Testing the Forensic Soundness of Forensic Examination Environments on Bootable Media

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TESTING THE FORENSIC SOUNDNESS OF FORENSICS EXAMINATION ENVIRONMENTS ON BOOTABLE MEDIA

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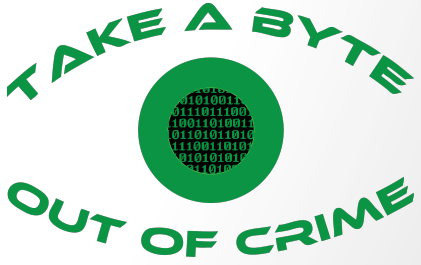
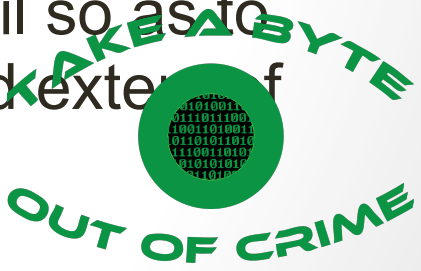
Introduction

- Many forensic bootable CD/DVD/USB Linux Distributions
- Bootable has advantages:
  - Conduct quick analysis on scene on a trusted OS
  - Examining without acquisition
  - Acquiring the RAM
  - Confronting suspect on scene
  - Provide known-good binaries for live examinations
  - No need to disassemble computer
  - Good for legacy hardware



Problem

- Despite utility, they might get called into question
- May change the suspect's system
  - So – its important to test forensic soundness of the live CDs
- We contend that alterations are permissible if:
  - Minimal in terms of their impact upon the data which is of evidentiary value,
  - Well-understood in terms of the nature and extent of those alterations, and
  - Documented properly and in sufficient detail so as to accurately represent the cause, nature, and extent of the alterations.



Apparatus

- Standard equipment found in most DF Labs
  - Suspect computer
    - Single HD and bootable optical drive
    - IBM Thinkpad T42
    - 40 GB disk
  - Forensic workstation
  - TABLEU Hardware writeblocker
  - Knoppix v7.0, Helix P3 Pro 2009R3, Kali Linux v1.0

Methodology

- Scenario performed
- Power down
- Remove Disk – connect to HD blocker
- Image disk (call this image img1)
- Reinstall disk
- Boot from bootable media
- Examine the data on drive and shutdown
- Remove disk, re-image (img2)
- Compare hash values and files

Knoppix Results

- Auto mount read/write
- Allowed us to create files from its graphical shell – logged on as default user
- C:\[root]\$I30
- C:\[root]\$MFT
- C:\[root]\Documents and Settings\Administrator\Local Settings\$I30
- C:\[root]\Program Files]Cisco Packet Tracer 5.3.1\sounds\ simulationTab.wav

Comparison of images for Knoppix v7.0

Image	SHA1 Hash Value
Img	e942df9b391053ce33a2ddfc8cdd19713413e43a
img'	fd041692beb80245c6468ae13a087b0df61cd892

d

Helix 3 Pro results

- C:\[root]\$I30
- C:\[root]\$MFT
- C:\[root]\WINDOWS\bootstat.dat
- Contents did not change, only access time stamp was changed

Comparison of images for Helix3 Pro 2009R3.

Image	SHA1 Hash Value
Img	6aa81d809c1c2bdff55baa8d4a8a95682718344d
img'	d454ab49357118618daaad214a40b66dc0ebd7df

Kali Linux

- Automatically mounted as read/write
- Unmounted partition, and mounted again as read
- 1. C:\[root]\$I30
  2. C:\[root]\$LogFile
  3. C:\[root]\$MFT
  4. C:\[root]\WINDOWS\bootstat.dat
- Contents did not change, only access time stamp was changed

Comparison of images for Kali Linux v1.0

Image	SHA1 Hash Value
Img	1c473f5fee75dec2e9c2703f57d2a2bac0a59b75
img'	693bbfe4fd20b6afbd7f3d581501cd6402af3c6a

Windows USB bootable forensic tool

- 1667 added files ☹

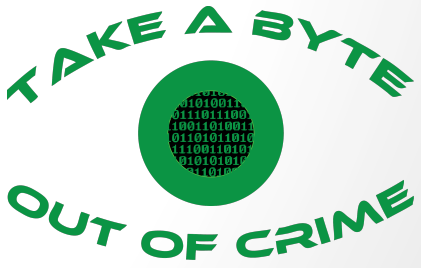
Summary

Summary of results.

	Helix3 Pro 2009R3	Kali v1.0	Knoppix v7.0
Hard disk altered?	Yes	Yes	Yes

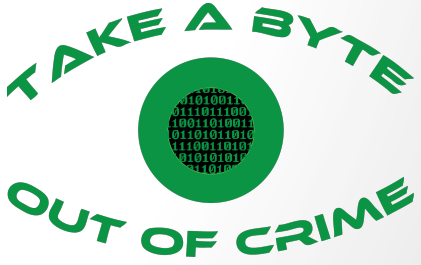
Files changed (hash values differ) during search	`$LogFile`
	`$MFT`
	`C:\WINDOWS\bootstat.dat`
		`C:\$I30`
		`$LogFile`
		`$MFT`
		`C:\WINDOWS\bootstat.dat`
			`C:\$I30`
			`$MFT`
			`C:\Documents And Settings\Administrator\Local Settings\$I30`
			`C:\Program Files\Cisco Packet Tracer 5.3.1\sounds\simulationTab.wav`

Forensic usage acceptable?	Yes	No	No



Future Work

- Predictability
  - Set of experiments with more types and kinds of computers
  - We have to verify predictable alterations (more testing)
- Broader testing
  - Experiments with other bootable environments
  - Test on other filesystems – we did our testing only on NTFS Windows XP systems
  - Deeper survey of all distributions and effects of mounting disks
- Deeper analysis
  - Investigate the causes of the changes
- Automate process
  - Create scripts to automate the testing process



Additional UNHcFREG Projects

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