

A Devil in Disarray

How Hacking for Profit Has Crippled the Online Economy of *Diablo II*

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From its inauspicious beginnings as a term to describe computer programmers who were exceptionally skilled at their chosen line of work, the label “hacker” has taken on almost mythical proportions. The simplest evolution experienced thus far is that the connotation of the word has shifted towards those who use their abilities for malicious ends, forcing their way into seemingly secure systems with little regard for anything besides their own amusement, but this is hardly the extent of the transformation. Entire communities have sprung up beneath the banner of hacking, swapping their discovered loopholes and security flaws in open forums, a collaborative effort to gain access to forbidden areas of cyberspace. Online gamers bandy around with alacrity the numero-symbolic subtleties of “1337 5|>34|<”, or “leet speak”, a language popularized by the “hacker culture” portrayed in such 80’s movies as *Hackers*. Friends may be teasingly called “1337 h4x0|2s”, literally “elite hackers”, after displays of particular competence, while true hackers or the indigenous “script kiddies”, those who merely implement exploits developed by real programmers, perhaps will receive the epithet of “n00b |-|4x0r”, where “n00b” is the technical abbreviation of “newcomer” that has become a rather derogatory slur among the ranks of the truly 1337, and “|-|4x0r” is, once again, none other than another variation of the ubiquitous “hacker”. If you have at all been touched by the growing grasp of the Internet, then you will likely find yourself at one point using hacks, or being targeted by hacks. Especially in the games of today, there is no escaping the overwhelming influence that hackers now exert, whether it be through the indecipherable excuses for communication tossed around in chat rooms, or the program running in the background of your computer processes, giving you that killer edge over your opponent, or perhaps even through the beloved character that you log into, only to discover it completely stripped of items, dignity, and sense of security.

Although their presence is felt universally in computer games, hackers enjoy a special relationship with *Diablo II* and its successor, *Diablo II: Lord of Destruction*, the two massively successful titles released by the company Blizzard North on June 28 of 2000 and 2001, respectively.¹ While many popular games have had their difficulties with hacking outbreaks, few have been so deeply scarred by them as *Diablo II*; in its current incarnation after a long onslaught of hacks, the virtual economy is shattered, the game balance is practically nonexistent, and players are moving in droves to the safety of Single Player and Mod-based communities. Usually, most game hackers are still driven by the same desire as ordinary players—to be the best within the framework of the game—even if they achieve it through unorthodox means. Opposing this perspective is what has happened with *Diablo II*: thanks to the hacks, there is hardly a framework of a game left at all. What is it that drives this self-destructive form of hacking?

The simple abundance of hacking in *Diablo II*, without touching on the strange form it takes, can be explained in part by the history of the *Diablo* series. The legacy of the precursor to these two games, the original *Diablo*, is invariably remembered by the astounding completeness with which hackers conquered the stark dungeon landscape beneath Tristram, where the story of *Diablo* unfolds. One of the original hack-and-slash RPGs, or role-playing games, *Diablo* initially delighted audiences with its beautifully rendered levels, intuitive point-and-click interface, and atmospheric quests that led you through dark corridors and against ferocious monsters. What set it apart from most games of the time was how well it catered itself to online play, among friends

¹ Bolty. “Lurker Lounge: Diablo II – News Archive.” <<http://www.lurkerlounge.com/diablo2/news>>

and strangers alike.² However, because all character information in *Diablo* is stored on the client's computer and passed to the other computers in the multiplayer space—known as an “asynchronous peer-to-peer” architecture³—clever programmers soon figured out ways to set themselves apart from the rest of the crowd: by impossibly raising their characters' statistics to ridiculous levels, by duplicating existing items or forming new ones from little more than thin air, or worse yet, by killing off other innocent players with the touch of a key, even in the safe haven of Tristram itself. Frustrated players had only the options of retiring to private LAN games and Single Player campaigns, or succumbing to the urge to retaliate with hacks themselves.⁴

Seeing the landscape of their masterpiece laid to waste at the hands of hackers, the programmers behind *Diablo* put an extraordinary amount of effort into their plans to forestall hacking in its sequel, the aptly named *Diablo II*. The plot of *Diablo II* picked up where *Diablo* left off: the hero of the original *Diablo*, believing it the only way to truly defeat the Lord of Terror, plunged Diablo's soulstone into his forehead, and subsequently became Diablo's gateway back into the world of Sanctuary. For the sequel, more playable characters were added, the movement system shifted away from tile-based, and the method of skill advancement was dramatically altered; altogether, though, the isometric view, point-and-click, hack-and-slash feel stayed true to the original. In terms of multiplayer, though, the structure entirely changed. While the Single Player and LAN games would still be based on the asynchronous peer-to-peer paradigm for the sake of speed, Blizzard introduced a new venue for community gaming, called the Closed Realms of Battle.net. Instead of having each client keep its own data concerning itself, these regional Realms (USEast, USWest, Europe, and Asia) use a client/server model, where all the relevant data is stored on the server, and clients merely send in how they choose to interact with the world. Because the servers of Battle.net are controlled by Blizzard, every interaction can be checked for its legality before directly affecting the surrounding world; also, because the character data cannot be accessed directly by any player, the only methods of improving your character are those sanctioned by in-game mechanics. Initially, thanks to this revamped architecture, many naïvely believed that, “Diablo II [would] be completely Hack Proof.”⁵ Inevitability, though, is always waiting around the corner, as producer Bill Roper points out:

I mean, when we work on a game, we put maybe 10 programmers on it for the better part of 2 years. These guys work really hard and pour their life's blood into the project. When the game comes out, there are tens of thousands of programmers out there using the same tools that we use, who immediately start to find ways to break into it. We, as developers, are outgunned in sheer number of man hours. They can put the same amount of time in trying to take apart our code as we do in writing it in days because they have so many more people working on it.⁶

Emboldened by their reign of terror over the original *Diablo*, hackers no doubt had no intention of disappointing.

² Kuo, Andy. “STS 145 Final Paper.” <http://poweredge.stanford.edu/videogames/archive/StudentPapers/ByStudent/CaseStudies/K-O/K/Kuo_Andy.pdf> p. 3

³ Gray, Gaile and O'Brien, Mike. “Game Cheats and Cheat Prevention.” <<http://www.arena.net/news/mikearticle040802.html>>

⁴ Kuo pp. 3-4

⁵ Lethal. “Blizzard & Hacks: Past, Present, and Future.” <http://www.counter-hack.net/content.php?page=article_blizzard>

⁶ Rouse, Rich. “Interview with Bill Roper.” <<http://pc.ign.com/articles/065/065979p1.html>>

However, more important to its hacker allure than the sad history of hacking within the original *Diablo*, and also more revealing of the strange type of hacking that *Diablo II* attracts, is the fact that *Diablo II* falls into a category of games that sports persistent characters whose prestige is determined as much by the items that they wear and the experience level they've achieved as by the skill of the player controlling them. As with the win-loss ratios in first-person shooters or real-time strategies, RPGs with persistent characters allow a sense of superiority to flow from game to game, dictated by both equipment and experience, such that it can be flaunted in the face of less accomplished players; unfortunately, competitive scenarios like this one are all that hackers truly need to thrive. Still, as mentioned, while this fact alone is worrisome, such competition is common to all varieties of games. What sets apart *Diablo II* and other RPGs with persistent elements (such as *EverQuest*, *Ultima Online*, or *Dark Ages of Camelot*) is the addition of a persistent economy, where prestige can be bought and sold unlike in any other computer game genre. As players rise in the ranks of a virtual economy of this sort, they can likewise break into the real economy, peddling their ephemeral electronic wares, mere blips within the circuits of computers, on auction sites like eBay for very physical sums of money.⁷ Hacking can always put you ahead in games, but in a game like *Diablo II*, it can at the same time fill your pocket with dollar bills, lending a whole different aspect to the pursuit. Ironically enough, though, in virtual economies where the gold standard has migrated into the non-virtual world, a perpetuated enterprise of hacking for profit necessitates escalation of scope at every step of the way, devastating the natural economy as a byproduct; while lucrative along the way, hacking for real profit can only, in the end, destroy itself.

To trace this argument through the chronology of *Diablo II*, we naturally start at the beginning. On June 28, 2000, two years after expected, *Diablo II* was finally shipped to a waiting public. Thanks to the tamper-resistant client/server design, Closed Battle.net was free of hacks for nearly six months, aside from a bug with the skill Bone Wall, which caused the summoned barrier to inappropriately drop items when it was destroyed, and a minor exploit involving player killing, both of which were patched with little delay. Consumer confidence was high, and *Diablo II* prospered, going on to sell an amazing 2.75 million copies worldwide as of January 2001.⁸ Before the posting of this statistic, however, the idyllic complacency of Battle.net was shattered by hackers who figured out a method of violating the sanctity of the "secure" Battle.net servers, stealing a sizable number of player accounts. Battle.net players were angered both at the "cybervandals" who had taken from them months of work, and at Blizzard itself, for not having prevented the situation in the first place. This first major breach of security of the supposedly bullet-proof Closed Battle.net servers obviously shook the faith of *Diablo II* players around the globe, foreshadowing things to come, and also demonstrated that the vestiges of real world economy were already bleeding into the world of Sanctuary; one affected player, "Unknown Shadow", complained, "I just lost about \$1200 worth of characters and items! ... DO SOMETHING!!!!!"⁹ Blizzard answered the uproar by rolling back any affected characters to their status as of December 19, 2000, before any character thefts had occurred, providing a temporary solution to a problem of hacking that would just not go away.

⁷ Dibbell, Julian. Lecture in STS145 class, 14 March 2003

⁸ Kuo p. 5

⁹ Lemos, Robert. "Diablo II gaming heroes hacked, looted." <<http://zdnet.com.com/2100-11-526771.html?legacy=zdn>>

Around this time, a weakness in *Diablo II*'s client/server architecture was revealed, which would form the basis for many of the more persistent hacks that still remain unpatched and unprotected to this day. To carry information back and forth between client and server, *Diablo II* uses packets, which encapsulate the appropriate data to synchronize interactions between the character you see on your screen and the actual character in the Closed Battle.net databases. Most of the packets correspond to what you're actually seeing as you play the game—"object location, hit points, skills being used, equipment, etc."¹⁰—but hidden information that your computer needs to know, but you shouldn't, can also be passed along. Hackers eventually developed programs called "packet sniffers", which would intercept the packets flowing between client and server, and cull important data from them. One application of this is MapHack, which reveals the entire map of a dungeon, including all the usually hidden monsters, shrines, and chests, greatly decreasing the time required to "explore" a certain area. Another influential usage of these packet sniffers was the GambleHack, which would identify whether an item that you were gambling for was Unique, Set, Rare, or Magical. Taking advantage of the particular order in which Unique Rings would spawn in a game, this exploit allowed thousands of Battle.net users to amass huge quantities of the rarest Unique Ring, the Stone of Jordan (usually identified only by its acronym, SOJ). GambleHack was eventually neutralized when Blizzard changed the way that gambling worked, but MapHack is widely abused even now, with most people estimating that usage spans at least 50% of the online population.

Following in the footsteps of GambleHack was the first duplicating (more often referred to as duping) exploit, in March 2001. Already mass-produced by GambleHack, SOJs edged closer to making the leap from common to currency, setting up the later era where nearly all trades would be conducted in terms of some abstract SOJ price instead of based on the appropriate needs on either end of the deal. This was not the only effect, though. While Blizzard fairly quickly patched this and a subsequent duping exploit, released about a month later, they surprisingly imposed no punishments of any sort on those who actually used the hacks. No CD keys were banned, no accounts were deleted; the loophole was closed, and Blizzard washed its hands of the matter. Dupers now had a taste of how lucrative duping could be, enormously increasing their online wealth in a matter of days, and they also knew that they could carry out these shady undertakings with impunity, no consequences at all to worry about. From this point on, hacking became a sort of game in itself, with hackers throwing out clever bug-exploiting programs and reaping the benefits while they lasted, and Blizzard methodically fixing the problems without handing out so much as a slap on the wrist. Because of this *laissez-faire* attitude, the hacking community flourished for the next year, completely free to go about their lucrative business however they saw fit.

By all accounts, duping is the most profitable variety of hacking. There have been many methods developed over the years, most involving bugs with how items are buffered in trade or quest windows, or how servers can be crashed without saving the state of items on a character.¹¹ Regardless of how they work, duplication hacks allow you to indefinitely multiply your supply of valuable items, which gives you the opportunity to make an insane amount of money before supply and demand catches up with you. Most of the profit in hacking items is also achieved through duping, in that one version of the hacked item is actually generated through the hack,

¹⁰ Flux. "The Top Ten Bugs in D2/D2X." <<http://www.diabloii.net/columnists/flux09.shtml>>

¹¹ Counter Hack. "Diablo II Cheats & Hacks." <<http://www.counter-hack.net/content.php?page=diablo2>>

and the rest are merely copies of that first one, duped to high heaven and sold off one by one. Because of their integral role in making money off of *Diablo II*, dupe methods are highly sought after, and also extremely valuable, as Blizzard closes them down as soon as they become public. In his efforts to keep up sales, one eBay user “went through about 5 different methods that were all sequentially fixed by Blizzard over the course of 6 months. There was always a mad rush to find a new method after Blizzard fixed the last. With such a huge amount of money to be made, it is no wonder that people worked night and day just to find the next new method.”¹² Indeed, looking in the short term, duping is a win-win situation: the sellers get their money, and the purchasers get a useful item that they probably would not have found on their own.

Long term, though, introduced a series of drawbacks to duping, the most obvious one being the Dupe Scan® that Blizzard implemented. What the Dupe Scan ensured was that if any two items with the same identification number (ergo, duped) entered the same game, only one of them would leave it. This was a major setback to dupers, because players were forced to concede that trading for dupes was not quite as beneficial as before, knowing that they could disappear without warning several games down the line. In light of this, hacks came out that exploited the natural loot-generating capabilities of *Diablo II* to produce, in illegitimate quantities, legitimate items that couldn't be deleted through identification number comparison. The first of these, called ChestHack, surfaced in April 2002,¹³ and allowed players to essentially open a single item chest an unlimited number of times. Item chests have a fairly low chance to produce good items, but when a player can simply stand by a chest and make it throw out as many items as he wants onto the ground, the chances add up. The negative effects of this hack extended past the realm of the economy; due to the masses of people clicking on chests, the actual game servers experienced massively unwarranted amounts of stress. For the first time, Blizzard really took notice, and covertly began tracking users of the ChestHack. On April 5, 2002, the ChestHack was patched...and over 7,000 accounts of ChestHack users were deleted. Less than a week passed, and over 20,000 more accounts were deleted for ChestHack related violations. This decisive action by Blizzard decimated the hacking community, but could not stop progress; a mere two days later, a similar hack, which allowed a NPC to give a quest reward Rare item as many times as desired, was released and patched shortly afterward.

The hacking community was revitalized very quickly by D2Hackit, a program which “allowed the user to load modules to perform automated functions as well as view received packets and send others,” while being completely undetectable by Blizzard. With this tool, hackers were able to program a number of useful automated modules for their characters, which became known as Bots—ShopBot, for instance, had your character visit the town vendor and hunt his inventory for good Magical items, and PindleBot would repeatedly kill a certain Unique Boss monster, Pindleskin, who is capable of dropping every item in the game. Like duping, botting was very profitable in the short term, as powerful Unique and Magical items were still worth something on eBay. However, both of these hacking variations experience the same long term problem: the more effective they are at increasing supply of a rare item, the less valuable that item becomes. Duping or botting alone cannot sustain a business of hacking for profit, because as long as you're dealing with the same old items, your prices can only drop. Also, as well as ruining your get-rich-quick scheme, you ruin the entire value structure of the game; the

¹² Tamas, Corey. “Selling Diablo 2.” <<http://www.macgamer.com/features/publish.php?id=729>>

¹³ Elly, Gaile, and Flux. “News Archives.” <<http://www.diabloii.net/newsupdates/archive>>

previous “best” items are now merely mundane and dull, because they’re so widespread. The same phenomenon occurred in the original *Diablo*:

On thing that I [Bill Roper] think a lot of players missed in *Diablo* was that it had a very cool economy built into it in regards to having to make decisions on what to buy. This little addictive feature was lost to cheating when items and gold could be generated at will. We want some items to be so rare that only two or three of them may exist amongst everyone that plays on BattleNet. That way, if you have something like that, and someone sees it, it’s a really big deal. It gives your character a lot of notoriety, and we certainly want the game to have that kind of uniqueness to it.

People are willing to pay for notoriety, but once you’ve duplicated enough of every item in the game so that anyone can have a copy, that notoriety vanishes.

How then do you keep the items that you’re selling fresh and exciting, while at the same time duplicating them as often as possible so that you have a steady supply to pawn off to well-paying patrons? The solution, of course, is to hack up completely new items, ones that never could be created naturally in the game; a quick survey of the *Diablo II* related eBay auctions is more than adequate proof that this is the course of action that hackers have taken, with an overwhelming percentage of the highest priced sales involving items that no Blizzard programmer could ever have imagined.¹⁴ The first such example came in February 2002, when a variation of a hack developed by Herzog Zwei, one of the most recognized hackers of *Diablo II*, was used to remove the Runes from the sockets of an item. In *Diablo II*, when Runes are placed inside of an item in a certain order, corresponding to a Runeword, they grant certain extra bonuses, beyond those innate to the Runes. This method of desocketing removed the bonuses granted specifically by each Rune, but the additional Runeword bonuses remained. These items, which took on the name “Ith” by some mechanism of the hack used, could then be resocketed with other useful Jewels or Runes, making them more powerful than any conventional item available. Just like any ordinary item, the demand for a hacked item such as this one would wane over time; however, as long as new hacked items could be introduced as older hacked items became devalued, then the market would be sustained. This is exactly what hackers did: Iths gave way to duped versions of unbalanced Uniques from version 1.08 of *Diablo II*; 1.08 Uniques were followed by fused/bugged items, which combined the bonuses of several Unique items into one; fused/bugged items eventually lost ground and passed the throne to completely unbalanced “white” items that had been snuck in from Open Battle.net, which is still based on an asynchronous peer-to-peer structure and thus is teeming with fantastic homemade items. While the eBay economy remained strong, thanks to the steady influx of new and improved hacked items, the *Diablo II* virtual economy was left far behind, as legitimate items had been made worthless long ago in comparison to the hacked items available.¹⁵ Hacking for profit was working out exactly as planned, but it was destroying the very economic fabric of the game in the process.

The early parts of March 2003 brought in the straw that broke the proverbial camel’s back. A new duping method was released, and almost immediately, the entirety of Battle.net jumped on it. Items, legit and hacked alike, were replicated in the thousands, subsequently reducing their values to practically nothing. For example: keep in mind that Arkaine’s Valor, the Unique Balrog Skin, and Windforce, the Unique Hydra Bow, are among the rarest items that

¹⁴ eBay. “Items matching (diablo 2).” <<http://search.ebay.com/search/search.dll?GetResult&query=diablo+2&from=R8&ht=1&st=2&category1=1249&Top10=&SortProperty=MetaHighestPriceSort&catref=C1>>

¹⁵ Morgalis. “The Origin of Bugged Items.” <<http://www.diabloii.net/columnists/a-items-origin.shtml>>

could be found in the current version of *Diablo II*, 1.09d, and that version 1.08 has been out of circulation for more than a year; then consider this testimony from Andrew, on the Closed USWest Realm:

I just wanted to tell you that I was GIVEN 2 .08 valors and 2 .08 Wf's yesterday. By someone in a random game! Never met him before. I was in a game and someone said "FREE SOJS IN ACT 5!" I went there and literally every spot on the ground was an soj. There must have been over 500 of em!¹³

Uncontrolled duping is almost always bad for eBay sales, because a large increase in item supply will naturally cause prices to plummet, just as happened with the in-game values of the 1.08 Arkaine's Valors, 1.08 Windforces, and Stones of Jordan described by Andrew. Due to its magnitude, though, this particular instance didn't simply harm the economy; it essentially killed it, both for in-game and auction site transactions. As remarked by Flux in his assessment of the whole affair, "One amusing aspect of this duping outbreak is that the long time hacked item sellers on eBay are ruined. They're asking 1/10th the price from a week ago, and not even getting that." Many people, disgusted with the state of Battle.net, simply refused to play publicly any more; the only ray of hope in this bleak horizon is that the overall death of trading, thanks to this glut of items, was followed by the emergence of several legitimate communities, seeking to return to the simpler days where you found items on your own and traded them directly for what you needed, instead of running through intermediaries of duped currency for unnecessary pieces of hacked gear.

Over the three years that *Diablo II* has been on the market, the scope of released hacks seems only to have increased with time. In a hacking business driven by real profit, this would seem to be the natural course of events. The common theme between these different varieties of hacks—duplication, hacked items, and botting—is that they generate unforeseen excesses of desirable items: duping and botting by making the powerful items far less scarce than they should be, and hacking by introducing powerful items that never should have existed in the first place. The catch-22 is that you must continue to replenish your stock of some item in order to keep selling and profiting off of it, but whenever this happens, this desirable item you're selling off becomes far less desirable, as everyone already has one, or several. Equivalent prices drop, profit margins dwindle; the only solution for the hacker would then be to dupe or bot even rarer items, or introduce yet more powerful hacked items into the system, otherwise there is no way that he can continue to make money. This point is demonstrated perfectly the Constricting Ring, which debuted to values of nearly \$500, but dropped to around \$6 after fewer than two months. Obviously, this is a vicious cycle, with items becoming popularized, earning a few quick bucks, and then fading permanently into worthlessness. Where it ends is difficult to imagine, since in theory, people will continue to shell out money as long as a hacker can continue to shell out even better items. However, with Blizzard patching security loopholes as they pop up, the hacker's creative juices will have to dry up eventually, leaving behind a desiccated husk of a game, no way to profit off of it any more, but because of the abundance of overpowered items that has been created, no way to really enjoy it in its full treasure-hunting, multiplayer glory, either.

In a world without an avenue for real life profit based on the virtual economy of the game, the patterns of hacking would probably not follow the one just described. For a start, there would be no wholesalers—players who stockpile overpowered items, privately dupe them, and slowly release them to the market. Purchasing a non-public dupe method can set you back "from a mere \$200 to \$10,000," and while avid eBay sellers can currently recoup this investment as

much as threefold, being unable to liquidate their virtual items into money would mean that wholesalers would be facing a huge, irreplaceable monetary loss every time that Blizzard patched a dupe exploit. Perhaps the seller wouldn't mind losing a few hundred or thousand dollars in order to be extremely wealthy within this isolated version of the economy in *Diablo II*; you may scoff, but even completely virtual economies have very real aspects to them (i.e. it is not the integration of physical money into a virtual economy that proves it to be real, but rather the reality of that virtual economy that allows for the integration of physical money). The difference, though, is that while the value of the dollar does not significantly decrease based on the faltering of the *Diablo II* economy, the assessment of wealth within the game does. Thus, hacking for profit entirely within a game, without the support of item and character auctions in the real world, is a wholly fruitless endeavor: whatever in-game riches you may accumulate by your hacking are eventually undone, completely devalued, by the same efforts that elicited them.

Banning the sale of items and characters from *Diablo II* on eBay would be a very simple step for Blizzard to take. The company has precedent on its side; early in 2001, Sony and Verdant successfully blocked the sale of *EverQuest* characters on both eBay and Yahoo auctions,¹⁶ and Blizzard itself has prevented eBay from hosting sales of *Warcraft III* Beta CD-Keys. This would only prevent the manifestation of hacking for profit, and not by any degree stop hacking altogether—as long as there's competition to be had, then hacking will persevere as well. Still, it is currently money-driven hacking that is ravaging *Diablo II*'s virtual economy, as explained by this study. Blizzard may have a million changes that it wants to make in terms of fixing *Diablo II*, but removing the incentive for this destructive cycle to begin at all is a good place to start.

¹⁶ Roe, Andy. "AW Profiles Player Auctions." < <http://www.auctionwatch.com/awdaily/reviews/profiles/2001/playerauction.html>>

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