Creating Games with Unity and Maya

How to Develop Fun and Marketable 3D Games

Adam Watkins
Dedication

As always, to my beautiful and exciting Kirsten, Anaya, and Isaiah.
Acknowledgments

Books like this are the results of a lot of work by a lot of people. It is important to point them out.

First, many thanks to Kelly Michel and the team at the Los Alamos National Laboratory that made working on this book possible. The opportunities to learn and grow have been exciting to me professionally, and I’ve personally very much enjoyed my time working with my teammates Brian Dickens, Elise Elfman, Jake Green, and Birch Hayes.

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Finally, working on books is always a bit of an exercise in patience by the family of the author. This round, the patience of my forever friend Kirsten and her care of the little peeps has been of unimaginable help.
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Introduction

Why This Book?

The Unity Game Engine has been shaking things up. The engine is only a little over five years old now and in 2010 they have earned Develop Magazine’s Grand Prix Award and surpassed 170,000 developers. The user base of consuming Unity products has grown dynamically as well. There are over 30 million total Unity Web Player installations, and the base continues to expand at over 2 million installs per month.

Part of this success undoubtedly comes from their 2009 bold move to give away a free version of Unity Indie. Suddenly, everyone could get their hands on a game engine and anyone with the will to learn could start making games. Unity further empowered the masses by making Unity a viable development platform for iDevices (iPhone, iPod Touch, iPad), Mac, PC, Xbox 360, Wii, and now Android and PlayStation 3. Web deployment further democratized the 3D development and distribution process. At conferences and online Unity is generating quite the buzz. Since I have been using the software, conversations among faculty at training institutions and game developers alike have gone from, “Unity? No, I’ve never heard of that. Is it new?” to “Yeah, we’re using Unity in three of our courses coming up this semester,” and Skype tags that say, “I want Unity 3.0.”

But with all this buzz, and the rapid development and deployment cycle that the Unity 3D team has undergone, there has been a distinct lack of introductory documentation, especially documentation aimed at the entire process of game development. In recent months there have been some new (and really nice) books released to get people into Unity and it is true that Unity provides some nice downloadable projects and some tutorials attached to those projects (which you should grab for free if you haven’t yet), but often while my students (who are trained as 3D artists) have worked through these, although they have become familiar with Unity’s interface and with what does what, they are simply unable to extrapolate this knowledge into a new “authored from scratch” game. Further, most of the Unity 3D provided tutorials are focused on Unity and provide prebuilt assets that the reader simply plugs into his or her Unity project. This misses some of the vital creative processes and tricks of getting these assets into Unity.

And so the impetus for this book emerged: create artist-driven, holistic training modules that provide the theory of game development and the methodology behind Unity that empower readers to create their own games.
Who's It For?

My professional background recently has been developing training games for inspectors in pursuit of nonproliferation efforts at the Los Alamos National Laboratory. But this is a temporary assignment and part of a one-year research sabbatical. I am on sabbatical from a position as head of 3D Animation at the University of the Incarnate Word in San Antonio, TX where I have taught 3D animation for over 10 years. With this background, as I use tools, I am always thinking of how this particular tool or technique can be taught, and how it can be taught differently to different demographics.

In the construction of this book, there are three main groups of learners in mind:

- **Game Enthusiasts**: The biggest group of students we have coming into our university are those with the idea, "I love to play video games, therefore, I'll be great at making them." Unfortunately this is often not the case—consuming is much different than creating—but, this sort of enthusiasm is important to maintain through the long learning arcs that are required for making 3D games. This book assumes that, at the very least, you love games. And that you are passionate enough about them that you want to create your own games.

  This volume is for you. Equipped with a free version of Unity and a copy of Maya, this book will provide you with the necessary steps and ideas to empower your own game creation. The book is organized into manageable tutorials coupled with theory discussions so you can see measurable progress quickly that you can bridge into your own development. In a few days, or weeks, you could have your first tutorial-driven game developed, and the scripts to begin your own.

- **Students**: Ten years ago, developing 3D animation programs was all the rage at colleges and universities. This enthusiasm has crept into high schools and even middle schools. With this 3D curriculum—of which you may be a part—has come the natural desire to expand into game development. This book has been specifically structured with you in mind.

  The tutorials are structured so that they can be tackled in class or as part of a homework assignment. The pacing has been carefully considered to allow for bite-sized chunks of knowledge that are still delivered at a brisk pace. Most importantly, each chapter builds on the next and allows for real progress really quickly.

- **Teachers**: I have done a lot of training for teachers at colleges, universities, and high schools. I have seen the panic in teachers' eyes—the teachers with little 3D or game training—but who have been tasked with developing a game development curriculum and then teaching that curriculum. To be sure, it is a daunting task, and one that is a little unfair to saddle on a teacher with their other tasks. Have no fear though, this book will help lighten the load.
Included in the appendices for this book (on the supporting website (http://www.Creating3DGames.com) are some suggested curricula for using this book in a classroom setting. It will help in being able to plug this book into your work flow and class plans. Although it will be critical that you follow the tutorials yourself to understand the questions that the students will undoubtedly have, this volume will provide some tutorials for in class or homework that will help to provide a lot of instruction in learning the 3D-to-game publication process.

Structure

Although presently I am also a game developer, my long-term passion is teaching. I know how people learn 3D and game engines. There is an unfortunate trend for many early learners to pick up a tutorial and immediately start working through the steps without any consideration to why that tutorial was written, and what the basic concepts are behind the steps they are following. At the end of the tutorial, readers have the sense of accomplishment that they have finished the tutorial, but suddenly come to the crushing reality that they can’t create their own project, and they couldn’t even replicate this project unless the tutorial was in front of them again. Essentially, they have become recipe followers—they can only cook if the book is open in front of them, and if someone else has figured out the steps. They certainly aren’t chefs. The goal of this book is to make master game chefs. To do this, there are some specific conventions this book will follow.

First, every chapter and every tutorial will be prefaced with some theory—some explanations of the method behind the madness of what they are about to embark on. This theory will cover not only the reasoning of the tutorial and its goals but also the reasoning behind Maya or Unity and their particular implementation of 3D technique. Avoid the temptation to skip the theory and smash into the tutorial; you will be much more enriched by understanding the reason behind the steps.

Every chapter will also include tutorials, some longer than others, but each with a very specific learning objective in mind. Each tutorial will build upon the last and move us closer to completing the game that will be playable at the end of this book. However, this book is a novel, not a collection of short stories, and if you skip too far ahead too quickly, you will miss vital information that make later chapters seem logical. So even if you know the technique covered and you have no need to follow a given tutorial, be sure you skim through it to see what is being covered there.

Finally, each chapter will include some challenges—homework assignments if you will—that ask you to use the information you have gathered to create your own implementation of the techniques. Hobbyist rarely use these, but
they are an important self-assessment tool to check if you have really gotten the core concepts presented in the chapter. You will get the most out of this book if you tackle those challenges. They will cement ideas and strengthen technique before you move on.

**Book Paradigm and Assumptions**

Although *Creating Unity3D Games* is meant to be holistic, it is not comprehensive of *everything* involved in creating 3D games. It is assumed that you have the following things:

- **Unity and Maya:** At the publication of this book, the latest versions of this software will be Maya 2011 and Unity 3.2. The Unity 3.2 Indie license is free (downloadable at www.unity3d.com), and if you are a student, Maya 2011 can be had for free for one year at http://students.autodesk.com/ if you sign up at the Autodesk Education Community. For a registered student, your biggest expense of the process will be this book.

- **Basic Knowledge of Maya:** This knowledge can indeed be basic, but this book will not take a huge amount of time to work through Maya interface, or basic tools. You should know how to navigate the camera controls and how to conduct basic functions of moving, rotating, and scaling objects. This book will be focusing on very game-specific techniques to modelling, texturing, and animating, and so some general knowledge of Maya will be of great help, although not critical.

- **Love and Knowledge of Games:** No need to be a game geek. But, knowing the basics of how games work and what makes them fun will be important to making games. The game in this book will be a first-person and third-person hybrid with both first-person shooter and puzzle elements. These are carefully designed to help you grasp some important concepts. But always be referencing past knowledge and looking for ways to expand the ideas covered in these pages to your own blockbuster title.

**Book Conventions**

Throughout this volume, I will be making use of several conventions to assist you in understanding what I'm talking about, and where.

When we are tackling a tutorial, each step will be numbered:

- **Step 1:** Do this and then,
- **Step 2:** Do this. When you're finished,
- **Step 3:** Try this.

Usually, these instructions will be tied closely to screenshots to help illustrate the step, or the results of a step.

Because the goal of this book is not to simply recreate the game presented here, but to equip you with the skills and tools to create your own game after
finishing this tome, there will be frequent “breaks” in the tutorials to do some explaining. Watch for:

**Tips and Tricks**

**Warnings and Pitfalls**

**Why?**

These will be the important notes that get you beyond the confines of the tutorials, and on to your own million-dollar games.

Finally, navigating through the programs can be tricky (especially in Maya with its multiple nodes). Drop-down menus will be indicated with the following format:

Modeling>Mesh>Combine (Options)

This is shorthand for, “In Modeling mode, go to the Mesh drop-down menu and look for Combine, and choose the Options box.”

In Unity, this will be a little simpler since there are no disappearing drop-down menus like there are in Maya. However, it will be important that we are aware of what things need to be typed—as in code. Any script we type will be listed and formatted like this:

```csharp
function Update()
{
   SetActiveRecursively(true);
}
```

Occasionally, there will be some salient information within the code that is important to notice. When this is needed, the text will be bolded (you, however, would not need to use bold text when writing the script):

```csharp
function Update()
{
   SetActiveRecursively(true);
}
```

Similarly, new ideas, concepts, or keywords will be bolded within the body of the text.

**A Note about the Approach**

I come from an art background. I have a BFA in Theatre Set Design and an MFA in Graphic Design with an emphasis in 3D animation. I think like a 3D artist and I teach 3D artists. Because of this, this book and its approach to learning Unity is constructed through the lens of a 3D artist. This does not mean that there won't be programming or scripting—in fact, scripting is a critical part of the game development process. Without it there is no game, and so it cannot be ignored, and will be covered heavily in this volume. Even for artists, it’s best to surrender now and embrace the power of scripting within a game engine. However, the entire process will be covered from the viewpoint of a 3D artist.

This will be very effective for some readers, particularly those who are coming at the game development cycle from an art or 3D background. But it may
include some information that might be too basic for those approaching this from a programming background. Not to worry though, the first part of the book is 3D focused, and so there should be plenty of new material for those coming from the scripting world.

So there it is. Tear into it. Be sure to read the theory and do the homework. It will be fun to have a completed game when you finish this book, but not nearly as fun as utilizing the tools and techniques we explore to create your own 3D interactive and engaging gaming masterpiece!