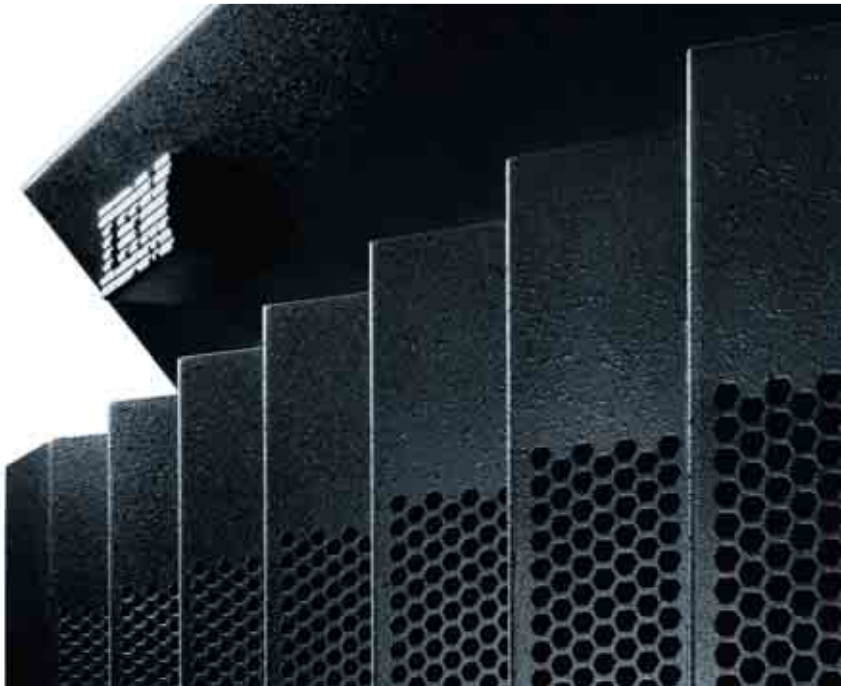


IBM TotalStorage Product Guide



Strategic storage imperatives

Information technology is the lifeblood of any business, especially today when organizational performance depends on information on demand. Business accountability hinges on it, laws and regulations mandate it, customers demand it and effective business processes rely on it. With information on demand, businesses can respond quickly with the flexibility to meet customer requirements, market opportunities or external threats. But as utterly valuable as information on demand has become, it also has become more costly to store, maintain and protect.

A comprehensive approach to the challenges of providing information on demand

To meet these challenges, IBM® has taken a holistic approach to the problem, looking well beyond storage products alone to help you share, manage and protect your data. To provide complete solutions for businesses using the on demand model, IBM has addressed three areas of IT.

Infrastructure simplification

Few would question the statement that IT infrastructures have grown more complex in recent years. The dramatic growth in the use of IT, combined with distributed computing architectures, is part of the reason. But business processes have also become more complex and integrated too, driving a greater need for complex interconnections among systems.

The added complexity that accompanies growth can stand in the way of fully realizing the benefits of IT. *Infrastructure simplification* is a way to look at the entire IT operation and help eliminate the complexity that can raise costs, reduce reliability and create dependencies on specialized skills—factors making it harder to operate as an on demand business.

Three proven methods for simplifying an IT infrastructure are consolidation, virtualization and automated management. Each technique can be applied to all areas that compose an IT operation—servers, storage and networks.

Within the storage arena, consolidation can include reducing the number of data centers and sharing fewer large-capacity storage systems among a greater number of application servers. Consolidated resources can cost less and can be easier to share and protect.

Storage virtualization involves a shift in thinking from physical to logical—treating storage as a logical pool of resources, not individual devices. Not only can this help simplify the storage environment, but it also can help increase utilization and availability.

The storage arena is ripe with opportunities to lower administrative costs through automation, particularly through workflows. Once tasks are automated, administrators can deal with more strategic issues. In addition, automation can help reduce errors and contribute to higher system performance.

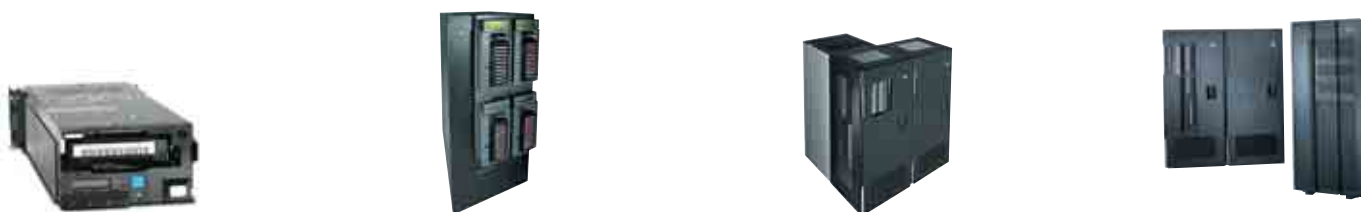
Business continuity

On demand businesses rely on their IT systems to conduct business. Everything must be working all the time. Nothing less is acceptable. A sound and comprehensive *business continuity* strategy encompasses high availability, near continuous operations and disaster recovery. For each of these areas, the IBM TotalStorage® Resiliency Family includes a comprehensive set of products that are compatible with multiple platforms.

Information lifecycle management

The primary goal of *information lifecycle management (ILM)* techniques is to optimize the storage and management of information based on its value to your business. An ILM process can help a business maximize the value of information, from the moment of its creation to the moment of its disposal. Corporate governance policies, business processes and compliance guidelines all influence ILM policies.

The primary capabilities from IBM that support ILM include optimized storage environments with tiered storage platforms, policy-based retention management software, content and records management applications, and non-erasable, non-rewritable media. The potential benefits to your business include improved risk management, optimum storage utilization, better handling of compliance issues and lower costs.



Tape Products

	3592	3590	3494	3494-VTS
Product	1/2" Tape Drive	1/2" Tape Drive	1/2" Cartridge Tape Library	Virtual Tape Server
Machine model	3592 J1A	3590	3494 (Frames) L12, L14, L22-Library D12,D14,D22,D24-Library (Frame) S10-Storage HA1-High Availability	3494 B10, B20
Product strengths	Multipurpose drive, capacity, performance, Write Once Read Many (WORM) support	Capacity, performance, reliability	Modular, reliable automation for high-volume storage	Virtualtape, fastaccess peer-to-peer copy
Technology	Longitudinal Serpentine	Longitudinal Serpentine		Disk: Emulated 3490E Tape: 3592, 3590 1/2"
Number of heads/tracks	8/512	H: 16/384 E: 16/256	Drive Dependent	N/A
Number of drives	1	1	Drive Dependent	64–256 (virtual)
Max number of cartridges	N/A	N/A	6,240 ²	500,000 (virtual volumes)
Cartridge capacity native/compressed	300/900GB 300/900GB WORM 60/180GB 60/180GB WORM	E: 20/60GB EX: 40/120GB H: 30/90GB HX: 60/180GB	Drive Dependent	Drive Dependent
Max system capacity com-pressed¹	900GB	EX: 120GB HX: 180GB	H: 561TB HX: 1122TB J1A: 5616TB	Disk: up to 5.2TB Tape: 5616TB
Max drive data rate¹ native/com-pressed	40/120 MBps	E: 14/42 MBps H: 14/42 MBps	Drive Dependent	VTS: Drive Dependent
Time to data⁴	Cartridge Dependent	Model Dependent	Drive Dependent	VTS: 1–3 seconds if data in VTS Cache
Interface	FC, ESCON®, FICON, 2Gb FICON	SCSI-2 F/W, Diff PCI, Ultra SCSI, FC, ESCON, FICON, 2Gb FICON	SCSI-2 F/W, Diff PCI, Ultra SCSI, FC, ESCON, FICON, 2Gb FICON	Ultra SCSI, ESCON, FICON
SAN-ready⁶	pSeries, iSeries, RS/6000®, Sun, HP, Windows NT®, Linux, Windows 2000	pSeries, iSeries, RS/6000, Sun, HP, Windows NT, Linux, Windows 2000, Tru64 UNIX	pSeries, iSeries, RS/6000, Sun, HP, Windows NT, Linux, Windows 2000, Tru64 UNIX	pSeries, RS/6000, Windows NT, Windows 2000, Sun
Supported plat-forms⁵	iSeries, AS/400®, pSeries, RS/6000, zSeries, S/390®, Linux, Windows 2000, Sun, HP	iSeries, AS/400, pSeries, RS/6000, zSeries, S/390, Tru64 UNIX, Linux, Windows 2000, Sun, HP	iSeries, AS/400, pSeries, RS/6000, zSeries, S/390, Linux, Windows 2000, Sun, HP	pSeries, RS/6000, zSeries, S/390, Windows 2000, Sun, HP
ISV (Independent Software Vendor)⁵	Model Dependent ⁷	Model Dependent ⁷	A B D E F G H I J K L M ⁸	
Media part number 1-888-IBM-Media	18P7534	05H4434 X: 05H3188	18P7534 (3592) 05H4434 (3590) X: 05H3188 (3590)	18P7534 05H4434 X: 05H3188
Warranty	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7

FW = Fast/Write, Diff = Differential, N/A = Not Applicable, FC = Fibre Channel, X = Extended length cartridge, 10E = IBM Onsite Exchange, CRU = Customer Replaceable Unit
 NOTES: 1: Compressed data rates are estimates and are data-, application- and processor-dependent. User results may vary. 2: Max number of cartridges decreases as tape drives are added.
 3: AX = 4.1.5 or later. 4: Load and search only. 5: Server platforms with SAN-ready attachability, model- and feature-dependent. 6: Depends on virtual cartridge configuration. 7: The latest ISV support can be found in the connectivity section at ibm.com/storage/tape/contrx. 8: The following vendors provide application support to the platforms defined above: A = Tivoli® Storage Manager (TSM), B = IBM SysBack™ 6000, C = CA ARCserve IT, D = Legato Networker, E = VERITAS NetBackup, F = CA Alexandria, G = SOH ReelBackup, H = SOH ReelBackup, I = LSC, J = IBM BRMS, K = IBM OnDemand, L = HelpSystems RobotWare, M = LXI Media Management, N = Dantz

Products (continued)



Midmarket Tape Products

	3580	3581	3582	3583	3584
Product	Tape drive	Tape autoloader	Tape library	Tape library	Tape library
Machine model	3580 L33 Ultrium 3 L23 Ultrium 2 H23 Ultrium 2	3581 L28 Ultrium 2 F28 Ultrium 2 L23 Ultrium 2 H23 Ultrium 2	3582 L23 Ultrium 2 F23 Ultrium 2	3583 L18-18 Carts L36-36 Carts L72-72 Carts	3584 L22-base frame for 3592, D22-expansion frame for 3592, up to 15 frames may be added L52-base frame for LTO, D52-expansion frame for LTO, up to 15 frames may be added
Product strengths	Open systems attach, high capacity, fast data transfer rate, desktop footprint	Open systems attach, multiplatform, high capacity, optional barcode reader	Open systems attach, multiplatform, scalable, high capacity, direct-to-SAN attach	Open systems attach, multiplatform, scalable, high capacity, direct-to-SAN attach	Open Systems attach, Multiplatform, Advanced Library Management System, Ultra-Scalable, High Capacity, Enterprise Tape Drive 3592 support, WORM support, Dual robotic accessors
Technology	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine	Longitudinal Serpentine
Number of heads/tracks	Ultrium 3: 16/704 Ultrium 2: 8/512	Ultrium 3 Technology is now available Ultrium 2: 8/512	Ultrium 3 Technology is now available Ultrium 2: 8/512	Ultrium 3 Technology is now available Ultrium 2: 8/512	3592: 8/512 Ultrium 3 Technology is now available Ultrium 2: 8/512
Number of drives	1	1	1-2	1-6	1-192
Max number of cartridges	1	8 - L28, F28 7 - L23, H23	24	72	6,887 ²
Cartridge capacity native/compressed	Ultrium 3: 400GB Native Ultrium 2: 200/400GB	Ultrium 3 Technology is now available Ultrium 2: 200/400GB	Ultrium 3 Technology is now available Ultrium 2: 200/400GB	Ultrium 3 Technology is now available Ultrium 2: 200/400GB	3592: 300/900GB 3592: 300/900 WORM Ultrium 3 Technology is now available Ultrium 2: 200/400GB
Max system capacity com-pressed¹	Ultrium 3: 800GB Ultrium 2: 400GB	L23, H23: 2.8TB L28, F28: 3.2TB L38; F38: 6.4TB	Ultrium 3: 19.2TB Ultrium 2: 9.6TB	Ultrium 3: 57.6TB Ultrium 2: 28.8TB	3592: 5.63PB Ultrium 3: 5.63PB Ultrium 2: 2.75PB
Max drive data rate¹ native/com-pressed	Ultrium 3: 80 MBps* Ultrium 2: 35/70 MBps	Ultrium 3: 80/160 MBps Ultrium 2: 35/70 MBps	Ultrium 3: 80/160 MBps Ultrium 2: 35/70 MBps	Ultrium 3: 80/160 MBps Ultrium 2: 35/70 MBps	3592: 40/120 MBps Ultrium 3: 80/160 MBps Ultrium 2: 35/70 MBps
Time to data⁴	Ultrium 3: 47 seconds Ultrium 2: 49 seconds	Ultrium 3: 47 seconds Ultrium 2: 49 seconds	Ultrium 3: 47 seconds Ultrium 2: 49 seconds	Ultrium 3: 47 seconds Ultrium 2: 49 seconds	3592: Cartridge Dependent Ultrium 3: 47 seconds Ultrium 2: 49 seconds
Interface	L33, L23, LVD H23, HVD	L28, F28-FC fabric L23, LVD H23, HVD L38, LVD; F38, FC fabric	LVD, HVD, FC fabric	LVD, HVD, FC fabric	3592: FC fabric Ultrium 3: FC fabric Ultrium 2: FC Fabric
SAN-ready⁶	pSeries, RS/6000, Windows NT, Sun	pSeries, RS/6000, Windows NT, Sun	pSeries, RS/6000, Windows NT, Sun	pSeries, RS/6000, Windows NT, Sun	pSeries, RS/6000, Windows NT, Sun
Supported plat-forms⁵	xSeries, Netfinity®, iSeries, AS/400, pSeries, RS/6000, Windows 2000, Windows Server 2003, Sun, HP, Linux	xSeries, Netfinity, iSeries, AS/400, pSeries, RS/6000, Windows 2000, Windows Server 2003, Sun, HP, Linux	xSeries, Netfinity, iSeries, AS/400, pSeries, RS/6000, Windows 2000, Windows Server 2003, Sun, HP, Linux	xSeries, Netfinity, iSeries, AS/400, pSeries, RS/6000, Windows 2000, Windows Server 2003, Sun, HP, Linux	xSeries, Netfinity, iSeries, AS/400, pSeries, RS/6000, Windows 2000, Windows Server 2003, Sun, HP, Linux
ISV (Independent Software Vendor)⁵	A C D E F G H I J L N ⁸	A C D E F G H I J L N ⁸	A C D E F G H I J L N ⁸	A C D E F G H I J L N ⁸	A C D E F G H I J L N ⁸
Media part number 1-888-IBM-Media	Ultrium 3: 24R1922 Ultrium 2: 08L9870	Ultrium 3: 24R1922 Ultrium 2: 08L9870	Ultrium 3: 24R1922 Ultrium 2: 08L9870	Ultrium 3: 24R1922 Ultrium 2: 08L9870	3592: 18P7534 Ultrium 3: 24R1922 Ultrium 2: 08L9870
Warranty	L33: 3 years, CRU** L23, H23: 3 years, CRU * Native only ** In most countries	F28, L28: 3 years, CRU	3 years, CRU	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7

FW = Fast/Write, Diff = Differential, N/A = Not Applicable, FC = Fibre Channel, X = Extended length cartridge, IOE = IBM Onsite Exchange, CRU = Customer Replaceable Unit
 NOTES: 1: Compressed data rates are estimates and are data - application- and processor-dependent. User results may vary. 2: Max number of cartridges decreases as tape drives are added.
 3: AX 4, 1.5 or later. 4: Load and search only. 5: Server platforms with SAN-ready attachability, model- and feature-dependent. 6: Depends on virtual cartridge configuration. 7: The latest ISV support can be found in the connectivity section at ibm.com. 8: The following vendors provide application support to the platforms defined above: A = Atull Storage Manager (TSM), B = IBM SysBack™ 6000, C = CA ARCserve IT, D = Legato Networker, E = VERITAS NetBackup, F = CA Alexandria, G = SOH Raedilibrarian, H = SOH Raedilibrarian, I = SSC, J = IBM BMMs, K = IBM OnDemand, L = HelpSystems Robot/Save, M = LXI Media Management, N = Dantz

Products (continued)



	Tape Products							HDD	Optical
	7205	7206	7206-VX2	7207	7212-102*	7212-312	7332	7204	7210
Product	SDLT Drive Tape Drive	4mm DDS-4 4mm Gen 5 (DAT72)	8mm VXA-2 Tape Drive	SLR (QIC) Compatible External Tape Drive	Storage Device Enclosure	VXA-2 Autoloader	4mm DDS-3,4 Tape Autoloader	External Disk Drive	External DVD-RAM
Machine model	7205 550	7206 220-DDS4 336-DDS Gen 5	7206 VX2	7207 122 330	7212 102	7212 312	7332 220-DDS4	7204 536-36GB 573-73GB	7210 025-9.4GB 030-9.4GB
Product strengths	Cost-effective save/restore/archive solution	Cost-effective streaming tape drive	Low-cost, high- capacity VXA-2 technology	Backward read/write compatible with iSeries internal	Rack-mountable 2-drive enclosure uti- lizes only 1U (1.75") of space	Rack-mountable Only 1 EIA rack unit high	Autoload tape car- tridges into DDS-4 drive	External deskside disk storage	External deskside Optical storage
Technology	Longitudinal Serpentine	Helical Scan DDS	Helical Scan VXA	SLR (QIC format)	4mm, VXA, SLR DVD-ROM/RAM	Helical Scan	Helical Scan	N/A	N/A
Number of heads/tracks	8/536	Rotating Drum	Rotating Drum	1/1	4mm/VXA: Rotating Drum	Rotating Drum	Rotating Drum	8 heads 4 disks	025-enclosed media 030-back media
Number of drives	1	1	1	1	1-2	1	1	1	1
Max number of cartridges	1	1	1	1	2	10	6	N/A	1
Cartridge capacity native/compressed	160/320GB	220: 20/40GB 336: 36/72GB	20/40GB 40/80GB 80/160GB	122: 4/8GB 330: 30/60GB	DDS-4: 20/40GB DAT72: 36/72GB SLR: 60/100GB VXA-2: 80/160GB	80 GB/160GB	20/40GB	N/A	2.6GB-7.4GB
Max system capacity compressed¹	320GB	220: 40GB 336: 72GB	160GB	122: 4/8GB 330: 30/60GB	160GB with two VXA-2 drives 18.8GB with two DVD- RAM drives	1600 GB	240GB	518: 18GB 536: 36GB 573: 73GB 646:146GB	N/A
Max drive data rate¹ native/com-pressed	16/32 MBps	220: 3/6 MBps 336: 3/6 MBps	6/12 MBps	122: .38/.76 MBps 330: 4/8 MBps	DDS/DAT72: 3/6 MBps VXA: 6/12 MBps	6/12 MBps VXA-2	3/6 MBps DDS-4	80 MBps	N/A
Time to data⁴	70 seconds	50 seconds	50 seconds	122: 85 seconds 330: 50 seconds	VXA-2: 40 seconds SLR: 50 seconds DAT72: 50 seconds	50 seconds	40 seconds	70ms	5 seconds
Interface	SCSI-2 F/W, Diff PCI, Ultra2 SCSI LVD	SCSI-2 F/W SE, LVD/SE	SCSI-3 ULTRA, LVD/SE, 160/320	SCSI-2 SE, ULTRA, LVD/SE, 160/320	SCSI-3 ULTRA, LVS/SE, 160/320	SCSI-3 Ultra, LVD-SE, 160/320	SCSI-2 F/W SE, LVD/SE	SCSI-3 ULTRA, LVD/SE, 160/320	SCSI-3 ULTRA, LVD-SE, 160/320
Supported plat- forms⁵	p5, pSeries, RS/6000 ³	p5, pSeries, RS/6000	p5, pSeries, RS/6000, i5, iSeries, AS/400	i5, iSeries, AS/400, p5, pSeries, RS/6000	p5, pSeries, RS/6000, i5, iSeries, AS/400	p5, pSeries/RS6000	p5, pSeries, RS/6000	p5, pSeries, RS/6000	p5, pSeries, RS/6000, i5, iSeries, AS/400
Media part number 1-888-IBM-Media	35L1119	DDS-4: 59H4456 DAT72: 18P7912	24R2134 - 20GB 24R2136 - 40GB 24R2137 - 80GB	122: 59H3660 330: 19P4209	DDS-4: 59H4456 DAT72: 18P7912 VXA-2: 24R2137 SLR60: 19P4209 SLR100: 35L0968	24R2137	59H4456	N/A	025-19P0490 030-18P8039
Warranty	IBM Onsite Repair 1 Year, 24x7	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 Year, 24x7	IBM Onsite Repair 1 Year, 24x7	CRU, IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7	IBM Onsite Repair 1 year, 24x7

* 7212-102 also offers DVD-ROM and DVD-RAM optical drives

F/W = FastWide, Diff = Differential, N/A = Not Applicable, FC = Fibre Channel, X = Extended length cartridge, 10E = IBM Onsite Exchange, CRU = Customer Replaceable Unit
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 3: AX 4, 1.5 or later. 4: Load and search only. 5: Depends on virtual cartridge configuration. 7: The latest iSeries support can be found in the connectivity section at ibm.com/storage/tape/conntrix.
 A = Tivoli Storage Manager (TSM), B = IBM SysBack™ 6000, C = CA ARCserve IT, D = Legato NetWorker, E = IBM TSM NetBackup, F = CA Alexandria, G = SOH ReelLibrary, H = SOH ReelBackup,
 I = LSC, J = IBM BRMS, K = IBM OnDemand, L = HelpSystems Robot/Save, M = LX Media Management, N = Dantz.

Selecting a Solution

	Model	Technology	Maximum System Capacity (GB)*	zSeries S/390	i5/iSeries**	p5/pSeries	xSeries Netfinity	Open Systems***
Enterprise Tape Products	3592-J1A	1/2" Enterprise	900					
	3590, E1A, H1A, E11, H11	1/2" Enterprise	180					
	3494, L12, L14, L22, D12, D14, D22, D24, S10, HA1	1/2" Enterprise	Up to 5616000					
	3494-B10, B20 Virtual Tape Server	Virtual Tape 1/2" Enterprise	Up to 5616000					
Midmarket Tape Products	3580-L23, H23 3580-L13, H13, L11, H11	LTO LTO	400 200					
	3581-L13, H13, L17, H17	LTO	1400					
	3581-L23, H23	LTO	2800					
	3582-L23, H23, F23	LTO	9600					
	3583-L18, L36, L72	LTO	28800					
	3584-L32, D32	LTO	2752400 (2.75PB)					
Complementary Storage Products	7204-536	HDD	36					
	7204-573	HDD	73					
	7204-646	HDD	146					
	7205-550	SDLT	320					
	7206-220	4mm DDS-4	40					
	7206-336	DAT72	72					
	7206-VX2	8mm VXA-2	160					
	7207-122	QIC	8					
	7207-330	SLR	60					
	7212-102	4mm	320					
	7212-102	DVD, SLR, VXA-2	320					
	7212-312	VXA-2	1600					
	7332-220	4mm DDS-4	240					

* Compressed; see ibm.com/totalstorage for specific capacities.

** Available on i5 through AIX/Linux partitioning

*** See ibm.com/totalstorage for specific open systems connectivity.



IBM @server Systems and IBM TotalStorage

Customer demand for lightning-fast communication and transactions has driven the need for universal commitment to e-business. No matter what industry, or what size company, success today hinges on building a high-performance, responsive infrastructure that embraces open standards—exactly what you will find in the IBM @server product portfolio. Investments in servers often result in demands on disk and tape storage systems. IBM has a family of storage offerings that complements the @server product portfolio. There is no better storage offering for IBM @server systems than an IBM TotalStorage product. These offerings are tested and supported by IBM and are backed by outstanding IBM service and support.

IBM TotalStorage Proven Program Helps Simplify Interoperability

The IBM TotalStorage Proven™ Program is designed to help customers identify storage solutions and configurations that have been pretested for interoperability. IBM TotalStorage Proven means that the applications and hardware you choose from leading companies, combined with state-of-the-art IBM storage technology, can provide you with flexible, ready-to-run and more easily installed solutions that can help address your software and infrastructure needs.

Storage Proven means integrated solutions are more than just hardware and software—they are tested together for specific applications and configurations. IBM helps take the guesswork out of putting a total solution together, which can help simplify your purchase decision, freeing you to focus on running your business.

Please visit the Storage Proven Web site at ibm.com/totalstorage/proven to view more than one hundred available products and solutions to meet your storage needs.

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More than 140 worldwide IBM TotalStorage Solution Centers can deliver one-stop shopping for storage hardware, software and consulting services. The Solution Centers offer you both a local venue for hands-on testing of IBM storage solutions and a platform for proof-of-concept and benchmarking activities. These centers also work with the leading storage software providers to support a wide variety of choices for interoperability. IBM Business Partners will help you select and implement a solution to help your business succeed in today's dynamic marketplace. Visit: ibm.com/storage/tssc



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MB, GB and TB equal 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, where referring to storage capacity. Actual storage capacity will vary based upon many factors and may be less than stated. Some numbers given for storage capacities give capacity in native mode followed by capacity using data compression technology.

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