Microsoft

# Inside Microsoft SharePoint 2013

Scot Hillier
Mirjam van Olst
Ted Pattison
Andrew Connell
Wictor Wilén
Kyle Davis

insp_book.indb 1 11/11/13 10:21 AM

Published with the authorization of Microsoft Corporation by:
O'Reilly Media, Inc.
1005 Gravenstein Highway North
Sebastopol, California 95472

Copyright © 2013 by Scot Hillier Technical Solutions, LLC, Ted Pattison Group, Inc., Mirjam van Olst, Andrew Connell, Wictor Wilén, Kyle Davis
All rights reserved. No part of the contents of this book may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

ISBN: 978-0-7356-7447-9

1 2 3 4 5 6 7 8 9 LSI 8 7 6 5 4 3

Printed and bound in the United States of America.

Microsoft Press books are available through booksellers and distributors worldwide. If you need support related to this book, email Microsoft Press Book Support at *mspinput@microsoft.com*. Please tell us what you think of this book at *http://www.microsoft.com/learning/booksurvey*.

Microsoft and the trademarks listed at *http://www.microsoft.com/about/legal/en/us/IntellectualProperty/Trademarks/EN-US.aspx* are trademarks of the Microsoft group of companies. All other marks are property of their respective owners.

The example companies, organizations, products, domain names, email addresses, logos, people, places, and events depicted herein are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

This book expresses the author's views and opinions. The information contained in this book is provided without any express, statutory, or implied warranties. Neither the authors, O'Reilly Media, Inc., Microsoft Corporation, nor its resellers, or distributors will be held liable for any damages caused or alleged to be caused either directly or indirectly by this book.

**Acquisitions and Developmental Editor:** Kenyon Brown

**Production Editor:** Kara Ebrahim

**Editorial Production:** Online Training Solutions, Inc. (OTSI)

**Technical Reviewers:** Wayne Ewington and Neil Hodgkinson

**Copyeditor:** Online Training Solutions, Inc. (OTSI)

**Indexer:** Angela Howard

**Cover Design:** Twist Creative • Seattle

**Cover Composition:** Ellie Volckhausen

**Illustrator:** Rebecca Demarest

# Contents at a glance


| | | |
|---|---|---|
| | *Introduction* | *xvii* |
| CHAPTER 1 | **SharePoint 2013 developer roadmap** | **1** |
| CHAPTER 2 | **SharePoint development practices and techniques** | **35** |
| CHAPTER 3 | **Server-side solution development** | **71** |
| CHAPTER 4 | **SharePoint apps** | **119** |
| CHAPTER 5 | **Client-side programming** | **163** |
| CHAPTER 6 | **SharePoint security** | **213** |
| CHAPTER 7 | **SharePoint pages** | **267** |
| CHAPTER 8 | **SharePoint Web Parts** | **309** |
| CHAPTER 9 | **SharePoint lists** | **353** |
| CHAPTER 10 | **SharePoint type definitions and templates** | **405** |
| CHAPTER 11 | **SharePoint site provisioning** | **441** |
| CHAPTER 12 | **SharePoint workflows** | **467** |
| CHAPTER 13 | **SharePoint search** | **503** |
| CHAPTER 14 | **SharePoint Enterprise Content Management** | **541** |
| CHAPTER 15 | **Web content management** | **591** |
| CHAPTER 16 | **Business Connectivity Services** | **621** |
| CHAPTER 17 | **SharePoint social enterprise features** | **673** |
| | *Index* | *725* |

insp_book.indb 4 11/11/13 10:21 AM

# Contents

*Introduction* . . . . . *xvii*

**Chapter 1 SharePoint 2013 developer roadmap 1**

A brief history of SharePoint . . . . . 2
Understanding the impact of SharePoint Online on the SharePoint platform . . . . . 3
Examining SharePoint Foundation architecture . . . . . 4
Understanding SharePoint farms . . . . . 6
Creating web applications . . . . . 8
Understanding service applications . . . . . 12
Creating service applications in SharePoint Server 2013 . . . . . 14
Managing sites . . . . . 15
Customizing sites . . . . . 19
Using SharePoint Designer 2013 . . . . . 23
Understanding site customization vs. SharePoint development . . . 24
Windows PowerShell boot camp for SharePoint professionals . . . . . 26
Learn Windows PowerShell in 21 minutes . . . . . 26
The Windows PowerShell Integrated Scripting Environment (ISE) . . . . . 30
The SharePoint PowerShell snap-in . . . . . 31
Summary . . . . . 34

**Chapter 2 SharePoint development practices and techniques 35**

Setting up a developer environment . . . . . 36
Deciding between virtual and physical . . . . . 37
Understanding hardware and software requirements . . . . . 38
Delivering high-quality solutions . . . . . 40
Automating SharePoint administration by using Windows PowerShell scripts . . . . . 42
Using PowerShell to deploy a custom solution . . . . . 44
Configuring SharePoint service applications . . . . . 46



insp_book.indb 5 11/11/13 10:21 AM

Using debugging tools . . . . . 52
Working with ULS and Windows event logs . . . . . 53
Using the Developer Dashboard . . . . . 54
Using the SharePoint Developer Tools in Visual Studio 2012 . . . . . 55
Choosing a development approach . . . . . 59
Using the SharePoint APIs . . . . . 61
Understanding the server-side object model . . . . . 62
Using the client-side object model . . . . . 63
Using the REST APIs . . . . . 67
Summary . . . . . 69

**Chapter 3 Server-side solution development 71**

Understanding the server-side object model . . . . . 73
Developing farm solutions . . . . . 76
Creating a SharePoint project in Visual Studio . . . . . 77
Designing your SharePoint solution: Features . . . . . 79
Adding declarative elements . . . . . 81
Adding a feature receiver . . . . . 84
Understanding the SharePoint root directory . . . . . 86
Deploying and debugging farm solutions . . . . . 89
Updating farm solutions . . . . . 94
Upgrading features . . . . . 95
Developing sandboxed solutions . . . . . 102
Understanding the sandbox execution environment . . . . . 104
Creating a SharePoint project for a sandboxed solution . . . . . 106
Deploying and debugging sandboxed solutions . . . . . 109
Updating and upgrading sandboxed solutions . . . . . 113
Summary . . . . . 117

**Chapter 4 SharePoint apps 119**

Understanding the new SharePoint app model . . . . . 119
Understanding SharePoint solution challenges . . . . . 120
Understanding the SharePoint app model design goals . . . . . 122



insp_book.indb 6 11/11/13 10:21 AM

Understanding SharePoint app model architecture . . . . . 122
Working with app service applications . . . . . 123
Understanding app installation scopes . . . . . 124
Understanding app code isolation . . . . . 125
Understanding app hosting models . . . . . 126
Reviewing the app manifest . . . . . 130
Setting the start page URL . . . . . 132
Understanding the app web . . . . . 134
Working with app user interface entry points . . . . . 137
Using the chrome control . . . . . 144
Packaging and distributing apps . . . . . 147
Packaging apps . . . . . 147
Publishing apps . . . . . 152
Installing apps . . . . . 155
Upgrading apps . . . . . 157
Trapping app life cycle events . . . . . 158
Summary . . . . . 162

**Chapter 5 Client-side programming 163**

Understanding app designs . . . . . 163
Assessing SharePoint-hosted app designs . . . . . 164
Assessing cloud-hosted app designs . . . . . 164
Introduction to JavaScript for SharePoint developers . . . . . 165
Understanding JavaScript namespaces . . . . . 165
Understanding JavaScript variables . . . . . 166
Understanding JavaScript functions . . . . . 167
Understanding JavaScript closures . . . . . 168
Understanding JavaScript prototypes . . . . . 169
Creating custom libraries . . . . . 170
Introduction to jQuery for SharePoint developers . . . . . 173
Referencing jQuery . . . . . 174
Understanding the global function . . . . . 174
Understanding selector syntax . . . . . 175



insp_book.indb 7 11/11/13 10:21 AM

Understanding jQuery methods . . . . . 175
Understanding jQuery event handling . . . . . 176
Working with the client-side object model . . . . . 177
Understanding client object model fundamentals . . . . . 177
Working with the managed client object model . . . . . 180
Working with the JavaScript client object model . . . . . 188
Working with the REST API . . . . . 195
Understanding REST fundamentals . . . . . 196
Working with the REST API in JavaScript . . . . . 200
Working with the REST API in C# . . . . . 206
Summary . . . . . 212

**Chapter 6 SharePoint security 213**

Reviewing authentication and authorization . . . . . 213
Understanding user authentication . . . . . 214
Understanding the User Information List . . . . . 216
Working with users and groups . . . . . 216
Working with application pool identities . . . . . 219
Understanding the SHAREPOINT\SYSTEM account . . . . . 220
Delegating user credentials . . . . . 221
User impersonation with the user token . . . . . 221
Securing objects with SharePoint . . . . . 222
Rights and permission levels . . . . . 224
Understanding app authentication . . . . . 224
Understanding app authentication flow . . . . . 233
Understanding app authorization . . . . . 234
Managing app permissions . . . . . 235
Understanding app permission policies . . . . . 235
Requesting and granting app permissions . . . . . 236
Requesting app-only permissions . . . . . 239
Establishing app identity by using OAuth . . . . . 240
Understanding app principals . . . . . 242
Developing with OAuth . . . . . 247
Establishing app identity by using S2S trusts . . . . . 256



insp_book.indb 8 11/11/13 10:21 AM

Architecture of an S2S trust . . . . . 257
Configuring an S2S trust . . . . . 259
Developing provider-hosted apps by using S2S trusts . . . . . 263
Summary . . . . . 265

**Chapter 7 SharePoint pages 267**

SharePoint and ASP.NET . . . . . 267
Learning ASP.NET basics . . . . . 267
Understanding how SharePoint relates to IIS web applications . . 271
Understanding the web.config file . . . . . 272
Understanding the SharePoint virtual file system . . . . . 274
Working with files and folders in SharePoint . . . . . 275
Understanding page customization . . . . . 277
Using pages in SharePoint . . . . . 282
Understanding master pages . . . . . 282
Understanding MDS . . . . . 287
Understanding content pages . . . . . 289
Creating a custom branding solution . . . . . 296
Working with application pages . . . . . 298
Customizing the ribbon . . . . . 303
Understanding the anatomy of the SharePoint ribbon . . . . . 303
Adding a custom ribbon control . . . . . 304
Summary . . . . . 307

**Chapter 8 SharePoint Web Parts 309**

Understanding Web Part fundamentals . . . . . 309
Understanding Web Parts . . . . . 309
Comparing ASP.NET and SharePoint Web Parts . . . . . 310
Understanding App Parts . . . . . 311
Understanding Web Part zones . . . . . 311
Understanding the Web Part Manager . . . . . 312
Understanding static Web Parts . . . . . 312
Storing Web Part control description files in the Web Part Gallery . . . . . 313



insp_book.indb 9 11/11/13 10:21 AM

Developing and deploying Web Parts . . . . . 313
Building your first Web Part . . . . . 313
Deploying and uninstalling a Web Part . . . . . 317
Deploying a Web Part page with Web Parts . . . . . 319
Controlling Web Part rendering . . . . . 324
Overriding the *RenderContents* method . . . . . 324
Using *CreateChildControls* . . . . . *325*
Responding to events . . . . . 325
Combining *CreateChildControls* and *RenderContents* . . . . . *327*
Using Visual Web Parts . . . . . 329
Working with Web Part properties . . . . . 331
Persisting Web Part properties . . . . . 331
Using custom Editor Parts . . . . . 333
Exploring advanced Web Part development . . . . . 337
Using Web Part verbs . . . . . 337
Using Web Part connections . . . . . 340
Using parallel and asynchronous execution in Web Parts . . . . . 345
Summary . . . . . 350

**Chapter 9 SharePoint lists 353**

Creating lists . . . . . 353
Working with fields and field types . . . . . 357
Performing basic field operations . . . . . 358
Working with lookups and relationships . . . . . 361
Understanding site columns . . . . . 362
Working with content types . . . . . 366
Programming with content types . . . . . 368
Creating custom content types . . . . . 370
Working with document libraries . . . . . 372
Creating a document library . . . . . 372
Adding a custom document template . . . . . 373
Creating document-based content types . . . . . 375
Working with folders . . . . . 378



insp_book.indb 10 11/11/13 10:21 AM

Creating and registering event handlers . . . . . 379
Understanding event receiver classes . . . . . 380
Understanding remote event receivers . . . . . 381
Registering event handlers . . . . . 383
Programming before events . . . . . 387
Programming after events . . . . . 388
Querying lists with CAML . . . . . 389
Understanding CAML fundamentals . . . . . 389
Querying joined lists . . . . . 391
Querying multiple lists . . . . . 392
Throttling queries . . . . . 394
Working with LINQ to SharePoint . . . . . 396
Generating entities with *SPMetal* . . . . . *396*
Querying with LINQ to SharePoint . . . . . 401
Adding, deleting, and updating with LINQ to SharePoint . . . . . 402
Summary . . . . . 404

**Chapter 10 SharePoint type definitions and templates 405**

Custom field types . . . . . 405
Creating custom field types . . . . . 406
Creating custom field controls . . . . . 410
JSLink . . . . . 420
Custom site columns and content types . . . . . 428
Creating site columns and content types by using CAML . . . . . 428
Creating site columns and content types by using the server-side object model . . . . . 430
Custom list definitions . . . . . 433
Summary . . . . . 439

**Chapter 11 SharePoint site provisioning 441**

The GLOBAL site definition . . . . . 442
Site definitions . . . . . 443
Webtemp*.xml . . . . . 443
ONET.xml for site definitions . . . . . 445



insp_book.indb 11 11/11/13 10:21 AM

Feature stapling . . . . . 448
Order of provisioning when using site definitions . . . . . 449
Custom site definitions . . . . . 450
Web templates . . . . . 451
elements.xml . . . . . 451
ONET.xml for web templates . . . . . 452
Deploying web templates . . . . . 455
Using custom code to create sites . . . . . 458
Site templates . . . . . 458
Site provisioning providers . . . . . 459
Web provisioning events . . . . . 461
Web templates and SharePoint apps . . . . . 463
Summary . . . . . 465

**Chapter 12 SharePoint workflows 467**

Workflow architecture in SharePoint 2013 . . . . . 467
Installing and configuring a Workflow Manager 1.0 farm . . . . . 468
Understanding workflow in SharePoint 2013 . . . . . 469
Creating custom workflows for SharePoint 2013 . . . . . 469
Building custom workflows . . . . . 470
Custom workflows with Visio 2013 and SharePoint Designer 2013 . . . . . 470
Custom workflows with Visual Studio 2012 . . . . . 476
SharePoint Designer 2013 and web services . . . . . 485
Creating custom activities . . . . . 487
Using tasks in workflows . . . . . 492
Adding tasks to a workflow . . . . . 492
Custom task outcomes . . . . . 494
Workflow services CSOM and JSOM . . . . . 497
Adding custom forms to workflows . . . . . 498
Association forms in SharePoint 2013 . . . . . 498
Initiation forms in SharePoint 2013 . . . . . 500
Summary . . . . . 502



insp_book.indb 12 11/11/13 10:21 AM

**Chapter 13 SharePoint search** **503**

Introducing search-based applications . . . . . 504

Understanding search architecture . . . . . 506

Understanding the indexing process . . . . . 507

Understanding the query process . . . . . 509

Understanding Keyword Query Language . . . . . 510

Creating no-code customizations . . . . . 513

Creating simple link queries . . . . . 513

Extending the Search Center . . . . . 514

Using the Content Search Web Part . . . . . 523

Using the client-side API . . . . . 523

Using the REST API . . . . . 524

Using the CSOM API . . . . . 526

Using the script Web Parts . . . . . 528

Improving relevancy . . . . . 529

Enhancing content processing . . . . . 531

Creating .NET Assembly Connectors for search . . . . . 534

Search-enabling a model . . . . . 534

Implementing security in search results . . . . . 537

Crawling the .NET Assembly Connector . . . . . 539

Summary . . . . . 539

**Chapter 14 SharePoint Enterprise Content Management** **541**

Understanding the Managed Metadata Service Application . . . . . 541

Understanding managed metadata . . . . . 542

Using managed metadata in a custom solution . . . . . 545

Understanding content type syndication . . . . . 556

Document services . . . . . 559

Understanding versioning . . . . . 559

Understanding Document IDs . . . . . 563

Understanding Document Sets . . . . . 567

Using the Content Organizer . . . . . 574

Understanding Word Automation Services . . . . . 578



insp_book.indb 13 11/11/13 10:21 AM

Records management . . . . . 584
In-place records management . . . . . 584
Records archives . . . . . 586
eDiscovery . . . . . 586
Summary . . . . . 589

**Chapter 15 Web content management 591**

Understanding the WCM features . . . . . 591
Publishing site templates . . . . . 592
Accessing SharePoint publishing files . . . . . 594
Mapping to the SharePoint Master Page Gallery . . . . . 594
Page layouts . . . . . 595
Understanding the page model . . . . . 595
Creating a new page layout . . . . . 597
Managing the presentation of page fields . . . . . 597
Working with edit mode panels . . . . . 599
Working with Web Part zones . . . . . 600
Understanding device channels . . . . . 600
Working with device channel panels . . . . . 603
Understanding managed navigation . . . . . 604
Working with managed navigation APIs . . . . . 604
Creating a navigational term set . . . . . 605
Content aggregation . . . . . 607
Deciding between the Content Query and Content Search Web Parts . . . . . 609
Working with display templates . . . . . 611
Understanding cross-site publishing . . . . . 617
Working with catalogs . . . . . 617
Summary . . . . . 620

**Chapter 16 Business Connectivity Services 621**

Introduction to Business Connectivity Services . . . . . 622
Creating simple BCS solutions . . . . . 624



insp_book.indb 14 11/11/13 10:21 AM

Creating External Content Types . . . . . 624
Creating External Lists . . . . . 627
Understanding External List limitations . . . . . 628
Understanding BCS architecture . . . . . 630
Understanding connectors . . . . . 631
Understanding Business Data Connectivity . . . . . 631
Managing the BDC service . . . . . 632
Understanding the BDC Server Runtime . . . . . 635
Understanding the client cache . . . . . 635
Understanding the BDC Client Runtime . . . . . 635
Introduction to the Secure Store Service . . . . . 635
Understanding package deployment . . . . . 639
Understanding authentication scenarios . . . . . 639
Configuring authentication models . . . . . 639
Accessing claims-based systems . . . . . 643
Accessing token-based systems . . . . . 643
Managing client authentication . . . . . 643
Creating External Content Types . . . . . 644
Creating operations . . . . . 645
Creating relationships . . . . . 648
Defining filters . . . . . 649
Using ECTs in SharePoint 2013 . . . . . 651
Creating custom forms . . . . . 651
Using External Data Columns . . . . . 652
Using External Data Web Parts . . . . . 652
Creating a profile page . . . . . 653
Searching External Systems . . . . . 654
Supplementing user profiles . . . . . 655
Using ECTs in Office 2013 . . . . . 655
Understanding Outlook integration . . . . . 655
Using Word Quick Parts . . . . . 656
Creating custom BCS solutions . . . . . 656
Using the BDC Runtime object models . . . . . 656
Using the Administration Object Model . . . . . 659



insp_book.indb 15 11/11/13 10:21 AM

Creating custom event receivers . . . . . 662
Creating .NET Assembly Connectors . . . . . 663
Developing SharePoint apps . . . . . 668
Summary . . . . . 671

**Chapter 17 SharePoint social enterprise features 673**

What's new in SharePoint 2013 . . . . . 673
Understanding social components . . . . . 674
Working with the social APIs . . . . . 675
Understanding user profiles . . . . . 676
Retrieving user profile properties . . . . . 677
Understanding social feeds . . . . . 689
Retrieving posts from your newsfeed . . . . . 689
Retrieving posts from a site feed . . . . . 698
Posting to your personal feed . . . . . 704
Posting to a site feed . . . . . 709
Understanding following within SharePoint 2013 . . . . . 710
Following people . . . . . 712
Understanding Yammer . . . . . 719
Understanding how Yammer can work with SharePoint . . . . . 719
Retrieving followers and followings from Yammer . . . . . 719
Summary . . . . . 723

*Index* *725*



insp_book.indb 16 11/11/13 10:21 AM