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Exploiting Online Games:
Cheating massively distributed systems

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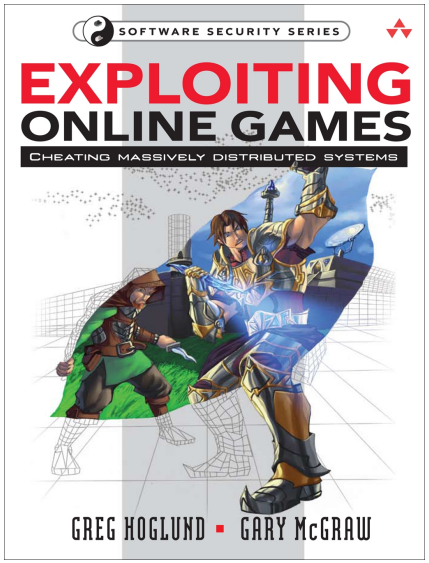

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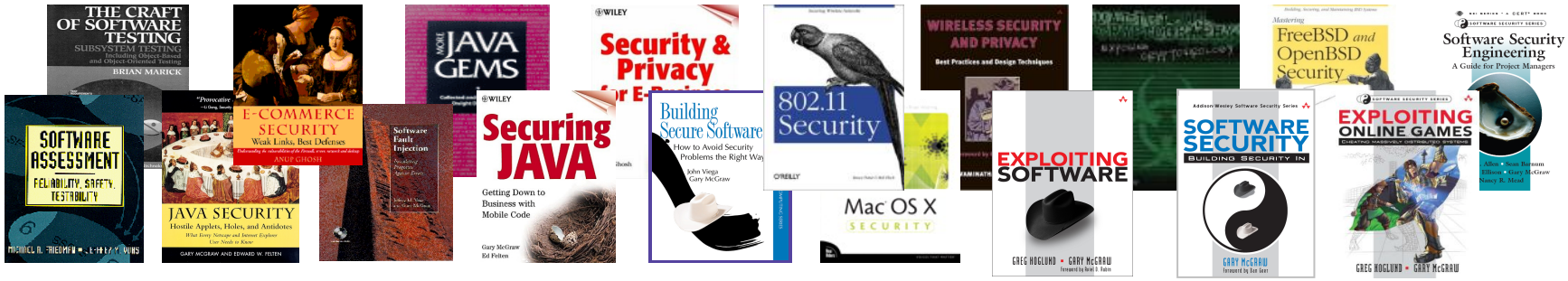
Cigital

- Founded in 1992 to provide software security and software quality professional services
- Recognized experts in software security and software quality
  - Widely published in books, white papers, and articles
  - Industry thought leaders
- Consultants to EA



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Disclaimer

- In our research for this book and this presentation we have broken no laws.
- We expect our readers likewise not to break the law using the techniques we describe.

Why online games?

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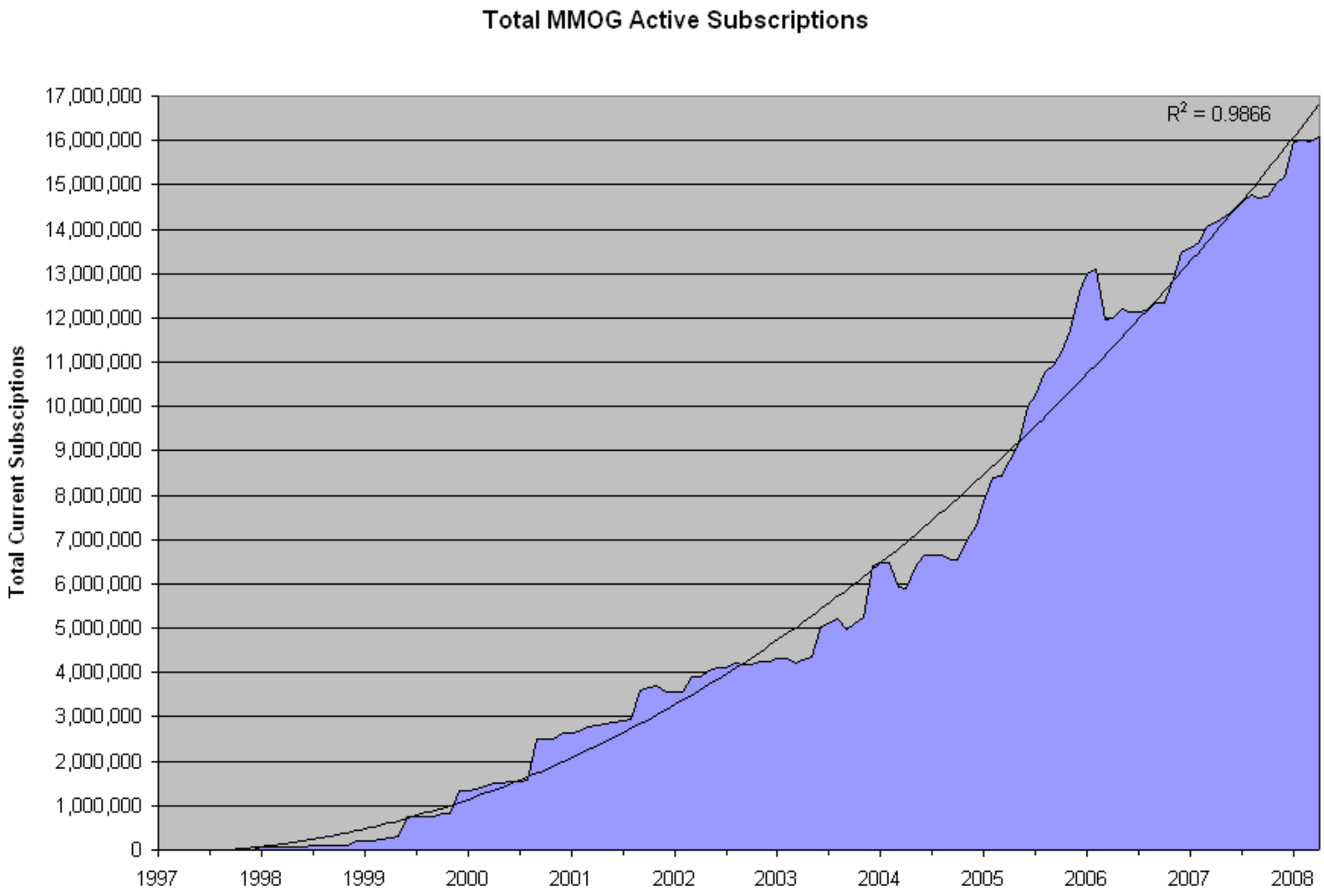
Online games are a bellwether

- Online games (like World of Warcraft) have up to 900,000 simultaneous users on six continents
  - 10,000,000 people subscribe to WoW
  - 16,000,000+ play MMORPGs
  - Clients and servers are massively distributed
  - Time and state errors are rampant
- MMORPGs push the limits of software technology
- Modern distributed systems in other domains are evolving toward similar models
  - SOA, Web 2.0
- Time and state errors are the XSS of tomorrow



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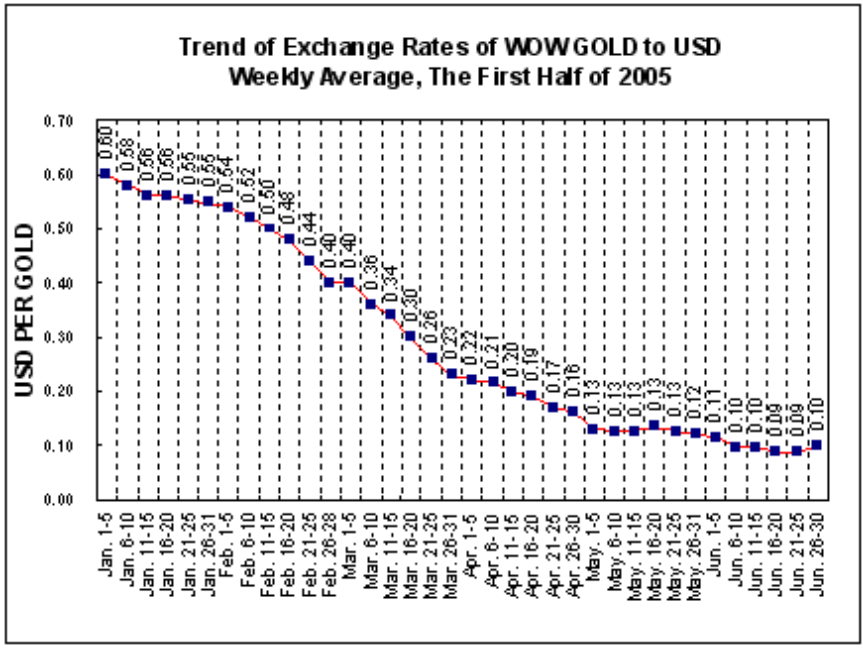
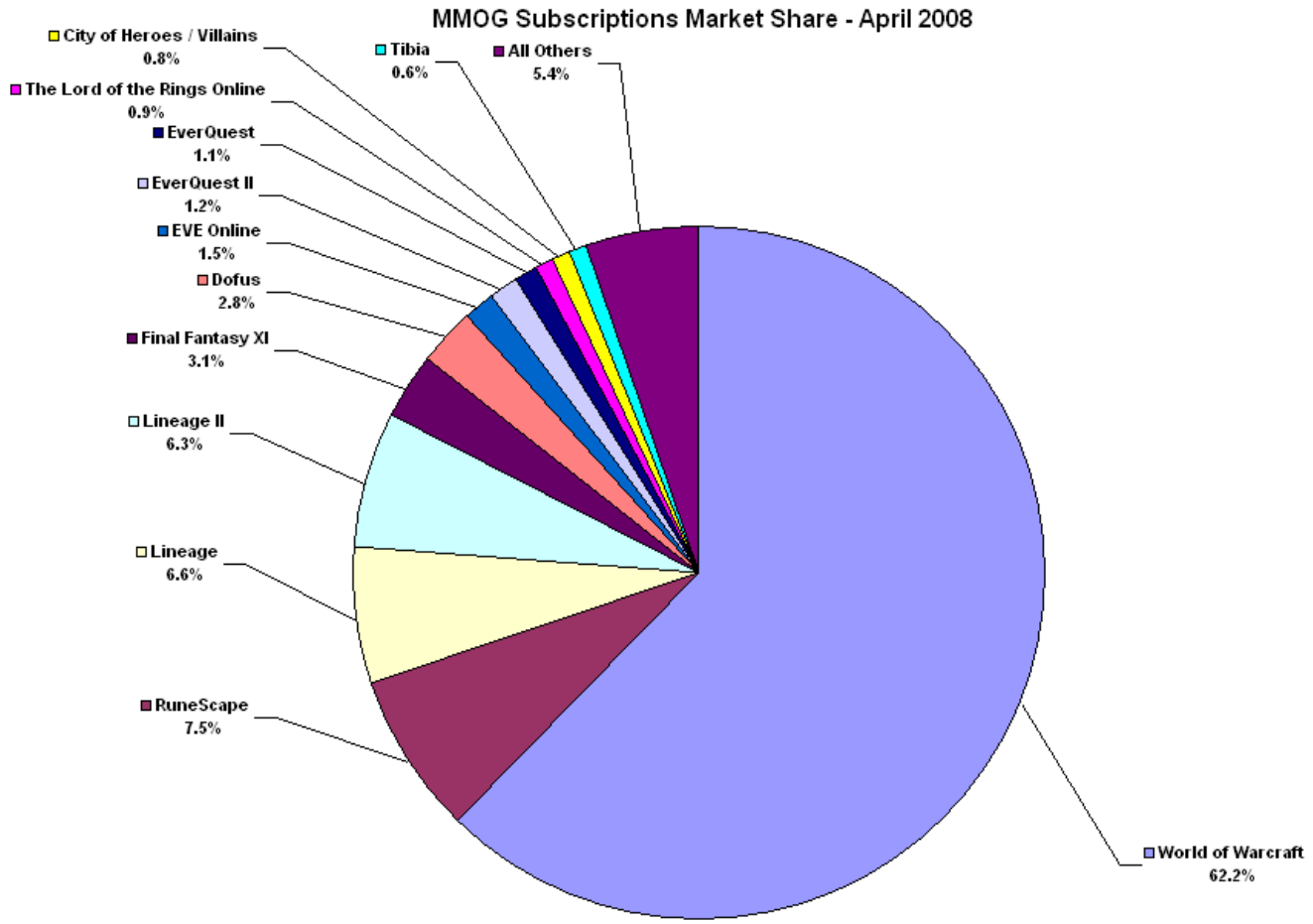
Online games are big business

- One game (WoW) has over 10,000,000 subscribers
- $14 * 10M = 140M * 12 = $1.68B (not to mention buying the client)
- A healthy middle market exists for pretend stuff
- Cheating pays off



Why pick on World of Warcraft?



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Isn't this exploit discussion bad?

1995

- Dan Farmer fired from Silicon Graphics for releasing SATAN with Wietse Venema
- FUD: possible attack tool!

2009

- Any system administrator not using a port scanner to check security posture runs the risk of being fired

Fall 2004

- John Aycock at University of Calgary publicly criticized for malware course
- FUD: possible bad guy factory

Should we talk about attacking systems?

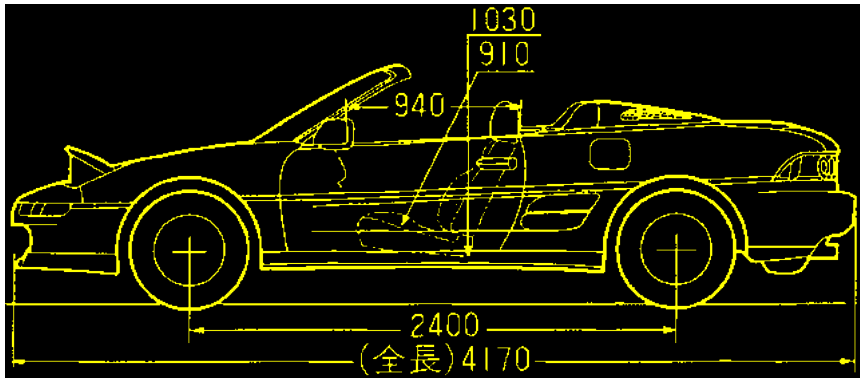
The good news and the bad news

Good news

- The world loves to talk about how stuff breaks
- This kind of work sparks lots of interest in computer security

Bad news

- The world would rather not focus on how to build stuff that does not break
- It's harder to build good stuff than to break junky stuff



Lawyers, guns, and money

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Lawyers

- Game law is set up to counter piracy (not cheating)
  - “Cracking” a game costs game companies big money
  - Security mechanisms protect against cracking
  - Online components answered this problem wholly
- The DMCA is now being used to counter cheating as well
- End User License Agreements (EULAs) and Terms of Use (TOU) lay out license obligations
  - WoW Glider case
  - Ginko Financial disappears
- Click to agree

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Egregious EULAs

- Sony's EULA allows installation of a rootkit on your machine
- Blizzard's EULA allows monitoring
  - The Warden
  - The Governor
  - Spyware or security mechanism?
- Gator's EULA disallows removal of the software
- Microsoft's Frontpage disallows negative comments about Microsoft
- EULAs for viruses allow (legal) propagation!
- Apple's EULA never dies

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“Guns”

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Money

- Exchange rates exist between in-game currency and real money
  - Per capita GDP in some MMO worlds is greater than the per capita GDP of some real countries
  - Economists study game economies
- Microsoft reports that the market in 2005 was over $6B
- DFC says the market will double to $12B by 2010
- Secondary markets are also thriving
  - In 10/2005 a player paid $100,000 for virtual stuff (an Asteroid Space Resort in Project Entropia)
  - IGE has over 420 employees and project a $7B market by 2009
    - Connections to thottbot (for better sweat shop work)
    - Chinese sweat shops make economic sense
  - Second Life is set up as a market in virtual stuff (and players own their creations)

“It’s easier than making shoes!”

- In China, over a half-million people “farm” MMO games
  - Some sleep on cots near the computers and work in shifts
- People choose this job. It can be better than working on your dad’s state-owned farm
- Almost anyone can get this job, even “unskilled” labor

http://youtube.com/watch?v=ho5Yxe6UVv4

Bugs, bots, and kung fu

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Two kinds of cheating

- "Exploits" - actual game bugs, which are exploited to
  - Teleport
  - Duplicate items or gold
  - See stuff you're not supposed to see
- Bots
  - Both AFK and non-AFK
  - Only performing legal inputs, but in an automated fashion

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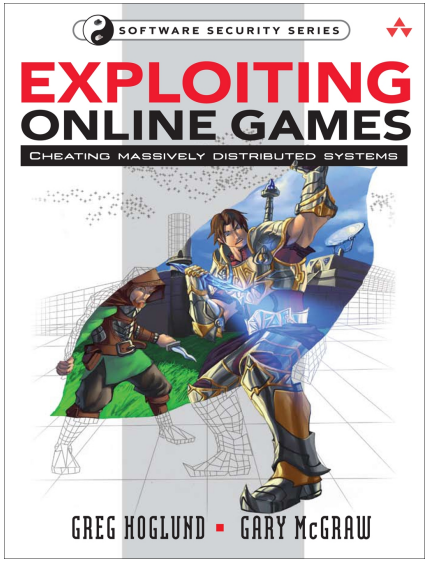
Botting

- Botting happens because
  - "Grinding" is really boring
  - Players are "farming"
    - Running the game to farm a resource, possibly running multiple accounts at once
- Farming bots are common
- Aimbots are a different story
  - FPS hacks
- PvP combat bots help too
  - For use in RPG combat

How botting happens

- MACRO's & Scripts (most common)
- Memory read & write
- DLL Injection
- Debugging



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MACROs

- Inject keystrokes and mouse movement
- Sample pixels and read memory locations
  - Take over the GUI
  - Must dedicate the computer to this
  - Error prone
  - Screen and controls must be preconfigured exactly as required
- ACTool, AutoHotKey, AutoIt3.0, LTool-0.3, xautomation
- Example: WoW_Agro Macro (in chapter 2)


Xanier
7
Northshire Valley
N
There is nothing to attack.
[Xanier] whispers: im curently in atack mode
To [Xanier]: im curently in atack mode
[Xanier] whispers: lazydraw
To [Xanier]: lazydraw
[Xanier] whispers: im atempting to start atack mode
To [Xanier]: im atempting to start atack mode
[Xanier] whispers: lazydraw
To [Xanier]: lazydraw

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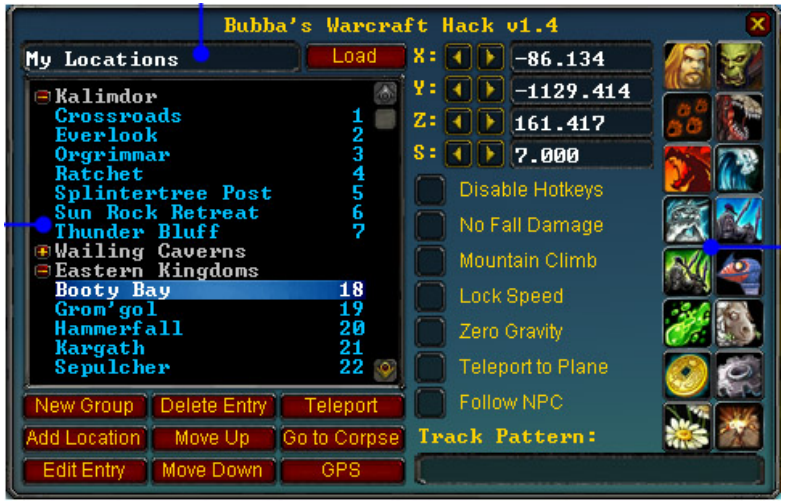
Process manipulation

- Read & Write memory data
  - Coordinates
  - Speed
  - Direction
- Use with a MACRO
  - Read data directly (instead of sampling pixels)
- Build fresh sploits
  - Map hacks
  - Teleporting
  - Speed hacks



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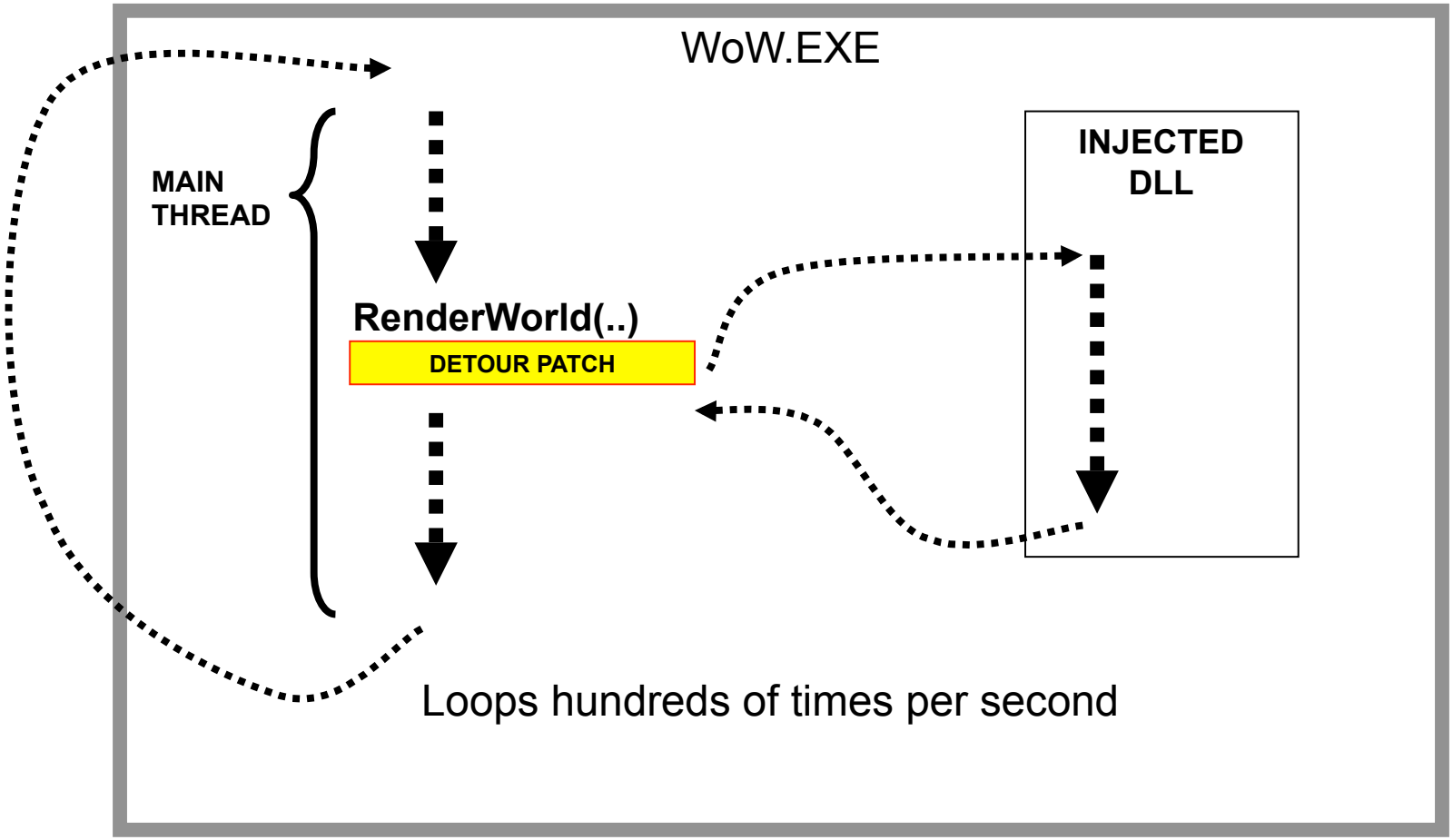
Thread hijacking

- Hijack main system thread
  - Eliminates thread safety issues
- Call internal functions within game client directly
  - Minimize the game program
  - Runs itself
  - Doesn't have errors in sampling
- Eliminates need for MACRO altogether

Thread hijacking

- Used in a few WoW botting programs



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Techniques for cheating

- Over the game (control the GUI)
  - keystrokes
  - mouse dropping
  - pixel sampling
- In the game (manipulating objects)
  - memory manipulation
  - finding objects (automatically)
- Under the game
  - 3D teleporting
  - DLL injection
  - be the graphics card
- Outside the game
  - sniffing
  - crypto cracking
  - kernel fu

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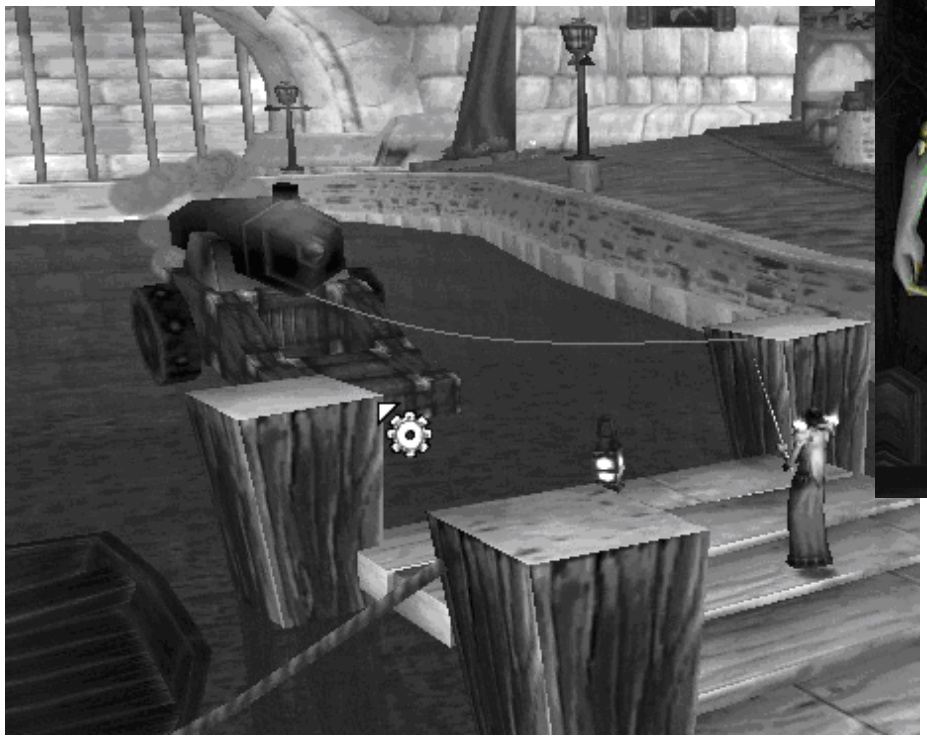
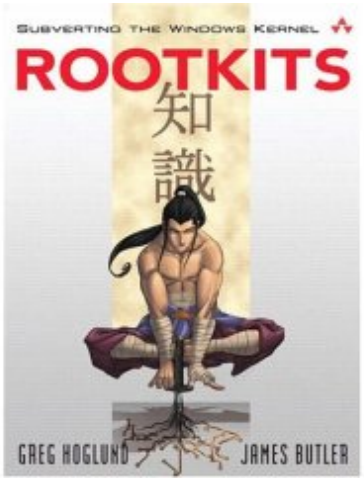
Total conversion and mod'ing

- Replace graphics with new graphics
- Replace client logic



Advanced game hacking fu

- See *Hacking World of Warcraft: An exercise in advanced rootkit development*
  - Greg Hoglund's presentation from Black Hat 2006
  - http://www.rootkit.com/vault/hoglund/GregSlidesWoWHack.rar



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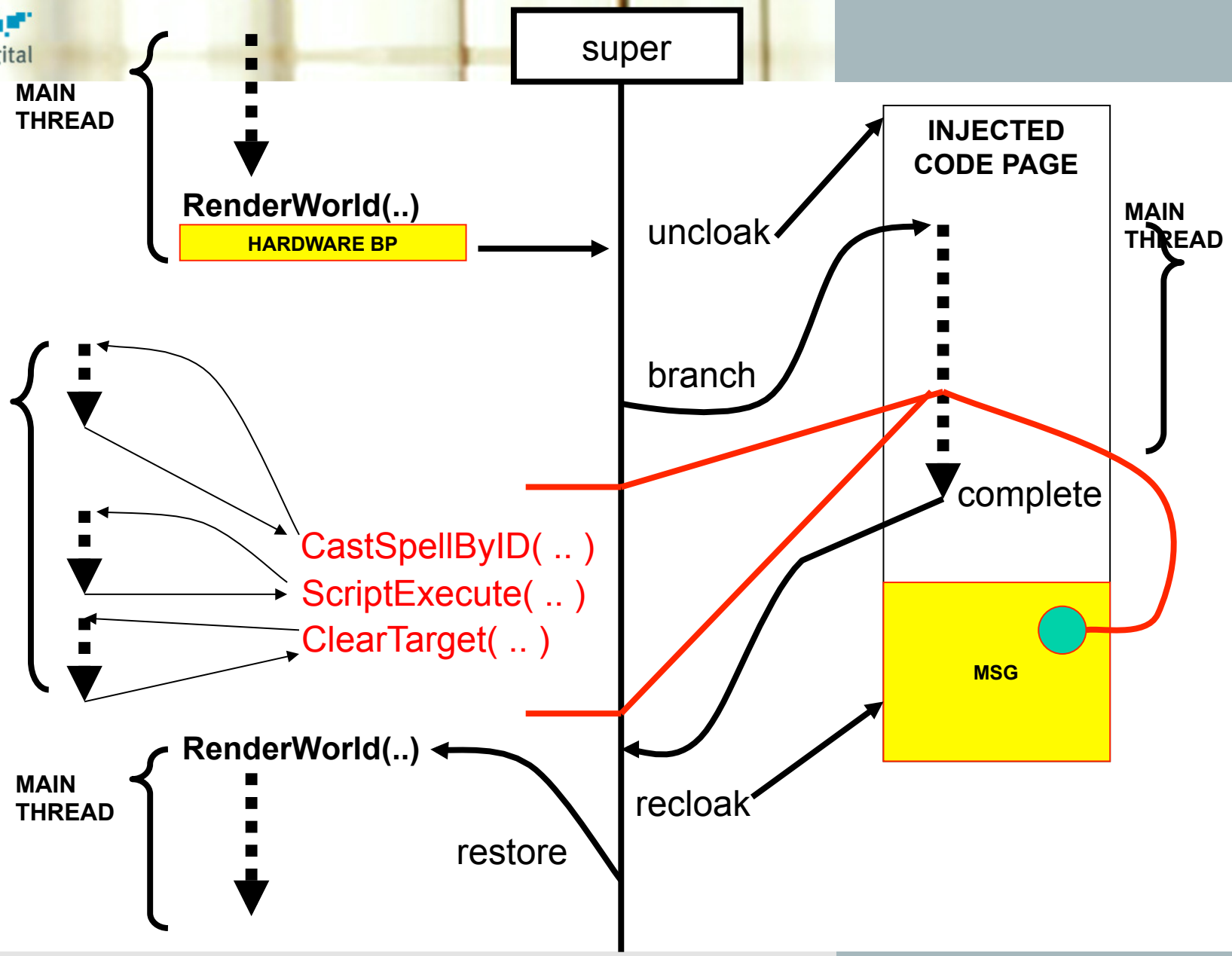
State of the art

- Combine injected payload with cloaking and thread hijacking to FORCE in-game events
  - Spell casting
  - Movement
  - Chat
  - Acquire and clear targets
  - Loot inventory



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Classic arms race

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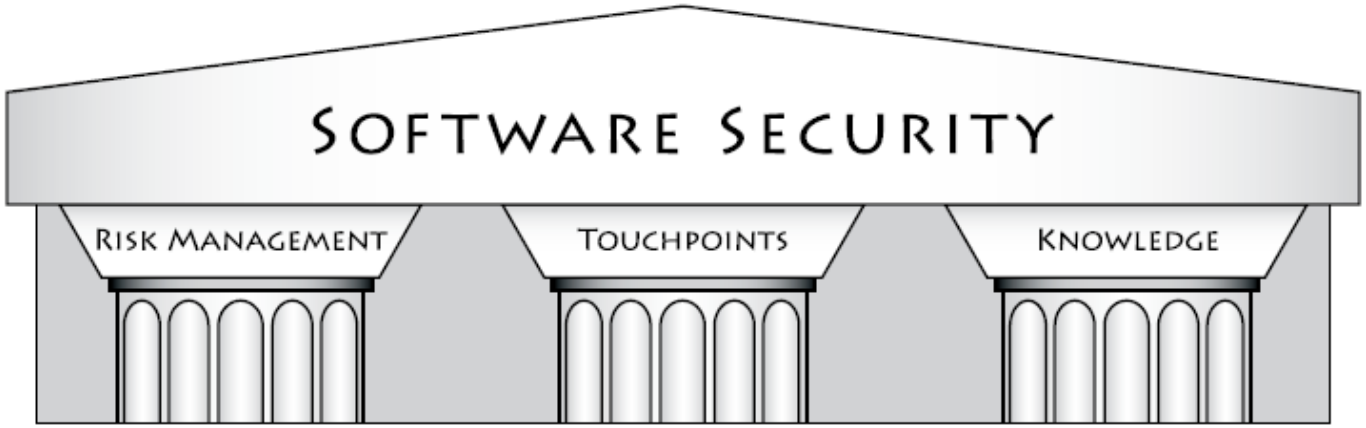
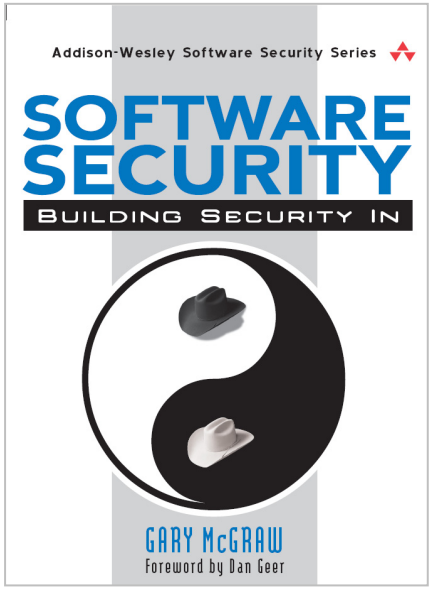
Breaking stuff is important

- Learning how to think like an attacker is essential
- Do not shy away from discussing attacks
  - Engineers learn from stories of failure
- Attacking class projects is also useful!

Solving the problem: Software Security

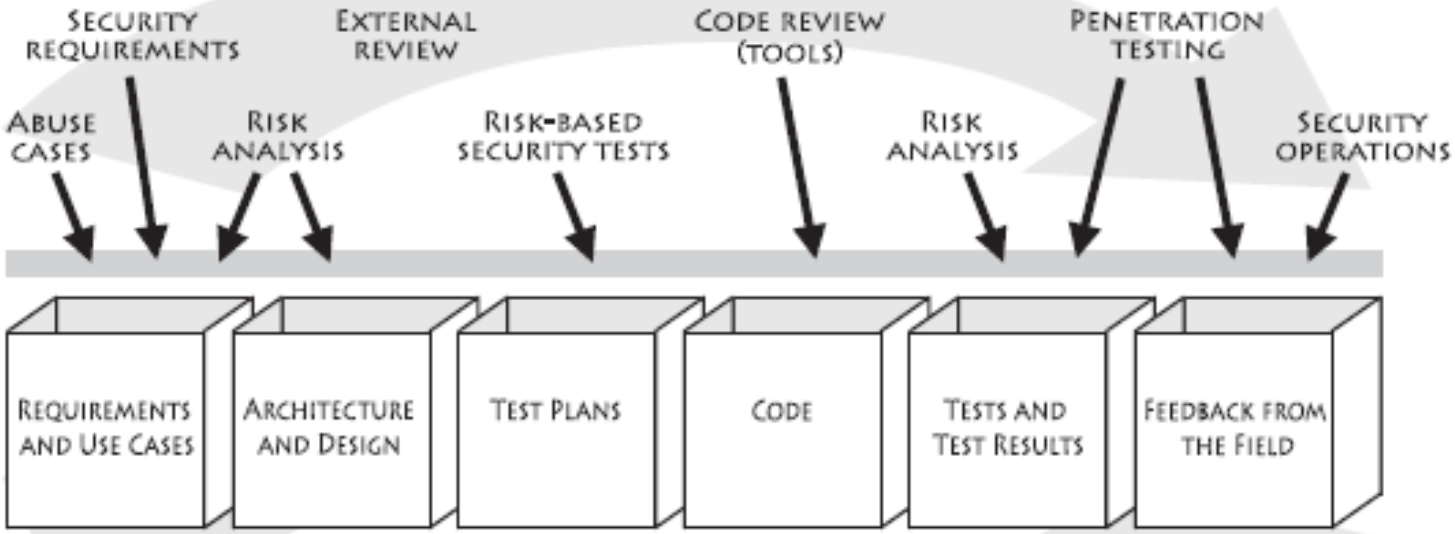




Three pillars of software security

- Risk management framework
- Touchpoints
- Knowledge

Software security touchpoints



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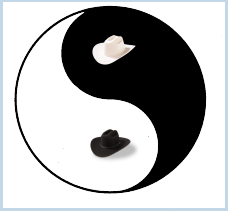
Using BSIMM

- BSIMM released March 2009 under creative commons
  - http://bsi-mm.com
  - steal the data if you want
- BSIMM is a yardstick
  - Use it to see where you stand
  - Use it to figure out what your peers do
- BSIMM is growing
  - More BSIMM victims (9+17 and counting)
  - BSIMM Europe
  - BSIMM Begin
  - Statistics
  - Correlations



Where to Learn More

informIT & Justice League

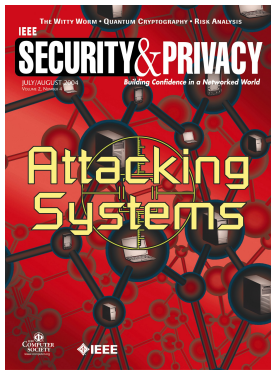
- www.informIT.com
- No-nonsense monthly security column by Gary McGraw

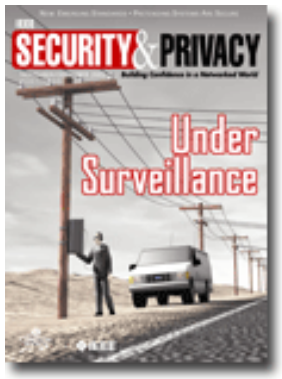
- www.cigital.com/justiceleague
- In-depth thought leadership blog from the Cigital Principals
  - Scott Matsumoto
  - Gary McGraw
  - Sammy Migues
  - Craig Miller
  - John Steven

IEEE Security & Privacy Magazine + 2 Podcasts

- Building Security In
- Software Security Best Practices column edited by John Steven
- www.computer.org/security/bsisub/

The Silver Bullet Security Podcast with Gary McGraw





- www.cigital.com/silverbullet
- www.cigital.com/realitycheck

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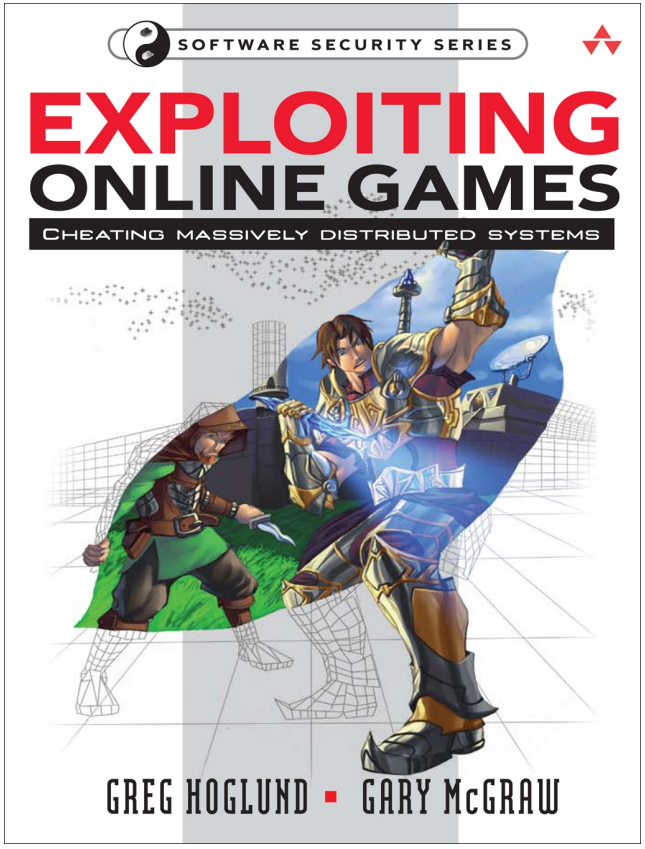
Exploiting Online Games: the book



- Cheating massively distributed systems
  - Sploits, hacks, mods
  - Key lessons for other software
- Part of the Addison-Wesley Software Security Series
- **AVAILABLE NOW**

Addison Wesley

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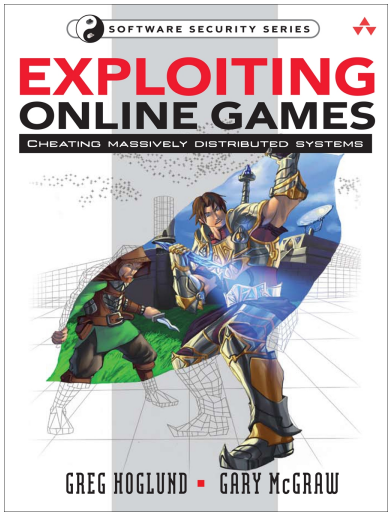
- Cigital's Software Security Group invents and delivers software security
- See the Addison-Wesley Software Security series
- Send e-mail: gem@cigital.com



For more

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"If we're going to improve our security practices, frank discussions like the ones in this book are the only way forward."

-Ed Felten
Princeton