# **RAMDISK Benchmarks**

Test system: Nehalem Core i7 950 and 4 GByte RAM Software OS: WIN7 32-bit (max 4Gbyte RAM) Setup: 2 GByte RAMDISKs from different software vendors Hypothesis: RAMDISKs have different performance due to their implementations License: All material, pictures can be freely reused with proper attribution (CC-by) Author: Tobias Kind / FiehnLab 2009 / fiehnlab.ucdavis.edu

🖉 System	A REAL PROPERTY OF TAXABLE PARTY.		👰 Windows Task Mana	ger			
Cano v 💌 🗸 All Control Panel I	teme - Sustem -	Search Control Panel	<u>File Options View H</u> el	P			
	tems • System •		Applications Processes	Services	Performance Netv	vorking Users	
Control Panel Home	View basic information abo	ut your computer	CPU Usage	CPU Usage H	listory		
😵 Device Manager	Windows edition						
Remote settings	Windows 7 Enterprise	$\frown$	0%				
😵 System protection	Copyright © 2009 Microsoft rights reserved.	Corporation. All			لمكر الأصححار		
Reference of the settings Reference of the settings Reference of the setting s	ngrits reserved.		Memory	Physical Men	nory Usage History		
			2.36 GB		C System		
	12001010		Total	3583	Handles	9189	
	System		Cached	563	Threads	450	
(1)	Rating:	System rating is not available	Available	1158	Processes	33	
See also	Processor:	Intel(R) Core(TM) i7 CPU 950 @ 3.07GHz	Free	660	Up Time	0:00:09:38	
Action Center		3.46 GHz	- Kana al Maranama (MID) -		Commit (MB)	2474 / 7163	
Windows Update	Installed memory (RAM):	3.50 GB	Kernel Memory (MB) = Paged	58			
Performance Information and	System type:	32-bit Operating System	Nonpaged	19	😚 <u>R</u> esourc	e Monitor	
Tools	Pen and Touch:	No Pen or Touch Input is available for this Display					

# Used disk benchmark tools:

- CrystalDiskMark crystalmark.info
- HDTach (trial) www.simplisoftware.com
- HDTune (trial) www.hdtune.com
- Atto www.guru3d.com

**Direct IO Disks** - can be mounted as virtual disk and can be used with drive letter - are **not** seen by Windows Disk Manager or HDTune/HDTach

- faster than direct disk mode (SCSI)

#### **Comments:**

- Error may be as high as 20%;
  - Older unsupported tools such as ATTO may have caching issues
  - Direct IO is faster than direct disk mode
  - Two test with two repeats, fastest result taken for table
  - FAT and FAT32 and NTFS results mixed

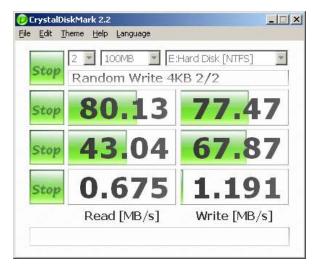
See a collection of other HD benchmark tools at http://www.benchmarkhq.ru

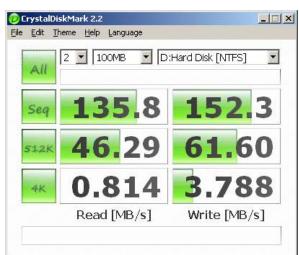
# Ramdisk performance results for Windows 7

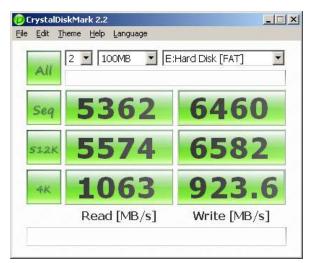
		Sequentia	l [MB/s]	Random 5	12k [MB/s]	Random 4k	[MB/s]	Average (ALL)
Num	Name	Read	Write	Read	Write	Read	Write	Score
1	QSOFT Ramdisk Enterprise	5362	6460	5574	6582	1063	924	4327
2	VSuite Ramdisk (prof.)	4544	5269	4731	5247	1000	795	3598
3	Gili Ramdisk	3684	4684	4213	4857	610	541	3098
4	Virtual Hard Drive 2 Pro	4654	4006	4365	4186	719	623	3092
5	StarPort iSCSI Initiator	4441	5179	3992	4493	186	188	3080
6	SuperSpeed RamDisk Plus	4409	4995	3995	4492	199	193	3047
7	ImDisk Virtual Disk Driver	3923	4500	3176	3556	81	63	2550
8	Cenatek Ramdisk	3215	3573	2902	3054	225	197	2194
9	RamPhantom 7	3414	3835	2717	2871	53	57	2158
10	Gavotte Ramdisk	3314	3531	454	460	4	4	1295
11	Everstrike DiskBoost	NA	NA	NA	NA	NA	NA	NA
12	AR RAM Disk	NA	NA	NA	NA	NA	NA	NA
13	StarWind iSCSI 4.0	NA	NA	NA	NA	NA	NA	NA
14	Moio Systems RAMDisk	NA	NA	NA	NA	NA	NA	NA
15	Cenatek RAMDISK XP	NA	NA	NA	NA	NA	NA	NA
16	ERAM for Windows	NA	NA	NA	NA	NA	NA	NA
17	Microsoft KDMF/DDK	NA	NA	NA	NA	NA	NA	NA
		Testsystem	: Core i7 @	3.5GHz; DDF	3 RAM; WIN7	32-bit; Crys	talDiskmark 2	2.0; Error +/- 209

- A fast Ramdisk or ramdrive can deliver more than 5 GByte/sec seq. throughput
- Good support and signed drivers are important; Backup option is important
- Easy installation and de-installation as well as convenient GUI are a large plus
- CPU penalty for Ramdisk use is one CPU core due to RAMDISK and FS overhead
- Commercial and free versions can be used (performance is not ultimate measure)

# Benchmark of HDs vs. RamDisks vs. SSDs







Single HD Seagate 750 GByte HD ST3750528AS RAID10 (Intel Matrix RAID) WD RE3 750 GByte HD WD7502ABYS Single RamDisk QSOFT Ramdisk Enterprise

- How about consumer SSDs? They can reach several hundred MByte/sec but not more.
- IOPS for RAMDISKS: 30000-40000 @ 512 bytes and 4 kBytes
- How about external or PCI-X based SSDs like Fusion IO? The can reach 1000 Mbyte/sec.
- Cheapest DDR3 4Gbyte ~ 200 Dollars ; a 64 GByte RAMDISK would cost 3200 Dollar (4RAM)
- A fast SSD or disk RAID array (RAID10 or RAID6) should be used for the production system
- A small RAMDISK with few GBytes can be used when top performance is needed.
- Using a RAMDISK has a penalty of one CPU core in use due to filesystem and ramdisk overhead.

Product name: SuperSpeed RamDisk Plus / RamDisk Product version: 10.0.1.0

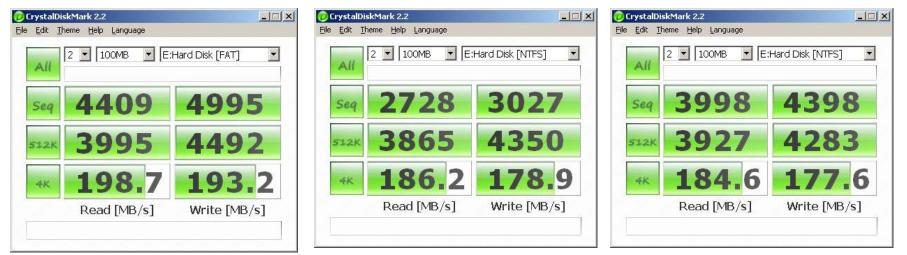
Source: <u>www.superspeed.com</u> (trial)

RamDisk Plus 10.0	)												×
<u>File Action H</u> elp													
02	6		P 🛛 🗞	3									
	No.	Size (MB)	Drive Letter	File System	Virtual	Rem	Partit	Zero	Save	Rese	Image Root	Memory allocation	
RAM Disks	1	2000	Ε:	FAT	F	F	Т	F	F	F	C:\	NUMA Nodes: 0	
	•												F
For Help, press F1												NUM	

- Utility: Easy to use, no installation issues; single program with Backup; WHQ certified no driver signature required
- Price: RAMDISK plus 64-bit: 99 Dollar

# Product name: SuperSpeed RamDisk Plus / RamDisk Product version: 10.0.1.0

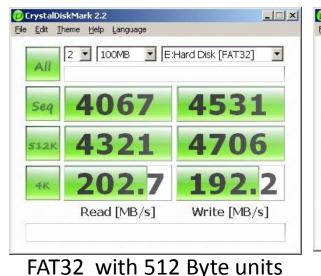
#### Max CPU utilization (8 logic CPUs): 25%



FAT with 32 kByte units

#### NTFS with 4 kByte units

#### NTFS with 64 kByte units



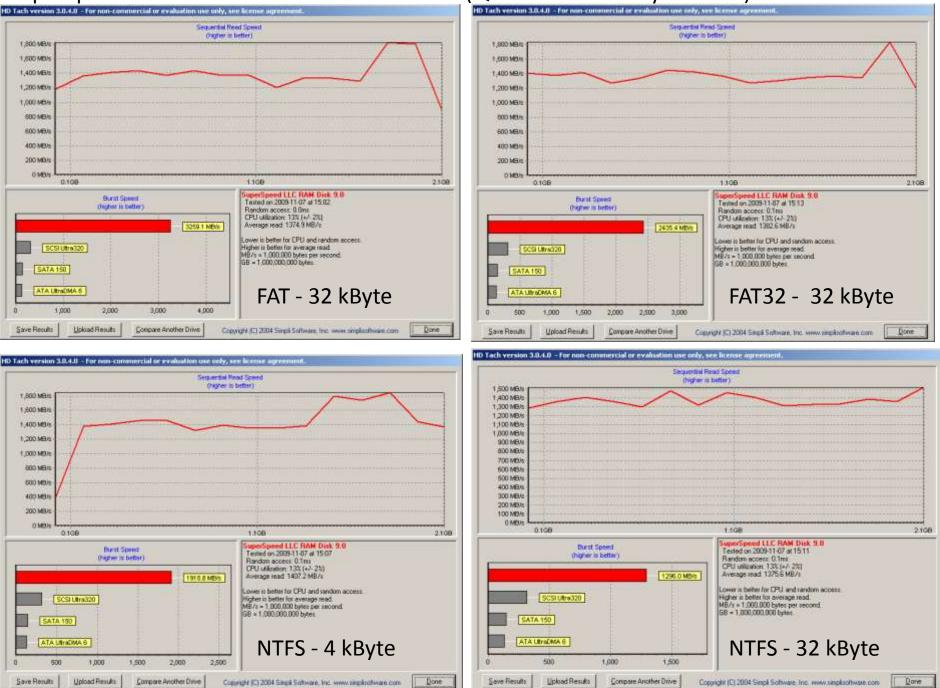
😥 CrystalDiskMark 2.2 \_ 🗆 X File Edit Theme Help Language 2 💌 100MB E:Hard Disk [FAT32] -All 4354 4909 Seg 4086 4639 512K 191 199.7 Write [MB/s] Read [MB/s]

FAT32 with 4 kByte units

\_ 🗆 🗙 D CrystalDiskMark 2.2 File Edit Theme Help Language 2 💌 100MB E:Hard Disk [FAT32] -All 4306 4968 Seg 4259 4761 512K 203.0 193.8 Write [MB/s] Read [MB/s]

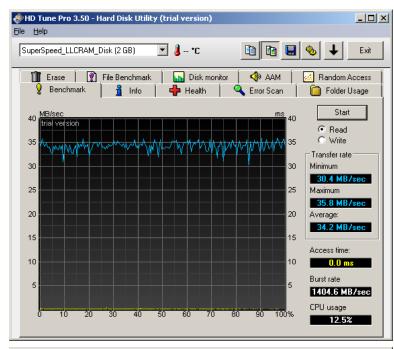
FAT32 with 16 kByte units

#### SuperSpeed RamDisk Plus with HDTACH READ (QuickBench 8 Mbyte Zones)

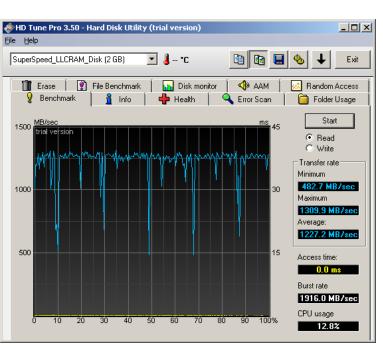


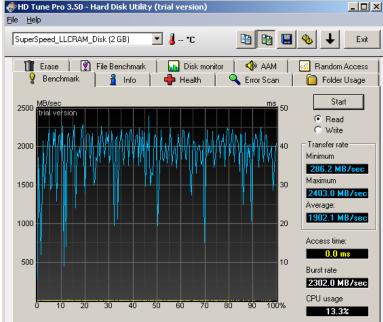
#### SuperSpeed RamDisk Plus HDTune READ block size selection

General Sendmark	Benchmark Transferrate	
Temperature	Test speed/acouracy	Block size
	Fast Accusite	512 bytes 💌



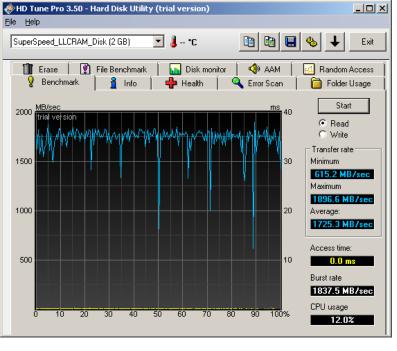
### 512 byte in HDTUNE

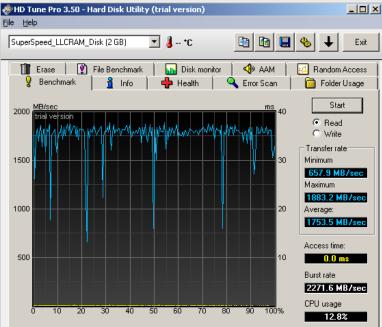




#### 8 Mbyte in HDTUNE

#### 32 kbyte in HDTUNE



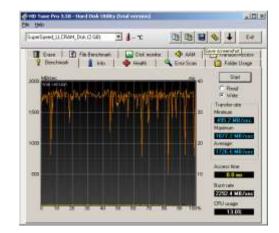


Read test - FAT 32k

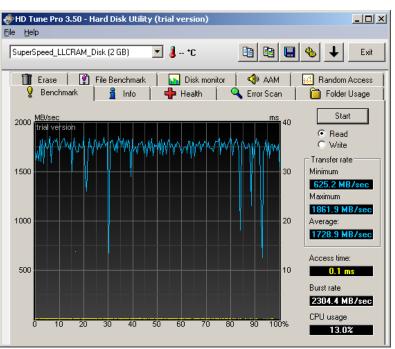
#### SuperSpeed RamDisk Plus TEST with HDTune block size 64k

Read test

FAT32 - 4k



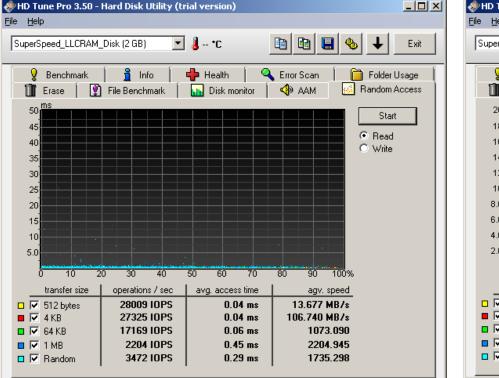
#### Write test



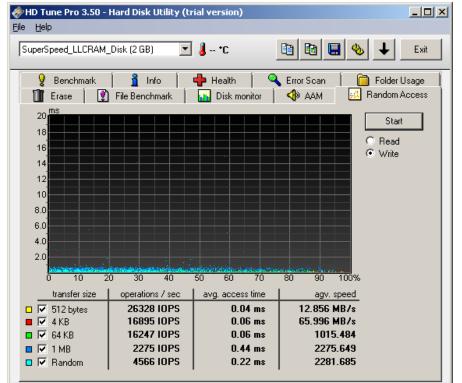
Read test - NTFS - 4k

#### SuperSpeed RamDisk Plus HDTune IOPS

#### **IOPS** Read



#### **IOPS** Write



Read/write performance: RAMDISK 28,174 IOPS @ 4K || SSDs have around 10k-20k @ 4k Read/write performance: 2 GByte RAM = 30 Dollars  $\rightarrow$  933 IOPS per dollar @ 4k

Product name: VSuite RamDisk

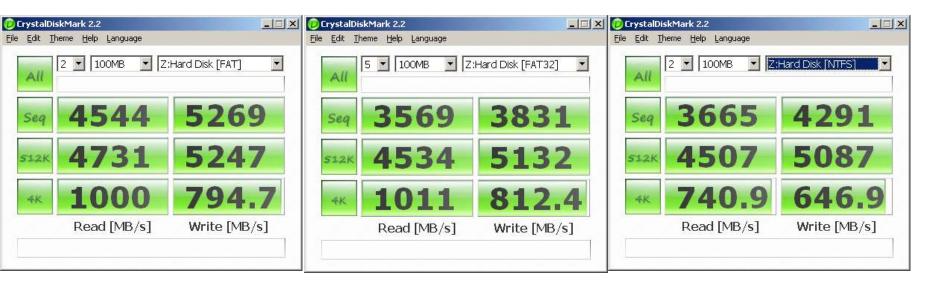
Product version: 4.1

Source: <u>www.romexsoftware.com</u> (trial and free version) CN = SmartSource Shanghai Electronic Technology Co. Ltd

🕲 YSuite Ramdisk (Professional Edition)										
	Ramdisk —									
	Drive	Vol Label	File Sys	Vol Size	Disk Size	Direct	Image	Location	Status	
Ramdisk										
O.										
69		n Mode		_						ן ך
Options	Disł	<size:< th=""><th>6</th><th>4 MB</th><th>0</th><th>SCSI Disk</th><th>•</th><th>Direct IO</th><th>Disk</th><th></th></size:<>	6	4 MB	0	SCSI Disk	•	Direct IO	Disk	
	Driv	/e Letter: A	uto Assign	•		Spanned N	1edia Sup	port		
	File	System:	ITFS	-	RAN	4 Size 🛛		MB		
	Cluster Size: Default									
	Volume Label: RAMDISK Overlapped IO Support									
	Enable NTFS Compression     Dynamic RAM Allocation     Compact Mode									
	Create TEMP Folder									
		Enable Image File	,							
		🔲 Save at Com	puter Shutdo	wn 🔲 Timir	ng Save Eve	ry 6	50 Mins	🔲 Rea	I-Time Save	
		Save Format:	Direct Mir	ror 🔘 Smai	rt Mirror 🔎	Compresse	ed Mirroi	Default	-	
		🔲 Quick Save M	1ode	🔲 Quic	k Load Mode					
		Use OS Invisible I	Memory (F	eature not su	upported by t	he comput	er)			
		dd	Remove		operties	Clas	ar Conten		Refresh	
ACIAES	<sup></sup>	<u> </u>	Kelliove	Pr	opercies	Clea	ir concen	u	Refresh	
SOFTWARE	Load	Image	Save Image	Imp	ort Config	Exp	ort Confiș		Exit	
					I	Designed b	y Romex	Software.	All rights rese	rved.

- Utility: Easy to use, no installation issues; single program with Backup/Image file; Self signed certificate; Direct IO and SCSI disk
- Price: RAMDISK plus 64-bit: 99 Dollar and free version available

VSuite Ramdisk Professional; Direct IO and SCSI Disk



FAT formated (Direct IO)

FAT32 formated (Direct IO)

#### NTFS formated (Direct IO)

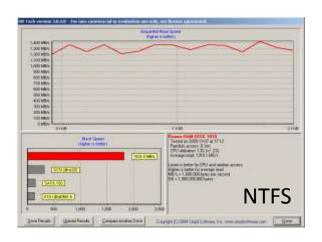
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All 2 I 100MB E:Hard	d Disk [FAT]	All	2 💽 100MB 💽 E:	Hard Disk [FAT32]	All	2 💽 100MB 💽 E:	Hard Disk [NTFS]
seq 4113	4670	Seq	3338	3634	Seq	3359	3671
512K 3867	4169	512K	3696	4068	512K	3310	3474
<sup>4K</sup> <b>190.7</b>	<b>183.</b> 2	4K	<b>188.</b> 6	182.9	4K	173.6	<b>167.</b> 9
Read [MB/s]	Write [MB/s]		Read [MB/s]	Write [MB/s]		Read [MB/s]	Write [MB/s]

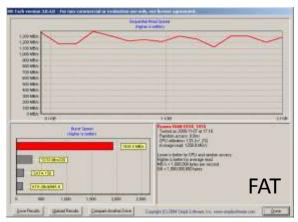
FAT formated (SCSI)

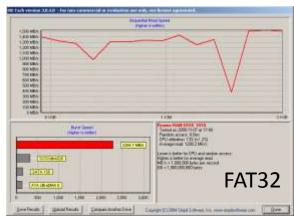
FAT32 formated (SCSI)

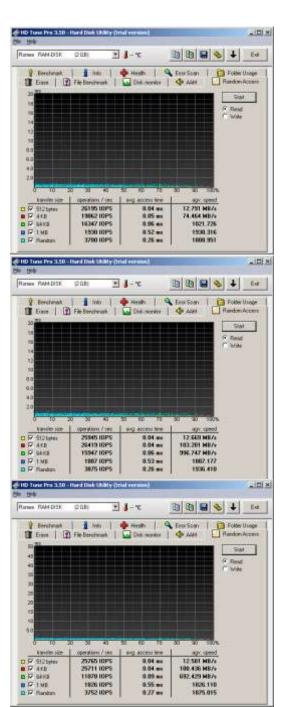
NTFS formated (SCSI)

#### VSuite Ramdisk Professional; SCSI disk









#### NTFS

FAT

FAT32

#### Product name: **Virtual Hard Drive 2 Pro** Product version: 2.0 Source: http://www.farstone.com (*trial version*) *CN = Farstone Technology Inc*

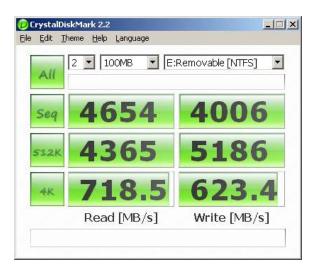
Select the Virtual Hard Drive task you want to perform.   Select the Virtual Hard Drive task you want to perform.   Select the Virtual Hard Drive task you want to perform.   Select the Virtual Hard Drive task you want to perform.   Select the RAM Disk   Create a RAM Disk   Use the RAM Disk to store and access data and run applications.   Select the RAM Disk image file   Loads an existing RAM Disk image file into memory   Configure your RAM Dive Settings   Drive Letter:   Seve a RAM Disk   Creates a RAM Disk image file   Creates a RAM Disk image file	Virtual Hard Drive Pro	File 🗱 Tools 🜒 Help 🥭 FARSTONE 🗁 🗐 🛞	ritual Hard Drive Pro	📄 File 🔣 Tools 🕜 Help	🗢 FARSTONE 😑 🗎 🛞
Explore a RAM Disk   Manages a RAM Disk via Windows Explorer   Settinos   Virtual Hard Drive Settings	Select the V	Create a RAM Disk         Creates a fixed size RAM Disk within your computer's physical memory. You can use the RAM Disk to store and access data and run applications.         Load a RAM Disk image file         Loads an existing RAM Disk image file into memory         Save a RAM Disk         Creates a RAM Disk image file         Remove a RAM Disk image file         Removes the current RAM Disk from memory         Explore a RAM Disk via Windows Explorer         Settings	<b>Configure your RAM</b> File System: Drive Letter:	I Drive Settings	(Available memory:3-2404MB)

Utility: Easy to use, no installation issues; single program with Backup/Image file; Self signed certificate; Requires Reboot; Direct IO (no HDTUNE/HDTACH)

Price: 29 Dollars

#### Product name: Virtual Hard Drive 2 Pro

## Direct IO (no HDTUNE/HDTACH)



Թ Untitled - ATTO Disk Benchmark	
<u>F</u> ile <u>V</u> iew <u>H</u> elp	
Drive: [-e-]	Direct I/O
I Iransfer Size: 0.5 ▼I to 18192.0 ▼I KB	<ul> <li>I/O <u>C</u>omparison</li> <li>Overlapped I/O</li> </ul>
	◯ <u>N</u> either
2	Queue Depth: 4 💌
Stripe <u>G</u> roup: Controlled <u>by</u> :	
	Start
<< Description >>	<u>^</u>
Test Results	
Write 🛑 Read 🚃	Write Read
0.5	60928 65408
	119076 129437 233070 236654
4.0	423133 424157
8.0	675901 679280
	116260 53248 695664 510722
64.0	149480 1015401
128.0	569638 335544
256.0	131007 930968
512.0	528936 991756 393792 921102
2048.0	859522 600974
4096.0	0 861644
8192.0	974947 718440
0 200 400 600 800 1000 1200 1400 1600 1800 Transfer Rate - MB / Sec	2000
For Help, press F1	NUM ///

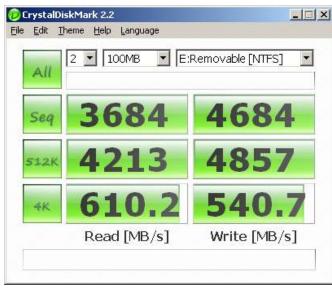
Product name: **Gili Ramdisk** Product version: 3.2 Source: <u>http://www.gilisoft.com</u> (trial version) CN = Pepstyle International Limited

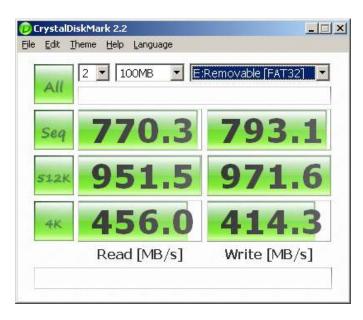
Ramdisk <sup>™</sup>	
ter: E:, Size:20	DOMB
	Create a RAM Disk
Create a RAM Disk Create a new RAM Disk and set its file system, drive letter, disk size, etc.	File system:     NTFS       Drive letter:     E:       Size(MB):     2000
Mount the image files into the RAM Disk      Back      Back      Cancel	Used Memory 638MB Free Memory 2945MB

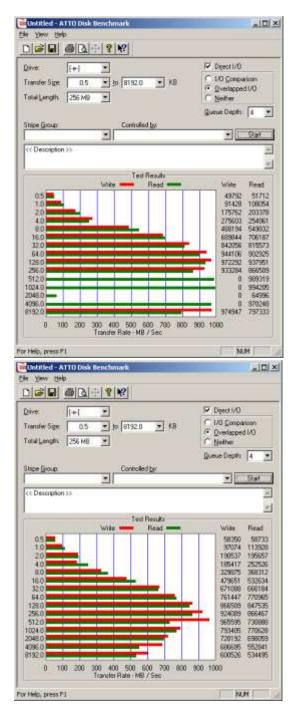
- Utility: Easy to use, no installation issues; single program with Backup/Image file; No certificate; Direct IO (no HDTUNE/HDTACH)
- Price: 25 Dollars

#### Product name: Gili Ramdisk

## Direct IO (no HDTUNE/HDTACH)







#### NTFS

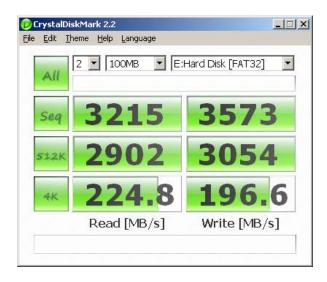
#### FAT32

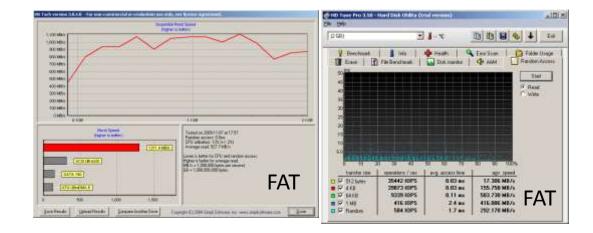
Product name: **Cenatek Ramdisk (now Dataram)** Product version: V3.5 Source: http://memory.dataram.com *(free version)* CN = Dataram; self signed

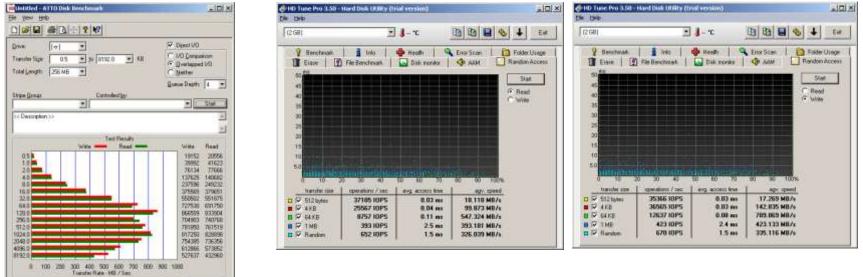
🐲 Dataram RAMDisk Configuration Utili	ty	_ 🗆 🗙
<u>File</u> Help		
Settings Load and Save Event Log	g] Options]	
Basic Settings		
Set the size and type of RAMDisk	you want to create.	and the second s
	FAT16 Partition	
Disk Size 2000 MB	C FAT32 Partition	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
(Maximum 2982 MB)	C Unformatted	
⊢ Boot Sector Settings		
Windows boot sector	C DOS Boot Sector	40 to
Start RAMDisk	Stop RAMDisk	
Verifying driver start		

- Utility: Easy to use, no installation issues; single program with Backup/Image file; Self signed certificate;
- Price: Free version; For larger than 4GByte free registration req.; PopUp to 18004memory.com

#### Product name: Cenatek Ramdisk (now Dataram)







Read IOPS

Write IOPS

ATTO NTFS

For Help, press F1

MAR

Product name: **AR RAM Disk** Product version: Source: http://www.arsoft-online.com

AM Disk Settings	×
AR Soft RAM Disk for Windows NT/2000 Version 1.20 (11/13/2009)	
Enable RAM Disk RAM Disk is running	
General Geometry File System	
Driver Letter: Z: (Current)	
Startup Type: O System	
Automatic	
Operating mode:	
RAM Disk mode	
C Emulate a local hard disk	
Defaults OK Cancel	

Utility: Easy to use; does not mount under WIN7

Price: free

Product name: **Moio Systems Power RAMDisk** Product version: 2009.3.8. Power RAMDisk v2.80 (trial) Source: http://www.moiosystems.com/

🍥 PowerRamDisk v2.80			×
RAM Disk			
RamDisk Size: 12M 💌	FileSystem © FAT	<u>A</u> djust Size	
Disk Letter:	○ FAT32 ● NTFS	Remove Disk	HELP
			EXIT
00''		<u>B</u> rowse	
Image information is not available.			
	Save	Load	

Utility: Not signed, version 2.8 does not mount under WIN7; new version available (not tested)

Price: 10 Dollars

Product name: **StarWind iSCSI** Product version: **StarWind 4.0 (trial)** Source: <u>www.starwindsoftware.com</u> CN- Rocket Division Software LTD

StarWind	nnection <u>D</u> evice <u>H</u> e	elo					<u>_   ×</u>	J
	Refresh	Preferences	Remove device		About			
Device tree			Target name				Туре	1
	AK Connections	:3260						
	- 🎽 🦽 🔳	amDrive0	ramdrv				RAM disk	
						A	dd Device Wizard Specify RAM di	
Ready								rive device parameters
Reauy							File system type: Large drive (A	as a single partition FAT32  AWE mode) e concurrent ISCSI connections (clustering)
ilitv:	Use for	net (TCP	PIP) acces	S			Help	< <u>B</u> ack <u>N</u> ext > Cancel

Price: free or 395 Dollars (basic)

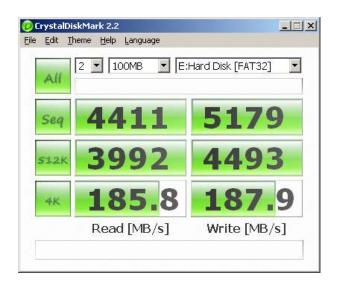
Problem: v4.0 does not mount under WIN7; new v5 available (not tested)

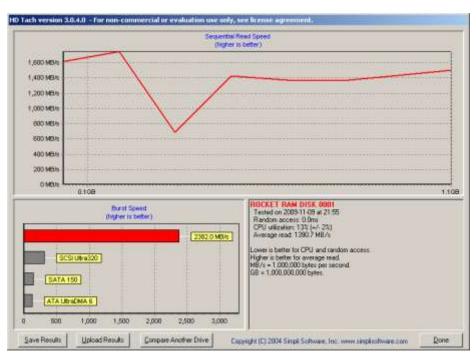
Product name: **StarPort iSCSI Initiator** Product version: **StarPort 3.6.3** *(trial)* Source: www.starwindsoftware.com

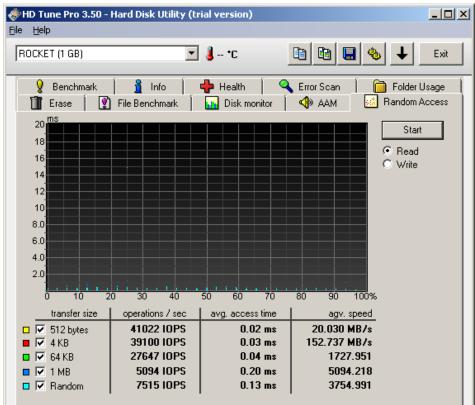
Type of the Device selection page	
Device Type. Please select type of device you wish to create.	
Device type:	
Local RAM disk device     Remote (SCSI device	
<ul> <li>Virtual <u>D</u>VD device</li> <li>Remote <u>A</u>oE (ATA-over-Ethernet) device</li> <li>Image File device</li> </ul>	
	Local RAM disk device parameters
	New Local RAM disk device parameters Please specify new Local RAM disk device parameters
< <u>Back</u> <u>N</u> ext > Cancel	Local RAM disk size in MBs:
	Maximum supported RAM disk size in MBs: 1024
	Create <u>f</u> ormatted disk
	✓ Automount this device
	< Back Next >

Utility: Use for net (TCPIP) access, Maximum 1024 Mbyte; NTFS, FAT and FAT32 Price: Free for personal use

#### Product name: StarPort iSCSI Initiator





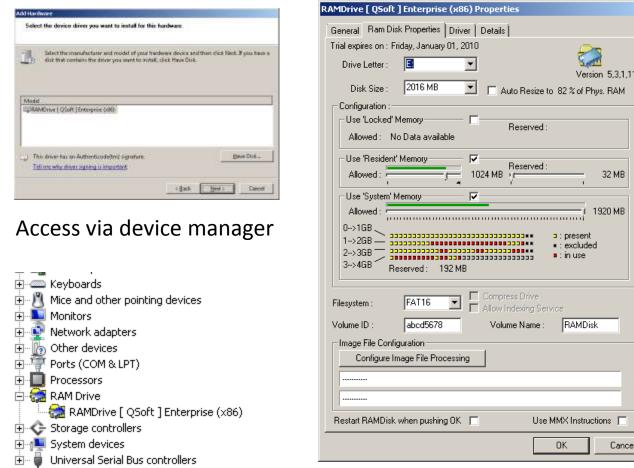


Product name: **Cenatek RAMDISK XP** Product version: Any Source: www.cenatek.com

😤 Cenatek RAMDiskXP Configuration		
File Help		
Settings Load and Save Memory Sett	ings Advanced Usage	1
Use these controls to set the size and ty create. Disk Type Hard Disk	ype of RAMDisk you want to	
Disk Size 5 📩 MB	<ul> <li>FAT16 Partition</li> <li>FAT32 Partition</li> <li>Unformatted</li> </ul>	
NOTE: The maximum RAMDisk size is deter	rmined by the Memory Settings.	
Start RAMDisk	Stop RAMDisk	

Utility: Only runs under WINXP see Dataram (former Cenatek) version for WIN7Price: Free for personal use (from Dataram, former Cenatek)

Product name: QSOFT Ramdisk Enterprise Product version: 5.3.1.11 (trial) Source: <u>http://members.fortunecity.com/ramdisk</u> CN= Christiaan Ghijselinck



×

32 MB

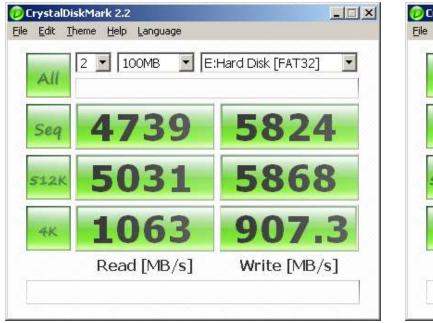
1920 MB

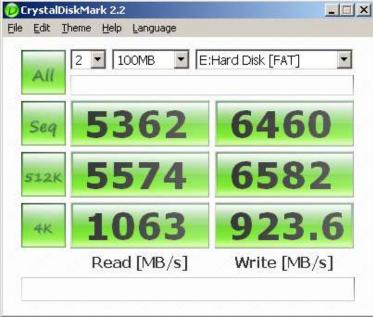
Cancel

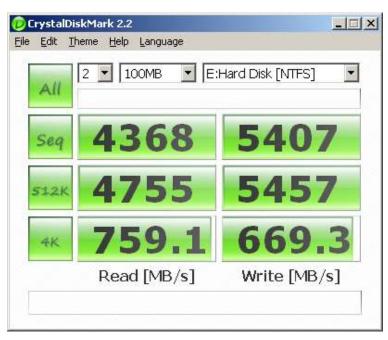
Not easy to install; in WIN7 use **hdwwiz**; however no installation issues Utility: Self signed certificate; Direct IO (no HDTUNE/HDTACH)

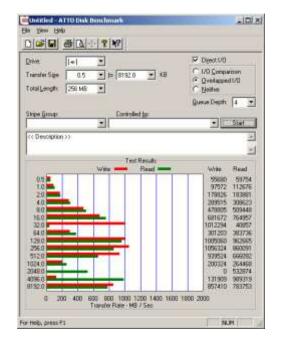
25 Dollars (enterprise) Price:

#### Product name: QSOFT Ramdisk Enterprise









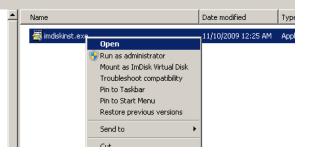
Product name: ImDisk Virtual Disk Driver

Product version: 1.1.4 Source: http://www.ltr-data.se/opencode.html

	🧿 ImD	isk ¥irtual Disk	Driver				
	<u>File</u> <u>S</u> e	lected <u>W</u> indow	<u>A</u> bout				
	Current	y mounted <u>v</u> irtual (	disks				
Win7 Control Panel	Drive	Image file			Size	Properties	Filesystem
	B:	Virtual memory			1.406 GB	Read/write	FAT32
📑 Desktop Gadgets	L						
🖳 Display							
🗽 Fonts							
📀 ImDisk Virtual Disk Driver							
📖 Keyboard							
💺 Network and Sharing Center							
	Mou	nt <u>n</u> ew	<u>J</u> nmount	Extend size	F <u>o</u> rmat	Save jmage	<u>R</u> efresh list

- Utility: Very hard to install and to remove; in WIN7 follow HOWTO (next page) Direct IO (no HDTUNE/HDTACH)
- Price: Free/open source

#### Product name: ImDisk Virtual Disk Driver



### 1) Explorer $\rightarrow$ Run as administrator

miniorio ap Escenci	manoshocanin		manaar	Local by score
🧠 HomeGroup Provider	Performs n		Manual	Local Service
🤹 Human Interface D	Enables ge		Manual	Local System
🔍 IKE and AuthIP IPs	The IKEEX		Manual	Local System
🔍 ImDisk Virtual Disk	Helper ser	Started	Manual	Local System
🔍 Interactive Service	Enables us		Manual	Local System
🔍 Internet Connectio	Provides n		Disabled	Local System
🔍 IP Helper	Provides tu	Started	Automatic	Local System

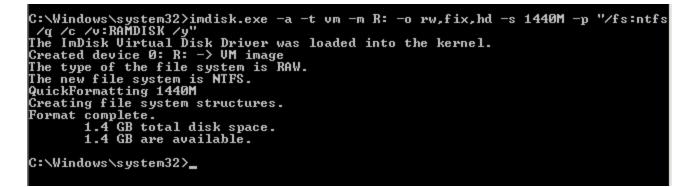
#### 2) System $\rightarrow$ Start Imdisk Service

Desktop Gadgets	Device !	Mene:	Cate swifte	Windows Update     XP5 Viewer
Clopiay	G Ease of	Deddard ene	L1002009	Accessories
A Ports	- Getting	Statul Certificatio		Calculator
🙆 ImDisk Wrtual Disk Driver	A Indexin	Plaurit as 2xCoA Vetaal Dell Open with		Command Decempt
S Keyboard	20 Location	Send to +		Connec Run as administrator
😟 Network and Sharing Center	Rotfice	GAL Come		Getting Open file location
Performance Information and Tools	Persona			Pin to Taskbar

#### 3) Control Panel

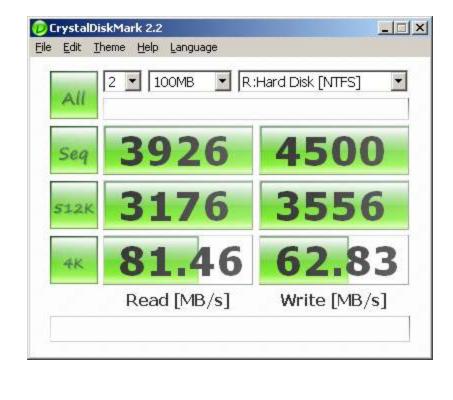
#### 4) Install certificate

#### 5) Open cmd as Administrator(!)



6) Enter at command line (thanks to dossi@bootland): imdisk.exe -a -t vm -m R: -o rw,fix,hd -s 1440M -p "/fs:ntfs /q /c /v:RAMDISK /y"

#### Product name: ImDisk Virtual Disk Driver



📁 Untitled - ATTO Disk Benchmark	
<u>File View H</u> elp	
Drive: [-r-]	Direct I/O
	/O <u>C</u> omparison Overlapped I/O
	<u>v</u> either
Que	ue Depth: 🛛 🔽
Stripe <u>G</u> roup: Controlled <u>by:</u>	
▼	Start
<< Description >>	*
Test Results	
Write — Read —	Write Read
0.5	2204 96676
1.0	3773 169033
	6590 348344 14804 610123
8.0	31813 901087
	58514 95780 100529 275937
64.0	175894 646665
128.0	240959 928664
512.0	304302 396128 343414 267766
1024.0	324197 199333
2048.0	290514 925639
4096.0	256262 461682 175448 126620
0 100 200 300 400 500 600 700 800 900 10	
Transfer Rate - MB / Sec	
J For Help, press F1	

Comment: To remove ImDisk type (use admin command): imdisk -d -u 0

#### Product name: ERAM for Windows

Product version: 2.20 Source: <u>http://hp.vector.co.jp/authors/VA000363/index.htm</u> CN= Not available

Image: 2000       11/12/2009 2:22 PM       File folder         Image: NT4       11/12/2009 2:22 PM       File folder         Image: NT351       11/12/2009 2:22 PM       File folder         Image: NT351       11/12/2009 2:22 PM       File folder         Image: NT351       5/2/2004 3:20 AM       Control panel item         Image: RAMM       Open with Control Panel Mount as ImDisk Virtual Disk 7-Zip       5/2/2004 3:20 AM       DOC File         Image: Send to         Image: Cut Copy       Create shortcut Delete Rename       Create shortcut Delete       Image: Send to       Image: Send to       Image: Send to         Image: Cut Copy       Create shortcut Delete       Image: Send to       Image: Send to       Image: Send to       Image: Send to         Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to         Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to         Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to       Image: Send to <t< th=""><th>Name</th><th></th><th>Date modified</th><th>Type *</th><th>1</th></t<>	Name		Date modified	Type *	1
Properties	<ul> <li>2000</li> <li>NT4</li> <li>NT351</li> <li>ERAMIT.CPL</li> <li>ERAMIT</li> <li>ERAMIT</li> <li>ERAMIT</li> <li>Run as administrator Mount as ImDisk Virtual Disk 7-Zip</li> <li>Open with</li> <li>Restore previous versions</li> <li>Send to</li> <li>Cut</li> <li>Copy</li> <li>Create shortcut</li> <li>Delete</li> <li>Rename</li> </ul>	•	11/12/2009 2:22 PM 11/12/2009 2:22 PM 11/12/2009 2:22 PM 5/2/2004 3:20 AM 5/2/2004 3:20 AM	File folder File folder File folder Control panel item DOC File	

ERAM for Windows NT/2000/XP	×
Drive(D) Z Rootdir ent(L) 128	
Alloc unit( <u>A</u> ) 2 💌 Media ID( <u>I</u> ) F8	
Disk size( <u>S</u> ) <mark>64</mark> KB	
- Memory source	
○ OS:NonPaged pool( <u>N</u> )	
OS:PagedPool(P)	
<pre>O External(E) need edit BOOT.INI</pre>	
External	
☐ Start address 0 MB-	
Detect limit Report to OS	
🗖 Local device 🛛 🗖 Make TEMP dir	
Ok Cancel Modify	

Utility: No mount under WIN7; requires reboot;

Price: Free/open source

## Product name: **Everstrike DiskBoost for Windows Vista/XP/2003/2000** Product version: 2.0 (trial) Source: <u>http://www.everstrike.com/ramdisk</u>

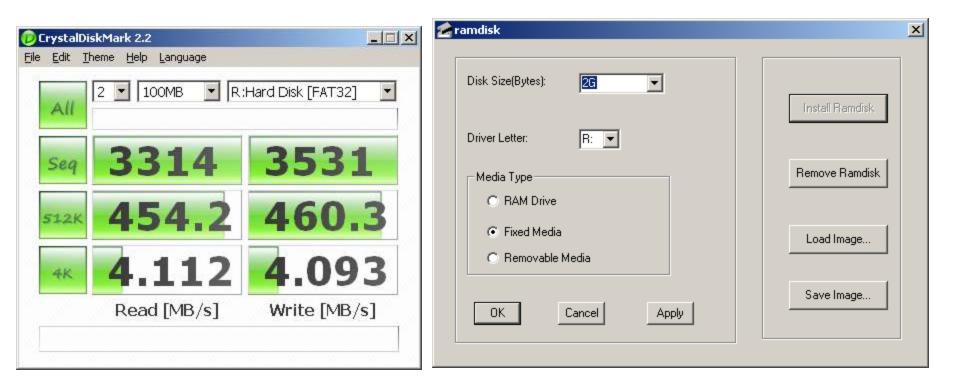
CN= Not available

🧕 DiskBoost 2.0 (Unregist	ered version)	Create Disk 🔀					
<u>File View Disk H</u> elp							
I 🞦 🕘 📎 🗙 🗸							Drive Letter:
Properties	д×	Field Choose	er "Group By	/" Box			Disk Size (Megabytes): 2000
Property	Value	Drive	Size	Туре	Mount	Synchronization	Type:
Drive	E:	E:	1.75 GB	Permanent	Auto	Lazy Write	Type: Permanent
Size (MB)	1800						Mount: Automatic 🔻
Туре	Permanent						Mount. Automatic
Mount	Auto						Synchronization:
Image Path/Partition Letter	C:\temp\test4.dbi						
Synchronization	Lazy Write						Cache Size Maximum 5
Cache Size Maximum (MB)	5						Cache Size Maximum 5
Timeout (minutes)	1						
Delete image file after disk r	True						Timeout (minutes):
Password Protected	No						
							Image File Path: C:\temp\test2.dbi
		•	1	1		•	Partition Letter:
Log						μ×	
2:44:14 PM: Failed to unr 2:44:22 PM: Successfully	nount disk Z. Not enough : / removed disk Z.	Encrypted     Password:					
							OK Cancel

Utility: Easy to install, current version not written for WIN7 (no drive actually mounted)Price: 69 Dollar (business)

#### Product name: Gavotte Ramdisk

Product version: 01.01.2008 Source: http://www.chweng.idv.tw/swintro/ramdisk.php



Utility: Easy to install and to use; no certificate; run as Administrator for install Price: free

Product name: **RamPhantom 7** Product version: v7 free Source: <u>http://www.iodata.jp/</u> CN: IO Data

All	2 💌 100MB 💌 E:	Hard Disk [FAT32]
Seq	3414	3835
512K	2717	2871
4K	<b>53.</b> 40	<b>57.</b> 05
	Read [MB/s]	Write [MB/s]

RamPhantom7 32 FREE???	×
全般 バージョン情報	
┌ RamPhantom7 32 FREEの状態	
RAMディスク	E:
RAMディスク容	128MB
使用メモリ	222222222222
バックアップ	2222222
└────────────────────────────────────	
??????????(C:)	116956MB
システムメモリー	3583MB
システム空きメモリー	2958MB
OS管理外メモリ	OMB
合計利用可能メモリ	2958MB
<ul> <li>◆RamPhantom7 32 製品版なら</li> <li>・2GBオーバーの大容量RAMディスクがご利用</li> <li>・DS管理外領域メモリーを無制限でご利用で</li> </ul>	できます。 きます。
RamPhantom7 32 製品版のご購入は	「アイオープラザ」で!
?????(D)	ご購入はこちら
	???( <u>C)</u>

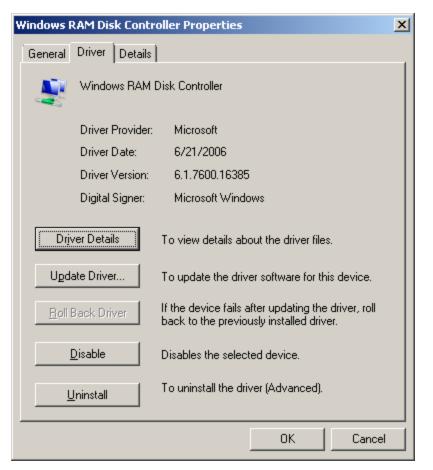
Utility: Install ok under WIN7; requires reboot; Free version 256 MB max

Price: 27 Dollar (Enterprise)

# Product name: Microsoft DDK KMDF Ramdisk

Product version: WIN 2000

Source: <u>http://msdn.microsoft.com/en-us/library/dd163312.aspx</u> <u>http://support.microsoft.com/kb/257405</u>

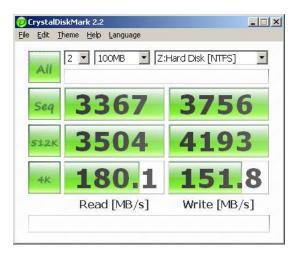


Utility: Ramdisk.sys sample driver for Windows 2000; No mount under WIN7; in WIN7 use **hdwwiz** (Hardware Wizard)

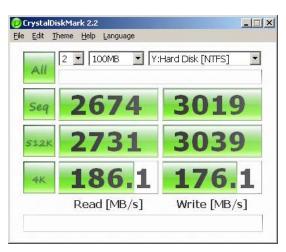
Price: Free/open source

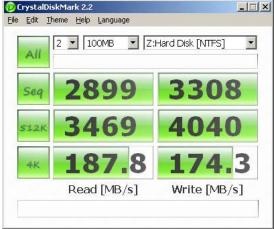
# **RAID of RAMDisks**

# (not recommended on production systems)



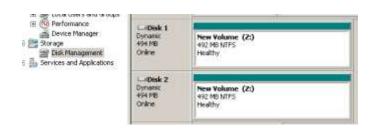
Mirrored Disks Windows





#### Striped Disks Windows

#### Spanned Disks Windows



Windows Disk Management

Windows Disk management allows striped, spanned, mirrored and RAID5 software disks Example with SuperSpeed driver (volumes visible in WIN7 Disk Manager) Software RAID system is slower than single drive alone