Monitor And Protect Your Data

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PATACS / OPCUG Joint Meeting

2016 November 19

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Modern Storage Devices Are Very Reliable...

- ...but they do fail
- How many of you have experienced a failure?

Do you know when your next failure will occur?

Would you like to?



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What Devices Are We Talking About?

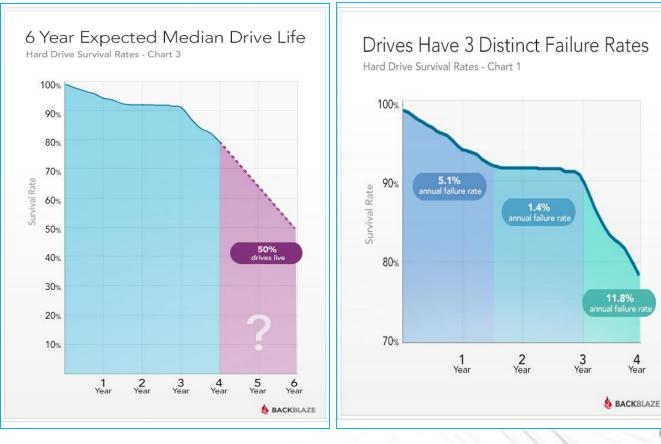
- Spinning Hard Drive
 - Internal
 - External
- Solid State Drive (SSHD)
- USB Memory Stick
- Memory Card (SD, microSD, etc.)
- Anything with firmware





Tried And True: Spinning Drive

- 5.1% AFR at 18 months
- 11.8% AFR at 3 years
- It gets worse after that
- Tip: More expensive Enterprise drives failed slightly more than consumer drives
- Source: Backblaze
 - How Long Do Disk Drives Last?
 - 60,000 spinning drives today
 - Detailed statistics since 2011



https://www.backblaze.com/blog/how-long-do-disk-drives-last/

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The New Standard: Solid State

- Definitely better performance
- Vendors claim return rates that are half (or less) of spinning drives
 - Tip: Their lips are moving
- When they fail, they fail quickly and hard
 - Tip: Check the warranty period
- Do you know what Write-cycle Exhaustion is?
 - All SSD devices will eventually fail, based on the number of write cycles (15-20 years)
- Source: Tom's Hardware
 - Is Your SSD More Reliable Than A Hard Drive?

With these [SSD] failures however, the drives were not recoverable at all. They generally disappeared completely, no longer being readable. Spinners die much more gracefully with an easier disk recovery...

http://www.tomshardware.com/reviews/ssd-reliability-failure-rate,2923-2.html

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A Window Into Your Device: S.M.A.R.T.

- Self-Monitoring, Analysis and Reporting Technology
- General ability of devices to monitor and report on metrics which determine the health of the device
- SMART code is stored in the firmware of the device, and runs whenever the device has power

Quick history of SMART:

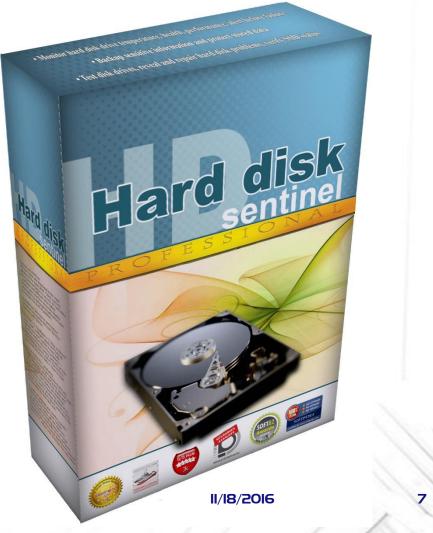
- Predictive Failure Analysis
 - IBM, 1992
- IntelliSafe
 - Group lead by Compaq, included Seagate, Quantum, Conner, and Western Digital
 - 1995, name changed to SMART

http://https://en.wikipedia.org/wiki/S.M.A.R.T./

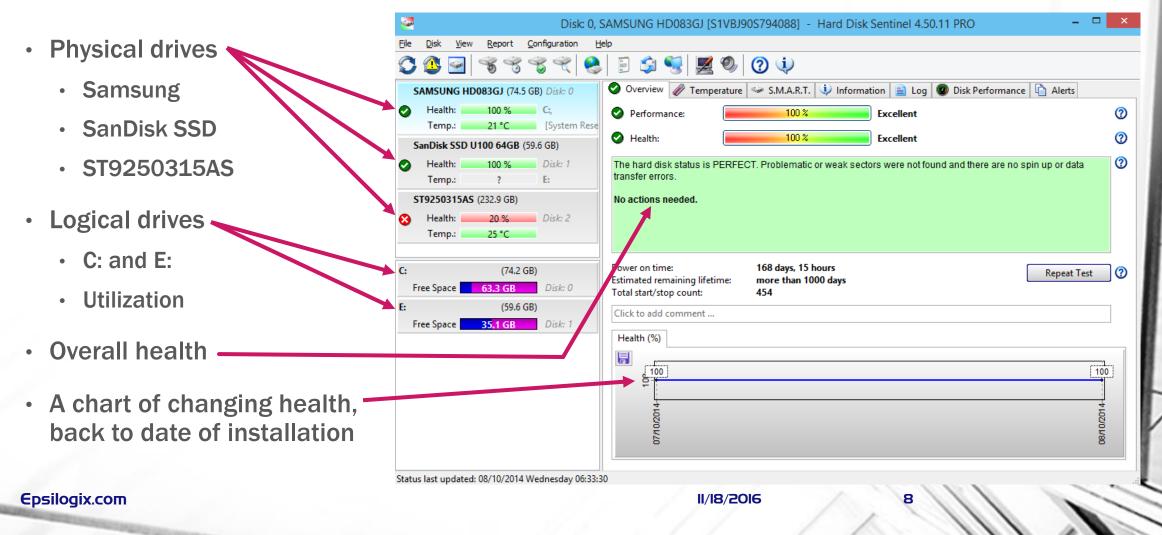
HD Sentinel: Know The Health Of Your Devices

- The very best use of SMART monitoring technology available anywhere
- There are other tools, but absolutely nothing that compares:
 - Extremely rich feature set
 - Platforms: NT Windows 10
 - Outstanding licensing terms
 - Support you will actually enjoy, if you need it

http://https://en.wikipedia.org/wiki/Comparison_of_S.M.A.R.T._tools/



Overview Tab



All You Really Need To Know

	Disk: 0, SAMSUNG HD083GJ [S1VBJ Ele Disk View Report Configuration Help	0S794088] - Hard Disk Sentinel 4.50.11 PRO – 🗖 🧮	×	
	000000000000000000000000000000000000000			
Overview:	SAMSUNG HD083GJ (74.5 GB) Disk: 0 Overview Temperature Health: 100 % C; Performance:	S.M.A.R.T. Unformation 🖹 Log 🚳 Disk Performance 🖒 Alerts	2	
	Temp: 21 *C [System Res SanDisk SSD U100 64GB (59.6 GB)	100 % Excellent		
	Health: 100 % Disk: 1 The hard disk status is PERFE transfer errors.	CT. Problematic or weak sectors were not found and there are no spin up or data		
	ST9250315AS (232.9 GB) No actions needed. No actions needed. Disk: 2			
	Temp: 25 °C			
	C: (74.2 GB) Preser on time: Free Space 63.3 GB D: Total start/stop count:	168 days 15 hours () a more than 1000 days 454		
	E: (15 and) Free Space Space Disk: 1 Health (%)			
	Health (%)	[:::::::::::::::::::::::::::::::::::::		
	07.4020	OPUL OCCU		
	Status last updated: 08/10/2014 Wednesday 06:33:30			
📀 Overview 🥒 Temperature	🗇 S.M.A.R.T. 🔍 I	nformation 📄 Log 🕻	Disk Performance 🚹 Alerts	
Performance:	100 %	Excellent		(?)
Health:	100 %	Excellent		(?)
The hard disk status is PERFE	CT. Problematic or we	ak sectors were not foun	d and there are no spin up or data	0
transfer errors.				-
tiansier enors.				
No actions needed.				
				11
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Temperature Tab

- Temperature:
 - Celsius or Fahrenheit
 - Current/Average/Max/Min
 - Chart of the values above, back to date of HD Sentinel installation

📀 Overview 🧳 Temperature 👒 S.M.A.R.T. 🔱	Information 📄 Log 👰 Disk Perform	nance 🚹 Alerts
🤣 Current Temperature:	<mark>36</mark> ℃	Set custom temperature thresholds
🥥 Average Temperature (today):	35.12 °C]
🧿 Maximum Temperature (today):	38 °C)
Maximum Temperature (during entire lifespan):	46 °C)
Maximum Temperature (ever measured):	43 °C	11/1/2016 7:21:57 PM
Minimum Temperature (ever measured):	25 °C	8/26/2016 6:36:16 AM

Temperature status is good.

It is recommended to calibrate the temperature and set the temperature offset on the S.M.A.R.T. page. This way later the correct temperature value will be displayed.

Current (°C)	Daily	/ Avei	rage	(°C)	Dai	ly Ma	ximu	m (*C) Da	ily M	inim	um (°(C)														
H 4	5															;						·						
4	0	3 3	3 3	3 3	33	3 3	3 3 3	33	3 33	33	3 3	<u>13</u>	3 3 3	3 3.	3 3	3 3	3 3 3	3	3 3	3 3	3 3	3 3	3 3	3 3	3	3 3	3	36
3	-																											
2	5 0	Σ	PM	PM	M	PM	PM	PM	PM	PM	PM	MH	PM	PM	PM	M	M	PM	Mo	Md		×	×	PM	M	20		
	1:00 PI	21:09 PI	31:17 PI	:41:26 PI	:51:34 PI	2:01:42 PI	2:11:51 PI	2:21:59 PI	2:32:07 PI	2:42:16 PI	2:52:24 PI	3:02:33 PI	3:12:41 PI	3:22:50 PI	3:32:58 PI	3:43:06 PI	3:53:15 PI	4:03:23 PI	4:13:32 PI	_	_	_	4:43:57 PI	4:54:06 PI	5:04:14 PI			5:24:31 PM

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S.M.A.R.T. Tab

- Key attributes that are monitored:
 - Their current values and status
 - Ability to adjust and compensate for errors in vendor setup
- When will you need to look here?
 - Typically, only if you have a question, and Support asks you to

No.	Attribute	Threshold	Value	Worst	Status	Data	Offset	Enable	
	Raw Read Error Rate	51	200	200	ОК	00000000000	— o 🛨	✓	
2 3	Spin Up Time	21	188	170	ОК	0000000061E	— o 🛨	~	
4	Start/Stop Count	0	100	100	OK (Always passing)	00000000054	— o 🛨	✓	.
95	Reallocated Sectors Count	140	200	200	ОК	00000000000	— o 🛨	~	
7	Seek Error Rate	0	200	200	OK (Always passing)	00000000000	— o 🛨	~	
9	Power On Time Count	0	84	84	OK (Always passing)	00000002FB2	— o 🛨	~	
2 10	Spin Retry Count	0	100	253	OK (Always passing)	00000000000	- 0 +	V	
11	Drive Calibration Retry Co.	0	100	253	OK (Always passing)	00000000000	— o 🛨	~	
12	Drive Power Cycle Count	0	100	100	OK (Always passing)	0000000004A	— o 🛨	~	
191	G-Sense Error Rate	0	1	1	OK (Always passing)	000000006C6	— o 🛨	~	
192	Power off Retract Cycle C	0	200	200	OK (Always passing)	0000000000C	— o 🛨	~	
193	Load/Unload Cycle Count	0	197	197	OK (Always passing)	00000002A6C	— o 🛨	~	
194	Disk Temperature	0	111	101	OK (Always passing)	00000000024	— o 🛨	~	
196 🕗	Reallocation Event Count	0	200	200	OK (Always passing)	00000000000	— o +	Image: A start and a start	
סיייייין 17 17 17 17 17	etry Count	0 0 (0	0 0	000000	Flags Self Preservir Performance,	Štatistical, Cr		
-1910/00/2	7/26/2016 8/2/2016 8/9/2016 8/15/2016 8/22/2016	9/4/2016 9/11/2016	9/24/2016	10/1/2016	10/14/2016 10/21/2016 11/3/2016 11/10/2016 11/17/2016	Attribute graph			•

Information Tab

- Information:
 - Vendor and Model
 - Interface
 - Firmware version
 - Every feature the drive supports

 Much more information than you ever wanted to know

Hard Disk Summary		Π
Hard Disk Summary	0	
Interface	S-ATA Gen3, 6 Gbps	
Disk Controller	Intel(R) Mobile Express Chipset SATA RAID Controller (RAID) [VEN: 8086,	
Hard Disk Model ID	WDC WD7500BPKX-75HPJT0	
Firmware Revision	01.01A01	
Hard Disk Serial Number	WD-WXC1E841TP0Z	
Total Size	715402 MB	
Power State:	Active	
Fower state.	Active	
Logical Drive(s)		
Logical Drive	C: [System2]	
Logical Drive	D: [Data2]	
ATA Information		
Hard Disk Cylinders	1 453521	
Hard Disk Heads	16	
Hard Disk Sectors	63	
ATA Revision	ATA8-ACS	
Transport Version	SATA Rev 2.6	
Total Sectors	183143646	
Bytes Per Sector	4096 [Advanced Format]	
Buffer Size	16384 KB	
Multiple Sectors	16	
Error Correction Bytes	50	
Unformatted Capacity	715405 MB	
Maximum PIO Mode	4	

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Performance Tab

• Performance:

- Count of data read and written, back to date of HD Sentinel installation
- General statistics
- Real-time chart of activity

Transfer Rate Information	
Total Data Read	945,616 MB, 947,217 MB since installation (7/20/2016)
Total Data Write	418,113 MB, 418,646 MB since installation
Average Reads Per Day	7,893.48 MB
Average Writes Per Day	3,488.72 MB
Current Transfer Rate	0 KB/s
Average Transfer Rate	39 KB/s
Maximum Transfer Rate	349,161 KB/s
Current Read Rate	0 KB/s
Current Write Rate	0 KB/s
Current Disk Activity	0%
Average Disk Activity Estimated Max. Transfer Rate	0.19 % 593,847 KB/s [516x DVD Write Speed]
Disk Activity %	Transfer Rate (MB/s)
Disk Activity %	Transfer Rate (MB/s) 350 280 210

Configuration Options You Will Want To Set

- Preferences
 - Language/Units
- Alerts
 - Enable Sound and Display options
- Message Settings
 - Enable Display on Screen and disable Send E-mail if not used
- Disk Control
 - Select Modify default disk icons
- Send Test Report
 - Click Update Test Report to generate it; no need to save it

Configuration - Hard Disk Ser	Alerts	_	_	_	X
 Preferences Status Window Thresholds / Tray Icon 	Warning	: Sound alert	Send/display message	Panic backup	Shut down
Alerts	When failure expected	v	V		
 Message Settings E-mail Configuration Registration Update Advanced Options 	When disk health is low Below 50 % Below 25 % When temperature is too high 50 Above 50 °C		> >		
Disk Control Hot Keys Operations	57 Above 57 °C When a new log entry is added When free disk space is low				
Send Test Report	Select Sound File		Set Free Disk	Space Thre	shold
	Repeat sound alert	Sei	nd daily status	; e-mails	
	Use PC Speaker	At	12:00		
	Test Sound Alert	Dis 📃 Dis	able tray icon	bubble ale	rts
		ОК	Can	icel	<u>H</u> elp

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Options To Seriously Consider: Email

- E-Mail Configuration
 - HD Sentinel will generate a complete report and email it to you when an Alert you checked is triggered
 - Set it up as you have your standard email client
 - Test with the Mail Test
 button
 - Remember to go back to Message Settings and enable Send E-mail if you disabled it previously

Configuration - Hard Disk Sen	tinel 4.71 PRO	×
Hard Disk Drives	🗐 E-mail Configu	ration
 Status Window Thresholds / Tray Icon Alerts Message Settings E-mail Configuration Registration Update Advanced Options Disk Control Hot Keys Operations Integration Send Test Report 	Mail account: Sender name: Sender e-mail: SMTP server: Recipient e-mail: CC (carbon copy): BCC (blind carbon copy): Authentication Options (Leave the Username: Password:	Port: Port: Mail Test se fields blank if not required) Use SSL
] [OK Cancel <u>H</u> elp

Options To Seriously Consider: Panic Backup

• Operations:

- Create a new Project
- The project uses your backup software (or your own) command to back up your data
- Go to Panic backup tab
- Add your new project to the list
- Panic Backup will run the command automatically if an Alert you checked is triggered

Configuration - Hard Disk Sent	inel 4./1 PRO
 Hard Disk Drives Preferences Status Window Thresholds / Tray Icon Alerts Message Settings E-mail Configuration Registration Update Advanced Options Disk Control Hot Keys Operations Integration Send Test Report 	Operations Projects Schedule Panic backup Project name: New Remove Comment: Project type: Run external application or batch file Start Now Command line: Start invisible, without displaying window Alert on error Alert will be generated (based on the configured message settings) if the external application completed with an exit code other than 0.
	Save Restore Default Projects
	OK Cancel <u>H</u> elp

HD Sentinel: Remember This Summary

- Modern devices (both spinning and solid state) collect data on dozens of metrics, and constantly monitor their own health
- Knowing the health of your devices allows you to correct transient problems (like overheating or disk filling up), but also to predict with reasonable accuracy when your drives will fail
- There are no built-in platform tools which expose this health information (only a single word displayed in Windows Disk Management)
- There are no built-in platform tools that provide automation to address any issues detected
- HD Sentinel provides a window to health information, monitors it, and allows you to decide which threshold conditions you want to be told about or act on
- The goal: Once configured, ignore HD Sentinel and continue with your normal work, unless
 you are notified there is a problem

Acknowledgements, And An Offer You Can't Refuse

- Gabe Goldberg (regular attendee, in our audience today)
 - Gabe's review of HD Sentinel, with an offer you really can't refuse:
 - http://apcug2.org/monitor_and_protect_your_hard_drive/
 - Discount of 40% off the 5-copy family license regular price of \$53, through December 24, 2016
 - Use the coupon code found on that page
 - Licenses are permanent, shareable with family and friends, and include all future versions
 - Net cost to you: \$32, or \$6.40 per computer!!!
 - <u>http://patacs.org/recmtgspat.html</u>
- Janos Mathe
 - CEO of H.D.S. Hungary and Lead Developer
 - An exemplary vendor, in every way

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References

- HD Sentinel:
 - http://www.hdsentinel.com/faq.php
 - http://www.hdsentinel.com/smart/index.php
 - http://www.hdsentinel.com/knowledgebase.php
- Other Sources:
 - https://en.wikipedia.org/wiki/S.M.A.R.T.
 - <u>https://en.wikipedia.org/wiki/Comparison_of_S.M.A.R.T._tools</u>
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 - <u>https://www.usenix.org/legacy/events/fast07/tech/schroeder/schroeder_html/</u> index.html

