones that failed, refining the ones that showed promise, latching on to the ones that proved to work well, and promoting the ones that exceeded expectations.

The language of information patterns is a formalism of expression. It standardizes an approach to representing ideas that enables clarity and precision of communication. It allows us to exchange a common understanding of those ideas and to manipulate those ideas to create even bigger, more profound ideas. And although the basic ideas captured in the language are not new, the ability to express those ideas in a formal language is both novel and profoundly innovative. It makes it possible to unleash the value of information patterns, and build even greater value more effectively.

As the former chief architect of IBM®’s SOA Foundation, I have long advocated the use of architecture for ensuring the utility of information systems solutions. These information patterns build on the traditions of Service Oriented Architecture (SOA) and, more important, fill a critical gap in SOA by addressing the correlation between services and information in our IT solutions. In keeping with the SOA tradition, these patterns are not just the raw materials of construction for IT developers, but are essential to aligning the objectives of IT and business—driving the form of the system to both enable the business to respond quickly to changing business conditions and to even compel the business to motivate changes that will gain it a competitive advantage in its marketplace.

The use of information patterns is imperative for modern information system design. This book is a must-read and I strongly encourage you to apply these techniques in your practices.

Rob High
IBM Fellow
CTO, IBM Watson™
Former chief architect, SOA Foundation
Preface

About This Book

Information is the heart of any organization’s operation. It defines who is involved, what activities are taking place, and the assets being brought to bear to create its goods and services. Managing information takes a multidisciplinary approach because it pervades every aspect of the organization’s life. We must consider where information comes from; consider how it is distributed, protected, governed, and monitored; as well as ensure it is used appropriately at its destination.

From a technical point of view, a myriad of technologies have emerged to tackle different aspects of information management. There is the Service Oriented Architecture (SOA) technology that makes information available to remote systems; databases and files systems to store information; messaging technology that sends notifications between systems; extract, transform, load (ETL) technology for moving and transforming large quantities of information; federated queries; big data technologies; replication technology; data quality and metadata tools; distributed security technology; analytics; archiving processes; and many more. For the architect, the choice of technology is overwhelming and there is a strong temptation to just stick with the technology we know well. The result is that our designs can become unbalanced, with too much focus on one dimension of the problem.

This book contains architecture patterns that characterize the typical information issues associated with distributed systems. They demonstrate how the seemingly competing technologies for information management, SOA, and business process management can be blended to create an effective, interconnected, and ordered IT landscape, making it both manageable and efficient.

The patterns are built around a supply chain metaphor. Information is supplied to the organization, processed, moved around, processed some more, and then output as some form of information product, such as a report or dashboard. Through this analogy, we cover how an organization can manage its information to support its operation effectively, balancing quality, availability, breadth, precision, and timeliness with cost.

xxiii
Information is not a physical asset, of course, so our notion of an “information supply chain” must extend the physical manufacturing and distribution supply chain metaphor with the recognition that information rarely moves from point to point as a discrete, whole unit. It is constantly being copied, transformed, renamed, partitioned, merged, updated, and deleted. More subtly, there are multiple versions of the “truth.” People’s interpretation and assumptions around the information they work with are highly contextual, and so when information is shared, it must be transformed to match the expectations and context of the new consumers before they will trust it to support their business.

*Patterns of Information Management* explains how information is transformed, enriched, reconciled, and redistributed along the information supply chain. The aim is to shape the way systems are integrated to create an orderly flow of information that can be reused and synchronized at key points in the processing.

A pattern-based approach is powerful because the resulting system behavior is determined by the way technologies are combined; the design choices are heavily affected by nonfunctional requirements, such as the amount of information, the arrival rates of new values, the level of quality that can be assumed, and the processing required to make the information useful. The patterns link together into a pattern language that spans from the holistic system level views for enterprise architects down to the design patterns of integration developers. The resulting pattern language enables the architect to make reasoned decisions about the applicability of each alternative approach and the inherent consequences of the choice.

**Intended Audience**

*Patterns of Information Management* is intended for enterprise architects, information architects, and solution architects who are responsible for defining how information systems should be linked together in order to synchronize, manage, and share information. Students and practitioners alike will find that the patterns create a framework in which to organize their existing experience and broaden their knowledge.

**How to Use This Book**

This book is principally a reference book. Chapters 1 and 2, “Introduction” and “The MCHS Trading Case Study,” respectively, set the scene, explaining how the pattern language is structured and walking through some examples. It is recommended that you read both of these chapters before using the patterns.

The remaining chapters contain the pattern definitions themselves. These chapters can be used to deepen your knowledge of the topic or as a pattern reference during a particular project. Because there are so many patterns, it is not possible, or necessary, to learn all of the patterns before starting to use them in a project. The patterns are organized into small, related groups that focus on a particular aspect of information management. We suggest that you start with a pattern...
group that is particularly relevant to your work. Study the pattern descriptions, paying attention to the differentiating aspects of each pattern, and map them to your project.

The content can be used in various ways:

- The pattern names define a vocabulary to discuss issues and technology options related to information architecture, governance, and management. The pattern names become the nouns and verbs of your design discussions, enabling you to characterize and choose between the options available.
- The pattern icons can be used in whiteboarding sessions and for documenting design decisions in reference architectures and solution specifications.
- The pattern descriptions provide design guidance for specific information supply chains and solutions.
- The pattern language provides a foundation for setting architectural standards and reference architectures. An organization can select the patterns it wants to support and develop reference implementations for them.
- The pattern language provides material for education and training in information architecture.

As you become familiar with one group of patterns, you can turn your attention to another—iteratively growing your knowledge. The consistency built into the pattern language will accelerate your learning process and very quickly you will become proficient in a significant working set of patterns.

Structure of the Book

*Patterns of Information Management* is divided into the following chapters:

**Chapter 1, “Introduction”**

Chapter 1 is an introduction to the topic of information management and the challenges that architects face. It explains what a pattern is, the conventions we use in documenting a pattern, and how patterns are linked together to form a pattern language.

**Chapter 2, “The MCHS Trading Case Study”**

Chapter 2 uses a case study involving a fictitious company called MCHS Trading to illustrate how the patterns of information management can be used in a project setting. These projects cover defining an information strategy; introducing a data warehouse and management reporting; introducing master data management hubs for operational master data; improving how information is governed, monitored, and managed; exchanging information with external parties; and using predictive analytics.
Chapter 3, “People and Organizations”
Chapter 3 is the first of the pattern definition chapters. It covers patterns relating to the way an organization is operating because this has a major impact on the way that information is managed. It describes the following pattern groups:

• Information centric organizations
• Information users

These patterns help in the definition of your information strategy and information governance program.

Chapter 4, “Information Architecture”
Chapter 4 covers the nature of information and how to think about its structure, meaning, and organization. This includes patterns that describe the different life-cycle patterns of information, models, metadata, information supply chains, and the solutions you may implement to improve the management of information. It includes the following pattern groups:

• Information elements
• Information identification
• Information provisioning
• Information supply chains

These patterns help you understand and plan the overall flow of information through your organization’s systems.

Chapter 5, “Information at Rest”
Chapter 5 contains pattern descriptions describing how information is accessed and stored. This includes descriptions of the different types of servers that support information management. The pattern groups in this chapter are as follows:

• Information services
• Information collections
• Information entries
• Information nodes

These patterns help to shape your thinking when deploying new capability into the IT environment, such as a new application, master data management hub, data warehouse, analytics, or reporting platform.
Chapter 6, “Information in Motion”

Chapter 6 documents the patterns for moving information between servers, including services, information routing, filtering, consolidation, and distribution. It contains the following pattern groups:

- Information requests
- Information flows

These patterns focus on how information is moved between the information nodes to satisfy the needs of their information processes.

Chapter 7, “Information Processing”

Chapter 7 describes the different types of processing that is performed on information and how it is triggered. The processes include business, movement, transformation, quality management, search, and analytics processes. It contains these pattern groups:

- Information triggers
- Information processes

These patterns help you categorize and select how information should be processed and maintained.

Chapter 8, “Information Protection”

Chapter 8 covers the patterns for protecting information, including validating, transforming, enriching, and correcting information; security; and monitoring. It includes three pattern groups:

- Information reengineering steps
- Information guards
- Information probes

Once you have your information supply chains mapped out, these patterns help you design how the information can be protected end to end.

Chapter 9, “Solutions for Information Management”

Chapter 9 covers the information solution pattern group. These patterns describe a selection of information projects that improve the information management of an organization’s information systems. Solutions incorporate a set of patterns focused on addressing particular information problems, though always in context with existing information landscapes so they must integrate with, enhance, or incorporate existing systems and information.

Appendices

The appendices include a glossary of technical terms and technology types that are mapped to the relevant patterns.
What Is Not Covered

This is a design pattern language and so does not recommend specific technologies and products. It aims to describe classes of technology, where they should be used, and the consequences of using them. This book is also intended to be an overview of the information management landscape. It does not include implementation details, particularly where there is plenty of literature covering these details. Finally, there are references to information governance in the patterns. Information governance is a supporting discipline for information management that involves business controls, procedures, and related technology. It is beyond the scope of this book to cover these aspects properly.

Further Information

There is an IBM developerWorks® community for the Patterns of Information Management where additional details, examples, and discussions are being posted. To join, visit: https://www.ibm.com/developerworks/community/groups/community/PoIM

This community provides you with an opportunity to ask questions about the patterns and suggest improvements.

Acknowledgments

The pattern language has been through many iterations, discussions, and workshops to get it into a state that is suitable for publishing. We would like to thank the following people who have provided help and feedback during the process.

From the EuroPLoP 2011 Pattern Writers Conference (where the INFORMATION NODE patterns were reviewed), there is our shepherd, Tim Wellhausen, and the members of the writer’s workshop: Klaus Marquardt, Markus Gaertner, Andreas Fiessler, and Joerg Pechau.

IBM has provided us with an environment where we have been able to develop and share the material with experts from many companies, industries, and software disciplines, drawing on their years of experience delivering complex projects and systems. As a result, we received valuable feedback from many subject matter experts, including Dan Wolfson, Dougal Watt, Steve Lockwood, Kyle Brown, Loretta Mahon Smith, Mike McRoberts, Rob High, Martin Wildberger, Richard Hedges, Stephanie Hazlewood, Patrick Dantressangle, Mukesh Mohania, Ivan Milman, Lena Woolf, David Radley, Larry Yusuf, Susan Visser, Sarah Tee, Herb Berger, Prasad Vempati, Keith Enhagen, Eleomara Goncalves, and Rickey Tang.

We would also like to thank the members of Pearson plc who have expertly guided and supported us in our first publishing effort—in particular, Bernard Goodwin and Michelle Housley.
About the Authors

Mandy Chessell
FREng CEng FBCS
Mandy has worked for IBM since 1987. She is an IBM Distinguished Engineer, IBM Master Inventor, and member of the IBM Academy of Technology Leadership Team. As the chief architect for InfoSphere® Solutions in IBM’s Software Group, Mandy designs common information integration patterns for different industries and solutions.

In earlier roles, Mandy’s work has focused on transaction processing, event management, business process management, information management, and model-driven development. This breadth is reflected in her invention portfolio, which to date stands at over 50 issued patents worldwide.

Outside of IBM, Mandy is a fellow of the Royal Academy of Engineering and a visiting professor at the University of Sheffield, UK. In 2001, she was the first woman to be awarded a Silver Medal by the Royal Academy of Engineering, and in 2000, she was one of the “TR100” young innovators identified by MIT’s Technology Review magazine. In 2006, she won a British Female Innovators and Inventors Network (BFIIN) “Building Capability” award for her work developing innovative people and the BlackBerry “2006 Best Woman in Technology - Corporate Sector” award. More recently, she was granted an honorary fellowship of the Institution for Engineering Designers (IED) and she won the “2012 everywoman Innovator of the Year.”

For more information on Mandy’s publications, see http://en.wikipedia.org/wiki/Amanda_Chessell.

Harald Smith
Harald has worked for IBM since 2005. Harald is a software architect in IBM’s Software Group specializing in information quality, integration, and governance products, and is IBM certified in delivering IBM Information Management solutions. In this role, he develops best practices, methodology, and accelerators for common information integration use cases.

Harald has 30 years of experience working with data quality products and solutions; product and project management; application development and delivery; system auditing; technical services; and business processes across the software, financial services, healthcare, and education sectors. Harald was the product manager at Ascential® Software and IBM responsible for designing and bringing the IBM InfoSphere Information Analyzer product to market as a key component in IBM’s information quality portfolio. He has been issued three patents in the field of information quality and rule discovery and was recently recognized as an IBM developerWorks Contributing Author.

His publications include the IBM developerWorks articles “The information perspective of SOA design” [parts 6, 7, and 8], “Use IBM WebSphere® AuditStage in a federated database environment,” “Using pre-built rule definitions with IBM InfoSphere Information Analyzer,”
“Designing an integration landscape with IBM InfoSphere Foundation Tools and Information Server” [part 1], and “Best practices for IBM InfoSphere Blueprint Director” [parts 1 and 2]. For the IBM InfoSphere Information Server documentation, Harald contributed to the “IBM InfoSphere Information Analyzer Methodology and Best Practices Guide” and “IBM InfoSphere Information Server Integration Scenario Guide”; he has also contributed to three IBM Redbooks®.
In software engineering, we are taught that abstraction, modularity, and information hiding are useful approaches when breaking down a set of requirements into manageable chunks for implementation. This book makes use of these principles to tackle the synchronization of information between IT systems.

Islands of Information

Most organizations use specialized IT systems called applications to run their operations. Each application supports a particular aspect of the business, either for the whole organization or a group within it. There may be applications for order taking, for billing, for distribution of goods, for management of employee data, and many more.

An application will store the information it is processing in a persistent store for later reference. This information store is often a private resource for the application. Over time, this store contains important details about the people with whom the organization is interacting, what assets they use, how, when, and why.

A healthy organization will develop and grow—and this change drives changes into its applications, affecting their function and scope. It can also lead to duplication of function:

- When two organizations merge, they can end up with at least two applications for each function.
- When a new product line or channel to market is introduced, an organization may choose to introduce a new application to support it, to avoid the possibility of disrupting the established business or to implement it faster.
- Multinational organizations find they need separate applications for different countries, or trading regions, to handle local customs and regulations.

Careful management and constant rationalization may reduce the number of applications so there is little or no overlap in function. However, an application is a complex mix of software and hardware. It takes considerable engineering effort to develop it, and so once the investment is made, an application is expected to have a long life (5–15 years). Ripping it out and replacing it can be expensive and difficult and so an organization may choose to maintain multiple applications for the same function.
When there are two applications covering the same function, information about that function is split between the two applications and is typically stored in a different format. Even when all applications support unique functions, there is still an overlap in the information that they hold. This is the information that describes the core interests of the organization, such as customers, suppliers, products, contracts, payments, assets, employees, and many more.

Over time, the private information stores of an organization’s applications become islands of duplicated and inconsistent information. This affects the efficiency of an organization and its ability to operate in a cost-effective, flexible, and coherent unit.

This book seeks to address the challenge of effective information management. How does an organization improve its management of information, working with the applications it already operates, to ensure it knows what its assets are, what it is working on, what commitments it has agreed to, how well it is performing, and how it can improve its operation?

Introducing MCHS Trading

MCHS trading is a fictitious trading company used in this book to illustrate different approaches to information management. MCHS Trading sells goods through four channels: on the Internet, via mail order, via a call center, and through physical shops. Due to differences in requirements, orders are taken by three different applications: E-shop for the Internet orders, Mail-shop for mail order and the call center, and the Stores application to support the needs of the physical stores. These applications were introduced incrementally as MCHS Trading opened the new channels to its customers.

Orders are fulfilled and money is collected through the Shipping and Invoicing applications, respectively. The E-shop, Mail-shop, and Stores applications send the order details to the Shipping application, which in turn forwards them on to the Invoicing applications as soon as an order is dispatched. This is illustrated in Figure 1.1.

![Figure 1.1 MCHS Trading’s order-processing systems.](image-url)
From a functional point of view, this is a rational separation of concerns. Each application has a clearly delineated set of responsibilities and the process works—customers get the goods they ordered and the correct money is collected in exchange for the goods.

However, when the information stores are added to the picture (see Figure 1.2), you can see that the details about customers, products, and orders are replicated across the systems. Why? Because this information is core to MCHS Trading’s business and so every application needs it in some form or another.

![Figure 1.2 Information stores supporting order processing.](image)

Failing to synchronize this information effectively leads to inflexibility and inefficiencies in the organization that can have an impact both internally and externally.

Consider an individual customer, Alistair Steiff. He has registered for a loyalty card, which is handled by the Stores application, and he also uses the E-shop and the mail order channel from time to time. The E-shop keeps a record of Alistair in the form of a customer account. This is different from the loyalty card account. The Mail-shop application takes Alistair’s details with each order. It has no capability to maintain his details for the next time he orders something through that channel, which Alistair finds a little annoying.

Alistair experienced another issue when he moved to a new address. Although he updated his address in his E-shop account, MCHS Trading kept sending his loyalty card statements to his old address. He tried phoning MCHS Trading’s call center but they could not help because they
were only set up to take new orders. He had to write a letter to MCHS Trading to get the loyalty card address updated.

Within MCHS Trading, there is also frustration with the current systems. It is difficult to understand the buying patterns of its customers:

• To understand which new products would be of interest to an individual
• To understand how an individual interacts across each of MCHS Trading’s sales channels

There are two issues here. First, the applications only store information that is relevant to their operation—so it is hard to see the complete picture when the details are spread among the applications. Second, applications are designed to reflect the current operational state of their work. They may keep historical data, but not in the form that is conducive to analysis of trends and anomalies.

This lack of insight is inhibiting MCHS Trading’s ability to grow and there is a need to introduce new management reporting capability to understand how the business is really performing.

Improving an Organization’s Information Management

The problems that MCHS Trading is experiencing are typical for many organizations. Information is distributed across multiple applications for operational efficiency, leaving the information duplicated, fragmented, and often inconsistent. As a result, the organization cannot act in a coordinated manner:

• They find it hard to get an overall picture of how well the organization is performing. This requires a consolidated view of their business activity, showing the current position, along with a historical perspective for comparison. For example, MCHS Trading would want to understand how many customers it has, what types of products its customers are interested in buying, how this is changing over time, how efficient the delivery process is, who its best suppliers are, and much more if it is to maintain its market leadership position.

• The quality of information varies from application to application. This means different parts of the organization are operating on different facts that could lead to different decisions being made for the same situation.

• The internal fragmentation of the information is often exposed outside of the organization, creating poor customer service or missed opportunities. This was Alistair Steiff’s experience when he tried to change his address—he had to ensure it was updated in each application—using a different process for each one.
• External regulators are skeptical that the organization’s reported results are accurate when ad hoc processes are used to create them because it is difficult to explain where the information came from and how the results were calculated.
• Information is not retained for the required amount of time—or too much information is retained for too long. Either case can inhibit the ability to find the right information in a timely manner.
• Failures in the mechanisms that move information around can corrupt the integrity of the organization’s information. These failures may be errors in the information itself, which means it cannot be transferred, or errors in the implementation of the mechanism, or a failure to initiate some processing in time, resulting in missing information. These failures may not be detected for some time and can be extremely difficult to resolve.

An organization needs to maintain a strong core of information to run the business. This requires a focus on how key information is created, processed, and stored within its IT systems:
• They must optimize where information is located relative to the workload that is using it—ensuring copies are taken in a thoughtful way and these copies are supported with mechanisms to maintain or remove them as new information becomes available.
• Related information should be correlated together to create a complete picture of the organization’s activities.
• Obsolete information must be removed to save storage and reduce the processing effort.
• Vital historical information needs to be retained.
• Information must be protected from inappropriate use, restored after a failure, and, despite the fact that most organizations have their silos and cliques, the right information needs to be exchanged and presented to the right people at the right time.

This is hard to achieve. Technology is often focused on providing function to the business rather than managing information. Specialist information management technology helps, but it has to be blended with the existing infrastructure. The blending process creates emergent properties.

Emergent properties are those characteristics that “appear” when components are combined together in a particular configuration—rather than being inherent properties of any one of the components. This is similar to the behavior of colors when you mix them together. If you combine blue and yellow, you get the color green. Green is an emergent property because it is not present in either the blue or the yellow—and only emerges when they are combined.

When we combine technology together, we also get emergent properties. These emergent properties may be additive, or they may override some of the components’ original capabilities.

Consider two applications sited on opposite coasts of the United States. The application on the East Coast needs to regularly send information to the West Coast application. However due to the different time zones in which they operate, there is a 3-hour period of its operation when the
West Coast application is not available. It is not possible to extend the period of operation of the West Coast application—and the East Coast application is not capable of buffering the information until the West Coast application comes online.

The solution is to provide a new database that is available whenever either application is online (see Figure 1.3). The East Coast application writes information into the database. The West Coast application processes the information in the database when it becomes available.

This is a common integration approach. The database in the middle is acting as a staging area. Its effect in the integration is to expand the time window that information can be transferred between the two applications. It may also improve the resiliency of the integration because the East Coast application is no longer affected by the occasional outages of the West Coast application. However, the downside is that when both applications are available, the staging area slows down the transfer of information between the two applications because there is a small delay between the East Coast application writing the information and the West Coast application picking it up. The time it takes to transfer information between two systems is called the latency of the information transfer.

![Figure 1.3 Using a staging area between two applications.](image)

The increased availability, latency, and resilience are all emergent properties of the integration. In general, the emergent properties relate to non-functional characteristics that may not be evident until the integration is in production. This is why architects like to use tried and tested approaches where the emergent properties are well understood.

This book describes how the flow of information between applications and other systems should be designed, calling out the emergent properties as they occur.

The aim is to shape the placement of workload and information stores within the IT systems to create an orderly flow of information that guarantees the quality of the results. The material is presented as a set of connected software design patterns, called a pattern language.
Patterns and Pattern Languages

A software design pattern defines a proven approach to solving a problem. The solution described in the pattern is typically a set of components that are interacting in a particular configuration. The pattern explains why this approach works, its associated trade-offs, and resulting benefits and liabilities. It also links to other patterns that may:

- Provide an alternative approach
- Provide a complementary capability
- Describe an approach to implementing a component that is named in the pattern’s solution

This linking together of related patterns creates what we call a pattern language.

Every pattern in this pattern language has a name that summarizes the solution it represents in a succinct manner. For example, there is a pattern called INFORMATION COLLECTION that describes a collection of related information. Notice that the pattern name is written using the small capitals formatting. This formatting convention is used wherever the pattern is first referenced in a section. The name of a pattern can act as shorthand for the solution during design discussions.

Choosing the terminology for the pattern names has been a challenge because the pattern language covers multiple architectural disciplines. Where possible, we have used industry standard names for the concepts and components exposed in the pattern language. However, we have found it necessary to introduce new terminology whenever there is conflicting nomenclature, or no obvious name exists.

Every pattern has an icon that can be used as a visual reminder of the pattern, particularly when whiteboarding and documenting solutions. The information collection icon is shown in Figure 1.4.

![Figure 1.4 Icon for the information collection pattern.](image)

The patterns are built on a common component model. This means that a pattern can be used as a component in the solution described by another pattern. When this occurs, the icon of the pattern is used in the solution diagram of the consuming pattern. For example, Figure 1.5
shows the solution for the staging area introduced in the previous section. It is built from a variety of pattern icons.

The meaning of the icons in the diagram, and the details of the patterns behind them, will become familiar to you as you work with the pattern language. The purpose here is to illustrate how the icon of one pattern, the information collection in this case, can be used in the solutions of other patterns.

Figure 1.5 The solution diagram for a staging area showing the use of the information collection icon.

Each of the patterns of information management can be used independently. However, the real value of a pattern language is the ability to compare and contrast different approaches to resolving a situation.

The patterns of information management that are relevant to a particular situation are collected together in a pattern group. Each pattern group has a lead pattern that describes the core principles and capabilities of the group. The pattern group is named after the lead pattern. The other patterns in the pattern group enhance one or more characteristics of the lead pattern to support a more specialized situation.

You may have noticed that in Figure 1.5, the information collection icon appears slightly modified in the solution diagram with five lines coming out of the left side (as shown in Figure 1.6). The modification to the information collection icon denotes that the staging area uses specialized information collections described by the TRANSIENT SCOPE pattern.

The modified icon visually represents that there is a relationship between the information collection and transient usage patterns. They are, in fact, from the same pattern group along with other patterns called LOCAL SCOPE and COMPLETE SCOPE.
To make it easy to compare and contrast the patterns in a group, each group of patterns begins with a table of pattern summaries, called patlets. A patlet shows a pattern’s icon, name, short problem statement, and summary of the solution. The aim of the patlets is to help you quickly discover and navigate to the pattern you need. Table 1.1 shows the patlet for the INFORMATION COLLECTION pattern, which is the lead pattern in its group.

Table 1.1  Sample Pattern Summary for Information Collection

<table>
<thead>
<tr>
<th>Icon</th>
<th>Pattern Name</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="INFORMATION COLLECTION icon" /></td>
<td>INFORMATION COLLECTION</td>
<td>Information must be organized so it can be located, accessed, protected, and maintained at a level that is consistent with its value to the organization.</td>
<td>Group related information together into a logical collection and implement information services to access and maintain this information.</td>
</tr>
</tbody>
</table>

Table 1.2 shows the related scope patterns from the same group. Notice that the icons are all variations of the information collection icon.

Table 1.2  Patlet Table for the Scope Patterns in the Information Collection Group

<table>
<thead>
<tr>
<th>Icon</th>
<th>Pattern Name</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="COMPLETE SCOPE icon" /></td>
<td>COMPLETE SCOPE</td>
<td>An information process needs to perform an activity once for each instance of a particular subject area (such as a customer, product, order, invoice, shipment, etc.) that occurs within the information supply chain.</td>
<td>The information process needs to use an information collection that stores a single information entry for each instance of the subject area that occurs within the information supply chain. Such an information collection is said to have a complete scope.</td>
</tr>
</tbody>
</table>
The implementations of the information processes hosted within an information node assume they are in complete control of changes to the information they use.

Provide information collections within the information node for the sole use of its information processes. These information collections will then only have information entries that are created by the locally hosted information processes. These types of information collections are said to have a local scope.

An information node needs to provide temporary storage for information entries that are being continuously added and removed by the information processes.

Create an information collection to temporarily store the information entries in the information node. From time to time, the information entries stored in this information collection will change, and so we say this collection has transient scope.

The detailed pattern descriptions follow the patlet tables. Many different styles and heading structures have been successfully used to describe software patterns. We have chosen to use one of the formats recommended by The Open Group Architecture Framework (TOGAF®) with the following subsections:

- **Context**—The situation where it is appropriate to consider using the pattern
- **Problem**—A description of the problem that this pattern solves
- **Example**—An example of the problem
- **Forces**—The factors that make this problem hard to solve
- **Solution**—A description of solution components and how they are assembled together
- **Consequences**—The benefits and liabilities of using the solution
- **Example Resolved**—How the example described is resolved using the pattern
- **Known Uses**—References to well-known technologies and approaches that support the pattern
- **Related Patterns**—Links to other relevant patterns in the pattern language

1. http://www.togaf.info
These sections provide a way to bring together a variety of information into a well-formed structure that summarizes the essence of the pattern. Together, they enable you to make reasoned choices of approach for the solution you are building.

**Basic Components in the Pattern Language**

A good place to start learning about the *Patterns of Information Management* is a pattern called INFORMATION PROVISIONING. This describes how five basic components interact to receive, process, and produce information.

Figure 1.7 comes from the information provisioning pattern description and shows the components and how they interact. All of these relationships are many-to-many.

Notice that the information collection pattern introduced previously is shown as a component in the information provisioning pattern along with some additional patterns: INFORMATION USER, INFORMATION TRIGGER, INFORMATION PROCESS, and INFORMATION SERVICE.

![Diagram of five basic components for processing information.](image_url)
The information user is a person working with the organization’s information. This person may be an employee or someone outside the organization such as a customer or a supplier. Each kind of information user has his or her own requirements for the kinds of information needed, where, and when. The information user is both a consumer of existing information and a contributor of new information. The information user works with user interfaces that are controlled by information processes.

The information processes perform the automated processing of the organization. There are many different kinds of information processes—but, collectively, they are the mechanisms by which information is received, transformed, and produced in some form or another.

An information trigger starts an information process. This may be the result of an information user request, a scheduler, an event being detected, or the need for more information. The information trigger passes the information process some context information that describes why it is being started. The information process augments this context information with information from the information users and other information known to the organization.

An information process accesses any additional information it needs through well-defined interfaces called information services. An information service provides a specialized view of the information that the information process needs. It is able to locate the requested information from a variety of sources and transform it into a format suitable for the requesting information process. An information service retrieves stored information from information collections.

The information collection manages a collection of related information. Typically, the contents of an information collection relate to the same subject area. However, an information collection may contain information that was collected from the same activity, such as the results of an experiment, from the same source, such as readings from a sensor, or from the same time period, such as social media extracted for a specific period of time.

The information provisioning pattern is a lead pattern of a pattern group. It recognizes that the information a person sees through a user interface is different from the way it is stored and shows the layering of components used to manage the mapping. The rest of the pattern group describes how information is provisioned when multiple systems are involved.

Information Integration and Distribution

As already discussed, an organization will have many applications and other kinds of IT systems. Each of these systems will host their own information processes, information services, and information collections.

We use the INFORMATION NODE pattern to represent the general concept of a system. You may want wish to think of this as a physical computer, or server. However, with the increasing use of virtual systems and cloud provisioning, the notion of physical hardware being tied to a particular system is becoming less common. So an information node is simply an identifiable “system” that the organization runs.

The information node is the lead pattern in a large information group that describes different types of systems. The application is represented by a pattern from the group called APPLICATION NODE. The STAGING AREA pattern is also in the same group.
The information node provides an execution environment for the information processes, information services, and information collections. Calls between these components can occur totally within the information node. However, it is also possible for information processes to access information from different information nodes. This capability is provided a specialist pattern within the information service pattern group called **REMOTE INFORMATION SERVICE**.

Figure 1.8 illustrates this mechanism. The remote information service uses an **INFORMATION REQUEST** pattern to retrieve information from an information collection located in another information node. The information request pattern consists of two message flows: one from the remote information service to the information node that hosts the information to request the information, and another flowing in the opposite direction to return the requested information.

The information node that receives the request for information routes it to an appropriate information service to extract the information and return a response. In Figure 1.8, this is shown as a **LOCAL INFORMATION SERVICE**—that is, one that uses information collections from the same information node—but it could be another remote information service.

![Figure 1.8 Accessing information from a different information node.](image-url)
The information request pattern retrieves information from its original location on demand. This means both the calling and the called information node must be available at the same time. When information must be copied from one information collection to another—for example, for performance or availability reasons—the information flow pattern is used instead. This introduces another kind of information node called an **INFORMATION BROKER** that calls remote information services to extract information from one or more information collections, transform it, and store it in other information collections. The effect is that information flows between the information nodes in what we call an information supply chain.

Figure 1.9 illustrates this flow of information. The numbers on the diagram refer to these notes:

1. Here, an information process calls a remote information service to retrieve information from information collection A. Under the covers, the remote information collection uses an information request to contact the information node where information collection A is located.
2. The information process then works with some information users to update the information and store the results in information collection B.
3. Information collection B stores the information in a new entry in the information collection.
4. An information broker now starts an information process to extract the information from information collection B and transform it and save it as a new entry in information collection C.
5. Another information process starts to retrieve the information from information collection C.
6. This process may make changes to the information and update it in information collection C.

This example illustrates how multiple copies of information are created—and also how these copies quickly become slightly different from one another. The differences could be as follows:

- **Superficial**—Such as a reformatting
- **Enriching**—Where additional information is added to the original information
- **Localized**—Where updates made are only relevant to the location where they are made
- **Managed**—Where the best source of information (called the authoritative source) is well known at all times
- **Conflicting**—Where it is hard to know which information collection is the best to use or retrieve the latest information from as changes are coming in to each of the copies in an unpredictable way
A well-defined information supply chain should avoid having information collections with conflicting differences in them. We aim to minimize the number of copies. Where copies are made, each should have a clear purpose and guidelines on when it should be used. Copies should be synchronized when updates are made, and where differences are unavoidable, there should be at least one copy that is known to have all of the latest information in it.

The INFORMATION SUPPLY CHAIN pattern is the lead pattern in a pattern group that describes different patterns of information movement between the information collections and how to synchronize the information to avoid conflicting differences. Designing information supply chains is a key challenge for both information architects and solution architects.

**Figure 1.9**  Flowing information between systems.

Pattern Language Structure

The pattern groups introduced in the previous sections show the breadth of factors an architect needs to consider to achieve a clean, correct, and flexible information design. At the top of the pyramid, you see the organization and the people who work within it. They drive the information strategy. The organization is supported by the information architecture, which is implemented by the information management components. This structure is summarized in Figure 1.10.
Chapter 2, “The MCHS Trading Case Study,” contains the case study, introducing the patterns through different projects at MCHS Trading. The remaining chapters contain the pattern descriptions and are organized according to the structure in Figure 1.10.

Chapter 3, “People and Organizations,” has the patterns for the organization and its people (see Table 1.3). These patterns include the information strategy, policy setting, and information governance.

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION CENTRIC ORGANIZATION</td>
<td>An organization needs to make good use of its information to achieve its goals.</td>
<td>Make the management of information a strategic priority. Develop systems and practices that nurture and exploit information to maximum effect.</td>
<td>You are thinking about the holistic approach that your organization should take to information management.</td>
</tr>
</tbody>
</table>

Figure 1.10  Structure of the pattern language for information management.
Information architects develop an understanding of the information needs of an organization and propose best practices for how it should be structured, stored, and managed. Solution architects are responsible for developing IT-based solutions to business problems. These solutions are dependent on information and so the solution architect relies on the information architecture created by the information architect when developing a new solution. Both the information architect and the solution architect use information architecture patterns in their work. These are described in the pattern groups shown in Table 1.4, and are described in more detail in Chapter 4.

**Table 1.4** Pattern Groups in Chapter 4

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION USER</td>
<td>Individuals need access to the organization’s information to perform their work.</td>
<td>Classify the people connected with the organization according to their information needs and skills. Then provide user interfaces and reports through which they can access the information as appropriate.</td>
<td>You want to define what types of user roles should be supported by a new information solution.</td>
</tr>
<tr>
<td>INFORMATION ELEMENT</td>
<td>An organization is looking for the best approach to manage the many kinds of information it has.</td>
<td>Group together related information attributes that follow the same life cycle and manage them appropriately.</td>
<td>You are new to information management and want to familiarize yourself with the types of information an organization has, and how it is managed.</td>
</tr>
<tr>
<td>INFORMATION IDENTIFICATION</td>
<td>An organization does not know what types of information it has, where it is located, how it is managed, and who is responsible for it.</td>
<td>Investigate and document the information requirements and existing support available to the organization.</td>
<td>You want to catalog the information you have and any new requirements. The resulting information is often called metadata.</td>
</tr>
</tbody>
</table>
### Chapter 5, “Information at Rest,” covers the way information is processed within an IT system (see Table 1.5). In this pattern language, a system is called an information node and there is a related pattern group devoted to the various types of systems.

Stored information is accessed through information services that locate the required information and format for the consumer. Information collections are logical groupings of stored information. Often the information is organized consistently within the collection. Approaches for identifying, structuring, locking, and storing information within an information collection are covered in the information entry pattern group.

#### Table 1.5 Pattern Groups in Chapter 5

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION PROVISION-ING</td>
<td>An information process needs information to perform its work.</td>
<td>Information is supplied to the process when it starts, through its user interfaces and through stored information.</td>
<td>You are considering how to provide information to an information process or information user.</td>
</tr>
<tr>
<td>INFORMATION SUPPLY CHAIN</td>
<td>An organization needs to process information in order to fulfill its purpose. How is the flow of information coordinated throughout the organization’s people and systems?</td>
<td>Design and manage well-defined flows of information that start from the points where the information is collected for the organization and links the flows to the places where key consumers receive the information they need.</td>
<td>You are designing how a particular type of information should flow between your systems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION SERVICE</td>
<td>Some information processes need the same information, but may require it to be formatted differently.</td>
<td>Define well-defined interfaces to the information that meet the needs of particular consuming information processes to enable them to create, retrieve, and maintain just the information they need.</td>
<td>You need to decide how an information process will access the information it needs.</td>
</tr>
</tbody>
</table>
Information must be organized so it can be located, accessed, protected, and maintained at a level that is consistent with its value to the organization.

You need to classify how the existing stores of information are used or decide how new information should be grouped and stored.

An instance of a type of information needs to be stored in an information collection.

You are designing how information should be managed within an information collection.

What is the appropriate IT infrastructure to host information collections and information processes?

You are selecting the type of system to host information and its related processing.

Chapter 6, “Information in Motion,” covers the information flow and information request pattern groups for moving information between information nodes (see Table 1.6).

### Table 1.6 Pattern Groups in Chapter 6

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION COLLECTION</td>
<td>Information must be organized so it can be located, accessed, protected, and maintained at a level that is consistent with its value to the organization.</td>
<td>Group related information together into a logical collection and implement information services to access and maintain this information.</td>
<td>You need to classify how the existing stores of information are used or decide how new information should be grouped and stored.</td>
</tr>
<tr>
<td>INFORMATION ENTRY</td>
<td>An instance of a type of information needs to be stored in an information collection.</td>
<td>Structure the information collection so that it is made up of a set of information entries. Each information entry stores a single instance of the subject area. Provide capability to manage and iterate over a collection of these archetypal instances.</td>
<td>You are designing how information should be managed within an information collection.</td>
</tr>
<tr>
<td>INFORMATION NODE</td>
<td>What is the appropriate IT infrastructure to host information collections and information processes?</td>
<td>Related information processes and information collections should be hosted together in a server.</td>
<td>You are selecting the type of system to host information and its related processing.</td>
</tr>
</tbody>
</table>
Chapter 7, “Information Processing,” covers the different kinds of information processes, along with the information triggers that start them, which are found in a typical organization’s IT systems (see Table 1.7).

### Table 1.7 Pattern Groups in Chapter 7

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION FLOW</td>
<td>How do you implement the movement of information between two information nodes?</td>
<td>Use an information trigger to start an information process to control the movement of information. This information process is responsible for extracting the required information from the appropriate sources, reengineering it, and delivering it to the destination information nodes.</td>
<td>You are designing information integration jobs to move information between different systems.</td>
</tr>
<tr>
<td>INFORMATION TRIGGER</td>
<td>An information process must be started when a particular event occurs.</td>
<td>When the event is detected, trigger a mechanism that is able to request the initiation of the process on an appropriate information node.</td>
<td>You are considering how to start an information process. This information process may be providing a new business function or moving information between information collections.</td>
</tr>
<tr>
<td>INFORMATION PROCESS</td>
<td>An organization has to process information to support one of its activities.</td>
<td>Formally define and implement the processing for that activity in an information node. Ensure this information node has access to the information it needs.</td>
<td>You want to understand existing processing and design new processing of information.</td>
</tr>
</tbody>
</table>

Another key concern for organizations with valuable information is how to protect it so it retains its quality and it is not misused or stolen. This is covered in Chapter 8, “Information Protection,” (see Table 1.8).
The protection of information is something that must be designed holistically, considering the welfare of key information at all stages of its lifetime. It is then implemented through the deployment of small components throughout the systems, where each is responsible for protecting an aspect of the information. The patterns of information management break down the aspects of information protection into three pattern groups:

- **INFORMATION REENGINEERING STEP**—These patterns focus on maintaining the quality and format of information.
- **INFORMATION GUARD**—These patterns ensure authorized people and processes are using information for authorized purposes.
- **INFORMATION PROBE**—These patterns are used to monitor the use and movement of information. With these patterns, it is possible to detect issues in the management of information and correct it.

### Table 1.8 Pattern Groups in Chapter 8

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION REENGINEERING STEP</td>
<td>An information process is not able to consume the information it needs, as currently exists.</td>
<td>Insert capability to transform the information so it is consumable by the information process.</td>
<td>You need to understand how information can be transformed to meet new requirements.</td>
</tr>
<tr>
<td>INFORMATION GUARD</td>
<td>The organization’s information needs to be protected from inappropriate use and theft.</td>
<td>Insert mechanisms into the information supply chain to verify that the right people are only using information for authorized purposes.</td>
<td>You need to consider the alternatives for the security and privacy of your information.</td>
</tr>
<tr>
<td>INFORMATION PROBE</td>
<td>The operation of an information supply chain needs to be monitored to ensure it is working properly.</td>
<td>Insert probes into key points in the information supply chain to gather measurements for further analysis.</td>
<td>You need to plan how information management should be monitored.</td>
</tr>
</tbody>
</table>
The information protection patterns are used as processing steps in both the information process and information service pattern groups where they transform, protect, or monitor information as it enters the organization; when it is stored; when it is sent between systems; when it is retrieved, updated, and eventually archived and deleted. Individually, they protect a single point in the processing—collectively, they protect the organization’s information throughout its entire life cycle.

The final pattern group in Chapter 9, “Solutions for Information Management,” covers solutions that tackle different aspects of how information management can be improved. They use the pattern groups described previously as components (see Table 1.9).

Table 1.9  Pattern Groups in Chapter 9

<table>
<thead>
<tr>
<th>Lead Pattern Name and Icon</th>
<th>Lead Pattern Problem Statement</th>
<th>Lead Pattern Solution Summary</th>
<th>Start Here When...</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION SOLUTION</td>
<td>An organization recognizes there is a missing capability or a major issue with the way it manages an aspect of its information.</td>
<td>Create a project, or series of projects, to transform the way the information is managed by the organization’s people and information systems.</td>
<td>You want to plan changes to your information systems to improve information management.</td>
</tr>
</tbody>
</table>

Summary

This chapter introduced some of the information management challenges an organization faces. Their applications provide the information processes that drive the business. These processes need access to a variety of information to perform their function. This information is distributed and duplicated among the applications and the challenge is to keep this information synchronized while ensuring it is available and suitably structured for all of the organization’s needs.

This chapter also introduced the patterns of information management. The patterns of information management are a collection of software design patterns that describe best practices for blending software components together to manage the typical information management challenges that organizations face. These patterns each have a succinct name and icon for use in design discussions. Each pattern also has a tabulated short description called a patlet and a full description that explains when to use it, how it works, and the consequences of using it.

Throughout the pattern language, this book uses a fictitious company called MCHS Trading to illustrate the use of the patterns. The patterns are also grouped together around particular information management topics called pattern groups. Each pattern group has a lead pattern that describes the basic mechanism at work and the rest of the patterns in the group are variations of this basic pattern.
The first lead pattern for a pattern group that was introduced was information provisioning. This explained the layers of components used to provide information to the organization. We then went on to explain how the pattern language is structured and where each of the pattern groups are located in the book.

Now that you have seen the pattern groups in the pattern language, you can choose to navigate directly to the patterns of interest. Alternatively, Chapter 2 describes how MCHS Trading used the patterns to transform its information systems through a series of projects.
This page intentionally left blank
This page intentionally left blank
Index

A
access auditing probe pattern, 575
accessing stored information, 16
ACMN field, information values profile pattern, 158
ACTID field, information values profile pattern, 158
ACXDT field, information values profile pattern, 158
adding customer details, 41
aggregate key pattern, 294, 307-309
agile business process pattern, 177, 470, 474-476
agile business processes, 44
analysis information nodes, 385-386
information analysis node pattern, 386-389
information decision definition process pattern, 521-523
information mining store pattern, 389
information pattern detecting processes pattern, 523-525
analytics process patterns, 517
information pattern discovery process pattern, 518-520
anonymize data pattern, 571
anonymizing, 568
application node, 64
application node pattern, 324-329, 599
application private provisioning pattern, 166, 169-171
applications, 1-2
archiving process, 193
archiving process pattern, 324
attribute-level information elements, 122
information code pattern, 126-128
information link pattern, 123-124
information metric pattern, 124-126
authentication, 568
authorization, 568

B
B2B trading partnerships, 51-55
batch information request pattern, 399
bespoke application process pattern, 470-472
big data and warehouse patterns, 618
information solution patterns, 618
historical system of record pattern, 619-624
workload offload pattern, 624-626
big data information processing, 376
information warehouse pattern, 377-379
map-reduce node pattern, 382-385
streaming analytics node pattern, 380-382
broadcast distribution pattern, 433, 444-446
buffered routing pattern, 407, 413-415
business analyst pattern, 97
business information nodes, 324
application node pattern, 326-329
information content node pattern, 330-332
information cube pattern, 340-342
information mart pattern, 337-340
information store pattern, 334-337
search node pattern, 332-334
business intelligence and analytics patterns, information solution patterns, 626
next best action pattern, 630-633
operational analytics pattern, 628-629
performance reporting pattern, 626-628
business processes pattern, 469-470
agile business process pattern, 474-476
bespoke application process pattern, 471-472
collaborative editing process pattern, 479-481
information reporting processes pattern, 481-483
packaged application process pattern, 472-474
state driven process, 476-479
check data pattern, 139, 539, 548-550
classifications, product details, 33-34
classify data pattern, 539, 546-548
clerical review process pattern, 484, 487-489
collaborative editing process, 33
collaborative editing process pattern, 372, 470, 479-481
collection control pattern, 571
collection-level provisioning, 162, 185-186
event-based provisioning pattern, 196-197
mirroring provisioning pattern, 189-193
peer provisioning pattern, 193-195
recovery provisioning pattern, 197-198
snapshot provisioning pattern, 186-188
complete coverage pattern, 33, 285
complete scope, 8, 10, 32
complete scope pattern, 279-282
concentrating information supply chain pattern, 209
consequences
aggregate key pattern, 308
agile business process pattern, 475
application node pattern, 328-329
application private provisioning pattern, 170
bespoke application process pattern, 472
broadcast distribution pattern, 445
buffered routing pattern, 415
cache provisioning pattern, 185
caller's key pattern, 311
cascading information supply chain pattern, 213
centralized master pattern, 606
check data pattern, 549
classify data pattern, 547-548
clerical review process pattern, 488
collaborative editing process pattern, 480
complete scope pattern, 282
consolidating information supply chain pattern, 224
correct data pattern, 550
daisy chain provisioning pattern, 176
derive relationship pattern, 563
derive value pattern, 561
distributed activity status pattern, 591
enrich data pattern, 545-546
event correlation node pattern, 359
event-based provisioning pattern, 196
external sensor trigger pattern, 464
filtered consolidation pattern, 425-426
filtered routing pattern, 417
golden reference pattern, 612
hierarchical information supply chain pattern, 227
historical system of record pattern, 622
hub interchange information supply chain pattern, 217-218
hybrid usage pattern, 276
independent consolidation pattern, 431
independent distribution pattern, 442-443
information access audit pattern, 637
information activity hub pattern, 375
information activity pattern, 111
information analysis node pattern, 386-389
information archiving process pattern, 498
information asset hub pattern, 371
information asset pattern, 109
information broadcasting process pattern, 512
information brokers pattern, 347
information centric organization pattern, 75
information change trigger pattern, 462
information code pattern, 127
information collection pattern, 257
information configuration pattern, 140
information content node pattern, 332
information cube pattern, 341-342
information decision definition process pattern, 522
information deployment process pattern, 503
information element patterns, 104
information entry patterns, 291
information event pattern, 114
information event store pattern, 365
information ever-greening process pattern, 497
information federation process pattern, 508
information flow pattern, 404-405
information governance program pattern, 90
information guard pattern, 569
information identification patterns, 132
information key pattern, 296
information lineage pattern, 160
information link pattern, 123-124
information location pattern, 147
information management obligation pattern, 79
information management principle pattern, 85
information management strategy pattern, 82-83
information mart pattern, 339
information matching process pattern, 495
information metric pattern, 125
information mining store pattern, 391
information mirror store pattern, 363
information model pattern, 142
information monitoring pattern, 640-641
information node management process pattern, 529
information node patterns, 323
information node upgrade pattern, 588-589
information pattern detecting processes pattern, 524
information pattern discovery process pattern, 519-520
information payload pattern, 120-121
information probe patterns, 573
information process pattern, 469
information processing variables pattern, 115
information profile tracking processes pattern, 486
information provisioning patterns, 165
information queueing process pattern, 510
information reengineering steps pattern, 536
information registry pattern, 609
information relocation process pattern, 506
information remediation process pattern, 490
information replication process pattern, 501-502
information reporting processes pattern, 482
information request pattern, 398
information scavenging process pattern, 516
information schema pattern, 144
information service patterns, 241
information service trigger pattern, 460
information solution patterns, 581
information store pattern, 336-337
information streaming process pattern, 380-382
information summarizing process pattern, 514-515
information summary pattern, 118
information supply chain patterns, 206
information trigger patterns, 452
information user pattern, 93-94
information validation process pattern, 492-493
information values profile pattern, 156-158
information values report pattern, 155
information warehouse pattern, 378-379
link entries pattern, 555
linked information provisioning pattern, 183
local information service patterns, 245
local key patterns, 299
local scope pattern, 283
look-up table node pattern, 357
managed archive pattern, 635
manual information trigger pattern, 455
map-reduce node pattern, 384
master usage pattern, 270
merge entries pattern, 557
mirroring provisioning pattern, 191
natural key pattern, 304
new information node pattern, 586
next best action pattern, 632
operational analytics pattern, 629
operational health monitoring process pattern, 528
operational status store pattern, 366-367
ordered consolidation pattern, 428
ordered distribution pattern, 440-441
packaged application process pattern, 473
partitioned distribution pattern, 437
partitioned routing pattern, 411
partner collaboration pattern, 598
peer exchange information supply chain, 231-232
peer provisioning pattern, 194
performance reporting pattern, 627
physical information collection pattern, 262
queue manager pattern, 351-352
recovery provisioning pattern, 198
recycled key patterns, 302
reference usage pattern, 272
remote information service patterns, 249
restructure data pattern, 540-541
sample data pattern, 566
sandbox usage pattern, 278
scheduled information trigger pattern, 457
scheduling process pattern, 531
search node pattern, 334
semantic integration pattern, 596
semantic mapping pattern, 152
semantic tagging pattern, 149
separate entries pattern, 559
service oriented provisioning pattern, 181
shared master pattern, 603
single view information supply chain pattern, 221-222
smooth data pattern, 564
snapshot provisioning pattern, 188
stable key pattern, 314
staged routing pattern, 408
staging area pattern, 354-355
standardize data pattern, 543-544
state driven process, 477
streaming analytics node pattern, 381-382
subject area definition pattern, 135
summarized routing pattern, 419
synchronized consolidation pattern, 423
synchronized distribution pattern, 434-435
synchronized masters pattern, 616
transient scope pattern, 285
triggering information service pattern, 251-252
user private provisioning pattern, 168
user shared provisioning pattern, 179
valid values definition pattern, 138
virtual information collection pattern, 265
workload offload pattern, 625
consolidating information flows, 66
consolidating information flows pattern, 420
filtered consolidation pattern, 424-427
independent consolidation pattern, 429-432
ordered consolidation pattern, 427-429
synchronized consolidation pattern, 421-424
consolidating information supply chain pattern, 223-225
context
aggregate key pattern, 307
agile business process pattern, 474
application node pattern, 326
application private provisioning pattern, 169
bespoke application process pattern, 471
broadcast distribution pattern, 444
buffered routing pattern, 413
cache provisioning pattern, 184
Index

caller's key pattern, 310
cascading information supply chain pattern, 211
centralized master pattern, 604
check data pattern, 548
classify data pattern, 546
clerical review process pattern, 487
collaborative editing process pattern, 479
complete scope pattern, 279
consolidating information supply chain pattern, 223
correct data pattern, 550
daisy chain provisioning pattern, 172
derive relationship pattern, 562
derive value pattern, 560
distributed activity status pattern, 590
enrich data pattern, 545
event correlation node pattern, 358
event-based provisioning pattern, 196
external sensor trigger pattern, 462
filtered consolidation pattern, 424
filtered routing pattern, 416
golden reference pattern, 610
hierarchical information supply chain pattern, 225
historical system of record pattern, 619
hub interchange information supply chain pattern, 215
hybrid usage pattern, 274
independent consolidation pattern, 429
independent distribution pattern, 441
information access audit pattern, 636
information activity hub pattern, 372
information activity pattern, 110
information analysis node pattern, 386
information archiving process pattern, 497
information asset hub pattern, 368
information asset pattern, 106
information broadcasting process pattern, 511
information brokers pattern, 343
information change trigger pattern, 460
information code pattern, 126
information collection pattern, 254
information configuration pattern, 139
information content node pattern, 330
information cube pattern, 340
information decision definition process pattern, 521
information deployment process pattern, 502
information element patterns, 101
information entry patterns, 289
information event pattern, 113
information event store pattern, 364
information ever-greening process pattern, 496
information federation process pattern, 507
information flow pattern, 403
information governance program pattern, 88
information guard pattern, 567
information identification patterns, 129-130
information key pattern, 295
information lineage pattern, 159
information link pattern, 123
information location pattern, 145
information management obligation pattern, 78
information management principle pattern, 83
information management strategy pattern, 81
information mart pattern, 337
information matching process pattern, 493
information metric pattern, 124
information mining store pattern, 389
information mirror store pattern, 360
information model pattern, 141
information monitoring pattern, 638
information node management process pattern, 528
information node patterns, 320
information node upgrade pattern, 587
information pattern detecting processes pattern, 523
information pattern discovery process pattern, 518
information payload pattern, 119
information probe patterns, 572
information process pattern, 466
information processing variables pattern, 114
information profile tracking processes pattern, 483
information provisioning patterns, 163
information queueing process pattern, 509
information reengineering steps pattern, 534
information registry pattern, 607
information relocation process pattern, 505
information remediation process pattern, 489
information replication process pattern, 499
information reporting processes pattern, 481
information request pattern, 396
information scavenging process pattern, 515
information schema pattern, 143
information service patterns, 238
information service trigger pattern, 458
information solution patterns, 578
information store pattern, 334
information streaming process pattern, 380-382
information summarizing process pattern, 513
information summary pattern, 117
information supply chain patterns, 200
information trigger patterns, 450
information user pattern, 92
information validation process pattern, 491
information values profile pattern, 156
information values report pattern, 153
information warehouse pattern, 377
link entries pattern, 553
linked information provisioning pattern, 182
local information service patterns, 243
local key patterns, 297
local scope pattern, 282
look-up table node pattern, 356
managed archive pattern, 634
manual information trigger pattern, 453
map-reduce node pattern, 382
master usage pattern, 267
merge entries pattern, 556
mirror key pattern, 305-306
mirroring provisioning pattern, 189
natural key pattern, 302-303
new information node pattern, 582
next best action pattern, 630
operational analytics pattern, 628
operational health monitoring process pattern, 527
operational status store pattern, 366
ordered consolidation pattern, 427
ordered distribution pattern, 439
packaged application process pattern, 472
partitioned distribution pattern, 436
partitioned routing pattern, 410
partner collaboration pattern, 597
peer exchange information supply chain, 230
peer provisioning pattern, 193
performance reporting pattern, 626
physical information collection pattern, 259
queue manager pattern, 349
recovery provisioning pattern, 197
recycled key patterns, 300
reference usage pattern, 271
remote information service patterns, 246
restructure data pattern, 538
sample data pattern, 565
sandbox usage pattern, 277
scheduled information trigger pattern, 455
scheduling process pattern, 530
search node pattern, 332
semantic integration pattern, 593
semantic mapping pattern, 150
semantic tagging pattern, 148
separate entries pattern, 558
service oriented provisioning pattern, 179
shared master pattern, 601
single view information supply chain pattern, 219
smooth data pattern, 563
snapshot provisioning pattern, 186
stable key pattern, 312
staged routing pattern, 406
staging area pattern, 353
standardize data pattern, 542
state driven process, 476
streaming analytics node pattern, 380
subject area definition pattern, 134
summarized routing pattern, 418
synchronized consolidation pattern, 421
synchronized distribution pattern, 432
synchronized masters pattern, 613
d transient scope pattern, 284
triggering information service pattern, 250
c user private provisioning pattern, 167
c user shared provisioning pattern, 177
c valid values definition pattern, 136
c virtual information collection pattern, 263
c workload offload pattern, 624
copy of information, differences, 14
core coverage, 33
core coverage pattern, 286-285
correct data pattern, 50, 539, 550-552
coverage patterns
c complete coverage pattern, 285
core coverage pattern, 285-286
extended coverage pattern, 285-286
local coverage pattern, 287
create information request pattern, 398
customer details, 103
adding, 41
changing, 42
creating, 41
creating single view of, 37-42
deleting, 42-43
E-Shop, 37
sources of, 38
Stores, 37
updating, 42-43
customer details, merging into Reporting Hub, 39
Customer Hub, 40-41
information supply chains, 208
Customer-Care application, 44
customers, MCHS trading, 3-4

D
daisy chain provisioning pattern, 112, 172-177, 250, 253
data dictionaries, subject area definition pattern, 136
data quality analyst pattern, 97
data scientist pattern, 97
data stewards, 150
data-centric access pattern, 571
deferred update pattern, 318
delete information request pattern, 398
deleting customer details, 42-43
derive relationship pattern, 539, 562-563
derive value pattern, 539, 560-562
differences, copies of information, 14
distributed activity status pattern, 177, 590-593
distributed locking pattern, 317
distributing information flows pattern, 432-433
broadcast distribution pattern, 444-446
independent distribution pattern, 441-444
ordered distribution pattern, 439-441
partitioned distribution pattern, 436-439
synchronized distribution pattern, 432-435
dynamic structure pattern, 316

e
EDI (Electronic Data Interchange), 53
Electronic Data Interchange (EDI), 53
e emergent properties, 5
crypt data pattern, 571
cryption, 569
enrich data pattern, 50, 539, 545-546
entity-level information elements, 106-107
information activity pattern, 110-112
information asset pattern, 106-110
information event pattern, 113-114
information processing variables pattern, 114-116
information summary pattern, 117-119
d entry uniqueness probe pattern, 575
d entry-level structure pattern, 316
d event information request pattern, 575
E-Shop
c customer details, 37
information, 50
d event correlation node pattern, 343, 358-360, 382
d event information request pattern, 399
d event-based provisioning pattern, 185, 196-197
d ever-greening process pattern, 51
d examples
aggregate key pattern, 307
d agile business process pattern, 474
d application node pattern, 326
d application private provisioning pattern, 169
d bespoke application process pattern, 471
d broadcast distribution pattern, 444
d buffered routing pattern, 413
cache provisioning pattern, 184
caller’s key pattern, 310
c cascading information supply chain pattern, 211
centralized master pattern, 604
c check data pattern, 548-549
classify data pattern, 546-547
clerical review process pattern, 487
collaborative editing process pattern, 479
complete scope pattern, 279
consolidating information supply chain pattern, 223
correct data pattern, 550-551
Daisy chain provisioning pattern, 173
derive relationship pattern, 562
derive value pattern, 560
distributed activity status pattern, 590
enrich data pattern, 545
event correlation node pattern, 359
event-based provisioning pattern, 196
external sensor trigger pattern, 463
filtered consolidation pattern, 424
filtered routing pattern, 416
golden reference pattern, 610
hierarchical information supply chain pattern, 226
historical system of record pattern, 619
hub interchange information supply chain pattern, 215
hybrid usage pattern, 275
independent consolidation pattern, 430
independent distribution pattern, 442
information access audit pattern, 636
information activity hub pattern, 373
information activity pattern, 110
information analysis node pattern, 387
information archiving process pattern, 498
information asset hub pattern, 368
information asset pattern, 106
information broadcasting process pattern, 511
information brokers pattern, 344
information centric organization pattern, 73
information change trigger pattern, 461
information code pattern, 126
information collection pattern, 254
information configuration pattern, 139
information content node pattern, 330
information cube pattern, 340
information decision definition process pattern, 521
information deployment process pattern, 502
information element patterns, 101
information entry patterns, 289
information event pattern, 113
information event store pattern, 364
information ever-greening process pattern, 496
information federation process pattern, 507
information flow pattern, 403
information governance program pattern, 88
information guard pattern, 567
information identification patterns, 130
information key pattern, 295
information lineage pattern, 159
information link pattern, 123
information location pattern, 145
information management obligation pattern, 78
information management principle pattern, 84
information management strategy pattern, 81
information mart pattern, 337
information matching process pattern, 494
information metric pattern, 125
information mining store pattern, 390
information mirror store pattern, 360-362
information model pattern, 141
information monitoring pattern, 638
information node management process pattern, 529
information node patterns, 321
information node upgrade pattern, 587
information pattern detecting processes pattern, 523
information pattern discovery process pattern, 518
information payload pattern, 120
information probe patterns, 572
information process pattern, 466
information processing variables pattern, 115
information profile tracking processes pattern, 485
information provisioning patterns, 163
information queueing process pattern, 509
information reengineering steps pattern, 535
information registry pattern, 607
information relocation process pattern, 505
information remediation process pattern, 489
information replication process pattern, 501
information reporting processes pattern, 481
information request pattern, 396
information scavenging process pattern, 516
information schema pattern, 143
information service patterns, 238
information service trigger pattern, 458
information solution patterns, 579
information store pattern, 335
information streaming process pattern, 380-382
information summarizing process pattern, 514
information summary pattern, 117
information supply chain patterns, 200
information trigger patterns, 450
information user pattern, 92
information validation process pattern, 492
information values profile pattern, 156
information values report pattern, 153
information warehouse pattern, 377
link entries pattern, 553
linked information provisioning pattern, 182-183
local information service patterns, 244
local key patterns, 297
local scope pattern, 283
look-up table node pattern, 356
managed archive pattern, 634
manual information trigger pattern, 454
map-reduce node pattern, 383
master usage pattern, 268
merge entries pattern, 556
mirror key pattern, 306
mirroring provisioning pattern, 189
natural key pattern, 303
new information node pattern, 582
next best action pattern, 630
operational analytics pattern, 628
operational health monitoring process pattern, 527
operational status store pattern, 366
ordered consolidation pattern, 427
ordered distribution pattern, 439
packaged application process pattern, 472
partitioned distribution pattern, 436
partitioned routing pattern, 410
partner collaboration pattern, 598
peer exchange information supply chain, 230
peer provisioning pattern, 193
performance reporting pattern, 627
physical information collection pattern, 259
queue manager pattern, 349
recovery provisioning pattern, 197
recycled key patterns, 300
reference usage pattern, 271
remote information service patterns, 247
restructure data pattern, 540
sample data pattern, 565
sandbox usage pattern, 277
scheduled information trigger pattern, 456
scheduling process pattern, 530
search node pattern, 333
semantic integration pattern, 594
semantic mapping pattern, 151
semantic tagging pattern, 148
separate entries pattern, 559
service oriented provisioning pattern, 180
shared master pattern, 601
single view information supply chain pattern, 219
smooth data pattern, 564
snapshot provisioning pattern, 187
stable key pattern, 313
staged routing pattern, 406
staging area pattern, 353
standardize data pattern, 542
state driven process, 476
streaming analytics node pattern, 380
subject area definition pattern, 134
summarized routing pattern, 418
synchronized consolidation pattern, 421
synchronized distribution pattern, 432
synchronized masters pattern, 614
transient scope pattern, 284
triggering information service pattern, 250
user private provisioning pattern, 167
user shared provisioning pattern, 177
valid values definition pattern, 137
virtual information collection pattern, 264
workload offload pattern, 624
examples resolved
aggregate key pattern, 309
agile business process pattern, 475-476
application node pattern, 329
application private provisioning pattern, 171
bespoke application process pattern, 472
broadcast distribution pattern, 446
buffered routing pattern, 415
cache provisioning pattern, 185
caller’s key pattern, 311
cascading information supply chain pattern, 213-214
centralized master pattern, 606
check data pattern, 549-550
classify data pattern, 548
clerical review process pattern, 488-489
collaborative editing process pattern, 480
complete scope pattern, 281
consolidating information supply chain pattern, 224
correct data pattern, 552
daisy chain provisioning pattern, 176-177
derive relationship pattern, 563
derive value pattern, 561
distributed activity status pattern, 592
enrich data pattern, 546
event correlation node pattern, 359
event-based provisioning pattern, 197
external sensor trigger pattern, 464
filtered consolidation pattern, 426
filtered routing pattern, 417
golden reference pattern, 612
hierarchical information supply chain pattern, 228
historical system of record pattern, 623
hub interchange information supply chain pattern, 218
hybrid usage pattern, 276
independent distribution pattern, 443
information access audit pattern, 637
information activity hub pattern, 375
information activity pattern, 112
information analysis node pattern, 389
information archiving process pattern, 498
information asset hub pattern, 371
information asset pattern, 109-110
information broadcasting process pattern, 512
information brokers pattern, 347-348
information centric organization pattern, 75-77
information change trigger pattern, 462
information code pattern, 127
information collection pattern, 257
information configuration pattern, 140
information content node pattern, 332
information cube pattern, 342
information decision definition process pattern, 522
information deployment process pattern, 504
information element patterns, 104
information entry patterns, 291
information event pattern, 114
information event store pattern, 365
information ever-greening process pattern, 497
information federation process pattern, 508
information flow pattern, 405
information governance program pattern, 90
information guard pattern, 569
information identification patterns, 132-133
information key pattern, 296
information lineage pattern, 160
information link pattern, 124
information location pattern, 147
information management obligation pattern, 80
information management principle pattern, 85-88
information management strategy pattern, 83
information mart pattern, 340
information matching process pattern, 495
information metric pattern, 126
information mining store pattern, 392
information mirror store pattern, 363
information model pattern, 142
information monitoring pattern, 641
Index

information node management process pattern, 529
information node patterns, 324
information node upgrade pattern, 589
information pattern detecting processes pattern, 524
information pattern discovery process pattern, 520
information payload pattern, 121-122
information probe patterns, 573
information process pattern, 469
information processing variables pattern, 116
information profile tracking processes pattern, 486
information provisioning patterns, 165
information queueing process pattern, 510
information reengineering steps pattern, 536-537
information registry pattern, 609
information relocation process pattern, 506
information remediation process pattern, 491
information replication process pattern, 502
information reporting processes pattern, 482-483
information request pattern, 398
information scavenging process pattern, 516
information schema pattern, 145
information service patterns, 241-242
information service trigger pattern, 460
information solution patterns, 581-582
information store pattern, 337
information streaming process pattern, 380-382
information summarizing process pattern, 513-515
information summary pattern, 118
information supply chain patterns, 207-208
information trigger patterns, 452
information user pattern, 94
information validation process pattern, 493
information values profile pattern, 157-158
information values report pattern, 155
information warehouse pattern, 379
link entries pattern, 555
linked information provisioning pattern, 183
local information service patterns, 246
local key patterns, 299
local scope pattern, 283
look-up table node pattern, 357-358
managed archive pattern, 635
manual information trigger pattern, 455
map-reduce node pattern, 384-385
master usage pattern, 269
merge entries pattern, 557
mirror key pattern, 307
mirroring provisioning pattern, 192
natural key pattern, 305
new information node pattern, 586
next best action pattern, 632
operational analytics pattern, 629
operational health monitoring process pattern, 528
operational status store pattern, 367
ordered consolidation pattern, 429
ordered distribution pattern, 441
packaged application process pattern, 473
partitioned distribution pattern, 438
partitioned routing pattern, 411-412
partner collaboration pattern, 598-599
peer exchange information supply chain, 232
peer provisioning pattern, 195
performance reporting pattern, 628
physical information collection pattern, 262
queue manager pattern, 352
recovery provisioning pattern, 198
recycled key patterns, 302
reference usage pattern, 273
remote information service patterns, 249
restructure data pattern, 541
sample data pattern, 566
sandbox usage pattern, 278
scheduled information trigger pattern, 457
scheduling process pattern, 531
search node pattern, 334
semantic integration pattern, 597
semantic mapping pattern, 152-153
semantic tagging pattern, 149-150
separate entries pattern, 558-560
service oriented provisioning pattern, 182
shared master pattern, 603
single view information
supply chain pattern, 222
smooth data pattern, 564-565
snapshot provisioning
pattern, 188
stable key pattern, 314-315
staged routing pattern, 409
staging area pattern, 355
standardize data pattern, 544
state driven process, 478-479
streaming analytics node
pattern, 382
subject area definition
pattern, 135
summarized routing pattern,
420
synchronized consolidation
pattern, 423
synchronized distribution
pattern, 434
synchronized masters pattern,
616
transient scope pattern, 284
triggering information service
pattern, 252
user private provisioning
pattern, 168
user shared provisioning
pattern, 179
valid values definition
pattern, 138
virtual information collection
pattern, 265
workload offload pattern, 625
extended coverage pattern, 33,
285-286
external sensor trigger pattern,
453, 462-465
flow of information, information
nodes, 14-15
forces
aggregate key pattern,
307-308
agile business process
pattern, 474
application node pattern, 326
application private
provisioning pattern, 169
bespoke application process
pattern, 471
broadcast distribution pattern,
444
buffered routing pattern, 413
cache provisioning pattern,
184
caller's key pattern, 310
cascading information supply
chain pattern, 211
centralized master pattern,
604-605
check data pattern, 549
classify data pattern, 547
clerical review process
pattern, 487-488
collaborative editing process
pattern, 479-480
correct data pattern, 551
core data pattern, 552
core activities pattern, 173
derive relationship pattern,
562
derive value pattern, 561
distributed activity status
pattern, 591
enrich data pattern, 545
event correlation node
pattern, 359
event-based provisioning
pattern, 196
external sensor trigger
pattern, 463
filtered consolidation pattern,
424-425
filtered routing pattern, 416
golden reference pattern,
610-611
hierarchical information
supply chain pattern, 226
historical system of record
pattern, 620
hub interchange information
supply chain pattern,
215-216
hybrid usage pattern, 275
independent consolidation
pattern, 430
independent distribution
pattern, 442
information access audit
pattern, 636-637
information activity hub
pattern, 373
information activity pattern,
110
information analysis node
pattern, 387
information archiving process
pattern, 498
information asset hub pattern,
368-369
information asset pattern, 108
information broadcasting
process pattern, 511
information brokers pattern,
344
information centric
organization pattern, 73-74
information change trigger
pattern, 461
information code pattern, 127
information collection
pattern, 255
information configuration
pattern, 139
information content node
pattern, 330
information cube pattern,
340-341
F
filtered consolidation flow, 66
filtered consolidation pattern,
420, 424-427
filtered routing flow, 65
filtered routing pattern, 407,
416-418
information decision definition process pattern, 521
information deployment process pattern, 503
information element patterns, 101
information entry patterns, 289-290
information event pattern, 113
information event store pattern, 364
information ever-greening process pattern, 496
information federation process pattern, 507
information flow pattern, 403
information governance program pattern, 88-89
information guard pattern, 567-568
information identification patterns, 131
information key pattern, 295-297
information lineage pattern, 159
information link pattern, 123
information location pattern, 145
information management obligation pattern, 78-79
information management principle pattern, 84
information management strategy pattern, 81-82
information mart pattern, 338
information matching process pattern, 494
information metric pattern, 125
information mining store pattern, 390
information mirror store pattern, 362
information model pattern, 141-142
information monitoring pattern, 638-639
information node management process pattern, 529
information node patterns, 321
information node upgrade pattern, 587-588
information pattern detecting processes pattern, 523
information pattern discovery process pattern, 519
information payload pattern, 120
information probe patterns, 573
information process pattern, 466
information processing variables pattern, 115
information profile tracking processes pattern, 485
information provisioning patterns, 163
information queueing process pattern, 509
information reengineering steps pattern, 535
information registry pattern, 607-608
information relocation process pattern, 505
information remediation process pattern, 490
information replication process pattern, 501
information reporting processes pattern, 481-482
information request pattern, 396-397
information scavenging process pattern, 516
information schema pattern, 144
information service patterns, 239
information service trigger pattern, 458
information solution patterns, 579-580
information store pattern, 335
information streaming process pattern, 380-382
information summarizing process pattern, 514
information summary pattern, 117
information supply chain patterns, 200-202
information trigger patterns, 450
information user pattern, 92-74
information validation process pattern, 492
information values profile pattern, 157
information values report pattern, 153
information warehouse pattern, 377-378
link entries pattern, 553
linked information provisioning pattern, 182-183
local information service patterns, 244
local key patterns, 298
local scope pattern, 283
look-up table node pattern, 357
managed archive pattern, 634
manual information trigger pattern, 454
map-reduce node pattern, 383
master usage pattern, 268
merge entries pattern, 557
mirror key pattern, 306
mirroring provisioning pattern, 189
natural key pattern, 303
new information node pattern, 582-584
next best action pattern, 630
operational analytics pattern, 628
operational health monitoring process pattern, 527
operational status store pattern, 366
ordered consolidation pattern, 427
ordered distribution pattern, 439
packaged application process pattern, 473
partitioned distribution pattern, 436
partitioned routing pattern, 410
partner collaboration pattern, 598
peer exchange information supply chain, 230
peer provisioning pattern, 193-194
performance reporting pattern, 627
physical information collection pattern, 259-261
queue manager pattern, 349
recovery provisioning pattern, 197
recycled key patterns, 300-301
reference usage pattern, 271
remote information service patterns, 247
restructure data pattern, 540
sample data pattern, 565
sandbox usage pattern, 277
scheduled information trigger pattern, 456
scheduling process pattern, 530
search node pattern, 333
semantic integration pattern, 594-595
semantic mapping pattern, 151
semantic tagging pattern, 149
separate entries pattern, 559
service oriented provisioning pattern, 180
shared master pattern, 601-602
single view information supply chain pattern, 220
smooth data pattern, 564
snapshot provisioning pattern, 187
stable key pattern, 313
staged routing pattern, 406
staging area pattern, 353
standardize data pattern, 542-543
state driven process, 476-477
streaming analytics node pattern, 380
subject area definition pattern, 135
summarized routing pattern, 418
synchronized consolidation pattern, 422
synchronized distribution pattern, 432
synchronized masters pattern, 614
transient scope pattern, 284
triggering information service pattern, 250-251
user private provisioning pattern, 168
user shared provisioning pattern, 177-179
valid values definition pattern, 137
virtual information collection pattern, 264
workload offload pattern, 624
function-centric access pattern, 571

G
glossaries, subject area definition pattern, 136
golden reference pattern, 40, 599, 610-613

H
hard-coded behavior,
information configuration pattern, 139
hierarchical information supply chain pattern, 209, 225-229
historical system of record pattern, 29, 119, 618-624
historical values pattern, 318
hub interchange information supply chain pattern, 195, 209, 215-219
hybrid usage, 45, 63
hybrid usage pattern, 198, 229, 266, 274-277

I
icons, information collection
icon, 7
identity propagation pattern, 571
identity verification pattern, 95, 571
improving information management, 4-6
independent consolidation pattern, 420, 429-432
independent distribution pattern, 433, 441-444
information access audit pattern, 633, 636-638
information activity hub, 46, 112
information activity hub pattern, 361, 372-376, 591
information activity pattern, 45, 102, 107, 110-112, 116, 468
information analysis node, 64
information analysis node pattern, 386-389, 392, 626
information architecture, 99
Index

information archiving process pattern, 484, 497-499
information asset hub, 40, 109
information asset hub pattern, 219, 223, 312, 315, 361, 368-372
information asset pattern, 37, 102, 106-110, 372, 468
information assets, 30
information at rest patterns, 235
information collection coverage patterns, 285-287
information collection pattern, 253-259
information entry patterns, 288-292, 316
information key patterns, 292-297
information service implementation patterns, 243
information service patterns, 236-243
location of information, 259
scope of information collection, 279-280
usage of information collection, 266
information auditor pattern, 97
information broadcasting process, 194
information broadcasting process pattern, 500, 511-513
information broker pattern, 14, 36
information brokers, 53
information brokers pattern, 128, 183, 250, 343-348, 599
information centric organization pattern, 17, 70-78, 133
information governance program pattern, 70, 88-91
information management obligation pattern, 78-81
information management principle pattern, 70, 83-88
information management strategy pattern, 70, 81-83
information change trigger, 177
information change trigger pattern, 36, 453, 460-462
information code pattern, 103, 122, 126-128
information codes, 128
information collection, 12, 266
information collection pattern, 9, 19, 109, 185, 188, 192, 195, 235, 253-259
summary, 287
information collection usage pattern
hybrid usage pattern, 274-277
master usage pattern, 267-270
reference usage pattern, 271-274
sandbox usage pattern, 277-279
information collections, 62, 129, 204
information configuration pattern, 133, 139-140
information content node pattern, 324, 330-332
information crawling process pattern, 525
information cube pattern, 324, 340-342
information decision definition process pattern, 517, 521-523
information decision definition processes, 62
information decision model, 61
information deployment process, 50
information deployment process pattern, 500, 502-505
information editing process pattern, 470
information element pattern, 10
information element patterns, 99-106, 129, 259
information elements, 62, 103
information entries, 109, 177, 495
summary, 317-319
information entry key patterns, 317
information entry pattern, 19
information entry patterns, 235, 259, 288-292, 316
specialized operations, 317-319
information event pattern, 102, 107, 113-114
information event store pattern, 114, 361, 364-366
information ever-greening process pattern, 484, 496-497
information federation process pattern, 223, 500, 507-509
information flow pattern, 20, 29, 36, 112, 165, 188, 192, 195, 283, 395
routing information flows pattern, 406-407
summarized routing pattern, 446
information flow patterns, 401-406
information flow probe pattern, 575
information flows, 29
consolidating, 66
information governance program pattern, 70, 88-91, 133
information governor pattern, 97
information guard pattern, 21, 95, 203, 566-571
information guards, 533
information configuration pattern, 133, 139-140
reports, 154
information lineage pattern, 159-161
information values profile pattern, 156-158
information values report, 153-156

summary, 287
subject area definition pattern, 133-136
valid values definition pattern, 133, 136-139
information in motion patterns, 395
information flow pattern, 401-406
information request pattern, 396-398
information indexing process pattern, 525
information key pattern, 292-297
aggregate key pattern, 307-309
caller’s key pattern, 310-312
local key patterns, 297-300
mirror key pattern, 305-307
natural key pattern, 302-305
recycled key patterns, 300-302
stable key pattern, 312-315
information keys pattern, 124
information lineage pattern, 153-154, 158-161
information link pattern, 103, 105, 122-124
information location pattern, 136, 145-148, 158
information location resources, 132
information management, improving, 4-6
information management obligation pattern, 70, 78-81
information management principle pattern, 70, 83-89
information management strategy pattern, 70, 81-83
information mart pattern, 324, 337-340
information matching process pattern, 484, 493-495
information metric pattern, 103, 122, 124-126
information mining store, 64, 386
information mining store pattern, 389
information mirror store pattern, 360-364
operation status store pattern, 366-368
summary, 393
information node upgrade pattern, 506, 587-589
information nodes, 12-13, 109, 112, 195
flow of information, 14-15
information activity hub, 46
information owners, 49, 97
information owners pattern, 89
information pattern detecting process pattern, 517
information pattern detecting processes pattern, 126, 523-525
information pattern detection process, 61-62
information pattern discovery process pattern, 517-520
information payload pattern, 103, 112, 119-122, 177
supplementary patterns, 121
information principle pattern, 158
information probe pattern, 21, 570
information probe patterns, 197, 203, 533, 572-575
information probes pattern, 95
information process pattern, 16, 93-95, 112, 116, 465-469
business processes pattern, 469-470
information processes, 12
information processes pattern, 140, 449, 531-532
information processing patterns, 449
information trigger patterns, 450-452
information processing variables pattern, 102-103, 107, 112, 114-116
information profile tracking process, 49, 51, 59
information profile tracking
processes pattern, 483-486
information protection, 21, 533
information protection patterns,
633
information access audit
pattern, 636-638
information monitoring
pattern, 638-642
managed archive pattern,
634-636
information provisioning pattern,
12, 18, 64
information provisioning
patterns, 99, 161-165, 199, 324,
405, 468
information quality processes, 49
information queueing process
pattern, 356, 500, 509-511
information reengineering, 157
information reengineering steps,
21, 50, 188
information reengineering steps
pattern, 21, 533-538
information registry pattern, 599,
607-609
information relocation process
pattern, 500, 505-506
information remediation process
pattern, 484, 486, 489-491
information replication process,
406
information replication process
pattern, 499-502
information reporting processes,
28, 48
information reporting processes
pattern, 126, 156, 481-483
information request pattern, 13,
20, 112, 122, 395-398
batch information request
pattern, 399
create information request
pattern, 398
delete information request
pattern, 398
event information request
pattern, 399
initiate process information
request, 399
retrieve collection
information request pattern, 400
retrieve cursor information
request, 400
retrieve one information
request, 400
run process information
request, 399
summary, 401
update information request
pattern, 398
information scavenging process
pattern, 500, 515-517
information schema pattern, 106,
141, 143-145
information search process
pattern, 525
information service
implementation patterns, 243
local information service
patterns, 243-246
remote information service
patterns, 246-250
triggering information service
pattern, 250-253
information service pattern, 19
information service patterns,
182, 235-243, 253
information service trigger
pattern, 453, 455, 458-460
information services, 164, 217,
236-243
information solution pattern,
22, 27
information solution patterns,
578-582
big data and warehouse
patterns, 618
historical system of record
pattern, 619-624
workload offload pattern,
624-626
business intelligence and
analytics patterns, 626
next best action pattern,
630-633
operational analytics
pattern, 628-629
performance reporting
pattern, 626-628
changing information nodes,
582-583
information node upgrade
pattern, 587-589
new information node
pattern, 582-587
information protection. See
information protection
integrating information
nodes, 590
distributed activity status
pattern, 590-593
partner collaboration
pattern, 597-599
semantic integration
pattern, 593-597
summary, 642
information solutions, 577-578
partner collaboration pattern,
55
information stewards, 89
information stewards pattern, 97
information store pattern, 324,
334-337
information strategy, 61
building an information
strategy, 26-28
information streaming process
pattern, 380-382
information summarizing
process pattern, 119, 500,
513-515
information summary pattern,
103, 107, 117-119
information supply chain pattern,
15, 18, 91
information supply chain
patterns, 99, 188, 199-209, 232,
283
cascading information supply
chain pattern, 211-215
consolidating information supply chain pattern, 223-225
hierarchical information supply chain pattern, 225-229
hub interchange information supply chain pattern, 215-219
peer exchange information supply chain, 230-232
single view information supply chain pattern, 219-223
information supply chains, 56 information collections, 204-206 parts of, 203-204 information trigger pattern, 16, 449 information trigger patterns, 192, 195, 450-453
external sensor trigger pattern, 462-465
information change trigger pattern, 460-462
information service trigger pattern, 458-460
manual information trigger pattern, 453-455
scheduled information trigger pattern, 455-457 summary, 465 information triggers, 12, 35, 114, 164, 177 operational analytics, 59 information usage collection patterns, 266 information user pattern, 17, 91-95 business analyst pattern, 97 data quality analyst pattern, 97 data scientist pattern, 97 information auditor pattern, 97 information governor pattern, 97 information owners pattern, 97 information stewards pattern, 97 information worker pattern, 97 infrastructure operator pattern, 97 information users, 12, 48, 188
information validation process pattern, 484, 491-493 information values profile pattern, 132, 139, 150, 153-154, 156-158 information values profiles, 51 information values report, 154 information values report pattern, 153-156
information warehouse pattern, 29, 376-379
information warehouses, 379 information warehouses pattern, 156
information worker pattern, 97 information workers, 325, 483 infrastructure operator pattern, 97 initiate process information request, 399 integrating information nodes, information solution patterns, 590 distributed activity status pattern, 590-593 partner collaboration pattern, 597-599 semantic integration pattern, 593-597 integration nodes, 343 event correlation node pattern, 358-360
information brokers pattern, 343-348
information node patterns, 343
look-up table node pattern, 356-358 queue manager pattern, 349-353 staging area pattern, 353-356 interaction analysis pattern, 571 IT service management processes, 526

K known uses aggregate key pattern, 309 agile business process pattern, 476 application node pattern, 329 application private provisioning pattern, 171 bespoke application process pattern, 472 broadcast distribution pattern, 446 buffered routing pattern, 415 cache provisioning pattern, 185 caller's key pattern, 312 cascading information supply chain pattern, 215 centralized master pattern, 606 check data pattern, 550 classify data pattern, 548 clerical review process pattern, 489 collaborative editing process pattern, 481 complete scope pattern, 282 consolidating information supply chain pattern, 225 correct data pattern, 552
cascading information supply chain pattern, 215
distributed activity status pattern, 593
derive relationship pattern, 563 derive value pattern, 561 distributed activity status pattern, 593 enrich data pattern, 546 event correlation node pattern, 360

interaction analysis pattern, 571 IT service management processes, 526

K known uses aggregate key pattern, 309 agile business process pattern, 476 application node pattern, 329 application private provisioning pattern, 171 bespoke application process pattern, 472 broadcast distribution pattern, 446 buffered routing pattern, 415 cache provisioning pattern, 185 caller's key pattern, 312 cascading information supply chain pattern, 215 centralized master pattern, 606 check data pattern, 550 classify data pattern, 548 clerical review process pattern, 489 collaborative editing process pattern, 481 complete scope pattern, 282 consolidating information supply chain pattern, 225 correct data pattern, 552
cascading information supply chain pattern, 215
distributed activity status pattern, 593
derive relationship pattern, 563 derive value pattern, 561 distributed activity status pattern, 593 enrich data pattern, 546 event correlation node pattern, 360
Index

event-based provisioning pattern, 197
external sensor trigger pattern, 464
filtered consolidation pattern, 426
filtered routing pattern, 417
golden reference pattern, 613
hierarchical information supply chain pattern, 229
historical system of record pattern, 623
hub interchange information supply chain pattern, 219
hybrid usage pattern, 276
independent consolidation pattern, 431-437
independent distribution pattern, 443
information access audit pattern, 637
information activity hub pattern, 376
information activity pattern, 112
information analysis node pattern, 389
information archiving process pattern, 499
information asset hub pattern, 372
information asset pattern, 109
information broadcasting process pattern, 513
information brokers pattern, 348
information centric organization pattern, 77
information change trigger pattern, 462
information code pattern, 128
information collection pattern, 258
information configuration pattern, 140
information content node pattern, 332
information cube pattern, 342
information decision definition process pattern, 522
information deployment process pattern, 504
information element patterns, 105-106
information entry patterns, 291
information event pattern, 114
information event store pattern, 365-367
information ever-greening process pattern, 497
information fed, 508
information flow pattern, 405
information governance program pattern, 91
information guard pattern, 570
information identification patterns, 133
information key pattern, 297
information lineage pattern, 160-161
information link pattern, 124
information location pattern, 147-148
information management obligation pattern, 80-81
information management principle pattern, 88
information management strategy pattern, 83
information mart pattern, 340
information matching process pattern, 495
information metric pattern, 126
information mining store pattern, 392
information mirror store pattern, 363
information model pattern, 143
information monitoring pattern, 641
information node management process pattern, 530
information node patterns, 324
information node upgrade pattern, 589
information pattern detecting processes pattern, 524
information pattern discovery process pattern, 520
information payload pattern, 122
information probe patterns, 574
information process pattern, 469
information processing variables pattern, 116
information profile tracking processes pattern, 486
information provisioning patterns, 165
information queueing process pattern, 511
information reengineering steps pattern, 537
information relocation process pattern, 506
information remediation process pattern, 491
information replication process pattern, 502
information reporting processes pattern, 483
information request pattern, 398
information scavenging process pattern, 517
information schema pattern, 145
information service patterns, 242
information service trigger pattern, 460
information solution patterns, 582
information store pattern, 337
information streaming process pattern, 380-382
information summary pattern, 119
information supply chain patterns, 209
information trigger patterns, 452
information user pattern, 95
information validation process pattern, 493
information values profile pattern, 158
information values report pattern, 155-156
information warehouse pattern, 379
link entries pattern, 556
linked information provisioning pattern, 183
local information service patterns, 246
local key patterns, 300
local scope pattern, 283
look-up table node pattern, 358
managed archive pattern, 635
manual information trigger pattern, 455
map-reduce node pattern, 385
master usage pattern, 270
merge entries pattern, 558
mirror key pattern, 307
mirroring provisioning pattern, 192
natural key pattern, 305
new information node pattern, 586
next best action pattern, 632
operational analytics pattern, 629
operational health monitoring process pattern, 528
operational status store pattern, 367
ordered consolidation pattern, 429
ordered distribution pattern, 441
packaged application process pattern, 474
partitioned distribution pattern, 438
partitioned routing pattern, 412
partner collaboration pattern, 599
peer exchange information supply chain, 232
peer provisioning pattern, 195
performance reporting pattern, 628
physical information collection pattern, 262-263
queue manager pattern, 352-353
recovery provisioning pattern, 198
recycled key patterns, 302
reference usage pattern, 274
remote information service patterns, 249-250
restructure data pattern, 541
sample data pattern, 566
sandbox usage pattern, 279
scheduled information trigger pattern, 457
scheduling process pattern, 531
search node pattern, 334
semantic integration pattern, 597
semantic mapping pattern, 153
semantic tagging pattern, 150
separate entries pattern, 560
service oriented provisioning pattern, 182
shared master pattern, 603
single view information supply chain pattern, 222
smooth data pattern, 565
snapshot provisioning pattern, 188
stable key pattern, 315
staged routing pattern, 409
staging area pattern, 355
standardize data pattern, 544
state driven process, 479
streaming analytics node pattern, 382
subject area definition pattern, 136
summarized routing pattern, 420
synchronized consolidation pattern, 423
synchronized distribution pattern, 435
synchronized masters pattern, 618
transient scope pattern, 285
triggering information service pattern, 252
user private provisioning pattern, 168
user shared provisioning pattern, 179
valid values definition pattern, 138
virtual information collection pattern, 265
workload offload pattern, 625

L
latency of the information transfer, 6
lifecycle states pattern, 318
link entries pattern, 539, 553-556
linked information provisioning pattern, 178, 182-183, 332
local coverage pattern, 33, 287
local information service patterns, 243-246
local key patterns, 293, 297-300
local locking pattern, 317
local provisioning pattern, 263
local scope, 8, 10, 32
local scope pattern, 280, 282-284
localized provisioning, 162, 166-167
application private provisioning pattern, 169-171
user private provisioning pattern, 167-169
location of information, 259
physical information collection pattern, 259-263
virtual information collection pattern, 263-266
location of order details, 45
locking information entry key patterns, 317
look-up table node pattern, 343, 356-358
lookup tables pattern, 128

M
Mail-Shop, 41
managed archive pattern, 624, 633-636
management reports, creating, 28-30
manual information trigger pattern, 453-455
map-reduce node pattern, 376, 382-385
mask data pattern, 571
masking, 568
master data, 105
master data management patterns, 599-601
centralized master pattern, 604-606
golden reference pattern, 610-613
information registry pattern, 607-609
shared master pattern, 601-603
synchronized masters pattern, 613-618
master usage, 31
master usage pattern, 198, 266-270
MCHS Trading, 2-4, 26
B2B trading partnerships, 51-55
building an information strategy, 26-28
creating a single view of customer details, 37-42
creating a single view of product details, 30-37
creating management reports, 28-30
customers, 3-4
delivering information quality improvements, 47-51
predictive analytics, 55-66
understanding status of orders, 44-46
merge entries pattern, 539, 556-558
merging customer details into Reporting Hub, 39
message-level information elements, information payload pattern, 119-122
metadata collection, 150
mirror key pattern, 293, 305-307
mirror provisioning, 217
mirroring provisioning, 33-35, 64, 190-191
mirroring provisioning pattern, 185, 189-193, 362
M-Shop, 41

N
naming conventions, patterns, 7
natural key pattern, 293, 302-305
new information node pattern, 582-587
New Order, information processing variables pattern, 116
next best action pattern, 626, 630-633
ontologies, subject area definition pattern, 136
Open Services for Lifecycle and Collaboration (OSLC), 124
operation status store pattern, 366-368
operational analytics, 58
operational analytics pattern, 626, 628-629
operational data stores and hubs, 360-361
information activity hub pattern, 372-376
information asset hub pattern, 368-372
information event store pattern, 364-366
information mirror store pattern, 360-364
operation status store pattern, 366-368
operational health monitoring process pattern, 324, 526-528
operational health probe pattern, 575
operational management information process patterns, 526
information node management process pattern, 528-530
operational health monitoring process pattern, 527-528
scheduling process pattern, 530-531
operational status store pattern, 219, 361
optimistic locking pattern, 317
order details, location of, 45
order information, 112
ordered consolidation pattern, 420, 427-429
ordered distribution pattern, 433, 439-441
orders, status of, 34-44
Order-Tracking, 46-47, 375
OSLC (Open Services for Lifecycle and Collaboration), 124

P
packaged application process, 61, 64
packaged application process pattern, 470, 472-474
partition distribution, 36
partitioned distribution pattern, 433, 436-439
partitioned routing pattern, 407, 410-412
partner collaboration pattern, 55, 590, 597-599
pattern groups, 7
pattern languages, 7
components of, 11-12
structure, 15
patterns, 7-11
access auditing probe pattern, 575
aggregate key pattern, 294, 307-309
agile business process pattern, 177, 470, 474-476
analytics process patterns, 517
anonymize data pattern, 571
application node pattern, 324, 326-329, 599
application private provisioning pattern, 166, 169-171
archiving process pattern, 324
batch information request pattern, 399
bespoke application process pattern, 470-472
broadcast distribution pattern, 433, 444-446
buffered routing pattern, 413-415
business analyst pattern, 97
business intelligence and analytics patterns, 626
business processes pattern, 469-470
cache provisioning pattern, 178, 183-185
caller’s key pattern, 294, 310-312
canonical-based payload pattern, 121
cascading information supply chain pattern, 209
centralized master pattern, 36, 215, 599, 604-606
check data pattern, 139, 539, 548-550
classify data pattern, 539, 546-548
clerical review process pattern, 484, 487-489
collaborative editing process pattern, 372, 470, 479-481
collection control pattern, 571
complete coverage pattern, 33, 285
complete scope, 10, 32
complete scope pattern, 280
concentrating information supply chain pattern, 209
consolidating information flows pattern, 420
consolidating information supply chain pattern, 209, 223-225
core coverage pattern, 33, 285-286
correct data pattern, 539, 550-552
create information request pattern, 398
daisy chain provisioning pattern, 112, 172-177, 250, 253
data quality analyst pattern, 97
data scientist pattern, 97
data-centric access pattern, 571
deferred update pattern, 318
delete information request pattern, 398
derive relationship pattern, 539, 562-563
derive value pattern, 539, 560-562
distributed activity status pattern, 177, 590-593
distributed locking pattern, 317
distributing information flows pattern, 432-433
dynamic structure pattern, 316
encrypt data pattern, 571
enrich data pattern, 545-546
entry uniqueness probe pattern, 575
entry-level structure pattern, 316
environment probe pattern, 575
event correlation node pattern, 343, 358-360, 382
event information request pattern, 399
event-based provisioning pattern, 185, 196-197
extended coverage pattern, 33, 285-286
external sensor trigger pattern, 453, 462-465
filtered consolidation pattern, 420, 424-427
filtered routing pattern, 416-418
function-centric access pattern, 571
golden reference pattern, 599, 610-613
hierarchical information supply chain pattern, 209, 225-229
historical system of record pattern, 119, 618-624
historical values pattern, 318
hub interchange information supply chain pattern, 195, 209
hybrid usage pattern, 198, 229, 266, 274-277
identity propagation pattern, 571
identity verification pattern, 95, 571
independent consolidation pattern, 420, 429-432
independent distribution pattern, 433, 441-444
information access audit pattern, 633, 636-638
information activity hub, 112
information activity hub pattern, 361, 372-376
information activity pattern, 45, 102, 107, 110-112, 116, 468
information analysis node pattern, 386-389, 626
information archiving process pattern, 497-499
information asset hub, 109
information asset hub pattern, 219, 223, 315, 361, 368-372
information asset pattern, 102, 106-110, 468
information at rest patterns, 235
information auditor pattern, 97
information broadcasting process pattern, 511-513
information brokers pattern, 128, 183, 250, 343-348, 599
information centric organization pattern, 17, 70-78, 133
information change trigger pattern, 453, 460-462
information code pattern, 103, 122, 126-128
information collection pattern, 19, 109, 192, 195, 235
information configuration pattern, 133, 139-140
information content node pattern, 324
information crawling process pattern, 525
information cube pattern, 324, 340-342
information decision definition process pattern, 517, 521-523
information deployment process pattern, 500, 502-505
information editing process pattern, 470
information element pattern, 10
information element patterns, 99, 100, 101-106, 259
information entries, 109
information entry pattern, 19
information entry patterns, 235, 288-292, 317 specialized operations, 317-319
information event pattern, 102, 107, 113-114
information event store pattern, 114, 361, 364-366
information ever-greening process pattern, 484, 496-497
information federation process pattern, 223, 500, 507-509
information flow pattern, 20, 112, 192, 195, 283, 395
information flow probe pattern, 575
information governance program pattern, 70, 88-91, 133
information governor pattern, 97
information guard pattern, 21, 95, 203, 566-571
information identification, 99
information identification patterns, 18, 49, 129-133, 316, 582, 587
information indexing process pattern, 525
information keys pattern, 124, 292-297
information lineage pattern, 153-154, 159-161
information link pattern, 103, 122-124
information location pattern, 136, 145-148, 158
information management obligation pattern, 70, 78-81
information management principle pattern, 70, 83-88
information management strategy pattern, 70, 81-83
information mart pattern, 324, 337-340
information matching process pattern, 484, 493-495
information metric pattern, 103, 122, 124-126
information mining store, 386
information mining store pattern, 389
information mirror store pattern, 360-364
information model pattern, 106, 132, 136, 141-143
information monitoring pattern, 225, 633, 638-642
information node, 109, 112
information node management process pattern, 526, 528-530
information node patterns, 12-13, 19, 235, 259, 319-324, 587
information node upgrade pattern, 506, 587-589
information owners pattern, 97
information pattern detecting processes pattern, 126, 517, 523-525
information pattern discovery process pattern, 517-520
information payload pattern, 103, 112, 119-122
information principle pattern, 158
information probe pattern, 21, 570
information probe patterns, 197, 203, 572-575
information processes pattern, 16, 112, 116, 140, 449, 465-469, 531-532
information processing patterns, 449
information processing variables pattern, 102-103, 107, 112, 114-116
information profile tracking processes pattern, 483-486
information protection patterns, 633
information provisioning patterns, 18, 99, 161-165, 468
information queueing process pattern, 356, 500, 509-511
information reengineering steps pattern, 21, 534-538
information registry pattern, 599, 607-609
information relocation process pattern, 500, 505-506
information remediation process pattern, 486, 489-491
information replication process pattern, 499-502
information reporting processes pattern, 126, 156, 481-483
information request pattern, 13, 20, 112, 122, 395-398
information scavenging process pattern, 500, 515-517
information schema pattern, 106, 141, 143-145
information search process pattern, 525
information service patterns, 19, 182, 235
information service trigger pattern, 453, 458-460
information solution patterns, 22, 27, 578-582
integrating information nodes, 590
information stewards pattern, 97
information store pattern, 324, 334-337
information streaming process pattern, 380-382
information summarizing process pattern, 119, 500, 513-515
information summary pattern, 103, 107, 117-119
information supply chain patterns, 15, 18, 99, 199-209, 283
information trigger patterns, 16, 192, 195, 449, 450-452
information usage collection patterns, 266
information user pattern, 17, 91-95
information validation process pattern, 484, 491-493
information values profile pattern, 132, 139, 150, 153-154, 156-158
information values report pattern, 153-156
information warehouse pattern, 376-379
information warehouses pattern, 156
infrastructure operator pattern, 97
initiate process information request, 399
interaction analysis pattern, 571
lifecycle states pattern, 318
link entries pattern, 539, 553-556
linked information provisioning pattern, 182-183
local coverage pattern, 33, 287
local information service patterns, 243
local key patterns, 293, 297-300
local locking pattern, 317
local provisioning pattern, 263
local scope pattern, 10, 32, 280, 282-284
look-up table node pattern, 343, 356-358
lookup tables pattern, 128
managed archive pattern, 624, 633-636
manual information trigger pattern, 453-455
map-reduce node pattern, 376, 382-385
mask data pattern, 571
master data management patterns, 599-601
master usage pattern, 198, 266-270
merge entries pattern, 539, 556-558
mirror key pattern, 293, 305-307
mirroring provisioning pattern, 185, 189-193, 362
naming conventions, 7
natural key pattern, 293, 302-305
new information node pattern, 582-587
next best action pattern, 626, 630-633
operation status store pattern, 366-368
operational analytics pattern, 626, 628-629
operational health monitoring process pattern, 324, 526-528
operational health probe pattern, 575
operational status store pattern, 219, 361
optimistic locking pattern, 317
ordered consolidation pattern, 420, 427-429
ordered distribution pattern, 433, 439-441
packaged application process pattern, 470, 472-474
partitioned distribution pattern, 433
partitioned routing pattern, 407, 410-412
partner collaboration pattern, 590, 597-599
peer exchange information supply chain, 209, 230-232
peer provisioning pattern, 185, 193-195, 217, 232
performance reporting pattern, 483, 624, 626-628
physical information collection pattern, 260
physical security zone pattern, 571
profiling rule probe pattern, 575
provenance pattern, 318
provisioning information process patterns, 499-517
proxy pattern, 318
queue manager pattern, 343, 349-353
recovery provisioning pattern, 185, 197-198
recycled key patterns, 293, 300-302
reengineering information step pattern, 139
reference usage pattern, 266, 271-274
relationships pattern, 318
remote information service patterns, 243, 452
restructure data pattern, 538-542
retrieve collection information request pattern, 400
retrieve cursor information request, 400
retrieve one information request, 400
roll up information supply chain pattern, 126
routing information flows pattern, 406-407
run process information request, 399
sample data pattern, 539, 565-566
sample data probe pattern, 575
sandbox usage pattern, 266, 277-279
scheduled information trigger pattern, 453, 455-457
scheduling process pattern, 324, 526, 530-531
search node pattern, 324, 332-334
search processes pattern, 525-526
semantic integration pattern, 136, 265-266, 590, 593-597
semantic mapping pattern, 122, 124, 146, 150-153, 158, 283
semantic tagging pattern, 132, 146, 148-150, 153, 158
separate entries pattern, 539, 558-560
separation of duties pattern, 571
service oriented provisioning pattern, 179-182
shared master pattern, 599, 601-603
single view information supply chain pattern, 209, 219-223, 266
smooth data pattern, 539, 563-565
snapshot provisioning, 171
snapshot provisioning pattern, 185-188, 279, 362
soft delete pattern, 318
source-specific payload pattern, 121
specialist information reengineering steps pattern, 538-539
stable key pattern, 294, 312-315
staged routing pattern, 407
staging area pattern, 12, 343, 353-356
standardize data pattern, 539, 542-545
state driven process, 114, 476-479
state driven process pattern, 470
static structure pattern, 316
streaming analytics node pattern, 376, 465
subject area definition pattern, 27, 106, 132-136, 149, 156, 158
subject area probe pattern, 575
summarized routing pattern, 418-420
synchronized consolidation pattern, 420-424
synchronized distribution pattern, 432-435
synchronized masters pattern, 195, 599, 613-618
tagged media structure, 316
target-specific payload pattern, 121
transient scope pattern, 8-10, 33, 280, 284-285
triggered information service pattern, 266
triggering information service pattern, 223, 250-253
trusted node pattern, 571
unique entries pattern, 318
update information request pattern, 398
user private provisioning pattern, 166-169
user shared provisioning pattern, 169, 177-179
valid values definition pattern, 133, 136-139
virtual information collection pattern, 253, 260, 263-266
workload offload pattern, 460, 618, 624-626
peer exchange information supply chain, 209, 230-232
peer provisioning pattern, 185, 193-195, 217, 232
performance reporting pattern, 483, 624, 626-628
physical information collection pattern, 260, 259-263
physical security zone pattern, 571
predictive analytics, 55-66
problems
aggregate key pattern, 307
agile business process pattern, 474
application node pattern, 326
application private provisioning pattern, 169
bespoke application process pattern, 471
broadcast distribution pattern, 444
buffered routing pattern, 413
cache provisioning pattern, 184
caller's key pattern, 310
cascading information supply chain pattern, 211
centralized master pattern, 604
check data pattern, 548
classify data pattern, 546
clerical review process pattern, 487
collaborative editing process pattern, 479
consolidating information supply chain pattern, 223
correct data pattern, 550
daisy chain provisioning pattern, 173
derive relationship pattern, 562
derive value pattern, 560
distributed activity status pattern, 590
enrich data pattern, 545
event correlation node pattern, 358
event-based provisioning pattern, 196
external sensor trigger pattern, 463
filtered consolidation pattern, 424
filtered routing pattern, 416
golden reference pattern, 610
historical system of record pattern, 619
hub interchange information supply chain pattern, 215
hybrid usage pattern, 275
independent consolidation pattern, 430
independent distribution pattern, 441
information access audit pattern, 636
information activity hub pattern, 373
information activity pattern, 110
information analysis node pattern, 386
information archiving process pattern, 497
information asset hub pattern, 368
information asset pattern, 106
information broadcasting process pattern, 511
information brokers pattern, 344
information centric organization pattern, 73
information change trigger pattern, 461
information code pattern, 126
information collection pattern, 254
information configuration pattern, 139
information content node pattern, 330
information cube pattern, 340
information decision definition process pattern, 521
information deployment process pattern, 502
information element patterns, 101
information entry patterns, 289
information event pattern, 113
information event store pattern, 364
information ever-greening process pattern, 496
information federation process pattern, 507
information flow pattern, 403
<table>
<thead>
<tr>
<th>Pattern Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>information governance program pattern</td>
<td>88</td>
</tr>
<tr>
<td>information guard pattern</td>
<td>567</td>
</tr>
<tr>
<td>information identification patterns</td>
<td>130</td>
</tr>
<tr>
<td>information key pattern</td>
<td>295</td>
</tr>
<tr>
<td>information lineage pattern</td>
<td>159</td>
</tr>
<tr>
<td>information link pattern</td>
<td>123</td>
</tr>
<tr>
<td>information location pattern</td>
<td>145</td>
</tr>
<tr>
<td>information management obligation pattern</td>
<td>78</td>
</tr>
<tr>
<td>information management principle pattern</td>
<td>84</td>
</tr>
<tr>
<td>information management strategy pattern</td>
<td>81</td>
</tr>
<tr>
<td>information mart pattern</td>
<td>337</td>
</tr>
<tr>
<td>information matching process pattern</td>
<td>493</td>
</tr>
<tr>
<td>information metric pattern</td>
<td>125</td>
</tr>
<tr>
<td>information mining store pattern</td>
<td>389</td>
</tr>
<tr>
<td>information mirror store pattern</td>
<td>360</td>
</tr>
<tr>
<td>information model pattern</td>
<td>141</td>
</tr>
<tr>
<td>information monitoring pattern</td>
<td>638</td>
</tr>
<tr>
<td>information node management process pattern</td>
<td>528</td>
</tr>
<tr>
<td>information node patterns</td>
<td>320</td>
</tr>
<tr>
<td>information node upgrade pattern</td>
<td>587</td>
</tr>
<tr>
<td>information pattern detecting processes pattern</td>
<td>523</td>
</tr>
<tr>
<td>information pattern discovery process pattern</td>
<td>518</td>
</tr>
<tr>
<td>information payload pattern</td>
<td>119</td>
</tr>
<tr>
<td>information probe patterns</td>
<td>572</td>
</tr>
<tr>
<td>information process pattern</td>
<td>466</td>
</tr>
<tr>
<td>information processing variables pattern</td>
<td>114</td>
</tr>
<tr>
<td>information profile tracking processes pattern</td>
<td>483</td>
</tr>
<tr>
<td>information provisioning patterns</td>
<td>163</td>
</tr>
<tr>
<td>information queueing process pattern</td>
<td>509</td>
</tr>
<tr>
<td>information reengineering steps pattern</td>
<td>535</td>
</tr>
<tr>
<td>information registry pattern</td>
<td>607</td>
</tr>
<tr>
<td>information relocation process pattern</td>
<td>505</td>
</tr>
<tr>
<td>information remediation process pattern</td>
<td>489</td>
</tr>
<tr>
<td>information replication process pattern</td>
<td>499</td>
</tr>
<tr>
<td>information reporting processes pattern</td>
<td>481</td>
</tr>
<tr>
<td>information request pattern</td>
<td>396</td>
</tr>
<tr>
<td>information scavenging process pattern</td>
<td>515</td>
</tr>
<tr>
<td>information schema pattern</td>
<td>143</td>
</tr>
<tr>
<td>information service patterns</td>
<td>238</td>
</tr>
<tr>
<td>information service trigger pattern</td>
<td>458</td>
</tr>
<tr>
<td>information solution patterns</td>
<td>579</td>
</tr>
<tr>
<td>information store pattern</td>
<td>334-335</td>
</tr>
<tr>
<td>information streaming process pattern</td>
<td>380-382</td>
</tr>
<tr>
<td>information summarizing process pattern</td>
<td>514</td>
</tr>
<tr>
<td>information summary pattern</td>
<td>117</td>
</tr>
<tr>
<td>information supply chain patterns</td>
<td>200</td>
</tr>
<tr>
<td>information trigger patterns</td>
<td>450</td>
</tr>
<tr>
<td>information user pattern</td>
<td>92</td>
</tr>
<tr>
<td>information validation process pattern</td>
<td>491</td>
</tr>
<tr>
<td>information values profile pattern</td>
<td>156</td>
</tr>
<tr>
<td>information values report pattern</td>
<td>153</td>
</tr>
<tr>
<td>information warehouse pattern</td>
<td>377</td>
</tr>
<tr>
<td>link entries pattern</td>
<td>553</td>
</tr>
<tr>
<td>linked information provisioning pattern</td>
<td>182</td>
</tr>
<tr>
<td>local information service patterns</td>
<td>244</td>
</tr>
<tr>
<td>local key patterns</td>
<td>297</td>
</tr>
<tr>
<td>local scope pattern</td>
<td>282</td>
</tr>
<tr>
<td>look-up table node pattern</td>
<td>356</td>
</tr>
<tr>
<td>managed archive pattern</td>
<td>634</td>
</tr>
<tr>
<td>manual information trigger pattern</td>
<td>453</td>
</tr>
<tr>
<td>map-reduce node pattern</td>
<td>383</td>
</tr>
<tr>
<td>master usage pattern</td>
<td>268</td>
</tr>
<tr>
<td>merge entries pattern</td>
<td>556</td>
</tr>
<tr>
<td>mirror key pattern</td>
<td>305</td>
</tr>
<tr>
<td>mirroring provisioning pattern</td>
<td>189</td>
</tr>
<tr>
<td>natural key pattern</td>
<td>303</td>
</tr>
<tr>
<td>new information node pattern</td>
<td>582</td>
</tr>
<tr>
<td>next best action pattern</td>
<td>630</td>
</tr>
<tr>
<td>operational analytics pattern</td>
<td>628</td>
</tr>
<tr>
<td>operational health monitoring process pattern</td>
<td>527</td>
</tr>
<tr>
<td>operational status store pattern</td>
<td>366</td>
</tr>
<tr>
<td>ordered consolidation pattern</td>
<td>427</td>
</tr>
<tr>
<td>ordered distribution pattern</td>
<td>439</td>
</tr>
<tr>
<td>packaged application process pattern</td>
<td>472</td>
</tr>
<tr>
<td>partitioned distribution pattern</td>
<td>436</td>
</tr>
<tr>
<td>partitioned routing pattern</td>
<td>410</td>
</tr>
<tr>
<td>partner collaboration pattern</td>
<td>598</td>
</tr>
<tr>
<td>peer exchange information supply chain</td>
<td>230</td>
</tr>
</tbody>
</table>
Index

peer provisioning pattern, 193
performance reporting pattern, 626
physical information collection pattern, 259
queue manager pattern, 349
recovery provisioning pattern, 197
recycled key patterns, 300
reference usage pattern, 271
remote information, 246-247
restructure data pattern, 540
sample data pattern, 565
sandbox usage pattern, 277
scheduled information trigger pattern, 455
scheduling process pattern, 530
search node pattern, 332
semantic integration pattern, 593
semantic mapping pattern, 148
semantic tagging pattern, 148
separate entries pattern, 558
service oriented provisioning pattern, 180
shared master pattern, 601
single view information supply chain pattern, 219
smooth data pattern, 563
snapshot provisioning pattern, 186
stable key pattern, 313
staged routing pattern, 406
staging area pattern, 353
standardize data pattern, 542
state driven process, 476
streaming analytics node pattern, 380
subject area definition pattern, 134
summarized routing pattern, 418
synchronized consolidation pattern, 421
synchronized distribution pattern, 432
synchronized masters pattern, 614
transient scope pattern, 284
triggering information service pattern, 250
user private provisioning pattern, 167
user shared provisioning pattern, 177
valid values definition pattern, 137
virtual information collection pattern, 263-264
workload offload pattern, 624
process-level provisioning, 162, 171-172
daisy chain provisioning pattern, 172-177
profile rule probe pattern, 575
properties, emergent properties, 5
protecting information, 21
provenance pattern, 318
provisioning information process patterns, 499-517
information broadcasting process pattern, 511-513
information deployment process pattern, 502-505
information federation process pattern, 507-509
information queueing process pattern, 509-511
information relocation process pattern, 505-506
information replication process pattern, 499-502
information scavenging process pattern, 515-517
information streaming process pattern, 380-382
information summarizing process pattern, 513-515
proxy pattern, 318

Q
quality improvements, 47-51
quality information processes pattern, 483-484
clerical review process pattern, 487-489
information archiving process pattern, 497-499
information ever-greening process pattern, 496-497
information matching process pattern, 493-495
information profile tracking processes pattern, 483-486
information remediation process pattern, 489-491
information validation process pattern, 491-493
queue manager pattern, 177, 194, 343, 349-353, 511

R
recovery provisioning pattern, 185, 197-198
recycled key patterns, 293, 300-302
reengineering information step pattern, 139
reference usage, 62-63
reference usage pattern, 266, 271-274
relationships pattern, 318
remote information service, 177
remote information service pattern, 13
remote information service patterns, 243, 246-250, 253, 452
remote information services, 40
remote retrieval
retrieve collection
information request pattern, 400
retrieve cursor information request, 400
retrieve one information request, 400
reordering process, 59-60
reordering stock, 59-60
Reporting Hub, 271, 340
merging customer details, 39
reports
information identification patterns, 154
information lineage pattern, 159-161
information values profile pattern, 156-158
information values report, 153-156
management reports, 28-30
restructure data pattern, 50, 538-542
retrieve collection information request pattern, 400
retrieve cursor information request, 400
retrieve one information request, 400
roll up information supply chain pattern, 126
routing information flows pattern, 406-407
buffered routing pattern, 413-414
filtered routing pattern, 416-418
partitioned routing pattern, 410-412
staged routing pattern, 406-409
summarized routing pattern, 418-420
run process information request, 399

S
sample data pattern, 539, 565-566
sample data probe pattern, 575
sandbox usage, 64
sandbox usage pattern, 266, 277-279
scheduled information trigger pattern, 453, 455-457
scheduling process pattern, 324, 526, 530-531
search node pattern, 324, 332-334
search processes pattern, 525-526
security
authentication, 568
authorization, 568
semantic integration pattern, 124, 136, 265-266, 590, 593-597
semantic mapping pattern, 122, 146, 150-153, 158, 283
semantic tagging pattern, 132, 146, 148-150, 153, 158
separate entries pattern, 50, 539, 558-560
separation of duties pattern, 571
service oriented provisioning, 40
service oriented provisioning pattern, 178-182
service-level provisioning, 162, 177-178
cache provisioning pattern, 184-185
linked information provisioning pattern, 182-183
service oriented provisioning pattern, 179-182
user shared provisioning pattern, 177-179
shared master pattern, 599, 601-603
single view information supply chain pattern, 209, 219-223, 266
smooth data pattern, 539, 563-565
snapshot provisioning, 171
snapshot provisioning pattern, 185-188, 279, 362
soft delete pattern, 318
solutions
aggregate key pattern, 308
agile business process pattern, 475
application node pattern, 326-328
application private provisioning pattern, 169
bespoke application process pattern, 471-472
broadcast distribution pattern, 444
buffered routing pattern, 413-414
cache provisioning pattern, 184
caller's key pattern, 310
cascading information supply chain pattern, 211-212
centralized master pattern, 605-606
check data pattern, 549
classify data pattern, 547
clerical review process pattern, 488
collaborative editing process pattern, 480
complete scope pattern, 281
consolidating information supply chain pattern, 223
correct data pattern, 551
daisy chain provisioning pattern, 173-176
derive relationship pattern, 562
derive value pattern, 561
distributed activity status pattern, 591
enrich data pattern, 545
event correlation node pattern, 359
event-based provisioning pattern, 196
external sensor trigger pattern, 463
filtered consolidation pattern, 425
filtered routing pattern, 416
golden reference pattern, 611-612
hierarchical information supply chain pattern, 226
historical system of record pattern, 620-622
hub interchange information supply chain pattern, 216-217
hybrid usage pattern, 275
independent consolidation pattern, 430
independent distribution pattern, 442
information access audit pattern, 637
information activity hub pattern, 373-375
information activity pattern, 111
information analysis node pattern, 387-388
information archiving process pattern, 498
information asset hub pattern, 369-370
information asset pattern, 108-109
information broadcasting process pattern, 511-512
information brokers pattern, 344-347
information centric organization pattern, 74-75
information change trigger pattern, 461
information code pattern, 127
information collection pattern, 255-257
information configuration pattern, 139-140
information content node pattern, 330-331
information cube pattern, 341
information event definition process pattern, 521
information deployment process pattern, 503
information element patterns, 102-104
information entry patterns, 290
information event pattern, 113
information event store pattern, 364
information ever-greening process pattern, 496
information federation process pattern, 507-508
information flow pattern, 403-404
information governance program pattern, 89-90
information guard pattern, 568-569
information identification patterns, 131-132
information key pattern, 295
information lineage pattern, 159
information link pattern, 123
information location pattern, 145
information management obligation pattern, 79-80
information management principle pattern, 84-85
information management strategy pattern, 82
information mart pattern, 338-339
information matching process pattern, 494
information metric pattern, 125
information mining store pattern, 390-391
information mirror store pattern, 362
information model pattern, 142
information monitoring pattern, 639-640
information node management process pattern, 529
information node patterns, 321-323
information node upgrade pattern, 588
information pattern detecting processes pattern, 523
information pattern discovery process pattern, 519
information payload pattern, 120
information probe patterns, 573
information process pattern, 467-468
information processing variables pattern, 115
information profile tracking processes pattern, 485
information provisioning patterns, 163-165
information queueing process pattern, 510
information reengineering steps pattern, 535
information registry pattern, 608-609
information relocation process pattern, 505-506
information remediation process pattern, 490
information replication process pattern, 500
information reporting processes pattern, 482
<table>
<thead>
<tr>
<th>Pattern Type</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Request Pattern</td>
<td>397</td>
</tr>
<tr>
<td>Information Scavenging Process Pattern</td>
<td>516</td>
</tr>
<tr>
<td>Information Schema Pattern</td>
<td>144</td>
</tr>
<tr>
<td>Information Service Patterns</td>
<td>239-241</td>
</tr>
<tr>
<td>Information Service Trigger Pattern</td>
<td>458-459</td>
</tr>
<tr>
<td>Information Solution Patterns</td>
<td>239-241</td>
</tr>
<tr>
<td>Information Summary Pattern</td>
<td>117</td>
</tr>
<tr>
<td>Information Supply Chain Patterns</td>
<td>202-206</td>
</tr>
<tr>
<td>Information Trigger Patterns</td>
<td>450</td>
</tr>
<tr>
<td>Information User Pattern</td>
<td>93-94</td>
</tr>
<tr>
<td>Information Validation Process Pattern</td>
<td>492</td>
</tr>
<tr>
<td>Information Values Profile Pattern</td>
<td>157</td>
</tr>
<tr>
<td>Information Values Report Pattern</td>
<td>155</td>
</tr>
<tr>
<td>Information Warehouse Pattern</td>
<td>378</td>
</tr>
<tr>
<td>Link Entries Pattern</td>
<td>553-554</td>
</tr>
<tr>
<td>Linked Information Provisioning Pattern</td>
<td>183</td>
</tr>
<tr>
<td>Local Information Service Patterns</td>
<td>244</td>
</tr>
<tr>
<td>Local Key Patterns</td>
<td>298</td>
</tr>
<tr>
<td>Local Scope Pattern</td>
<td>283</td>
</tr>
<tr>
<td>Look-Up Table Node Pattern</td>
<td>357</td>
</tr>
<tr>
<td>Managed Archive Pattern</td>
<td>634-635</td>
</tr>
<tr>
<td>Manual Information Trigger Pattern</td>
<td>454</td>
</tr>
<tr>
<td>Map-Reduce Node Pattern</td>
<td>383</td>
</tr>
<tr>
<td>Master Usage Pattern</td>
<td>268</td>
</tr>
<tr>
<td>Merge Entries Pattern</td>
<td>557</td>
</tr>
<tr>
<td>Mirror Key Pattern</td>
<td>306</td>
</tr>
<tr>
<td>Mirroring Provisioning Process Pattern</td>
<td>189-191</td>
</tr>
<tr>
<td>Natural Key Pattern</td>
<td>303</td>
</tr>
<tr>
<td>New Information Node Pattern</td>
<td>584-586</td>
</tr>
<tr>
<td>Next Best Action Pattern</td>
<td>630-632</td>
</tr>
<tr>
<td>Operational Analytics Pattern</td>
<td>629</td>
</tr>
<tr>
<td>Operational Health Monitoring Process Pattern</td>
<td>527</td>
</tr>
<tr>
<td>Operational Status Store Pattern</td>
<td>366</td>
</tr>
<tr>
<td>Ordered Consolidation Pattern</td>
<td>427</td>
</tr>
<tr>
<td>Ordered Distribution Pattern</td>
<td>439</td>
</tr>
<tr>
<td>Packaged Application Process Pattern</td>
<td>473</td>
</tr>
<tr>
<td>Partitioned Distribution Pattern</td>
<td>436</td>
</tr>
<tr>
<td>Partitioned Routing Pattern</td>
<td>410</td>
</tr>
<tr>
<td>Partner Collaboration Pattern</td>
<td>598</td>
</tr>
<tr>
<td>Peer Exchange Information Supply Chain Pattern</td>
<td>230</td>
</tr>
<tr>
<td>Peer Provisioning Pattern</td>
<td>194</td>
</tr>
<tr>
<td>Performance Reporting Pattern</td>
<td>627</td>
</tr>
<tr>
<td>Physical Information Collection Pattern</td>
<td>261</td>
</tr>
<tr>
<td>Queue Manager Pattern</td>
<td>349-351</td>
</tr>
<tr>
<td>Recovery Provisioning Pattern</td>
<td>198</td>
</tr>
<tr>
<td>Recycled Key Patterns</td>
<td>301</td>
</tr>
<tr>
<td>Reference Usage Pattern</td>
<td>271-272</td>
</tr>
<tr>
<td>Remote Information Service Patterns</td>
<td>248</td>
</tr>
<tr>
<td>Restructure Data Pattern</td>
<td>540</td>
</tr>
<tr>
<td>Sample Data Pattern</td>
<td>566</td>
</tr>
<tr>
<td>Sandbox Usage Pattern</td>
<td>277-278</td>
</tr>
<tr>
<td>Scheduled Information Trigger Pattern</td>
<td>456-457</td>
</tr>
<tr>
<td>Scheduling Process Pattern</td>
<td>530</td>
</tr>
<tr>
<td>Search Node Pattern</td>
<td>333</td>
</tr>
<tr>
<td>Semantic Integration Pattern</td>
<td>595</td>
</tr>
<tr>
<td>Semantic Mapping Pattern</td>
<td>151</td>
</tr>
<tr>
<td>Semantic Tagging Pattern</td>
<td>149</td>
</tr>
<tr>
<td>Separate Entries Pattern</td>
<td>559</td>
</tr>
<tr>
<td>Service Oriented Provisioning Pattern</td>
<td>180</td>
</tr>
<tr>
<td>Shared Master Pattern</td>
<td>602-603</td>
</tr>
<tr>
<td>Single View Information Supply Chain Pattern</td>
<td>220-221</td>
</tr>
<tr>
<td>Smooth Data Pattern</td>
<td>564</td>
</tr>
<tr>
<td>Snapshot Provisioning Pattern</td>
<td>187</td>
</tr>
<tr>
<td>Stable Key Pattern</td>
<td>313</td>
</tr>
<tr>
<td>Staged Routing Pattern</td>
<td>406-408</td>
</tr>
<tr>
<td>Staging Area Pattern</td>
<td>353-354</td>
</tr>
<tr>
<td>Standardize Data Pattern</td>
<td>543</td>
</tr>
<tr>
<td>State Driven Process</td>
<td>477</td>
</tr>
<tr>
<td>Streaming Analytics Node Pattern</td>
<td>380-381</td>
</tr>
<tr>
<td>Subject Area Definition Pattern</td>
<td>135</td>
</tr>
<tr>
<td>Summarized Routing Pattern</td>
<td>418</td>
</tr>
<tr>
<td>Synchronized Consolidation Pattern</td>
<td>422</td>
</tr>
<tr>
<td>Synchronized Distribution Pattern</td>
<td>432</td>
</tr>
<tr>
<td>Synchronized Masters Pattern</td>
<td>615-616</td>
</tr>
<tr>
<td>Transient Scope Pattern</td>
<td>284</td>
</tr>
<tr>
<td>Triggering Information Service Pattern</td>
<td>251</td>
</tr>
<tr>
<td>User Private Provisioning Pattern</td>
<td>168</td>
</tr>
</tbody>
</table>
user shared provisioning pattern, 179
valid values definition pattern, 137-138
virtual information collection pattern, 264-265
workload offload pattern, 624
source-specific payload pattern, 121
specialist information reengineering steps pattern, 538-539
check data pattern, 548-550
classify data pattern, 546-548
correct data pattern, 550-552
derive relationship pattern, 562-563
derive value pattern, 560-562
enrich data pattern, 545-546
link entries pattern, 553-556
merge entries pattern, 556-558
restructure data pattern, 538-542
sample data pattern, 565-566
separate entries pattern, 558-560
smooth data pattern, 563-565
standardize data pattern, 542-545
specialized operations, information entry patterns, 317-319
stable key pattern, 294, 312-315
staged routing flow, 65
staged routing pattern, 407
staging, 6
staging area, 183
staging area pattern, 12, 343, 353-356
standardize data pattern, 539, 542-545
state driven process, 114, 476-479
state driven process pattern, 470
static structure pattern, 316
status of orders, 34-44
stored information, accessing, 16
Stores, customer details, 37
streaming analytics node pattern, 376, 380-382, 385, 465
subject area definition pattern, 27, 33, 83, 106, 132-136, 149, 153, 156, 158
subject area probe pattern, 575
summarized routing pattern, 407, 418-420
supplementary patterns, information payload pattern, 121
Supplier-net, 54-55
suppliers, interacting with, 52-53
supply chains, 199-209
synchronized consolidation pattern, 420-424
synchronized distribution pattern, 432-435
synchronized master pattern, 42
synchronized masters pattern, 195, 599, 613-618
unique entries pattern, 318
update information request pattern, 398
updating customer details, 42-43
user private provisioning pattern, 166-169
user shared provisioning pattern, 169, 177-179
valid values definition pattern, 33, 133, 136-139
validate data pattern, 50
validation of behavior, information configuration pattern, 139
virtual information collection pattern, 253, 260, 263-266
workload offload pattern, 460, 618, 624-626
tagged media structure, 179, 316
target-specific payload pattern, 121
taxonomies, subject area definition pattern, 136
The Open Group Architecture Framework (TOGAF), 10
TOGAF (The Open Group Architecture Framework), 10
transient scope pattern, 8-10, 33, 280, 284-285
triggered information service pattern, 266
triggering information service pattern, 223, 243, 250-253
trusted node pattern, 571
types of information models, 143