Software Forensics

Robert M. Slade, MS, CISSP

rslade@vcn.bc.ca

http://victoria.tc.ca/techrev/rms.htm

Electronic Fingerprints

- Introduction and definitions
- Forensic linguistics signatures and fingerprints
- Presentation in court

Introduction and definitions

- digital forensics
- computer forensics - data recovery
- network forensics - packets, headers and logs
- software forensics - code analysis
- forensic linguistics
  - authorship analysis, stylistics, stylometry, forensic linguistics, or forensic stylistics

Objectives of Software Forensics/ Programming

- intention/purpose/function of malware
- versions and "families" of malware
- cultural or group identity of programmer
- specific identity of programmer

Software Forensics History

- Virus research
- Forensic programming

Forensic linguistics signatures and fingerprints

- Individual identification
  - Group identification
- Content analysis
  - Error analysis
- Non-content analysis
  - Additional non-content indicators

Objects and tools

- objects of analysis
  - text strings, source code, object (machine) code
- fp tools
  - trial runs (bait/goat systems/files)
  - hex editors
  - sector/disk access (f-pbr, f-boot, DEBUG)
  - disassemblers (DEBUG, Codeview, IDA Pro)

Knowledge base

- Assembly/machine language programming concepts
  - CPU structure, operations
  - registers, memory usage
  - opcodes, interrupts

Programming cultures and cultural indicators

- user interfaces and commands
  - (MS Windows/CUA, text editors)
- program structures (MS Windows vs UNIX)
- program versions (Ohio/Den Zuk)
  - virus and malware families and variants

    (Jerus
    a
    l
    em/sURIV, Melissa/Papa/credit charge message)
- compiler signatures

Programming cultures and indicators

- functions
- interface
- programming style
- program requirements
- most indicators come from reviewing/using many programs
- indicators change as development technology changes
  - in 1990 CUA indicated IBM experience, now indicates Windows

user interface

- - Winamp uses amplifier/stereo interface
- - DOS "/" switches
- - UNIX "-" switches
- - WordStar, Sidekick follow UCSD Pascal editor
- - Perfect Writer followed emacs
- help systems
- - Windows - tree structure and index - must know keyword
- - Word Perfect - keyboard shortcuts, function lookup, synonyms
- - PINE - key commands - only a few pages for the whole set

program structure

- Windows large multifunction programs
- UNIX small single function programs
- Windows APIs and libraries
- UNIX piping
- Windows interface integrated, down to OS level
- UNIX interface over simple programs

program requirements

- will program run on older CPUs, limited memory, limited disk space
- - originally programmed on limited hardware?
- - programmer used to limited hardware?
- does program conserve memory at the expense of cycles?
- - programmer used to limited memory, good program runs at all
- does program conserve cycles?
- - programmer used to "real time" programming restraints
- latter examples indicated at machine level only
- - only in optimized code, indicates assembly programming

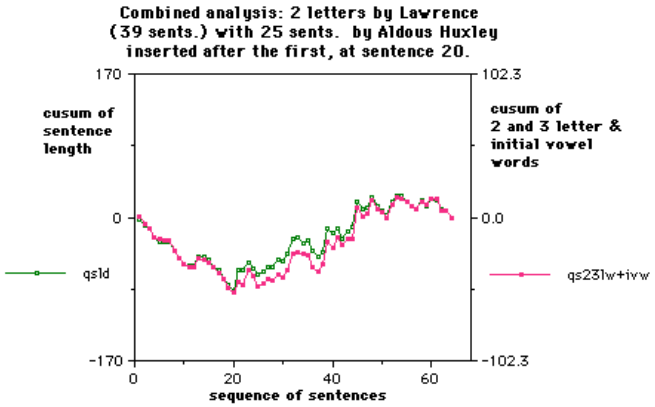
Function indicators

- heurisitc signatures (PSQR)
- operation/port scanning and logs
- Interrupts
- dangerous operations

Cusum analysis

- Cusum chart of text written by the same author
  - chart from "Analysing for Authorship" and may be found at http://hometown.aol.com/qsums

Cusum analysis



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Presentation in Court

- Rules of evidence
- Hearsay
- Technical issues
- Expert witness

Legal and ethical considerations

- Canadian law
  - "cause to be modified"
- international law
- evidence and proof
- ethical standards
  - "hacker code"
  - d
    isclosure and special considerations for malware
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Summary

- forensic linguistics provides strong corroboration
- these techniques must be presented carefully in court