

Extracted from:

# Core Data

---

## Apple's API for Persisting Data Under Mac OS X

This PDF file contains pages extracted from Core Data, published by the Pragmatic Bookshelf. For more information or to purchase a paperback or PDF copy, please visit <http://www.pragprog.com>.

**Note:** This extract contains some colored text (particularly in code listing). This is available only in online versions of the books. The printed versions are black and white. Pagination might vary between the online and printer versions; the content is otherwise identical.

Copyright © 2009 The Pragmatic Programmers, LLC.

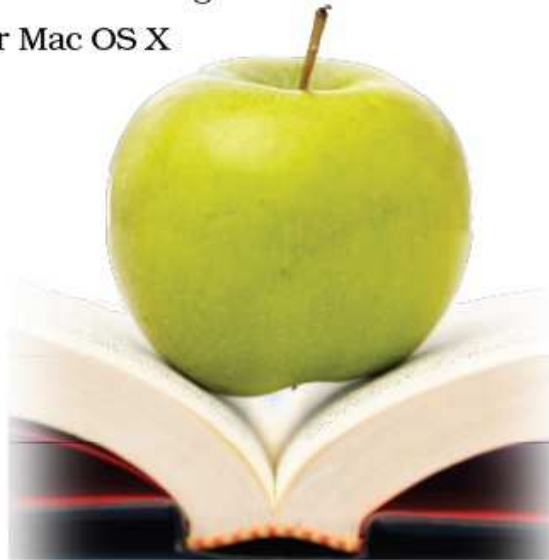
All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior consent of the publisher.

The  
Pragmatic  
Programmers

# Core Data

Apple's API for Persisting  
Data under Mac OS X



*Marcus S. Zarra*

*Edited by Daniel H. Steinberg*



Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and The Pragmatic Programmers, LLC was aware of a trademark claim, the designations have been printed in initial capital letters or in all capitals. The Pragmatic Starter Kit, The Pragmatic Programmer, Pragmatic Programming, Pragmatic Bookshelf and the linking *g* device are trademarks of The Pragmatic Programmers, LLC.

Every precaution was taken in the preparation of this book. However, the publisher assumes no responsibility for errors or omissions, or for damages that may result from the use of information (including program listings) contained herein.

Our Pragmatic courses, workshops, and other products can help you and your team create better software and have more fun. For more information, as well as the latest Pragmatic titles, please visit us at

<http://www.pragprog.com>

Copyright © 2009 Marcus S. Zarra.

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior consent of the publisher.

Printed in the United States of America.

ISBN-10: 1-934356-32-8

ISBN-13: 978-1-934356-32-6

Printed on acid-free paper.

B6.0 printing, July 29, 2009

Version: 2009-8-10

# Contents

---

|  |           |
|--|-----------|
| <b>Changes in the Beta Releases</b>  | <b>10</b> |
| Beta 6—July 29 . . . . .   | 10        |
| Beta 5—April 13 . . . . .  | 10        |
| Beta 4—February 12 . . . . .   | 10        |
| Beta 3—January 14 . . . . .  | 10        |
| Beta 2—December 11 . . . . .   | 11        |
| <br>   |           |
| <b>1 Introduction</b>  | <b>12</b> |
| 1.1 What Is Core Data? . . . . .   | 13        |
| 1.2 In This Book . . . . .   | 14        |
| 1.3 Acknowledgments . . . . .  | 17        |
| <br>   |           |
| <b>2 Getting Started with Core Data</b>                                    | <b>18</b> |
| 2.1 Our Application . . . . .  | 18        |
| 2.2 Our Application Design . . . . .                                       | 19        |
| 2.3 Advanced Readers . . . . .   | 20        |
| 2.4 Creating Our Xcode Project . . . . .                                   | 20        |
| 2.5 Building the Data Model . . . . .                                      | 20        |
| 2.6 Building the Controller Layer . . . . .                                | 26        |
| 2.7 Building the User Interface . . . . .                                  | 29        |
| 2.8 Adding a Splash of Code . . . . .                                      | 34        |
| <br>   |           |
| <b>3 Core Data and Bindings</b>  | <b>38</b> |
| 3.1 Key Value Coding . . . . .   | 38        |
| 3.2 Key Value Observing . . . . .  | 43        |
| 3.3 Cocoa Bindings and Core Data . . . . .                                 | 44        |
| 3.4 Other Interface Elements That Use KVO, KVC, and Core<br>Data . . . . . | 48        |

|          |  |            |
|----------|--|------------|
| <b>4</b> | <b>Under the Hood of Core Data</b>                   | <b>55</b>  |
| 4.1      | NSManagedObject . . . . .                            | 56         |
| 4.2      | NSFetchRequest . . . . .                             | 63         |
| 4.3      | NSSortDescriptor . . . . .                           | 67         |
| 4.4      | NSManagedObjectContext . . . . .                     | 68         |
| 4.5      | NSManagedObjectModel . . . . .                       | 72         |
| 4.6      | NSPersistentStoreCoordinator . . . . .               | 73         |
| 4.7      | Fetches Properties . . . . .                         | 75         |
| 4.8      | Wrapping Up . . . . .                                | 76         |
| <b>5</b> | <b>Versioning and Migration</b>                      | <b>77</b>  |
| 5.1      | Some Maintenance Before We Migrate . . . . .         | 78         |
| 5.2      | A Simple Migration . . . . .                         | 80         |
| 5.3      | Fundamentals of Core Data Versioning . . . . .       | 86         |
| 5.4      | A More Complex Migration . . . . .                   | 89         |
| 5.5      | Automatic Data Migration . . . . .                   | 92         |
| 5.6      | Manual Data Migration . . . . .                      | 94         |
| 5.7      | Progressive Data Migration . . . . .                 | 94         |
| 5.8      | Tips and Tricks . . . . .                            | 99         |
| <b>6</b> | <b>Performance Tuning</b>                            | <b>100</b> |
| 6.1      | Persistent Store Types . . . . .                     | 100        |
| 6.2      | Optimizing Your Data Model . . . . .                 | 102        |
| 6.3      | Fetching . . . . .                                   | 107        |
| 6.4      | Faulting . . . . .                                   | 111        |
| 6.5      | Access Patterns . . . . .                            | 115        |
| <b>7</b> | <b>Spotlight, Quick Look, and Core Data</b>          | <b>117</b> |
| 7.1      | Integrating with Spotlight . . . . .                 | 118        |
| 7.2      | Integrating with Quick Look . . . . .                | 133        |
| 7.3      | Putting It All Together . . . . .                    | 141        |
| 7.4      | Taking It Further . . . . .                          | 142        |
| <b>8</b> | <b>Sync Services and Core Data</b>                   | <b>143</b> |
| 8.1      | Sync Services Fundamentals . . . . .                 | 144        |
| 8.2      | Updating Our Data Model . . . . .                    | 146        |
| 8.3      | Creating the Sync Schema . . . . .                   | 149        |
| 8.4      | Creating the Client Description File . . . . .       | 152        |
| 8.5      | Modifying the NSPersistentStoreCoordinator . . . . . | 154        |
| 8.6      | Creating the Sync Helper . . . . .                   | 155        |
| 8.7      | The Syncrospector . . . . .                          | 161        |
| 8.8      | Wrapping Up . . . . .                                | 163        |

|           |  |            |
|-----------|--|------------|
| <b>9</b>  | <b>Multithreading and Core Data</b>          | <b>165</b> |
| 9.1       | Why Isn't Core Data Thread Safe? . . . . .   | 165        |
| 9.2       | Creating Multiple Contexts . . . . .         | 166        |
| 9.3       | Exporting Recipes . . . . .                  | 168        |
| 9.4       | Importing Recipes . . . . .                  | 176        |
| 9.5       | The Recursive Copy Reviewed . . . . .        | 181        |
| 9.6       | Wrapping Up . . . . .                        | 186        |
| <b>10</b> | <b>Core Data and iPhone</b>                  | <b>187</b> |
| 10.1      | Similarities and Differences . . . . .       | 187        |
| 10.2      | Memory Management . . . . .                  | 193        |
| 10.3      | Data Change Notifications . . . . .          | 195        |
| 10.4      | Recipes for the iPhone . . . . .             | 197        |
| 10.5      | Going Further . . . . .                      | 209        |
| <b>11</b> | <b>Recipe: Distributed Core Data</b>         | <b>210</b> |
| 11.1      | Building the Server . . . . .                | 211        |
| 11.2      | Building the Client . . . . .                | 221        |
| 11.3      | Testing the Networking Code . . . . .        | 224        |
| 11.4      | Wrapping Up . . . . .                        | 229        |
| <b>12</b> | <b>Recipe: Dynamic Parameters</b>            | <b>231</b> |
| 12.1      | Building the Xcode Example Project . . . . . | 233        |
| 12.2      | The DocumentPreferences Object . . . . .     | 234        |
| 12.3      | Review . . . . .                             | 239        |
|           | <b>Index</b>                                 | <b>241</b> |

# The Pragmatic Bookshelf

---

The Pragmatic Bookshelf features books written by developers for developers. The titles continue the well-known Pragmatic Programmer style and continue to garner awards and rave reviews. As development gets more and more difficult, the Pragmatic Programmers will be there with more titles and products to help you stay on top of your game.

## Visit Us Online

---

### Core Data's Home Page

<http://pragprog.com/titles/mzcd>

Source code from this book, errata, and other resources. Come give us feedback, too!

### Register for Updates

<http://pragprog.com/updates>

Be notified when updates and new books become available.

### Join the Community

<http://pragprog.com/community>

Read our weblogs, join our online discussions, participate in our mailing list, interact with our wiki, and benefit from the experience of other Pragmatic Programmers.

### New and Noteworthy

<http://pragprog.com/news>

Check out the latest pragmatic developments, new titles and other offerings.

## Buy the Book

---

If you liked this eBook, perhaps you'd like to have a paper copy of the book. It's available for purchase at our store: [pragprog.com/titles/mzcd](http://pragprog.com/titles/mzcd).

## Contact Us

---

|                       |  |
|-----------------------|--|
| Online Orders:        | <a href="http://www.pragprog.com/catalog">www.pragprog.com/catalog</a>   |
| Customer Service:     | <a href="mailto:support@pragprog.com">support@pragprog.com</a>           |
| Non-English Versions: | <a href="mailto:translations@pragprog.com">translations@pragprog.com</a> |
| Pragmatic Teaching:   | <a href="mailto:academic@pragprog.com">academic@pragprog.com</a>         |
| Author Proposals:     | <a href="mailto:proposals@pragprog.com">proposals@pragprog.com</a>       |
| Contact us:           | 1-800-699-PROG (+1 919 847 3884)   |