



Apache Essentials

Install, Configure, Maintain

—

Second Edition

—

Darren James Harkness

Apress®

Apache Essentials

Install, Configure, Maintain

Second Edition

Darren James Harkness

Apress®

Apache Essentials: Install, Configure, Maintain

Darren James Harkness
Port Coquitlam, BC, Canada

ISBN-13 (pbk): 978-1-4842-8323-3
<https://doi.org/10.1007/978-1-4842-8324-0>

ISBN-13 (electronic): 978-1-4842-8324-0

Copyright © 2022 by Darren James Harkness

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

Trademarked names, logos, and images may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, logo, or image we use the names, logos, and images only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Managing Director, Apress Media LLC: Welmoed Spahr
Acquisitions Editor: Divya Modi
Development Editor: James Markham
Coordinating Editor: Divya Modi
Copyeditor: Kim Burton

Cover designed by eStudioCalamar

Cover image designed by Freepik (www.freepik.com)

Distributed to the book trade worldwide by Springer Science+Business Media New York, 1 New York Plaza, New York, NY 10004. Phone 1-800-SPRINGER, fax (201) 348-4505, e-mail orders-ny@springer-sbm.com, or visit www.springeronline.com. Apress Media, LLC is a California LLC and the sole member (owner) is Springer Science + Business Media Finance Inc (SSBM Finance Inc). SSBM Finance Inc is a **Delaware** corporation.

For information on translations, please e-mail booktranslations@springernature.com; for reprint, paperback, or audio rights, please e-mail bookpermissions@springernature.com.

Apress titles may be purchased in bulk for academic, corporate, or promotional use. eBook versions and licenses are also available for most titles. For more information, reference our Print and eBook Bulk Sales web page at <http://www.apress.com/bulk-sales>.

Any source code or other supplementary material referenced by the author in this book is available to readers on GitHub (<https://github.com/Apress>). For more detailed information, please visit <http://www.apress.com/source-code>.

Printed on acid-free paper

To my own essentials, Chance and Kirsten

Table of Contents

| | |
|---|-------------|
| About the Author | xi |
| About the Technical Reviewer | xiii |
| Acknowledgments | xv |
| Introduction | xvii |
| Chapter 1: Getting Started with Apache | 1 |
| How Web Servers Work..... | 1 |
| The HyperText Transfer Protocol | 2 |
| A (Very) Brief History of Apache | 3 |
| Before You Begin..... | 5 |
| Keep Notes | 5 |
| Get Familiar with Your Terminal..... | 5 |
| Be Prepared to Read Documentation | 6 |
| What to Know Before Installing Apache..... | 6 |
| Using the Right Development Environment | 8 |
| Apache vs. Other Web Servers..... | 9 |
| Choosing Apache Over Nginx..... | 9 |
| Apache over npm start for Node Development..... | 10 |
| Obtaining Apache..... | 11 |
| Installing Apache on macOS | 11 |
| Installing Apache Through Homebrew | 12 |
| Running Apache as a Service Through Homebrew..... | 14 |
| Installing Apache on Linux | 15 |
| Choosing the Source Installation..... | 17 |
| The Benefit of Binary Installation | 19 |
| Installing on Windows | 20 |

TABLE OF CONTENTS

- Installing Apache Through XAMPP 21
 - Installing Apache as a Service in Windows 22
- Basic Configuration 23
- Where to Put Your Website Files 23
- Configuration Directory Structure 24
 - httpd.conf/apache2.conf 25
 - mime.types 26
- Configuring a Default Site 26
- Summing It Up 28
- Chapter 2: Configuration Essentials 29**
 - How Apache’s Configuration Is Structured..... 29
 - Where Do I Find Modules? 32
 - Installing Modules 33
 - Adding File Types..... 33
 - Configuring Modules 34
 - All About Directives 34
 - Directive Configuration 34
 - DocumentRoot /var/www 34
 - Configuring Your Primary Apache Site 36
 - Creating the New Directory 37
 - Updating Your Apache Configuration 38
 - Using .htaccess Files 42
 - Other Configuration Options You Should Know 43
 - Rewriting URLs 43
 - Creating Custom Error Messages 50
 - Authenticating Users Through Apache 54
 - Adding New File Types..... 57
 - Including External Configuration Files 57
 - Applying Changes 58
 - Summing It Up 58

| | |
|--|-----------|
| Chapter 3: Configuring Virtual Hosts | 59 |
| A Quick and Dirty Guide to Domains | 60 |
| What Are Virtual Hosts?..... | 61 |
| Creating Development Domains..... | 62 |
| Using the hosts File to Manage Local Domains..... | 62 |
| Using ngrok to Manage Local Domains | 63 |
| Setting up a Subdomain Pointing to Your Local Environment..... | 64 |
| Why Develop Locally? | 65 |
| Configuring Apache’s Virtual Hosts | 65 |
| A Sample Apache Configuration | 66 |
| Using Separate Configuration Files | 73 |
| Putting It All to Work..... | 73 |
| Pointing the Virtual Domains to Your Local Computer | 74 |
| Configuring Apache for Multiple Virtual Hosts | 74 |
| Summing It Up | 78 |
| Chapter 4: Scripting Languages | 79 |
| PHP | 80 |
| Installing PHP | 80 |
| Installing PHP on macOS | 80 |
| Installing PHP on Linux..... | 82 |
| Configuring Apache for PHP..... | 82 |
| On macOS..... | 83 |
| On Linux..... | 85 |
| Configuring PHP | 86 |
| Updating Default Configuration | 86 |
| Increasing the Memory Usage Limit..... | 86 |
| Increasing the Upload File Size | 87 |
| Configuring Noisy Error Reporting..... | 87 |
| Increasing Max Execution Time | 88 |
| Installing PHP Extensions..... | 89 |

TABLE OF CONTENTS

- Recommended php.ini..... 90
- Testing It Out 96
- Configuring Node.js on Apache 97
 - Configuring Your Node.js Application for Apache..... 98
 - Installing pm2..... 98
 - Configuring the Application 98
 - Adding Your Application as a Service 99
- Configuring Apache’s Reverse Proxy 100
 - Enabling Apache’s Proxy Modules..... 100
 - On macOS and Windows 100
 - On Linux..... 101
 - Creating a Virtual Host Configuration 101
 - Testing It Out 102
- Configuring React Apps on Apache 103
- Summing It Up 104
- Chapter 5: Securing Your Setup..... 105**
 - SSL at a Glance..... 105
 - Configuring SSL for Subdomains 106
 - Installing Certbot 106
 - Running Certbot..... 107
 - Configuring HTTPS for Local Domains 109
 - Setting up a Local SSL Certificate Authority 109
 - Installing OpenSSL 109
 - Storing Your Certificates..... 110
 - Configuring Apache for HTTPS..... 116
 - Creating a Separate Configuration File..... 116
 - Loading the SSL Module..... 117
 - Configuring the Apache’s SSL Module..... 117
 - Summing It Up 123

| | |
|--|------------|
| Chapter 6: Log Files | 125 |
| Error.log..... | 125 |
| Configuring the Error Log | 125 |
| access.log | 128 |
| Formatting the Access Log | 128 |
| Where Can I Find Apache's Log Files? | 135 |
| Configuring Apache Logs | 135 |
| Log Files for Virtual Hosts..... | 136 |
| Rotating Logs..... | 136 |
| What Do I Do with Log Files? | 143 |
| Using Log Analysis Programs | 144 |
| Creating Custom Scripts..... | 145 |
| Apache Configuration | 147 |
| Tracking Down 404 Errors and Why They Occur | 148 |
| Troubleshooting PHP | 148 |
| Writing to the Error Log | 149 |
| Summing It Up | 152 |
| Chapter 7: Sample Apache Configurations | 153 |
| Basic Apache Configuration (with PHP)..... | 153 |
| httpd.conf | 153 |
| Basic HTTPS Configuration | 160 |
| httpd.conf | 160 |
| extra/httpd-ssl.conf..... | 160 |
| Adding Rewrite Rules to Provide Human-Readable URLs..... | 162 |
| .htaccess | 162 |
| Setting up Multiple Hosts (One PHP and One Node.js)..... | 163 |
| httpd.conf | 163 |
| portfolio.local.conf..... | 164 |
| nodejs.local.conf | 165 |

TABLE OF CONTENTS

- Protected Directory 165
 - httpd.conf 167
 - dev.mydomain.com.conf..... 167
- Epilogue 169**
 - Keep Learning 169
- Appendix: HTTP Status Codes 171**
 - HTTP Status Codes..... 171
 - 1xx Informational Response..... 171
 - 2xx Success 172
 - 3xx Redirection 174
 - 4xx Client Errors..... 175
 - 5xx Server Errors 180
- Index..... 183**