A Strategy for Testing Hardware Write Block Devices

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Project Sponsors

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- State & Local agencies (Technical input)
- Internal Revenue, IRS (Technical input)

Protection Goals

- Prevent any change to data
- Allow access to entire user area
- Preserve the configuration of the drive
- May change a drive configuration – e.G., To access HPA or DCO

Prohibit Change by …

- Prohibit changes by a malicious program
- Prohibit accidental change (blunder)
- Prohibit change by operating system
- Prohibit damage to a drive
- Prohibit any changes to a hard drive

Write Block Strategies

- Block unsafe commands, allow everything else
  - + Always can read, even if new command introduced
  - - Allows newly introduced write commands

- Allow safe commands, block everything else
  - + Writes always blocked
  - - Cannot use newly introduced read commands

Creating a Specification

- Specification (informal) vs Standard (Formal ISO process)
- Steering committee selects topic
- NIST does research: tools, vendors, users
- NIST drafts initial specification
- Post specification on web for public comment
- Resolve comments, post final version

Writing the Specification

- Specification for a single forensic function
- Describe technical background, define terms.
- Identify core requirements all tools must meet.
- Identify requirements for optional features related to the function being specified.

Develop Test Assertions

- Each test assertion should be a single testable statement (or condition)
- Pre-condition: establish conditions for the test
- Action: the operation under test
- Post-condition: measurement of the results after the operation

Develop Test Cases

- A test case is an execution of the tool under test
- Each test case should be focused on a specific test objective
- Each test case evaluates a set of test assertion

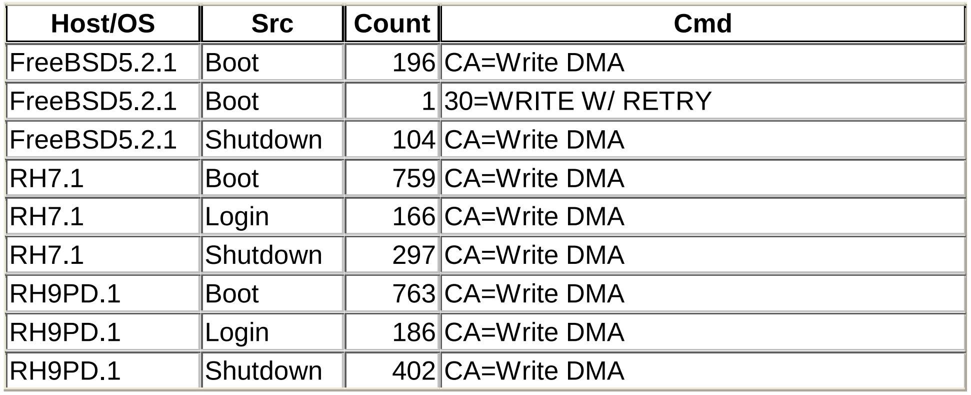
Develop Test Harness

- A set of tools or procedures to measure the results of each test assertion
- Must be under strict version control
- Must measure the right parameter (validated)
- Must measure the parameter correctly (verified)

Blocking Device Actions

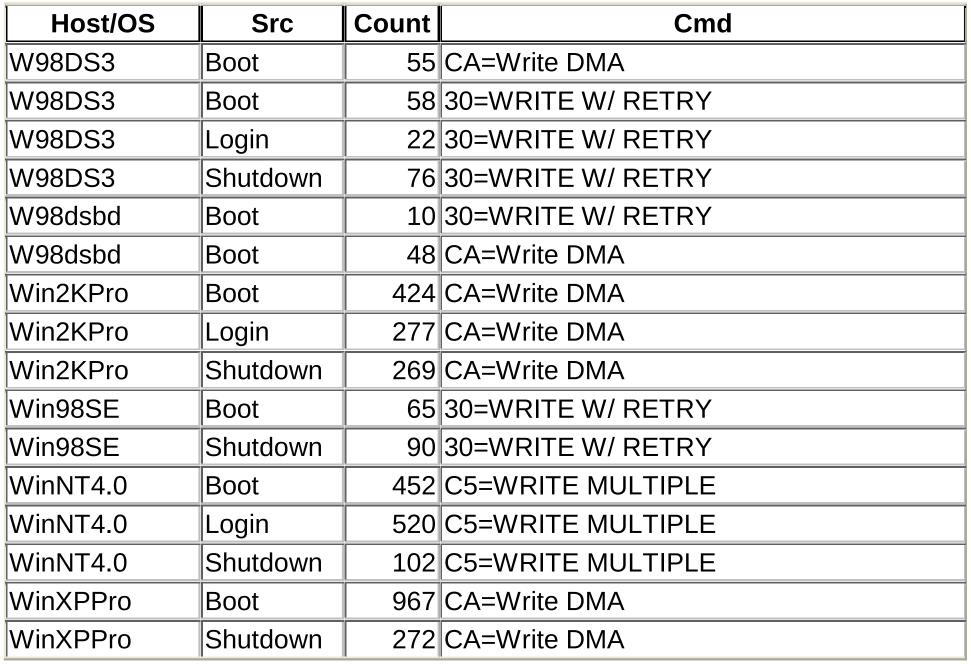
- The device forwards the command to the hard drive.
- The blocking device substitutes a different command
- The device simulates the command
- If a command is blocked, the device may return either *success* or *failure* back to the host
- Present the drive as a read-only device
- May issue commands without a command from the host

Write Commands Issued by OS (Unix)



Host/OS	Src	Count	Cmd
FreeBSD5.2.1	Boot	196	CA=Write DMA
FreeBSD5.2.1	Boot	1	30=WRITE W/ RETRY
FreeBSD5.2.1	Shutdown	104	CA=Write DMA
RH7.1	Boot	759	CA=Write DMA
RH7.1	Login	166	CA=Write DMA
RH7.1	Shutdown	297	CA=Write DMA
RH9PD.1	Boot	763	CA=Write DMA
RH9PD.1	Login	186	CA=Write DMA
RH9PD.1	Shutdown	402	CA=Write DMA

Write Commands Issued by OS (MS)



Host/OS	Src	Count	Cmd
W98DS3	Boot	55	CA=Write DMA
W98DS3	Boot	58	30=WRITE W/ RETRY
W98DS3	Login	22	30=WRITE W/ RETRY
W98DS3	Shutdown	76	30=WRITE W/ RETRY
W98dsbd	Boot	10	30=WRITE W/ RETRY
W98dsbd	Boot	48	CA=Write DMA
Win2KPro	Boot	424	CA=Write DMA
Win2KPro	Login	277	CA=Write DMA
Win2KPro	Shutdown	269	CA=Write DMA
Win98SE	Boot	65	30=WRITE W/ RETRY
Win98SE	Shutdown	90	30=WRITE W/ RETRY
WinNT4.0	Boot	452	C5=WRITE MULTIPLE
WinNT4.0	Login	520	C5=WRITE MULTIPLE
WinNT4.0	Shutdown	102	C5=WRITE MULTIPLE
WinXPPro	Boot	967	CA=Write DMA
WinXPPro	Shutdown	272	CA=Write DMA

Notable Blocker Behaviors

- allow the volatile SET MAX ADDRESS, block if non-volatile
- cached the results IDENTIFY DEVICE
- substituted READ DMA for READ MULTIPLE
- allowed FORMAT TRACK
- Depending on OS version, might no be able to preview NTFS partition

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