Chapter 8
The Ethics of Reverse Engineering for Game Technology

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ABSTRACT

This chapter demonstrates how legal concepts, accepted practices, and research in reverse engineering (a process of disassembling a system to understand how it works) can provide ethical and legal outlets for end-users. The game industry has influenced reverse engineering law and practice, challenging ethical practices in industry, academia, and with end-users. Although these communities supposedly rely on legal precedents, actual laws are often misunderstood, ignored, or just unknown. The communities continually struggle to balance the protection of intellectual property with consumer freedom, and reverse engineering demonstrates this conflict. We demonstrate how a variety of communities embrace reverse engineering through a series of case studies involving current commercial games and technology. The case studies include the modding community, massively-multiplayer online game community tools, digital preservation, and reverse engineering education. Although a clear ruling on legality eludes the field, we conclude with suggestions on dealing with ethical and legal aspects surrounding this issue.

INTRODUCTION

Reverse engineering (RE) is a process by which any commercially-available system is disas- sembled to learn how it works (Raja & Fernandes, 2008). For example, RE might mean learning how to customize Microsoft's Xbox™ gaming console (Huang, 2003) or studying mechanical design by taking apart small household appliances (Wu, 2008). Anytime a person inspects something

(which does not include just mechanical devices) and asks, "I wonder how this works?" they engage in RE. But, RE isn't always so innocent. To explain how the issues of RE can become complex, we will first enlist the help of a hypothetical end-user that we have named "Mitchell Ketchup." In the Background section, we delve deeper into RE's legal history and terminology to set up four case studies that explore how various groups have addressed legal and ethical aspects.

Mitchell Ketchup's Dilemma

Mitchell Ketchup likes to play old arcade games on his even older gaming console. But, one day his console breaks! All of his old games cannot play on the gaming console anymore, and he cannot replace it because consoles like his are rare and expensive, especially since companies no longer produce them. However, Mitchell discovers a website that has an emulator for his gaming console. Better yet (at least for him), he learns that he can download the emulator, as well as all of his old games! He can even download games he never owned—including new games created by a community of programmers passionate about the old console. Mitchell even found software tools to increase his game performance, e.g., custom software that interacts with a game (usually MMOs) to automatically play a particular character. But, he also learns that it is illegal to download "cracked" (i.e., decoded) games and/or tools that play them.

So, what should Mitchell do?

Ethical Questions

Mitchell's dilemma suggests several key questions:

- If the emulator and downloadable games were constructed through illegal RE, is Mitchell engaging in illegal activity? Is he being unethical?

- Is it ethical to create new works for an emulator that RE helped to create?
- Should Mitchell download only the games he already owns? Is he "allowed" to download others?
- Are the tools that improve Mitchell's performance on the games ethical for single player games? What about multi-player games?

Mitchell's dilemma—and the corresponding questions—are common in today's gaming culture. RE is a well-known process in all kinds of industries, especially where competitors strive to understand competing designs and technologies. But, end-users and academics (both faculty and students) also engage in RE for a variety of other purposes, which include the following artifacts of gaming culture, academia, and industry:

- A website called *ROM World Emulators*.
- A book called *Hacking the Xbox: an Introduction to Reverse Engineering* (Huang, 2003).
- A college course on alternative game interfaces/controllers in which students disassemble controllers, learn how they work, and make their own based on that technology (Doctorow, 2009).
- A client-side "mod" for a massively-multiplayer online game that filters incoming network traffic before it displays in the game to filter out real money trading spam (Aion Source, 2010).

Some of these resources are legal (at least in the USA), some are not, and some have vague legal standing—yet, they exist, right, wrong, and "in between." Better yet, do "right" and "wrong" imply ethics and/or legality? To help clarify the analysis, we need to define two criteria:

- **Legal:** An action or artifact that does not violate a government's law. In general, we

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