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# Digital Image Compositing Fundamentals

Wallace Jackson

Apress®

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*Digital Image Compositing Fundamentals is dedicated to everyone in the open source community who is working so diligently to make professional new media application development software and content development tools freely available to rich application developers so that they can utilize them to achieve our creative dreams and financial goals. Last but not least, I dedicate this book to my father, Parker Jackson, my family, my life-long friends, and my production ranch neighbors for their constant help, assistance, and those relaxing, late-night BBQs!*

# Contents at a Glance

<b>About the Author .....</b>	<b>xiii</b>
<b>About the Technical Reviewer .....</b>	<b>xv</b>
<b>Acknowledgments .....</b>	<b>xvii</b>
<b>Introduction .....</b>	<b>xix</b>
<b>■ Chapter 1: The Foundation of Digital Imaging: The Pixel.....</b>	<b>1</b>
<b>■ Chapter 2: The Size of Digital Imaging: Resolution .....</b>	<b>7</b>
<b>■ Chapter 3: The Shape of Digital Imaging: Aspect Ratio.....</b>	<b>15</b>
<b>■ Chapter 4: The Color of Digital Imaging: Color Theory .....</b>	<b>23</b>
<b>■ Chapter 5: The Digitization of Digital Imaging: Color Depth .....</b>	<b>31</b>
<b>■ Chapter 6: The Transparency of Digital Imaging: Alpha Channel ....</b>	<b>39</b>
<b>■ Chapter 7: The Isolation of Digital Imaging: Masking Tools .....</b>	<b>49</b>
<b>■ Chapter 8: The Organization of Digital Imaging: Using Layers.....</b>	<b>65</b>
<b>■ Chapter 9: The Algorithms of Digital Imaging: Blending Modes .....</b>	<b>79</b>
<b>■ Chapter 10: The Modality of Digital Imaging: Modal Operation .....</b>	<b>95</b>
<b>■ Chapter 11: The Automation of Digital Imaging: Plug-In Filters.....</b>	<b>111</b>
<b>■ Chapter 12: The Work Process of Digital Imaging: Compositing ....</b>	<b>123</b>
<b>■ Chapter 13: The Data Footprint of Digital Images: Optimization.....</b>	<b>135</b>
<b>■ Chapter 14: The Automation of Digital Imaging: Programming .....</b>	<b>151</b>
<b>Index.....</b>	<b>163</b>

# Contents

<b>About the Author .....</b>	<b>xiii</b>
<b>About the Technical Reviewer .....</b>	<b>xv</b>
<b>Acknowledgments .....</b>	<b>xvii</b>
<b>Introduction .....</b>	<b>xix</b>
<b>■ Chapter 1: The Foundation of Digital Imaging: The Pixel.....</b>	<b>1</b>
Downloading and Installing GIMP.....	1
A Foundation for Digital Images: The Pixel.....	5
Raster vs. Vector: Imaging vs. Illustration .....	6
Rendering: Turning Convert Vector Art into Raster Imagery .....	6
Summary.....	6
<b>■ Chapter 2: The Size of Digital Imaging: Resolution .....</b>	<b>7</b>
Resolution: The Number of Pixels in 2D .....	7
Doing the Math: Calculating Total Image Pixels.....	8
Matching Resolution to Target: Device Resolutions.....	8
Using Imaging Software: Determining Resolution .....	9
Summary.....	12

- **Chapter 3: The Shape of Digital Imaging: Aspect Ratio ..... 15**
  - Aspect Ratio: The Ratio of Pixels in 2D..... 15
  - Screen Shapes: Common Display Aspect Ratios ..... 16
  - Doing the Math: How to Arrive at the Aspect Ratio..... 16
  - Using Imaging Software: Maintaining Aspect Ratio..... 17
  - Summary ..... 21
- **Chapter 4: The Color of Digital Imaging: Color Theory ..... 23**
  - Color Theory: Using Pixel Color Channels..... 23
  - Subtractive Color: Print Using CMYK Color Plates ..... 24
  - Additive Color: Display Using RGB Color Channels ..... 26
  - Summary ..... 29
- **Chapter 5: The Digitization of Digital Imaging: Color Depth ..... 31**
  - Color Depth: Bit Levels that Define Color ..... 31
  - Indexed Color: Using Palettes to Hold 256 Colors..... 32
  - High Color: Using a 15-Bit and 16-Bit Color Depth ..... 34
  - True Color: Using a 24-Bit Color Image Backplate..... 35
  - True Color Plus Alpha: Using 32-Bit Digital Images ..... 36
  - Summary ..... 37
- **Chapter 6: The Transparency of Digital Imaging: Alpha Channel..... 39**
  - Alpha Channels: Defining Transparency ..... 39
  - Selection: Using Alpha for Selection Sets..... 43
  - Selecting Alpha Channel Data in Photoshop CS ..... 43
  - Selecting Alpha Channel Data in GIMP ..... 45
  - Summary ..... 48

<b>■ Chapter 7: The Isolation of Digital Imaging: Masking Tools .....</b>	<b>49</b>
Masking: Isolating and Extracting Pixels.....	49
Photoshop Magic Wand: Tolerance and Sampling .....	50
Adding to a Selection Set: Using the Shift Modifier .....	52
Selection Editing: Using an Alpha to Edit Selection .....	53
Mask Fine-Tuning: Alpha Edge Editing Techniques.....	55
GIMP Scissors Tool: Intelligent Masking Algorithm .....	58
Adjusting the Scissors Tool: Intelligent Spline Nodes .....	59
Summary .....	63
<b>■ Chapter 8: The Organization of Digital Imaging: Using Layers .....</b>	<b>65</b>
Layer Differentiation: Photoshop vs. GIMP .....	66
Photoshop Layers: Organization and Effects .....	66
GIMP Layers: Organization and Masking .....	67
Using Layers in Photoshop: Compositing .....	68
Adding a Text Object: Using the Vertical Text Tool.....	69
Special Effects Layers: Adding Effects to the Text.....	70
Adjustment Layer: Adjusting Image Characteristics .....	71
Using Layers in GIMP: Basic Compositing .....	73
Summary .....	78
<b>■ Chapter 9: The Algorithms of Digital Imaging: Blending Modes .....</b>	<b>79</b>
Pixel Blending: Porter Duff Modes Theory .....	79
Photoshop Blending: Blending Modes Supported.....	81
GIMP Blending: Blending Modes Supported .....	81
Using Modes in GIMP: Multiplying a Shadow .....	82
Photoshop Blending Modes: Cool Effects .....	86
Soft Light: Shining a Light on Your Digital Imagery .....	87
Hard Light: Adding a Glass Overlay Effect to Text .....	88



- Linear Burn: Turning a 3D Metal Hoop into Glass ..... 88
- Luminosity: Turning Your Metal Hoop into Chrome ..... 90
- Difference: Using a Layer to Invert Pixel Colors..... 90
- Summary ..... 92
- **Chapter 10: The Modality of Digital Imaging: Modal Operation..... 95**
  - Modal Operation: Part of the Pipeline..... 95
    - Processing Pipeline: Tool, Options, and Settings ..... 96
    - Practice Makes Perfect: Keeping It All in Your Mind ..... 96
  - Modal Operation: A Photoshop Example..... 96
    - Photoshop Magic Wand Tool: Modal Selection Sets ..... 97
    - Photoshop Layer Mask: Delete Default Layer Mask ..... 98
    - Custom Layer Mask: Add Selection as Layer Mask ..... 98
  - Modal Operation: The GIMP Example ..... 100
    - GIMP Layer Mask: Adding a Layer Mask..... 102
    - GIMP Special Effects: Creating a Ring Drop Shadow..... 103
  - Summary ..... 109
- **Chapter 11: The Automation of Digital Imaging: Plug-In Filters..... 111**
  - GIMP Plug-In Filters: Enhancing GIMP 2.8..... 111
  - GIMP’s Filters Menu: Using Plug-In Filters ..... 113
  - Photoshop’s Filter Menu: Using Plug-In Filters..... 116
  - Summary ..... 121
- **Chapter 12: The Work Process of Digital Imaging: Compositing..... 123**
  - GIMP Compositing: Using Layer Features ..... 123
  - Photoshop Compositing: Using Layers ..... 128
  - Summary ..... 133

<b>Chapter 13: The Data Footprint of Digital Images: Optimization.....</b>	<b>135</b>
Photoshop Optimization: Save for Web.....	135
Indexed Color Format: Using Less Color to Reduce File Size.....	137
Lossy Compression: Using JPEG to Reduce File Size .....	139
Layer Visibility: Selecting Which Pixels Will Be Saved .....	141
GIMP Optimization: File ► Export As.....	144
Creating a Masked PNG-32 Object in GIMP .....	147
Summary .....	150
<b>Chapter 14: The Automation of Digital Imaging: Programming.....</b>	<b>151</b>
Internal Scripting Languages: Automation .....	151
Photoshop Scripting: JavaScript and ExtendScript .....	152
GIMP Scripting: Scheme, Script-Fu, and Python .....	153
Java and JavaFX: javafx.scene.effect API.....	155
HTML5 and CSS3: Markup Compositing.....	157
Android Studio: The PorterDuff Class .....	159
Summary .....	161
<b>Index.....</b>	<b>163</b>

# About the Author



**Wallace Jackson** has been writing for several leading multimedia publications about work in the new media content development industry, after contributing a piece about advanced computer processing architectures for the centerfold (a removable “miniissue” insert) of an original issue of *AV Video Multimedia Producer* magazine that was distributed at the SIGGRAPH trade show. Wallace has written for a large number of popular publications about his work in interactive-3D and new-media-advertising campaign design, including: *3DArtist* magazine, *Desktop Publisher Journal*, *CrossMedia* magazine, *Kiosk* magazine, *AV Video Multimedia Producer* magazine, *Digital Signage* magazine, and many other publications.

Wallace has authored a dozen Apress book titles, including four titles in its popular Pro Android series, Java and JavaFX game development titles, digital image compositing titles, and new media content production titles.

In the current book on digital image compositing, he focuses on the GIMP and Photoshop CS6 digital image compositing software packages, and uses them to demonstrate digital image editing and compositing fundamentals to beginners who wish to become digital imaging professionals.

Wallace is currently the CEO of MindTaffy Design, an agency specializing in new media content production and digital campaign design and development, located in Northern Santa Barbara County, halfway between its clientele in Silicon Valley to the north and Hollywood, the “OC,” West LA, and San Diego to the south.

MindTaffy Design has created open source, technology-based (HTML5, JavaScript, Java, JavaFX, and Android 5.3) digital new media i3D content deliverables for more than a quarter century (since 1991).

The company’s clients consist of a significant number of international branded manufacturers, including Sony, Tyco, Samsung, IBM, Dell, Epson, Nokia, TEAC, Sun Microsystems, Micron, SGI, KDS USA, EIZO, CTX International, KFC, Nanao USA, Techmedia, EZC, and Mitsubishi.

Wallace received his undergraduate BA degree in business economics from the University of California at Los Angeles (UCLA) and his graduate degree in MIS business information systems design and implementation from University of Southern California in Los Angeles (USC). Wallace also received a postgraduate degree in marketing strategy from USC and completed the USC Graduate Entrepreneurship Program. He earned the two USC degrees while at USC’s nighttime Marshall School of Business MBA Program, which allowed him to work full time as a COBOL programmer while completing his degrees.

# About the Technical Reviewer



**Chád (“Shod”) Darby** is an author, instructor, and speaker in the Java development world. As a recognized authority on Java applications and architectures, he has presented technical sessions at software development conferences worldwide (in the United States, UK, India, Russia, and Australia). In his fifteen years as a professional software architect, he’s had the opportunity to work for Blue Cross/Blue Shield, Merck, Boeing, Red Hat, and a handful of start-up companies.

Chád is a contributing author to several Java books, including *Professional Java E-Commerce* (Wrox Press), *Beginning Java Networking* (Wrox Press), and *XML and Web Services Unleashed* (Sams Publishing). Chád has Java certifications from Sun Microsystems and IBM. He holds a BS in computer science from Carnegie Mellon University.

You can visit Chád’s blog at [www.luv2code.com](http://www.luv2code.com) to view his free video tutorials on Java. You can also follow him on Twitter at [@darbyluvs2code](https://twitter.com/darbyluvs2code).

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Finally, I'd like to acknowledge Oracle for acquiring Sun Microsystems and continuing to enhance Java and JavaFX, which allows their Java and JavaFX to remain the premiere open source programming languages, and allows digital image compositing pipelines to be written in Java code, taking this industry to the next level.

# Introduction

*Digital Image Compositing Fundamentals* is intended for digital photographers; multimedia producers; 2D-application developers; 2D or 3D web site developers; user interface or user experience designers; social media users of image-centric web sites and/or apps, including Instagram, Pinterest, Facebook, LinkedIn, XING, YouTube, and similar; and just about anyone interested in generating high-quality digital imagery or special effects delivered in popular PNG, JPEG, GIF and animGIF file formats.

The book covers digital image editing and compositing; in the early chapters, that equates to fundamentals: proper terms, topics, concepts, and definitions. The subsequent chapters each build on the knowledge of the previous chapter. So, by the time we get to the later chapters in the book, our readers should be creating some fairly advanced digital image compositing pipelines, by using alpha channels, masks, and blending modes, special effects, adjustment layers, and the like.

There is even coverage at the end of this book on data footprint optimization as well as on creating digital image compositing pipelines that use open source platforms such as Java, JavaFX, HTML5, CSS3, JavaScript, Python, and Android.

Chapter 1 focuses on one of the foundations of digital imaging, the pixel, and Chapter 2 looks at the size of digital imaging, or resolution. Chapter 3 covers aspect ratio and the shape of digital imaging, and Chapter 4 takes on digital imaging color theory.

As we get into Chapter 5, we take on the digitization of digital images using color depth, and Chapter 6 goes on to cover digital image transparency and the alpha channel. Chapter 7 looks at isolating areas in digital images using masking tools, and Chapter 8 addresses organizing the digital image composite by using layers.

Chapter 9 starts to get into more advanced concepts, like blending modes, and Chapter 10 discusses the modal operational nature of digital image compositing software packages, such as GIMP and Photoshop CS6. Chapter 11 covers the installation and usage of plug-ins, and Chapter 12 discusses the finer points of the digital image compositing pipeline using both Photoshop CS6 and GIMP 2.8.14.

In Chapter 13, we look at data footprint optimization and, finally, in Chapter 14 we review how computer programming languages factor into image compositing, both inside of GIMP and Photoshop and with popular open source platforms such as Python, Java, JavaFX, Android, JavaScript, CSS3, and HTML5.

If you're interested in digital photography or in digital imaging and want to learn the fundamentals, and how everything works in the digital domain from pixel to compositing pipeline, this is the digital image editing and special effects book for you. I even show how to do everything with free digital imaging software, GIMP 2.8.14, so your only expense will be this book.

Chock full of tips, tricks, tools, topics, terminology, techniques, and work processes, *Digital Image Compositing Fundamentals* can help you to transition from a digital imaging amateur to a knowledgeable professional where your digital image compositing pipeline is concerned.

## CHAPTER 1



# The Foundation of Digital Imaging: The Pixel

Welcome to *Digital Image Compositing Fundamentals*. This book will take you through the foundation of digital imaging as well as multilayered image compositing. It starts with the lowest-level concepts—in this chapter that's the **pixel**—and builds upon each of those concepts in subsequent chapters until we have a comprehensive understanding of image compositing concepts, pipelines, work flows, and terminology.

I will show you what the concepts, techniques, and terms look like as we progress through this book by reproducing them, using two of the most widely used digital image compositing software packages, Adobe Photoshop CS6 and the open source GIMP software package; the latter is free for commercial use.

Assuming you might not want to pay for the brand name digital imaging software, the first part of this chapter will cover how to download and install your very own open source GIMP software package. If you do want to use paid software, I suggest using Photoshop at \$10 per month. The rest of the chapter discusses the foundational element of digital image compositing: the pixel.

How the pixels are composited is what this book is all about, and each chapter will build on the knowledge from the chapters that preceded them until you have a clear picture (no pun intended) regarding precisely how digital image compositing pipelines work.

## Downloading and Installing GIMP

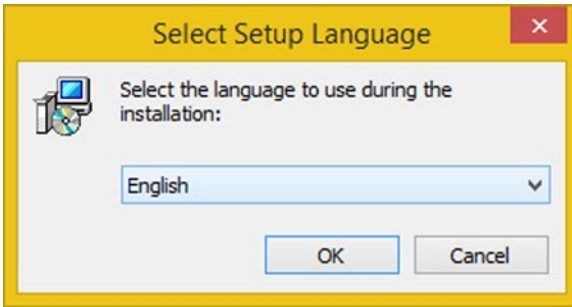
In order to follow along with this book, all readers are going to need to have a digital imaging software package of one kind or another, whether that is Adobe Photoshop or Corel Painter or PaintShop Pro. If you do not own any of these, you can use GIMP 2.8, which is free for commercial use.

To download GIMP 2.8.14, which is the current stable version of GIMP (the next version, GIMP 2.9, the predecessor to the much anticipated GIMP 3.0, is due out some time during 2016), go to [www.gimp.org](http://www.gimp.org) and click the orange **Download** button, seen in Figure 1-1, or alternately click the **Downloads** link on the right side of the screen.



**Figure 1-1.** Go to the *gimp.org* site; click the **Download** button

Then, download the GIMP-2.8.14.exe installer for your OS to start the installation. The installer will determine whether you need a 32-bit or a 64-bit version, so all you have to do is select the language that you want to use for the installation of the software and click the **OK** button, as shown in Figure 1-2.



**Figure 1-2.** Select a language you want to use for the install

Once you click the **OK** button, you'll get a **GIMP Setup** dialog, as shown in Figure 1-3, where you can click the **Install** button to start the installation process.



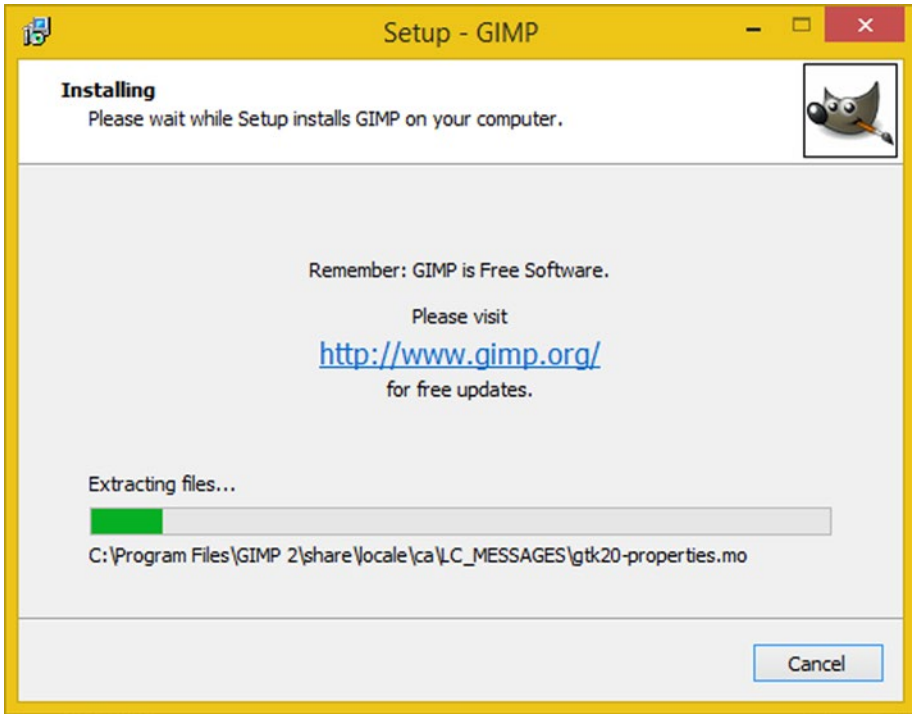


**Figure 1-3.** Click the *Install* Button to start the install

If you want to customize the installation, you can click the **Customize** button and select exactly what components you want installed on your system.

I recommend that you use the (full) **Install** button, which will give you the default GIMP software installation with the plug-ins, filters, and file support that is now part of the stable GIMP version, which is the fully completed (finished) package architecture. GIMP is an digital imaging-software package that rivals paid image editing software packages.

As you can see in Figure 1-4, GIMP will install itself.



**Figure 1-4.** GIMP tells you which file it's installing

Once the install process has completed, click the **Finish** button, shown in Figure 1-5, and then create a shortcut icon for the quick launch taskbar on your OS so that you can launch GIMP if you need it by using just a single mouse click.