The “Cracker World” is Connected

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Overview

- Who are the pirates of the 21st century?
- How do they work?
- Which tools do they use?
- How can we protect “us” against “them”?
- Questions & Answers

Traditional Pirates (16th/17th century)

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- The victims:
  - Hard-working farmers, craftsmen or artists
  - Hard-working ship owners and the ship crew
  - Ill-equipped soldiers on freight ships

  Prepared for the "market war" but not for real physical attacks

- The attackers:
  - Flexible, independent, small groups
  - Their power was the physical attack
  - Used the loot by themselves or sold it for a lower price

  Sometimes got rich with not much work

The dilemma of 16th/17th century

The risk that pirates will find a trading ship in open, unprotected water was assumed as low:

- Protection of a war ship was decided as too expensive
- Ship owners hoped that their ships would be safe
- Access to powerful weapons (canon etc) and qualified security staff was limited

Modern Pirates (21st century)

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- The victims:
  - Hard-working software designers and programmers
  - Hard-working software sales persons
  - Users of cracked software

  Prepared for the "market war" but
  not for real "exploiting software" attacks

- The attackers:
  - Flexible, independent, small groups
  - Their power is the knowledge (and their cracking tools)
  - Used the loot by themselves or sold it for a lower price

  Sometimes get rich with not much work

Modern pirates: How they work

Professional software of today is:

- License Management
  - User cannot use unlicensed software
  - User cannot use more licenses than he/she actually bought.
- Sophisticated programming
  - “Tricky” algorithms as core knowledge of the SW company
  - Usually not patented (to difficult, not always possible)
  - Source code is top secret or at least confidential
- Security modules
  - Different user rights, usually managed by passwords
  - Encrypted user data (text, picture, generic files)

Modern pirates: How they work (II)

Pirates attack the core of software:

- License management
  - Crack the license control mechanisms
  - Use/resell software, increase number of users
- Sophisticated programming
  - Disassemble interesting parts of software
  - Analyze implementation of secret algorithms
  - Use/resell knowledge to competitors or publish it
- Security modules
  - Crack the security mechanism
  - Use/resell secret user data or publish it

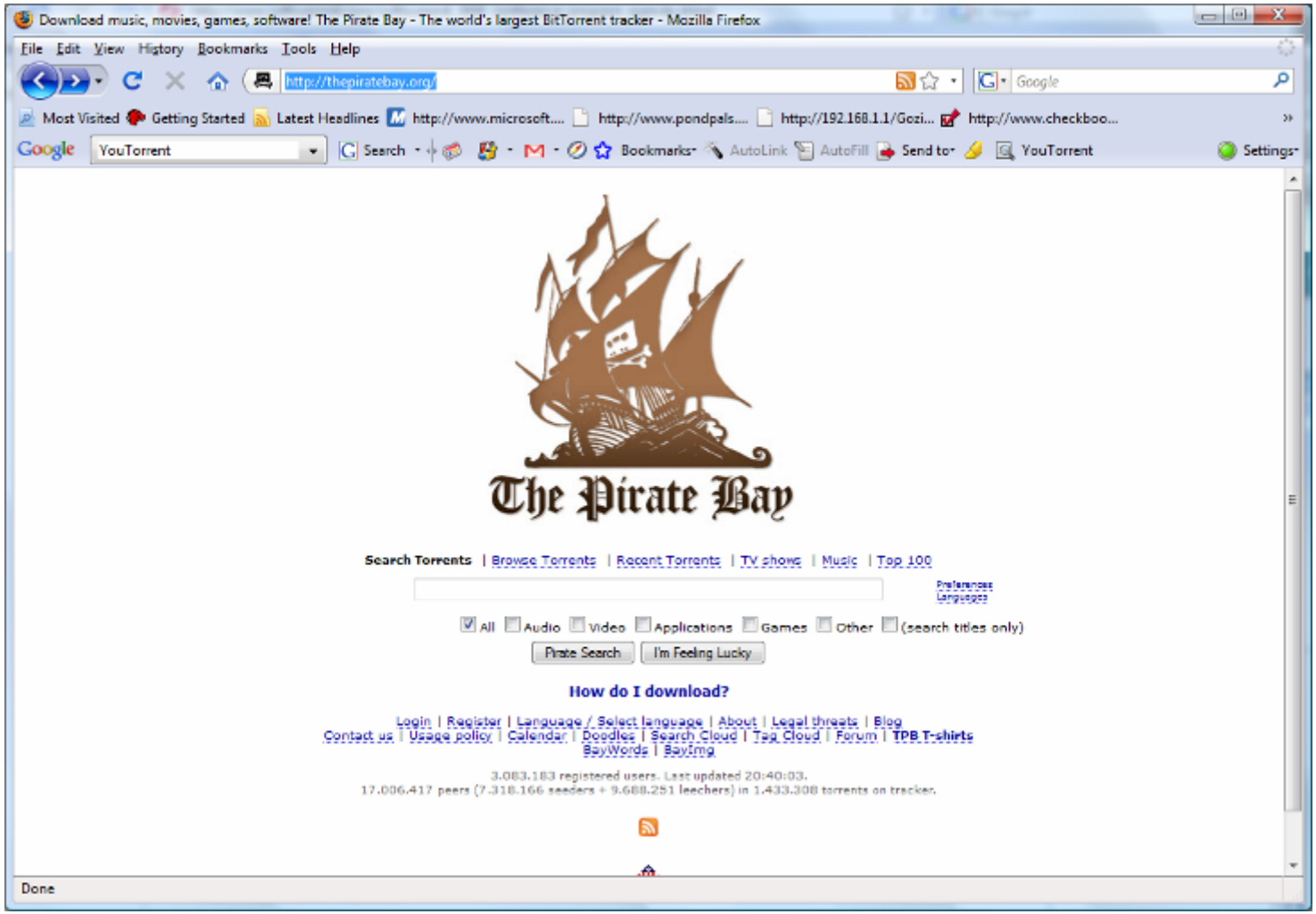
The dilemma of the 21st century

The risk that a software product is a target of pirates is assumed as low:

- Software has to be finished in high time-pressure
- Designer/programmer do not know how cracking works
- Access to powerful protection tools is difficult
- Knowledge about how to protect against cracking is low

The dilemma of the 21st century (II)

www.ThePirateBay.org



The dilemma of the 21st century (III)

"A Starbucks coffee shop with a wireless link may present an incredibly comfortable place from which to launch attacks […]

You are fairly safe if you're drinking coffee in a Houston Starbucks while launching an attack from
New Dehli over the border of China …"

From "Exploiting Software – How to Break Code"
by Greg Hoglund and Gary McGraw, Addison Wesley

Modern Pirates: Open Teams

Exploiting software can be difficult:

- Every step needs deep knowledge
  - Knowledge is complex and changes quickly

- Top crackers are usually highly specialized
  - Someone has the knowledge only (→ researcher)
  - Someone plans the suitable tools (→ designer)
  - Someone implements the tools (→ programmer)
  - Someone adapts the tools for real use (→ expert)
  - Someone uses the tools (→ cracker)
  - Someone sells the cracked software (→ dealer)

Modern Pirates: Open Teams (II)

Internet connects the open teams:

- Do not expect a proper website
- Outside of Google or other search engine
- Usually IP addresses only
  - Easy to switch, difficult to follow by legal investigation
  - Communication usually encrypted
- Entry points via newsgroups
  - “Experts” invites other “experts” dependent on knowledge
  - Knowledge is good protection against investigators

Which tools are they using (I)?

- Disassembler
  - IDA Pro – a commercial product
- Debugger
  - Olly Debug – freeware
- Finding "code of interest" (Crypto, Packing etc.)
  - PeID – freeware
- Restruct modified PE files
  - ImpRec – freeware

Which tools are they using? (II)

Microsoft .NET:

- Powerful programming model
- Powerful “cracking model”

My Favorite Tools:

- Red Gate’s .Net Reflector (Original Lutz Roeder)
- Microsoft Disassembler ILDASM
- Microsoft Assembler ILASM

Which tools are they using? (III)

WireShark:

- Universal network end-point and network communication tool
  - http://www.wireshark.org/
- Analyzes all traffic via TCP, UDP, IP etc.

Which tools are they using (IV)?

- SysInternals from Microsoft
  - www.sysinternals.com (Mark Russinovich)

Which tools are they using? (V)

Microsoft SysInternal Tools:

- RegMon
  "This monitoring tool lets you see all Registry activity in real-time."
- FileMon
  "This monitoring tool lets you see all file system activity in real-time."
- DiskMon
  "This utility captures all hard disk activity […]"

How tools are used?

Example: “License Setting via Machine Binding”

- Management Overhead for Licensor
  - Key Generator, Key Provider Website, Coding
- Annoying for Licensee
  - Change of Machine or parts of it needs re-licensing

- But: More or less easy to crack:
  - Machine identification is analyzed by system-call tracing tools (and these calls will then be faked)
  - Key Storage is file, disk or registry (what else?):
    - Microsoft’s RegMon, DiskMon and RegMon will tell all changes

How you can protect? (I)

C/C++ world (Assembler-based):

- Use newest compiler
  - Usually better code against buffer-overflow etc.
- Use highest optimization level
  - Especially inline-code (“forced inline”) helps a lot
  - High-optimized code is difficult to read, even for experts

How you can protect? (II)

.Net and Java World:

- Use obfuscation tools
  - Some are public-domain, some are “commercial grade”
  - Make it difficult to disassemble, re-source or modify intermediate code (MSIL, Java Byte Code)
  - Very few are really effective

How you can protect? (III)

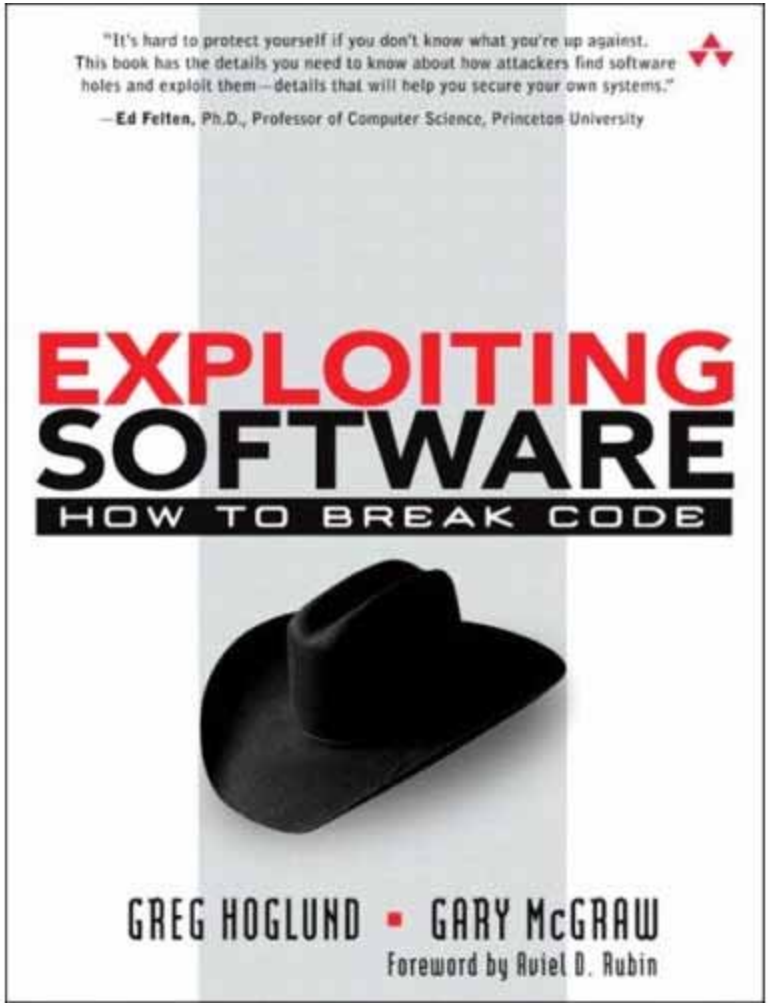
- Test with free cracking tools
  - See my List of Favorites

- Develop own Protection Technologies
  - Experience, Experience, Experience

The Bottom Line:

- Most developers do not have
  the time or knowledge
  to effectively avoid exploitation of their code

Further References (I)



Exploiting Software –

How to Break Code

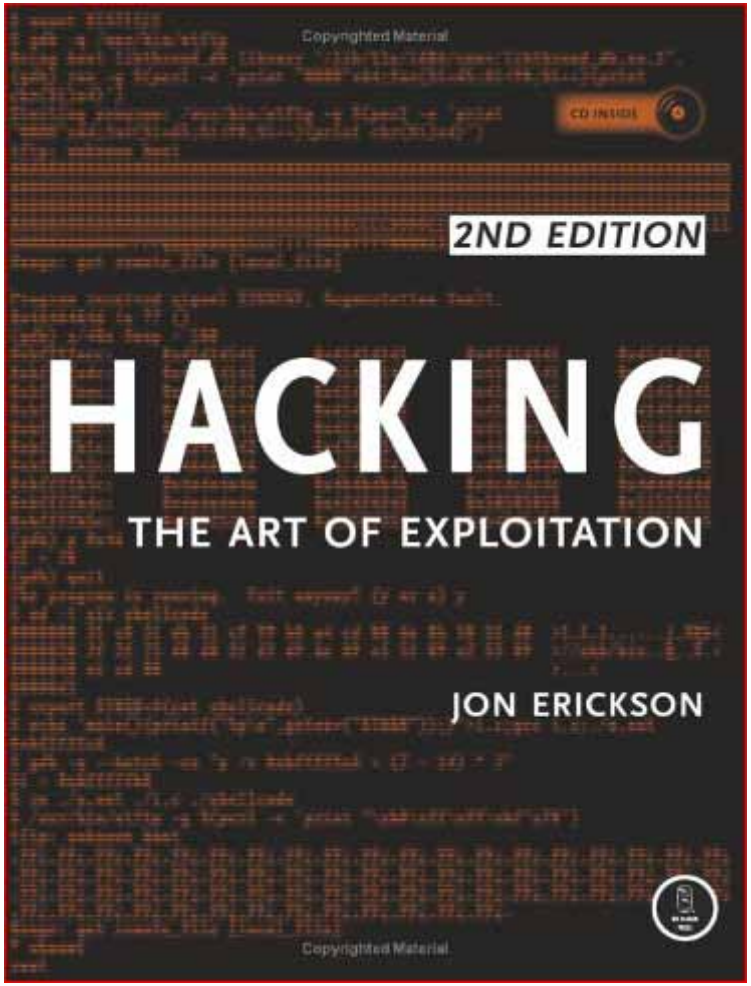
Greg Hoglund &
Gary McCraw

Addison Wesley, 2004

Amazon Review: 4.5 stars

(5: 17, 4: 8, 3: 2)

Further References (II)



"Reversing: Secrets of Reverse Engineering"
Jon Erickson

No Starch Press, 2008

Amazon Review: 4.5 stars

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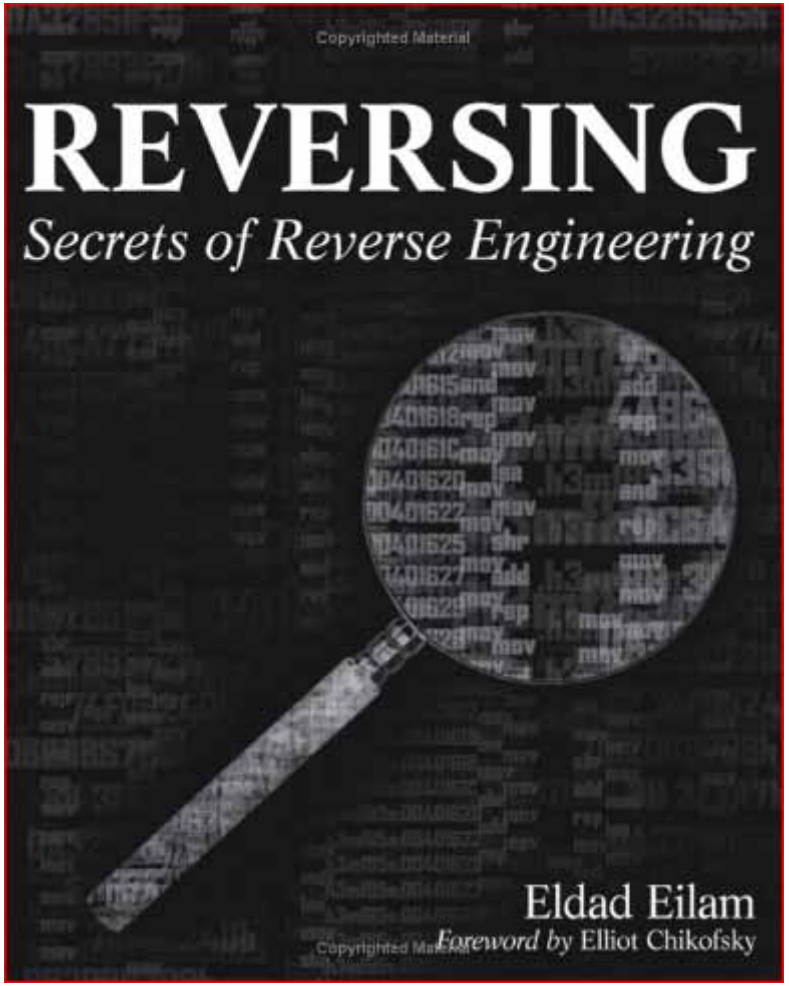

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Questions and Answers