3D Game Textures
Julie, Ellen, and Cooper.
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Acknowledgments

Brian Grabinski, Mark Birge-Anderson, and Jose Vazquez—the concept artists.

Ann Sidenblad, a great friend and one of the best digital artists I know, for providing her invaluable feedback.

Jeffrey C. Huff, Assistant Professor of Computer Graphics at Missouri State University, for technical editing on this version of the book.

Nick Marks, for his initial input on this book many years ago.

NVIDIA—Doug Rogers, Kevin Bjorke, Gary King, Sébastien Dominé, Carrie Cowan, and Derek Perez, for information and help developing the shader section.

Maggie Quale at Smith Micro Inc.

Alkis “Atlas” Roufas, for the Genetica3 demo on the desk.

Michael S. Elliott, for the use of the Tengwar-Gandalf font.

The Focal Press people, who are too numerous to name. Specifically, I worked with Laura Lewin, Amanda Guest, Katy Spencer, and Chris Simpson. In addition, Becky Golden-Harrell, who was at Focal Press for the first edition of this book.
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Welcome to the second edition of this book. Game development is still booming! Many more books have been written, even more information is available on the Internet, and many more colleges are offering courses, or even degrees, in game development—and many use this book. Thanks to all the students and instructors who emailed me with suggestions and corrections. I loved the praise, but really appreciate the feedback and corrections the most. You have made this a better book. Yet still I find that of all the numerous topics that fall under the large umbrella of game development, texture creation is still not getting thorough treatment. People still trumpet the virtues of the Offset Filter in Photoshop—hence the need for this second edition.

I wrote this book after having held many positions on various game projects from president and art director to in-the-trenches artist working through crunch times. I worked with many artists on numerous projects, and no matter what their education or background, their knowledge of game development came largely from actually doing it. No one school or book can adequately train you for an industry that changes so fast and requires a rather large set of skills to function in. Even an experienced game developer must face a learning curve quite frequently. The reality is that most game projects are one-time, unique ventures that are never to be done the same way twice. Things change too fast: the technology, the processes, the marketplace. And the industry is still a bit transitory, so you may find yourself in a new town, at a new company, at work on a new genre of game, with tools that you have never used before. You would think that writing a book about something that is so constantly changing and affected by so many variables would be impossible. But given all the change and evolution in our industry, there are some core skills and practices that don't change from year to year. My goal with this book is not only to show you how to create textures, but also to give you a basis for understanding the larger picture of game development as it pertains to texture creation. The difference between a good artist and a good artist who can function as a member of a high-performance game development team is the ability to do good work fast and efficiently—and to contribute to the forward momentum of the project. I approached each of the projects in the book with all of this mind and tried to give you a feel for the various situations in which you may find yourself as a game artist.
Note: Remember that although specific game tools are not the focus of this book, in the job hunt you will want to master at least one set of commercially useful game development tools—at the expert level, if possible.

I also developed the exercises in this book to rely heavily on Photoshop. I did this for several reasons:

- The only way to really get to know Photoshop well is to use it a lot and to use it with real-world examples, not just a limited three-step tutorial on the Offset Filter.
- When you get to know your way around Photoshop, you will be more impressed by it. Every day I learn some new trick or feature that saves precious time.
- When you are truly proficient in Photoshop, you will develop a feeling for the best way to accomplish a task. When you develop this feeling, you know that you have left the learning curve far behind you. You can then focus on getting better and faster at Photoshop until it becomes an extension of you. You will be less hindered in creating what you are envisioning.
- When you get to know the capabilities of Photoshop, you will be able to create anything you want and will be less dependent on resources that may not be available everywhere you go, such as premade texture sets, digital cameras, and other software.

When you are able to use other resources to create your textures, they will be much better—and not only visually. Your source files will be more flexible, better organized, and much easier to work with. This is very important, because creating game art is a balancing act. You are always making decisions that involve not only aesthetics, but also efficiency and technological limits. Having files that are easy to find and that can be quickly altered is as important as how good they look. The best-looking texture in the world is useless if you can't find it or it won't run in a game engine. And on a development team, you will most likely not be the only person using a file. If your layers are not named, grouped, and organized, the next person's job will be much, much harder. One of the biggest challenges in game development is not breaking any of the fragile connections between the thousands of parts of a typical game. A poorly organized file is one of the things that will threaten to break those connections; many poorly organized files will almost assuredly cause a break. These connections are called dependencies. The development team must function smoothly and efficiently as a whole, because usually certain tasks and goals must be reached by one group, or individual, in order for the other team members to move forward with their work. A good number of poorly organized or missing files will cause the guilty party to take longer to complete his work and cause the dependent party to wait before starting her work. There is a snowball effect, delays cause more delays, and the schedule starts to slip dramatically. The project may even grind to a standstill. What's worse is having no schedule and not knowing (until it's way too late) that the game you had hoped (or are contractually obligated) to develop is an impossibility given the lack of time and resources that you have so late in development.
The worst case is that this will cause the project to get cancelled. At best, this is where most of the infamous crunch time is created. Crunch time includes those last few months where the development team lives in the office day and night to finish a game. One day developers are going to realize that the reason they are crunching is because the project wasn't planned properly. Someone at a higher level didn't do his job a year or two earlier, and the developers end up paying for it.

So, beyond creating a wood or metal texture, the greater goal is to learn to create assets in an efficient, organized, and flexible way. To work on a game development team, speed, accuracy, and flexibility are critical. The process in which you handle assets is called the pipeline. From concept to creation to in-game asset, tens of thousands of files pass through the pipeline. So where you save your files; what you name them; and how you name, group, and organize the layers in a Photoshop file are all important details. You don't want to be the person responsible for losing or overwriting a file that took someone else hours or days to create. Not only will you create the loss of precious hours of work, but potentially you could be responsible for delaying the entire project.

I hope you enjoy the book.

What This Book Is Not

There is much confusion when it comes to the vocabulary of game development. This book does not cover careers, characters, animation, lighting, modeling, NURBS, shader programming, or character skinning and is not a vague overview of all game art. This book is focused on creating 2D textures for various 3D game environments.

Whom This Book Is For

This book is for game developers, architects, simulation developers, web designers, and anyone who needs to create 2D imagery for a 3D computer application. I have come across two general types of individuals in the art departments of game development teams: the artistically challenged technical person and the technically challenged artistic person. Most people are trained and/or simply more proficient at thinking in one of those ways. There's no shame in being a great programmer who can't draw a bloody talon or in being a great artist who can't do all that complex code stuff. This book will help the beginner get started in game texturing, but it will also help the technically oriented professionals who are artistically challenged create textures (in a way they can relate to), and it will teach the technically challenged artists to create their art in a fashion that will allow them to set up their work with an eye toward the important aspects of game development. There is no shame in being an artist who has focused solely on creating beautiful art, and not on the technical issues of game development, but it is limiting.
The good news is that the creation of beautiful art is the hard part. All you have to do now is set up your art in a way that allows you to quickly find, alter, and output your textures for use in a game.

Overview

Chapter 1: A Basic (Game) Art Education

The basis of computer art is art itself, so in Chapter 1, I discuss the most basic and important aspects of visual art. Although teaching you traditional fine-art skills is beyond the scope of this book, it is critical to have an understanding of some basic aspects of visual art in order to create game textures. The basic aspects of visual art we will focus on are shape and form, light and shadow, texture, color, and perspective.

Chapter 2: A Brief Orientation to Computer Graphic Technology

We will talk technology very briefly. You will eventually need to learn a good deal about the technical side of computer art to decide on the various issues that technology will present to you, but a brief orientation of technology is all you will need to start painting textures. Although creating art on a computer can be limiting, frustrating, and confusing for many people, once you understand the limits placed on you and learn to work within them, you are much more likely to create impressive work. The aspects of technology that we will look at are common features of graphic file formats, the power of two and the grid, UV mapping, and shader technology for artists.

Chapter 3: Shaders and Materials

Shaders allow for a level of realism in games that is stunning and getting better all the time. Simply put, a shader is a mini-program that processes graphic effects in real time. For example, the reflections on a surface can move in real time instead of being “baked” or permanently painted into a surface. Shader effects are very powerful visually, even if viewers are unaware of what they are seeing. That is, the average player would have a hard time specifying why the game looks so good. It may be the real-time reflections, normal mapping, or the specular mapping being processed in real time.

Chapter 4: Prepping for Texture Creation

In this chapter we will look at the various sources of digital resources for texture creation and each of the steps in the process of gathering, preparing, and storing your assets. The focus of this
book is the creation of textures using Photoshop, so that you develop strong Photoshop skills, but in reality it is more common, easier, and more effective to use photo reference in texture creation. We will be using photo reference later in the book, and the CD contains a good collection of photo reference for you to use in your work. We also look at the use of overlays or overlay textures in this chapter.

**Chapter 5: The Sci-Fi Setting**

This is the first tutorial chapter. A sci-fi scene looks complex due to the geometry and effects presenting use, but in actuality the texture set is very simple. We will start by taking from the concept sketch ideas for the base materials that we will create for the scene and from that build a simple and versatile set of textures. This method produces textures that can be used in various ways and that are designed to be used with the newer technology coming out (shaders like bump and normal mapping and so on).

**Chapter 6: The Urban Setting**

In this chapter you will learn to work more faithfully to the detail in a concept sketch or any reference material that may be given to you. When you create textures for a game environment, you are usually creating them for a world that has been thought out, detailed, and developed to the point that showcasing your creativity is not the primary goal of your work. You are showcasing your talent and ability to recreate what you see in the materials in front of you. We will build a set of textures as they were traditionally created, in sets: base, wall, floor, and ceiling. This chapter focuses on breaking out not only the base materials that need to be created for a scene, but also the detail textures as well. Even though this approach is falling by the wayside due to technological advances, it is still an applicable skill to many games and applications and a good skill to have when you are required to work with more advanced technology. We always start with the basics to build a material (shape, color, texture) and then build detail on top of that. What you end up with is a full texture set that is easily altered and built on. By the end of the chapter, you will have created all the textures needed for the urban environment as seen in the concept sketch.

**Chapter 7: The Outdoor Setting**

In this chapter we will create a set of textures for a forest that can be altered to look spooky, friendly, or fanciful. Using the basic approach presented here to break out the elements of an outdoor scene, you can also create a similar set of textures for any outdoor environment; jungle, desert, and so on. I will also introduce the use of photo source in texture creation. I mentioned in the very beginning of the book that the use of photo source to create
textures is not only common but preferred. It makes your job faster and easier and gives your textures an extra layer of richness that can take a lot of time to achieve otherwise. Although working with overlays may take the most time and tweaking, they are generally added later in the creation process, after a good foundation is laid. Using digital imagery will greatly enhance and speed up your work, but you don't want it to be a crutch that you will always have to lean on. We will also look at the ways that the sky is typically handled in a game. We will also look at terrain painting, clouds, and water.

Chapter 8: Game Effects

Games are full of visual effects—probably even more so than you realize. These effects are important, not just as eye candy, but for giving the player clues and information on what is happening in the game world. These effects also add a great deal to the level of immersion that a player will experience in a game. Typically, if you shoot at any surface in a game—wood, metal, concrete, and their variations—you will see and hear a different effect for each surface. Effects also include the glow around a candle, light shafts from a window, even raindrops. The assets for these effects are fairly easy to create. Actually, asset creation is the easy part of creating effects in a relative sense. It does take work to create the art and it must look good, but the systems that run the effects can be complex and challenging to work with. Generally, you will often create three types of effects: Static, Animated, and Particle.

Chapter 9: Normal Maps and Multi-Pass Shaders

This chapter focuses on normal mapping; specifically, creating them in Photoshop with a look at creating them using a 3D program. We will also create the supporting maps for a typical environment: bump, normal, specular, illumination, and opacity. I will explain how 3D applications are used to do this, but of course we won't be doing this in this book.

Bonus Chapter (on the DVD): The Fantasy Setting

This is a long chapter, so pace yourself. This chapter combines the creation of many high-detail textures that are used in a high-polygon-count scene. We will use the Path Tool in Photoshop to create the fancy curves that you see in the scene, and we will do some basic hand painting that will produce great results. Finally, we will look at the process of creating the textures used in a shader.

Have fun!
The Concept Artists

The Urban Setting
Jose Vazquez
Jose was born in Mexico and raised in Chicago, Illinois, from the age of three. He still keeps a close connection with his Mexican heritage. Jose has a B.A. in Illustration from Columbia College and a B.A. in Media Arts and Animation from the Illinois Institute of Art. Jose has more than 15 years of professional experience that began with graffiti and then grew into contracted large-scale murals. Dabbling in airbrush art, portraits, and paintings of all media, Jose has a strong traditional art background, but due to his animation education, all of his current works are digital. Jose currently develops characters in the video gaming industry. You can contact Jose at www.sephseer.com.

The Sci-Fi Setting
Brian Grabinski
Brian Grabinski was born and raised in Illinois. He graduated from the Chicago-based American Academy of Art in 1997. Upon graduation, he started working freelance and has worked as a full-time illustrator/graphic designer for 8 years now. Brian has also worked as a full-time concept artist for the video game company Rainbow Studios/THQ, based out of Phoenix, Arizona, and for the Chicago-area Animation Studio, Dreamation/Cineme. Brian continues to work freelance for various clients and is employed full-time at the Hoffman Estates, Illinois-based videogame company High Voltage Studios as a full-time concept artist. You can contact Brian via email at briangrabinski@aol.com or brian.grabinski@high-voltage.com.

The Fantasy Setting
Mark Birge-Anderson
Mark Birge-Anderson attended the Layton School of Art and Design in Milwaukee, Wisconsin, and the Art Academy of Cincinnati. He works in advertising in Chicago, coming up with original concepts and designs. He has also done concept art for an animation studio in Chicago and plans to pursue work in that exciting field. Mark does freelance illustration as well and can be reached at mark@matrix1.com.