



Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

State of West Virginia
 Request for Quotation
 21 - Info Technology

Proc Folder: 235721

Doc Description: Addendum #5 - Data Backup System

Proc Type: Central Purchase Order

Date Issued	Solicitation Closes	Solicitation No	Version
2016-09-01	2016-09-13 13:30:00	CRFQ 0210 ISC1700000001	6

BID RECEIVING LOCATION

BID CLERK
 DEPARTMENT OF ADMINISTRATION
 PURCHASING DIVISION
 2019 WASHINGTON ST E
 CHARLESTON WV 25305
 US

VENDOR

Vendor Name, Address and Telephone Number:

ADVANTAGE TECHNOLOGY
 950 KANAWHA BLVD E
 CHARLESTON, WV 25301
 304-342-0796

09/13/16 13:21:36
 WV Purchasing Division

FOR INFORMATION CONTACT THE BUYER

Stephanie L. Gale
 (304) 558-8801
 stephanie.l.gale@wv.gov

Signature X

FEIN # 74-3077314

DATE

9/12/10

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION:

Addendum #5 issued to:

1. Provide answers to technical questions received prior to the deadline and erroneously omitted from Addendum #3.

End of Addendum #5.

INVOICE TO	SHIP TO
DEPARTMENT OF ADMINISTRATION OFFICE OF TECHNOLOGY 1900 KANAWHA BLVD E, BLDG 5 10TH FLOOR CHARLESTON WV25305 US	IS&C - DATA CENTER MANAGER DEPARTMENT OF ADMINISTRATION BLDG 6 RM B110 1900 KANAWHA BLVD E CHARLESTON WV 25305-0135 US

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Cost of System - Complete Attachment A Pricing Page	0.00000	EA	<i>See Attachment A</i>	

Comm Code	Manufacturer	Specification	Model #
71151106			

Extended Description :

Vendor/s should not complete Oasis pricing, and should instead submit Attachment A Pricing Page as instructed on 4.1 Contract Award - Pricing Page in the Specifications.

SCHEDULE OF EVENTS

Line	Event	Event Date
1	Technical Questions Due	2016-08-17

ISC1700000001	Document Phase Final	Document Description Addendum #5 - Data Backup System	Page 3 of 3
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ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions

Charleston Solution

Part Number	Description	Quantity	Unit Price	Extended Cost
DR6300 Backup Appliance	576TB Usable DR6300--8.5PB Logical Netvault Backup Software (includes 5 Year 24x7	2	312000	624000
NetVault	Maintenance)	1	315000	315000
210-ADBC	Dell Poweredge R730xd Server	1	15909	15909
Dell Installation	Dell Installation	1	34320	34320
Dell Training	Dell Training	1	8800	8800
<i>Subtotal</i>				\$ 998,029.00

Flatwoods Solutions

Part Number	Description	Quantity	Unit Price	Extended Cost
DR6300 Backup Appliance	576TB Usable DR6300--8.5PB Logical Netvault Backup Software (includes 5 Year 24x7	2	312000	624000
NetVault	Maintenance)	1	315000	315000
210-ADBC	Dell Poweredge R730xd Server	1	15909	15909
Dell Installation	Dell Installation	1	34320	34320
Dell Training	Dell Training	1	8800	8800
<i>Subtotal</i>				\$ 998,029.00
Grand Total				\$ 1,996,058.00

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: _____

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6 |
| <input checked="" type="checkbox"/> Addendum No. 2 | <input type="checkbox"/> Addendum No. 7 |
| <input checked="" type="checkbox"/> Addendum No. 3 | <input type="checkbox"/> Addendum No. 8 |
| <input checked="" type="checkbox"/> Addendum No. 4 | <input type="checkbox"/> Addendum No. 9 |
| <input checked="" type="checkbox"/> Addendum No. 5 | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

ADVANTAGE TECHNOLOGY
Company


Authorized Signature

9/12/2016
Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

Revised 6/8/2012

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

Josh Halstead Sales Director
(Name, Title)
JOSH HALSTEAD SALES DIRECTOR
(Printed Name and Title)
950 KANAWHA BLVD E CHARLESTON, WV 25301
(Address)
304-342-0796 304-720-1423
(Phone Number) / (Fax Number)
jhalstead@advantagetech.biz
(email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

ADVANTAGE TECHNOLOGY
(Company)
Josh Halstead Sales Director
(Authorized Signature) (Representative Name, Title)
JOSH HALSTEAD Sales Director
(Printed Name and Title of Authorized Representative)
8/29/2016
(Date)
304-342-0796 304-720-1423
(Phone Number) (Fax Number)

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

MANDATE: Under W. Va. Code §5A-3-10a, no contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: ADVANTAGE TECHNOLOGY

Authorized Signature: [Signature] Date: 9/12/16

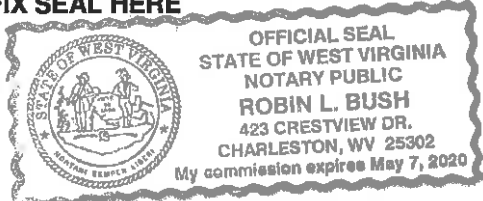
State of West Virginia

County of Kanawha, to-wit:

Taken, subscribed, and sworn to before me this 12 day of September, 2016.

My Commission expires May 7, 2020.

AFFIX SEAL HERE



NOTARY PUBLIC [Signature]

State of West Virginia

VENDOR PREFERENCE CERTIFICATE

Certification and application is hereby made for Preference in accordance with **West Virginia Code**, §5A-3-37. (Does not apply to construction contracts). **West Virginia Code**, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the **West Virginia Code**. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Vendor Preference, if applicable.

1. **Application is made for 2.5% vendor preference for the reason checked:**
 Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; **or,**
 Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification;
 Bidder is a resident vendor partnership, association, or corporation with at least eighty percent of ownership interest of bidder held by another entity that meets the applicable four year residency requirement; **or,**
 Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; **or,**
2. **Application is made for 2.5% vendor preference for the reason checked:**
 Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; **or,**
3. **Application is made for 2.5% vendor preference for the reason checked:**
 Bidder is a nonresident vendor that employs a minimum of one hundred state residents, or a nonresident vendor which has an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia and employs a minimum of one hundred state residents, and for purposes of producing or distributing the commodities or completing the project which is the subject of the bidder's bid and continuously over the entire term of the project, on average at least seventy-five percent of the bidder's employees or the bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years and the vendor's bid; **or,**
4. **Application is made for 5% vendor preference for the reason checked:**
 Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; **or,**
5. **Application is made for 3.5% vendor preference who is a veteran for the reason checked:**
 Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; **or,**
6. **Application is made for 3.5% vendor preference who is a veteran for the reason checked:**
 Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.
7. **Application is made for preference as a non-resident small, women- and minority-owned business, in accordance with West Virginia Code §5A-3-59 and West Virginia Code of State Rules.**
 Bidder has been or expects to be approved prior to contract award by the Purchasing Division as a certified small, women- and minority-owned business.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) rescind the contract or purchase order; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: ADVANTAGE TECHNOLOGY

Signed: 

Date: 9/2/16

Title: Director of Sales

*Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

Dell Data Protection | DR Series backup and deduplication appliances

Dell Data Protection | DR Series of backup and deduplication appliances support all the major backup software applications in use today and can lower your backup storage costs to as little as \$.16/GB while reducing your total cost of ownership. The purpose-built appliances achieve these results using patented Rapid technology as well as built-in, variable block-based deduplication and compression. The DR Series helps you:

- Reduce your backup storage footprint
- Speed up recovery
- Reduce or eliminate the need for physical tapes for backup
- Optimize network bandwidth by lowering the amount of data sent to disaster recovery sites

Simple, affordable solutions

The DR Series systems are extremely efficient, high-performance, disk-based backup and recovery appliances available in both physical and virtual configurations. The DR Series appliances are simple to deploy and manage, and offer unsurpassed total cost of ownership (TCO) benefits.



Innovative system software and an all-inclusive licensing model provide optimal functionality and help eliminate the hidden costs of future feature upgrades. The DR Series appliances have a simple installation process with intuitive remote setup and management capabilities. In addition, they are available in a range of usable capacity points, making them ideal for small enterprise, remote office environments and larger enterprise settings.

Harness the power of deduplication

Through the use of innovative Dell deduplication and compression technology, the DR Series systems can achieve data reduction levels up to 15:1. This reduction in data means that more backup data can be retained longer and within the same footprint.

As disk backup target repositories, the DR Series systems are specifically engineered to handle high-throughput streaming backup workloads, with all deduplication and compression operations being performed inline. This approach minimizes the impact on backup and recovery performance.

Backup more. Store less.
Perform better.

Benefits:

- Supports major backup applications for easy deployment.
- Lowers backup storage costs to as little as \$.16/GB using deduplication and compression.
- Speeds data ingest by up to 29TB/hr with built-in protocol accelerators.
- Decreases TCO with all-inclusive licensing that includes replication, encryption, protocol accelerators and all future feature releases.
- Enhances data protection with built-in software safeguards (early write verify and continuous data protection).
- Provides best-in-class hardware features (NVRAM, data integrity scans, RAID6 storage, hot spares).
- Contains built-in AES 256-bit encryption for data in motion or at rest.
- Allows backup to VTL libraries using iSCSI and NDMP protocols.
- Incorporates 13th generation of Dell PowerEdge servers (DR4300e, DR4300 and DR6300).
- Offers in-place capacity expansion (DR4300e).
- Delivers the highest density deduplication target appliances on the market today.

Achieve extensive scalability

The DR4300e, DR4300 and DR6300 offer flexible and seamless capacity expansion using Dell PowerVault MD1400 expansion shelves. The DR4300e appliance starts at 4.5TB with in-place upgrade to 9.0TB and additional expansion to 27TB using one MD1400 expansion shelf. The DR4300 appliances start at 18TB and scale to as much as 108TB of usable capacity (after RAID6) using two MD1400 expansion shelves. With the latest release of the DR Operating System, Dell has added support for 8TB disk drives on the MD1400 expansion shelves, allowing the DR6300 to scale from 18TB up to 360TB of total usable capacity (after RAID6). This pay-as-you-grow model allows you to expand capacity based on your business demands and helps alleviate challenges in the backup workflow.

Data backed up to DR Series appliances are handled as virtual shares or containers — eight for the DR2000v, 32 for the DR4300e, 64 for the DR4300 or 128 for the DR6300. DR appliance software automatically partitions existing capacity of the base unit and all expansion shelves, relieving the user of performing any storage provisioning.

Edge to core protection with virtual appliance

For cost-effective data protection for small, remote or branch offices, the DR2000v is an attractive choice since no additional hardware investments are necessary. This pure software solution¹ delivers most of the same benefits of a physical DR appliance, including deduplication, compression, replication and encryption at rest.

The DR2000v is implemented at the remote site for local data protection and recovery. For disaster recovery purposes, the DR2000v replicates deduplicated data remotely to a peer DR physical or virtual appliance. The DR2000v is offered in 1, 2, 4 or 12TB (with a maximum of eight containers) capacity points and may be ordered in packs of one or 10 licenses.

¹ DR2000v license must be linked to physical DR appliance.

² Please see online tech specs for additional software certifications.

Virtual Tape Library support

If you need to send backed-up data to tape formats due to legacy application requirements or retention requirements, the Dell DR Series offers Virtual Tape Library (VTL) support using NDMP or iSCSI connectivity. A single DR Series appliance can support four VTL libraries or containers. Each container stores backed up data on virtual LTO-4 tape drives further subdivided into virtual cartridges.

VTL containers are set up for an appliance using a new container configuration wizard that lets you establish containers using NAS, NDMP or iSCSI connectivity.

Reap the rewards of business continuity

One of the primary benefits of backup-to-disk appliances is the ability to recover data in the event of disaster. By saving storage space through deduplication and compression, greater amounts of data can be kept online longer, and businesses can meet their recovery time and recovery point objectives while also lowering capital and administrative costs.

Through the use of the DR Series replication functionality, the benefits of data deduplication can extend across the enterprise to provide a complete backup and disaster recovery solution for multi-site environments. By replicating only deduplicated data from one DR appliance to another, network bandwidth requirements are reduced and disaster recovery time is optimized.

Replication enables better disaster tolerance without the operational costs associated with transporting tapes off site, and it can be scheduled to occur during non-peak periods. During replication, ingest data is prioritized over replication data to help ensure optimal backup windows.

When you need additional security, the Dell DR Series supports Encryption at Rest using industry-standard 256-bit Advanced Encryption Standard (AES) and internal encryption keys generated

by the appliance. The encryption can be performed inline (while data is being ingested) or post-process — after the data has been stored on disk.

Management simplicity

As part of the DR Series software, the graphical user interface, Global View, is part of the DR Series operating system and provides an overview of a network of DR physical and virtual appliances, including system stats, hardware and software alerts, storage capacity/savings and important system information such as system and software versions.

Global View allows administrators to monitor a network of up to 64 DR appliances from a single screen for a seamless view of status across the enterprise. The DR Series appliance software automatically monitors the health of the hardware and verifies the integrity of the system software. Critical hardware and software issues can be sent by email for immediate notification.

Flexibility to meet your needs

As purpose-built backup target appliances, the DR Series systems are specifically designed to perform the functions of deduplication and compression. Optimized for this purpose, they support a broad range of leading backup software solutions, such as Dell NetVault Backup and vRanger, as well as Veritas[™] NetBackup[®] and Backup Exec[®], CommVault[®] Simpana[®], Microsoft[®] Data Protection Manager[®], Veeam, EMC Networker, IBM TSM, Oracle RMAN, ArcServe, Hewlett Packard[®] Data Protector[®], Bridgehead[®], Amanda[®] and Atempo Time Navigator.²

Accelerate backup operations with Dell DR Rapid technology

A distinguishing feature of the DR Series is DR Rapid — a technology offered through a set of plug-ins that comes standard with every appliance. The plug-ins are engineered by Dell and can be installed on the client servers or media servers connected to a Dell DR Series appliance. They help optimize performance using source-based deduplication and support Veritas OST



Feature	DR4300e	DR4300	DR6300	DR2000v
Form factor	2U	2U	2U	n/a
Internal storage	Redundant OS storage on dedicated disks (inside chassis) 12 3.5" drives, Near Line SAS—hardware RAID 6 configuration (11 drives + 1 hot spare)	Redundant OS storage on dedicated disks (inside chassis) 12 3.5" drives, Near Line SAS—hardware RAID 6 configuration (11 drives + 1 hot spare)	Redundant OS storage on dedicated disks (inside chassis) 12 3.5" drives, Near Line SAS—hardware RAID 6 configuration (11 drives + 1 hot spare)	Uses storage disks resident in the server hosting the virtual appliance (VMware ESXi (5.0, 5.1 or 5.5), Microsoft Hyper-V (2008R2, 2012, 2012R2))
Protocol support	NFS, CIFS, Rapid NFS, Rapid CIFS, OST, RDA, NDMP, iSCSI	NFS, CIFS, Rapid NFS, Rapid CIFS, OST, RDA, NDMP and iSCSI	NFS, CIFS, Rapid NFS, Rapid CIFS, OST, RDA, NDMP and iSCSI	NFS, CIFS, Rapid NFS, Rapid CIFS, OST, RDA
Networking	One Network Daughter Card option per node: 2 port 10GbE + 2 port 1GbE (base T or SFP+ or SFP+ w/cables); 4 port 1GbE; 4 port 10GbE (SFP+ or SFP+ w/cables) Plus one optional add-on NIC: 4 port 1GbE; 2 port 10GbE; 2 port 10GbE (base T or SFP+ or SFP+ w/cables)	One Network Daughter Card option per node: 2 port 10GbE + 2 port 1GbE (base T or SFP+ or SFP+ w/cables); 4 port 1GbE; 4 port 10GbE (SFP+ or SFP+ w/cables) Plus one optional add-on NIC: 4 port 1GbE; 2 port 10GbE; 2 port 10GbE (base T or SFP+ or SFP+ w/cables)	One Network Daughter Card option per node: 2 port 10GbE + 2 port 1GbE (base T or SFP+ or SFP+ w/cables); 4 port 1GbE; 4 port 10GbE (SFP+ or SFP+ w/cables) Plus one optional add-on NIC: 4 port 1GbE; 2 port 10GbE; 2 port 10GbE (base T or SFP+ or SFP+ w/cables)	2 x 1GbE ports
Systems management	iDRAC 8 Enterprise	iDRAC 8 Enterprise	iDRAC 8 Enterprise	n/a
Physical dimensions	2U RAC-mountable chassis; H: 8.73 cm (3.44 in.) x W: 48.2 cm (18.98 in.) x D: 75.58 cm (29.75 in.)	2U RAC-mountable chassis; H: 8.73 cm (3.44 in.) x W: 48.2 cm (18.98 in.) x D: 75.58 cm (29.75 in.)	2U RAC-mountable chassis; H: 8.73 cm (3.44 in.) x W: 48.2 cm (18.98 in.) x D: 75.58 cm (29.75 in.)	n/a
Rack weight	36.5 kg (80.47 lb.), maximum configuration	36.5 kg (80.47 lb.), maximum configuration	36.5 kg (80.47 lb.), maximum configuration	n/a
Capacity points	4.5TB (67.5TB logical) ³ 9.0TB (135TB logical) ³	18TB (270TB logical) ³ 36TB (540TB logical) ³	18TB (270TB logical) ³ 36TB (540TB logical) ³ 54TB (810TB logical) ³ 72TB (1.08PB logical) ³	Available in 4 post-RAID configurations 1TB, 2TB, 4TB and 12TB. ⁴ Each DR4300 or DR4300e can support up to 32 DR2000v licenses. Each DR6300 can support up to 64 DR2000v licenses.
Expansion unit capacity ⁵	One expansion shelf maximum: 9TB post RAID (135TB logical) ³ 18TB post RAID (270TB logical) ³	2 shelf maximum: 18TB post RAID (270TB logical) ³ 36TB post RAID (540TB logical) ³	4 shelf maximum: 18TB post RAID (270TB logical) ³ 36TB post RAID (540TB logical) ³ 54TB post RAID (810TB logical) ³ 72TB post RAID (1.08PB logical) ³	n/a
Wattage	750 W (redundant power supply)	1100 W (redundant power supply)	1100 W (redundant power supply)	n/a
Voltage	100 VAC to 240 VAC, auto ranging, 50Hz to 60Hz, 10 A-5A	100 VAC to 240 VAC, auto ranging, 50Hz to 60Hz	100 VAC to 240 VAC, auto ranging, 50Hz to 60Hz	n/a
Heat dissipation	2891 BTU/hr (maximum) (750 W PSU)	4100 BTU/hr maximum (1100 W PSU)	4100 BTU/hr maximum (1100 W PSU)	n/a
Regulatory model	E31S Series	E31S Series	E31S Series	n/a
Maximum throughput	21TB/hr with Rapid protocols ⁶	22TB/hr with Rapid protocols ⁶	29TB/hr with Rapid protocols ⁶	1.4TB/hr with RDA or OST ⁷
Backup software certifications	Dell AppAssure 5.x (Archive Repository Support only), NetVault Backup, vRanger; CommVault Simpana; Veritas Backup Exec and NetBackup; ARCserve; EMC Networker; Microsoft Data Protection Manager; Veeam; IBM TSM; Oracle RMAN; HP Data Protector; Bridgehead; Amanda, Atempo Time Navigator	Dell AppAssure 5.x (Archive Repository Support only), NetVault Backup, vRanger; CommVault Simpana; Veritas Backup Exec and NetBackup; ARCserve; EMC Networker; Microsoft Data Protection Manager; Veeam; IBM TSM; Oracle RMAN; HP Data Protector; Bridgehead; Amanda, Atempo Time Navigator	Dell AppAssure 5.x (Archive Repository Support only), NetVault Backup, vRanger; CommVault Simpana; Veritas Backup Exec and NetBackup; ARCserve; EMC Networker; Microsoft Data Protection Manager; Veeam; IBM TSM; Oracle RMAN; HP Data Protector; Bridgehead; Amanda, Atempo Time Navigator	Dell AppAssure 5.x (Archive Repository Support only), NetVault Backup, vRanger; CommVault Simpana; Veritas Backup Exec and NetBackup; ARCserve; EMC Networker; Microsoft Data Protection Manager; Veeam; IBM TSM; Oracle RMAN; HP Data Protector; Bridgehead; Amanda, Atempo Time Navigator

³ All capacity values are calculated using Base 10 (i.e., 1TB = 1,000,000,000,000 bytes). Logical capacity based on overall deduplication ratio average of 15:1.

⁴ Resource requirements: 4 virtual CPU cores, 8GB RAM, 200GB in addition to VM capacity.

⁵ Expansion unit must be greater than or equal to size of base unit and requires installation of the required expansion shelf license.

⁶ Expected performances when using RDA, Rapid NFS or Rapid CIFS, 10GbE and multiple backup or client server connections.

⁷ Throughput achieved for DR2000v using 4 clients x 2 streams.



Edge to Core protection — The DR2000v software-based virtual appliance gives you the flexibility to easily protect data residing at local or branch locations

Scalability — Gain more than five petabytes of logical capacity (based on dedupe ratios of 15:1) with the DR6300

Pay-as-you-grow expansion — Support for up to one (DR4300e), two (DR4300) or four (DR6300) Dell PowerVault MD1400 expansion shelves (available in 9TB, 18TB, 36TB, 54TB or 72TB usable capacities after RAID)

Ease deployment and enhance flexibility with support for legacy backup applications and Virtual Tape Libraries

New DR4300e allows in-box expansion from 4.5TB to 9TB

(RDA for OST), Dell NetVault Backup and vRanger (RDA for NVBU and vRanger), and backup applications using NFS or CIFS (Rapid NFS/Rapid CIFS).

The primary advantage of DR Rapid is it enables the client or media server to be the source of the deduplication process by performing chunking and hash computations before sending unique data blocks to the appliance, thus boosting overall performance.

DR Rapid with Veritas' Open Storage Technology (RDA for OST) supports Veritas Backup Exec or NetBackup. RDA for Dell NetVault Backup enables deeper integration by providing the ability to catalog and log remote copies of data to optimize backup and replication management.

For those backup applications using the NFS or CIFS protocol, DR Rapid includes the industry's first source-side deduplication for NFS and CIFS — Rapid NFS and Rapid CIFS. Similar to the other DR Rapid plug-ins, Rapid NFS and Rapid CIFS sit on either the client servers or media servers and can help boost to as much as 29TB/hour.⁸

Future-proof your data center

The DR Series appliances⁹ change the economics of disk-based protection by trimming storage costs, mitigating risk and reducing complexity in the infrastructure. By accelerating and streamlining the backup process, the Dell DR Series appliances help ensure information restores are delivered in a convenient and accurate manner — in time with business needs.

The deduplication and compression features within the DR Series are cornerstone technologies of Dell's data protection vision. Future products within this architecture will continue to leverage the same deduplication/compression capabilities.

Find the answers

Reduce IT complexity and costs and eliminate inefficiencies by making IT and business solutions work harder for you through Dell Services. The Dell Services team takes a holistic view of your needs and designs data protection solutions for your environment and business objectives while leveraging proven delivery methods, local talent and in-depth domain knowledge for the lowest TCO.¹⁰

Learn more at software.dell.com/products/dr-series-disk-backup-appliances.

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About Dell Software

Dell Software helps customers unlock greater potential through the power of technology — delivering scalable, affordable and simple-to-use solutions that simplify IT and mitigate risk. This software, when combined with Dell hardware and services, drives unmatched efficiency and productivity to accelerate business results. www.dellsoftware.com.

⁸ Expected performance when using RDA, Rapid NFS or Rapid CIFS, 10GbE and multiple backup or client server connections.

⁹ This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (www.openssl.org).

¹⁰ Availability and terms of Dell Services vary by region. For more information, visit www.dell.com/servicesdescriptions.



Dell NetVault Backup Technical Overview

A technical overview of NetVault Backup, including its architecture, benefits, key components and licensing options.

Written by Dell Software



Introduction

NetVault Backup is a comprehensive backup and recovery software solution that allows enterprises to protect data in diverse IT environments — all from one Web-based interface. It's scalable and supports multiple server and application platforms across your organization. A single, intuitive interface requires minimal experience, simplifying your data backup and recovery operations.

Architecture

NetVault Backup is based on a client-server architecture:

- A central NetVault Backup server provides job management, media management, device management, client management, reporting, notifications and logging. This server maintains a history of backups in the NetVault Backup database, enabling users to identify the objects they want to restore.
- NetVault clients are agents that work with the NetVault Backup server to back up and recover their respective servers, applications and data. The client software is installed on each machine to be protected. The

NetVault WebUI enables centralized administration of a NetVault Backup server from any workstation within the network.

NetVault supports tape drives, tape libraries and other backup devices attached to the central server itself or to a protected machine located anywhere on the network, enabling LAN-free backups.

Key capabilities

- **Application protection** – Ensure the availability of all of your business-critical applications, including Oracle, SQL Server®, Exchange Server, SharePoint®, MySQL™, DB2®, PostgreSQL, Domino®, Informix, Sybase® and Teradata®. No scripting is required to run “hot” backup and recovery jobs.
- **Virtualization support** – Extend advanced data protection to VMware® and Hyper-V® environments. NetVault Backup gives you consistent, reliable, point-and-click backup and restore for virtual environments without requiring you to be an expert.
- **Network-attached storage (NAS) protection** – Get advanced data protection for information stored on NAS devices, including those

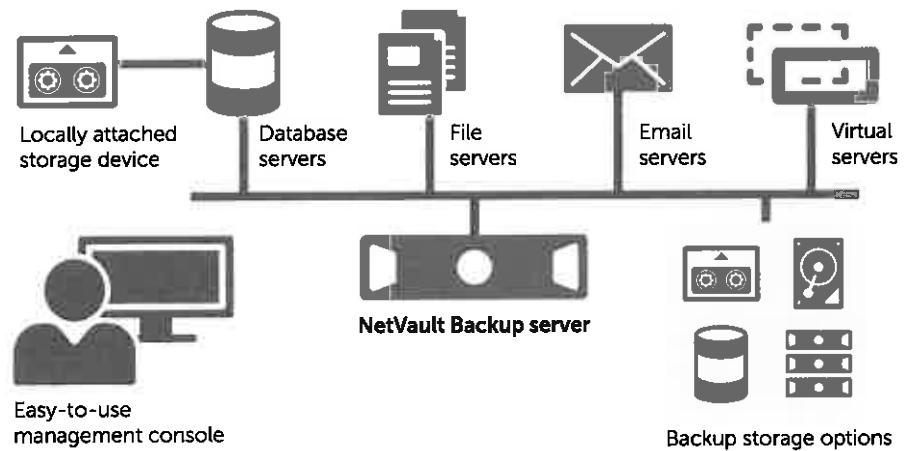


Figure 1. A typical NetVault Backup deployment consists of a NetVault Backup server, the NetVault WebUI, NetVault clients and backup storage.

The NetVault WebUI enables remote administration of a NetVault Backup server from any Web browser.

- made by Dell, EMC, Hitachi, IBM, NetApp and Sun. Reduce traffic over the LAN and maximize performance by backing up over the Network Data Management Protocol (NDMP). NetVault Backup supports many different storage topologies and configurations.
- **Global data deduplication** – NetVault integrates seamlessly with the Dell DR Series of deduplication appliances, enabling you to take full advantage of the appliances' powerful deduplication, compression and replication capabilities. Shrink backup windows and improve restore times, use source-side deduplication to reduce network traffic and efficiently send copies of your backup data offsite for disaster recovery.
- **Enterprise-wide control** – Use NetVault's Web-based user interface to configure, manage, and monitor your backup and recovery operations. Convenient wizards guide you through the common tasks, such as creating backup jobs, assigning policies, configuring storage devices, and generating reports.
- **Strong security** – Meet regulatory requirements without sacrificing backup windows or deduplication performance with an encryption plug-in for CAST-128, AES-256 or CAST-256 algorithm support. Flexible job-level encryption lets you easily select which data to encrypt.
- **Back up to disk and tape** – NetVault Backup supports disk- and tape-based backup to a wide range of storage targets, including disk-based devices, tape libraries, and third-party deduplication appliances. You'll also have the power to move data from one storage target to another for disaster recovery purposes.
- **Flexible storage attachment** – Avoid data transfers over the network by attaching a target storage device directly to a source server. With LAN-free backups, you can easily distribute the workload throughout the backup domain.
- **Simple, straightforward licensing** – NetVault Backup can be licensed by capacity or by component, giving you incredible flexibility. With component-based licensing, you can pick and choose which modules you need. You can also license NetVault by capacity and deploy an unlimited number of clients or application plug-ins. Dell offers two capacity-based licensing editions for NetVault Backup: One offers great value for growing businesses; the other offers comprehensive protection for larger enterprises.

NetVault WebUI

The NetVault WebUI (see Figure 2) enables remote administration of a NetVault Backup server from any Web browser. You can use the NetVault WebUI to perform various tasks, such as manage clients, storage devices, and storage media, perform backups and restores, monitor jobs and device activity, set up notifications, and generate and view reports.



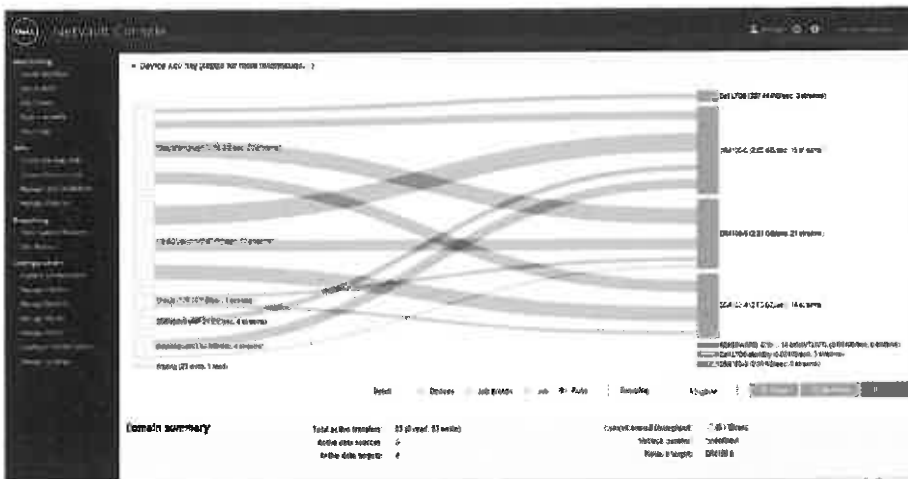


Figure 2. The NetVault WebUI enables administrators to monitor the data flow from source servers to the target storage device.

Configuration Wizard guides you through the process of performing common tasks, such as adding clients and storage devices, and creating backup jobs.

The process for creating and managing backup jobs has been streamlined as well. After the administrator chooses the data, schedule, target device, and backup options, NetVault will memorize each of those choices and create “shortcuts”, called NetVault Backup Sets that the administrator can use in the future. Those shortcuts will be stored in a dropdown menu for quick retrieval. This eliminates the need to manually select the data items each time a backup is performed, and ensures that the same data set is selected for the subsequent backups.

Backup Policies can be used to administer backup strategies such as following:

- Daily incremental and weekly full backups of file servers
- Full backups of multiple Windows workstations
- Full and incremental backups of multiple databases
- Monitoring backup activities

NetVault command-line interface

NetVault Backup’s command-line interface (CLI) allows administrators

to perform various operations from a terminal session using predefined executables. Using these commands, they can:

- **Start or stop the NetVault Backup service**
- **Create and submit jobs**—This includes creating, modifying and submitting backup and restore jobs for any NetVault client controlled by the NetVault Backup server. NetVault also provides command-line executables to create and modify the selection sets required for these jobs.
- **Manage backup devices and media**—This includes importing and exporting media items, blanking media items, reviewing drive and library status, marking media items for re-use, and several other functions.
- **Create and view canned and custom reports**—This includes various reports for clients, devices, media and jobs.
- **View operator messages**—This enables administrators to determine whether attention is required.

All CLI scripts are non-blocking. This means that a response to the script command is returned before the action has actually completed. This allows for continuous running of various scripts without interrupting NetVault Backup operations.

NetVault Backup server

The NetVault Backup server is the main component of the NetVault

NetVault Backup’s Configuration Wizard guides you through the process of performing common tasks.



The NetVault Backup server maintains a history of backups in the NetVault database, so administrators can quickly identify one or more objects they want to restore.

solution. It provides a variety of backup management functionality, including job management, media management, device management, client management, reporting, notifications, and logging functions. The NetVault Backup server maintains a history of backups in the NetVault database, so administrators can quickly identify one or more objects they want to restore. Target disk storage and physical or virtual tape libraries can be attached directly to the NetVault Backup server (or elsewhere within the backup domain using SmartClients).

The NetVault Backup server can be deployed on Windows or Linux.

NetVault clients

NetVault clients are the machines that will be protected by NetVault Backup. The NetVault client software is installed on each machine designated as a NetVault client.

NetVault clients can be deployed on the following operating platforms:

- Linux
- Windows
- Solaris
- Mac OS X
- FreeBSD
- AIX
- HP-UX
- NetWare

There are two types of NetVault clients for server backup/recovery: heterogeneous clients and SmartClients.

Heterogeneous clients

NetVault heterogeneous clients are used to protect any server, including file servers, database servers, email servers, application servers and web servers. The NetVault heterogeneous client includes several built-in plug-ins that are automatically installed when the administrator installs the client software. These plug-ins enable the administrator to perform several operations, including backup/restore file-system data, copy backup data, and consolidate incremental backups. Additional characteristics of the NetVault heterogeneous client include:

- Heterogeneous clients include support for NetVault Backup application plug-ins and NetVault bare metal recovery.
- Heterogeneous clients include support for locally attached tape-based backup devices with a NetVault Backup SmartClient license.
- Heterogeneous clients are supported by all NetVault Backup server editions.
- Heterogeneous clients require continuous connectivity to NetVault Backup server for all backups.
- The NetVault Plug-in for File System enables the administrator to create multiple backup jobs that protect any or all of the file-system data that is visible to the plug-in, including network-attached storage.
- All client-initiated backup jobs are visible in the NetVault Backup Jobs window.
- Administrators must perform all restores from the NetVault WebUI.

Each NetVault Backup server edition includes some heterogeneous clients. Additional heterogeneous clients can be added to the backup domain as

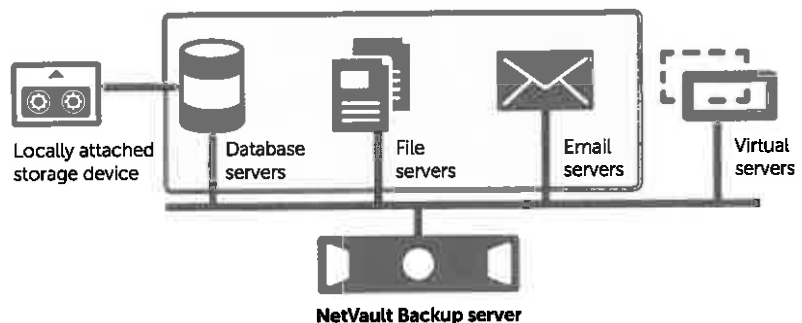


Figure 3. NetVault heterogeneous clients are used to protect any server, including file servers, database servers, email servers, application servers, and web servers.



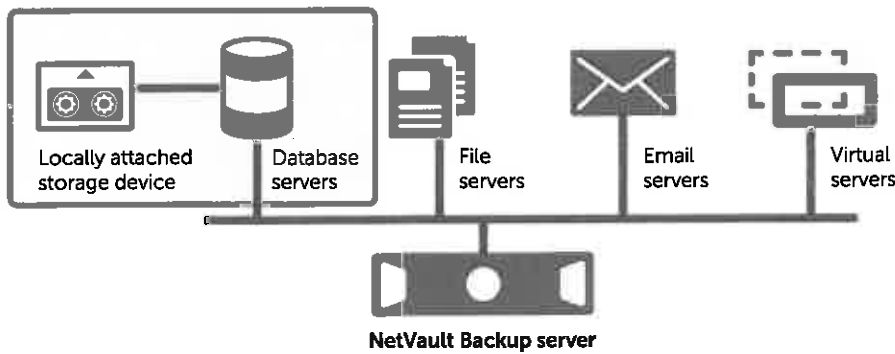


Figure 4. Using a NetVault SmartClient, an administrator can attach a storage device directly to a protected system, bypassing the NetVault Backup server.

required. The number of heterogenous clients that can be connected to a single backup server is dependent on the type of hardware used to host the NetVault Backup server and whether other resource intensive applications are also using the same machine.

NetVault SmartClients

NetVault SmartClients give you the freedom to attach storage wherever you like. Both virtual and physical tape libraries can be easily distributed throughout the backup domain. Backup data no longer needs to pass over the network and through a NetVault Backup server in order to be written to a target storage device.

Backup verification

NetVault Backup can check the correctness and completeness of a backup at the end of data transfer: it verifies the stream length written to the media and makes sure that no blocks were dropped during the backup. While the actual backup runs as Phase 1, backup verification runs as Phase 2 of the backup job. By default, the verification job runs on the NetVault Backup server. To avoid data transfers over the network, the administrator can choose to run verification locally on the SmartClients to which the target device used for the backup is connected. The target client for the verification job can be configured from the Verify tab on the configurator.

NetVault Backup allows administrators to run the verification jobs locally on the NetVault clients rather than the NetVault Backup server. They can use this feature for SmartClients to avoid data transfers over the network. However, this option is globally applied to all clients, which will not work for heterogeneous clients without a locally-attached backup device.

Application support

NetVault Backup uses specialized plug-ins to protect data in business-critical applications such as Oracle, SQL Server, Exchange, SharePoint, MySQL, PostgreSQL, Lotus Domino, Informix and Sybase. These plug-ins improve native options offered by these applications to reduce time-consuming integration efforts. With these improvements, administrators can protect their application investments and help close the gap between corporate application recovery and database protection requirements.

Microsoft Exchange

NetVault Backup increases confidence in the recoverability of Microsoft Exchange and enables users to create flexible backup policies that can account for multiple recovery scenarios. Its support for online backups via Exchange Server's Extensible Storage Engine (ESE) and Volume Shadow Copy Service (VSS) enables users to select their preferred backup method without requiring them to become experts in Exchange.

NetVault SmartClients give you the freedom to attach storage wherever you like.



Support for Oracle RMAN lets DBAs move the backup files and archived redo logs to tape.

NetVault Backup offers users a centralized way to set up, configure and define backup and restore policies for all of the organization's Exchange Servers, including those deployed in a database availability group (DAG) or a local continuous replication (LCR), single copy cluster (SCC) or cluster continuous replication (CCR) environment.

Informix

NetVault Backup increases application availability via fast online backup of Informix databases in UNIX, Linux and Windows environments using native application interfaces. Major features include multiple residency support; Level 1 and 2 incremental backups; and flexible operations that allow administrators to back up the whole system, individual data spaces or Informix binary large object (BLOB) spaces and logical logs.

IBM DB2

NetVault Backup provides a centralized web interface to set up, configure and define backup and restore policies for all of the organization's DB2 databases. Its support for online and offline backups gives administrators the flexibility to select their preferred backup method without requiring them to learn the DB2 internals. Its granular control that minimizes downtime by allowing administrators to restore complete databases, individual table spaces or individual log files quickly and more reliably.

Oracle

NetVault Backup enables organizations to protect all of their Oracle environments, including Oracle Real Application Clusters (RACs) and Data Guard. Its support for Oracle Recovery Manager (RMAN)-based backups lets DBAs take advantage of RMAN's native functionality and enables to move the backup files and archived redo logs to tape.

NetVault can handle a number of recovery scenarios with less human intervention. To perform a recovery, a DBA simply selects what needs to be restored, the latest backup, and,

if appropriate, the time, SCN or log sequence number for point-in-time recovery; NetVault Backup automatically performs the recovery without further interaction. It provides maximum flexibility during the recovery process, allowing the DBA to recover the database up to the point of failure no matter what caused the failure, whether it is a site disaster, media failure, user error or database corruption.

NetVault also supports Oracle's Automatic Storage Management (ASM), Flashback Database and Transparent Data Encryption.

MySQL

NetVault Backup can consolidate the backup and recovery of multiple MySQL storage engines into a single job without complex scripting. In addition to performing full, incremental or differential MySQL backups while data is online and accessible, NetVault offers improved point-in-time functionality to perform more granular restores: the administrator can restore to the point right before incident occurred, thereby significantly reducing data loss.

NetVault Backup supports mysqldump and MySQL Enterprise Backup (MEB), delivering protection that scales from small databases and tables to very large databases. When using NetVault together with MEB, administrators can perform online backups of InnoDB tables. The powerful combination of backup tools can also significantly improve backup and restore times and reduce an organization's backup storage footprint.

MySQL Server failover clusters

MySQL failover clustering (active/passive) is designed to provide high availability for an entire MySQL Server instance. For example, an administrator can configure a MySQL Server instance on one node of a failover cluster to fail over to any other node in the cluster during a hardware failure, OS failure or planned upgrade.



A failover cluster is a combination of one or more nodes (hosts) with one or more shared disks. Various resources hosted by the nodes—such as IP, shared storage and an application (MySQL in this case) —can be grouped together to create a clustered service. A virtual service appears on the network as if it were a single computer running an application, but provides failover from one node to another node if the current node becomes unavailable.

NetVault Backup provides support for MySQL Server failover clustering. Using the failover cluster network name, the backup solution is able to identify the current node that is in control of the MySQL Server clustered service and target it for backup.

Microsoft SharePoint

NetVault Backup offers granular control that enables the administrator to restore complete SharePoint farms, individual web applications or individual content databases, thereby minimizing downtime. Through automatic integration with a wide range of backup storage devices, SharePoint data is protected and safely sent and stored offsite to meet an organization's disaster recovery and business continuity goals.

Microsoft SQL Server

NetVault Backup provides fast, online backup of SQL Server databases in Windows environments. Its support for Online Virtual Device Integration (VDI) and Volume Shadow Copy Service (VSS) backups gives users the flexibility to implement their preferred backup method. And its granular control allows users to restore complete databases, partial databases or individual data files quickly and reliably, thereby minimizing downtime.

SQL Server failover clusters

SQL Server failover clustering (active/passive) is designed to provide high availability for an entire SQL Server instance. For example, an administrator can configure a SQL Server instance on one node of a failover cluster to fail over to any

other node in the cluster during a hardware failure, OS failure or planned upgrade.

A failover cluster is a combination of one or more nodes (hosts) with two or more shared disks, known as a resource group. The combination of a resource group, along with its network name, and an IP address that makes up the clustered application or server, is referred to as a virtual server. A virtual server appears on the network as if it were a single computer, but it provides failover from one node to another node if the current node becomes unavailable.

PostgreSQL

NetVault Backup offers a simple and easy way to perform routine backups for one or more PostgreSQL database in Solaris, Linux and Windows environments. The solution provides support for database cluster backups, individual database and table backups in different backup formats, such as plain-text SQL script, TAR archive and custom archive formats. It also offers granular control over restores and minimizes downtime by allowing an administrator to restore an entire database cluster, individual databases or individual tables more reliably.

IBM Lotus Domino Server

NetVault Backup ensures continuous availability by providing fast online backup and recovery of Lotus Domino environments. Support for full and incremental backups gives administrators the flexibility to choose their preferred backup method, and granular control minimizes downtime by allowing administrators to restore the Lotus Domino Server databases or individual user mailboxes quickly and reliably.

SAP

NetVault Backup increases application availability by providing fast, online backup of SAP R/3 databases in Linux, UNIX and Windows environments. This plug-in supports such important features as hot backup, integration with SAP R/3 tools, parallel backup support and selectable backup operations.

NetVault Backup offers granular control that enables the administrator to restore complete SharePoint farms, individual web applications or individual content databases, thereby minimizing downtime.

NetVault Backup provides consistent, reliable, point-and-click backup and restore for virtual environments—without requiring the administrator to be an expert.

Administrators can execute backups directly from SAP R/3. User databases can remain online and fully accessible during backup, which minimizes downtime. An administrator can submit jobs using a web interface or command-line interface. Most of the extensive features provided by NetVault Backup are supported when using SAP R/3 Backint command-line options and parameter files.

Sybase

NetVault Backup provides increased application availability via fast, online backup of Sybase databases in UNIX, Linux and Windows environments. Features include hot backup, support for multiple database servers on a single machine, advanced logging capabilities and a low-level backup API for maximized throughput.

Virtualization

NetVault Backup allows organizations to extend advanced data protection to VMware and Hyper-V environments using specialized virtualization plug-ins. Xen and KVM are supported by running a client (and plug-in, if desired) within the OS guest. NetVault Backup provides consistent, reliable, point-and-click backup and restore for virtual environments—without requiring the administrator to be an expert.

VMware

NetVault Backup provides protection for virtualization environments running stand-alone VMware ESX Servers or VMware vCenter Server connected to one or more ESX Servers. It works with VMware API for Data Protection (VADP) to provide centralized backups that reduce the load on each VMware ESX Server, allowing the servers to run more virtual machines and reduce backup traffic on the local area network.

The solution also takes advantage of VMware's changed block tracking (CBT) to ensure that only blocks that have changed since the initial full and the last incremental or differential backup are sent to the current incremental

or differential backup stream, thereby ensuring more efficient backups and reduced network demands.

NetVault is licensed according to whether the customer has deployed only a few stand-alone ESX servers or has many ESX servers that are optionally managed by a vCenter Server in their VMware deployment. There are two types of licenses for VMware:

- **Single ESX Server Edition**—Allows one stand-alone ESX Server to be connected to a single instance of the NetVault Backup Plug-in for VMware to protect all virtual machines on those servers.
- **Enterprise Edition**—Allows multiple ESX servers and/or vCenter servers to be connected to a single instance of the NetVault Backup Plug-in for VMware. There is no limit to the number of server or virtual machines that can be protected with a single Enterprise Edition license. In larger virtualized environments, it is often a good idea to deploy multiple plug-in instances for performance and load balancing reasons. Organizations can mix and match Enterprise Edition and Single ESX Server Edition as required.

Hyper-V

NetVault Backup protects Hyper-V environments from disasters, media failure and wide-ranging data corruption. An intuitive, easy-to-use graphical user interface (GUI) gives administrators a single, centralized web interface for configuring backup and restore policies for virtual environments.

NetVault offers granular control that minimizes downtime by letting the administrator restore complete VM images or individual Windows files faster and more reliably.

While it is optional to install application plug-ins inside the individual virtual machines for more granular application protection, the plug-ins are not required in order to perform image-level backups of the virtual machines for disaster recovery or file-level backups of the individual Windows guest OS



for faster file-level recovery from the Hyper-V hypervisor host. If the NetVault heterogeneous client or other plug-in is installed inside the virtual machine, a NetVault heterogeneous client license is required for the virtual machine.

Network-attached storage (NAS)

Network data management protocol (NDMP)

Using a specialized plug-in, NetVault Backup can protect NAS devices using network data management protocol (NDMP), a protocol designed to efficiently transfer large blocks of data directly to a locally attached SCSI device, a SAN-attached storage device or to a storage device elsewhere on the network.

NetVault offers advanced NDMP features, such as browsable volume and direct access restore (DAR), which increases restore speeds with fast positioning to the right section of the tape.

NetVault Backup supports NDMP backup for the following NAS platforms:

- Dell FluidFS
- Dell Compellent zNAS
- Hitachi / BlueArc
- IBM N series
- Isilon
- EMC VNX series
- EMC Celerra
- MiraPoint
- NetApp
- ONStor
- Oracle/Sun

NDMP transfer models

Organizations also have the flexibility to choose the right data transfer model to maximize their infrastructure capabilities, including local, remote, three-way and shared transfer models.

- **Direct attached or local backups**—In the direct attached or local backup model, the NetVault Backup Server instructs the NAS filer to write backup data to the tape device directly attached to the filer (via Fibre Channel or SCSI). The backup index information is transferred from the filer to the NetVault Backup server over the LAN via NDMP. During restore, the filer reads the

data from the direct-attached tape device on NetVault Backup server instructions. The actual data is not transmitted over the network during backup or restore, eliminating network congestion altogether. In addition, NetVault Backup server and clients on the LAN can also target the NAS filer's locally-attached tape devices for backup and restore operations.

- **Filer to NDMP-compliant network attached tape backups**—In addition to a tape device directly attached to the filer via Fibre Channel or SCSI, an NDMP-compliant network-attached storage device can be used as a target for backups. In this configuration, via NDMP over the LAN, the data is directly transferred to the tape and the backup index information is transferred to the NetVault Backup server. The network-attached storage device can be shared by one or more filers, NetVault Backup server and any number of NetVault clients.
- **Remote backups**—In the filer-to- NetVault Backup server or filer-to-SmartClient model (commonly referred to as remote backup model), the NetVault Backup server instructs the filer to perform backup to devices attached to the NetVault Backup server or SmartClient. Both the data and the backup index information are transferred from the filer to the NetVault Backup server over the LAN via NDMP.
- **Filer-to-filer backups**—In the filer-to-filer model, often referred to as three-way backup, the NetVault Backup server instructs filer A to start backing up data to the tape device attached to filer B. Backups and restores for filer B are performed directly to the local tape device, while backups and restores for filer A are routed through the network. The backup index information is transferred from filer A to the NetVault Backup server over the LAN via NDMP. This model allows sharing of tape libraries among multiple filers.
- **Clustered NAS devices**—Many models of NAS filers are sold as active/active and active/passive clustered configurations, which provide multiple NAS head controllers to enable redundant paths to the NAS storage in the event of a single head failure. In a clustered configuration, one NDMP license is required for the

Using a specialized plug-in, NetVault Backup can protect NAS devices using NDMP.

cluster and one NDMP cluster companion license is required for each additional node whether it is in active or passive node.

NetApp filers

Dell Software offers a NetApp bundle that consists of three plug-ins:

- **NetVault Backup Plug-in for SnapMirror to Tape**—Working in conjunction with NetApp’s SnapMirror software, the NetVault Backup Plug-in for SnapMirror to Tape can, via NDMP, take a point-in-time snapshot of an entire volume on a filer and then write that snapshot to a medium such as a tape in a tape drive. Through the use of NetApp utilities, it is also possible to “mirror” this snapshot to a second filer. A snapshot contains flags that mark the status of the data contained in the volume at the point in time the snapshot was taken. Therefore, the snapshot can be used to recover data to that point in time. This process allows for quick and relatively seamless disaster recovery.
- **NetVault Backup Plug-in for Snapshot Manager**—The NetVault Plug-in for Snapshot Manager, in conjunction with NetApp’s snapshot capability, enables administration and control of snapshot

creation as well as recovery of snapshots through the NetVault WebUI. NetVault Backup also allows a user to perform individual component restores.

- **NetVault Backup Plug-in for SnapVault Manager**—NetVault Backup Plug-in for SnapVault Manager provides an intuitive graphical front end that simplifies configuring and managing the NetApp SnapVault data backup services. This plug-in replaces the command-line interface provided with the base SnapVault product and provides a centralized web interface that allows administrators to manage multiple SnapVault environments with any number of clients.

SnapVault environments are comprised of at least one primary system and one or more secondary systems. A primary system consists of a filer and/or Open Systems machines with data to be backed up to a secondary filer, which is seen as the secondary system. When a filer is acting as a primary system, SnapVault will back up primary trees to one or more volumes on the SnapVault secondary system. With an Open System machine as a primary, SnapVault is capable of backing up directories and/or entire drives to a

NetVault bare metal recovery is capable of recovering an entire system, including the operating system, applications, system settings, partition information and data for any supported client.

Quick and easy rebuild a failed disk drive with

NetVault bare metal recovery

Netvault bare metal recovery	Typical bare metal recovery process
1. Repair the hardware	1. Repair or replace the hardware
2. Redefine RAID devices	2. Reinstall the OS
3. Boot VaultOS via any removable media	3. Repartition the drives
4. Open NetVault Backup user interface	4. Recreate the file systems
5. Restore machine data	5. Repatch the kernel
	6. Redefine RAID devices
	7. Recreate the volumes
	8. Reconfigure the network
	9. Redefine the printers
	10. Recreate user accounts
	11. Redefine network shares
	12. Reconfigure web, ftp & email
	13. Reconfigure Xwindows
	14. Reinstall database software
	15. Reinstall backup software
	16. Restore user data

Do you really remember all of these settings?

Can you really find out to restore the recovery file done properly at all?

Netvault bare metal recovery *simplifies* and *expedites* the painful process of bare metal recovery

Figure 5. NetVault bare metal recovery can recover an entire system, including the operating system, applications, system settings, partition information and data for any supported client.



volume on the secondary system. This secondary system is a central, disk-based unit that receives and stores backup data from filers and Open Systems as snapshots. Any NetApp filer can be configured as a secondary system.

Bare metal recovery

NetVault bare metal recovery is option capable of recovering an entire system, including the operating system, applications, system settings, partition information and data for any supported client. NetVault bare metal recovery provides bare-metal recovery with either offline/cold backups or online/hot backups.

In the event of a system failure, the administrator can boot the system using the minimal OS or LiveCD to initiate the recovery process. Administrators can recover a Windows or Linux system to similar or dissimilar hardware (P2P), or even a virtual machine (P2V).

Storage options

NetVault Backup supports disk- and tape-based backup to a wide range of storage targets, including disk-based devices, tape libraries, and deduplication appliances. You'll also have the power to move data from one storage target to another for disaster recovery purposes.

Physical backup devices can be configured for single or shared use, and can be connected through SCSI, iSCSI,

IP, SAS or Fibre Channel SAN interfaces. These devices can be connected to the NetVault Backup server, any NetVault SmartClient or any NAS filer within a NetVault domain.

NetVault's Automatic Device Configuration wizard helps an administrator to quickly add and configure backup storage devices. This wizard can recognize devices manufactured by multiple vendors, although not all are supported. NetVault automatically starts scanning for new devices in the backup domain.

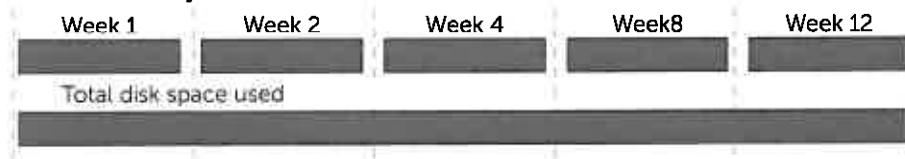
NetVault SmartDisk

NetVault SmartDisk provides a disk-based backup storage target with optional data deduplication to reduce storage costs. It uses a powerful byte-level, variable block-based software deduplication engine. This capability optimizes the use of storage resources in backup disk pools by analyzing smaller chunks of data during dedupe operations. This analysis ensures duplicate data is identified at a more granular level.

The byte-level, variable block approach intelligently compresses protected data for up to 90 percent reduction in the backup storage footprint, as illustrated in Figure 6. SmartDisk is hardware independent so an organization can use its existing storage

NetVault Backup supports disk- and tape-based backup to a wide range of storage targets, including disk-based devices, tape libraries, and deduplication appliances. You'll also have the power to move data from one storage target to another for disaster recovery purposes.

Without duplication



With duplication

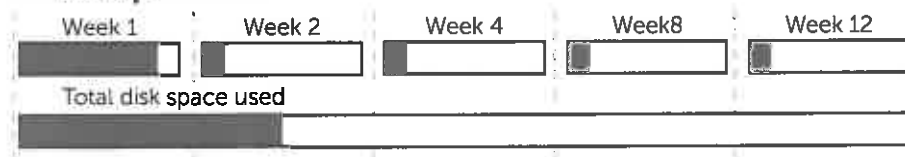


Figure 6. NetVault SmartDisk's deduplication can reduce your backup storage footprint by up to 90 percent



NetVault SmartDisk's byte-level, variable block approach intelligently compresses protected data for up to 90 percent reduction in the backup storage footprint.

infrastructure, often eliminating the need to purchase additional storage devices or expensive storage appliances. And with SmartDisk's post-process deduplication option, the administrator can schedule the deduplication outside the backup window to prevent any impact on normal backup operations.

SmartDisk's seamless integration with NetVault Backup provides job-level deduplication, giving the administrator complete control over the operation. This allows them to separately target deduplicated and non-deduplicated data to ensure the best storage savings and performance. And when this capability is combined with NetVault Backup's job-level encryption, the organization can get the best of both worlds by deduplicating the primary copy of their backup data for cost savings while encrypting the secondary copies for off-site storage and compliance needs.

Virtual tape libraries

NetVault Backup's virtual tape library (VTL) enables disk-based backup to be performed to available disk space in the customer environment. A NetVault Backup VTL emulates a physical tape library on a file system, allowing administrators to define the number of drives and media slots to be made available in the virtual library. Unlike NetVault SmartDisk, the space required for the media slots must be provisioned at creation time and unused space cannot be shared with other applications.

VTL capacity for a NetVault Backup server can be shared between VTL and shared virtual tape libraries (SVTLs). SVTLs are special backup-to-disk implementations that require fully dedicated volumes on a SAN and allow virtual libraries to be shared and concurrently accessed by multiple NetVault SmartClients, regardless of their underlying operating platform.

Removable storage devices

NetVault Backup provides support for RDX drives, which are removable

hard drives. Support for RDX drives is provided by creating a NetVault Backup virtual stand-alone drive.

Shared virtual tape libraries

Shared virtual tape libraries (SVTLs) extend the VTL implementation and allow organizations to share a VTL with multiple NetVault Backup machines for LAN-free backups. The interface can be Fibre Channel, iSCSI or SCSI. On Linux and Solaris platforms, SCSI_FCP protocol is also supported. The SVTLs are supported on the following platforms:

- Windows
- Linux (x86 and x86-64)
- Solaris SPARC and Solaris x86-64

The disks can be of any size. However, operating system imposed limitations do apply. The SVTL size can be changed on the fly using CLI utilities.

Physical tape

NetVault Backup supports a wide range of tape devices, including Dell and third-party physical tape libraries, appliances, autoloaders and tape drives. Administrators can back up directly to tape (D2T) or back up to disk and then to tape (D2D2T).

Here are a few capabilities of NetVault Backup:

- **Support for disk-to-tape (D2T) as well as disk-to-disk-to-tape (D2D2T)**—Support is provided for multiple copies and across tiered storage targets. Users can encrypt tape copies that are heading off site to provide added security, and full or partial restores can be made from any copy of the data.
- **Support for tape libraries** (control of the robotic arm to load or unload tapes), in addition to standalone tape drives
- **Management of tape from within NetVault WebUI**—Media can be grouped to form pools used to keep data from the same applications or with similar retention requirements together.
- **Device sharing between the NetVault Backup server and NetVault SmartClients**—Any number of tape devices can be shared by connecting devices over a SAN (FC or

iSCSI) directly to each node. The NetVault Backup Server can centrally manage the tape devices and media, and data flows directly to the target device.

- **ACSLs Library support**—Large, enterprise-class libraries, such as those from Oracle, provide special interfaces to centrally control and share one or more libraries.

Dynamically shared devices

NetVault Backup's dynamically shared devices (DSD) feature enables stand-alone tape drives and tape drives in physical or virtual libraries to be dynamically shared among NetVault clients in SAN and shared-SCSI environments. Each drive to be shared requires a DSD license, while each NetVault client that will target the shared drives requires a NetVault SmartClient license. DSD licenses are sold in one-unit increments.

Deduplication appliances

Third-party deduplication appliances can be connected to NetVault Backup servers or SmartClients as a storage repository.

Dell DR Series Deduplication Appliance

—The Dell DR appliance is a scalable disk backup appliance with built-in deduplication and compression capabilities. It integrates seamlessly with NetVault Backup. And even tighter integration is now available with the Dell DR Rapid Data Access (RDA) technology.

The RDA plug-in allows NetVault to retain end-to-end control of all the backup tasks, while delegating control of storage management to the DR appliance. NetVault regulates when data is backed up, when it's copied, and when it can be expired. The DR determines how the backup data is stored and copied between storage appliances.

Users can take advantage of the solution's powerful deduplication and replication capabilities, enabling them to maximize storage savings and reduce network bandwidth requirements—without adding complexity.

Rapid Data Access technology – RDA technology delivers tight integration between NetVault and the DR for significantly faster backup and restore rates. Organizations that use the two products together can achieve backup speeds of up to 22 TB/hour.

Source-side deduplication – The Dell DR appliance offers advanced deduplication and compression technology, which delivers data-reduction ratios as high as 15:1. It also enables NetVault customers to deduplicate data directly at the source of the backup. This source-side approach minimizes network traffic and reduces the overall backup storage footprint.

Optimized replication – Users can now schedule and manage replication of deduplicated data from one DR appliance to another directly from the NetVault WebUI. NetVault automatically detects the completion and location of replicated data copies, enabling fast restores and reliable disaster recovery.

This reduces network bandwidth by up to 15 times and drastically shortens disaster recovery time. Users can schedule replication during non-peak periods and prioritize ingest data over replication data to ensure optimal backup windows. By coupling deduplication with replication, an organization can minimize the costs and inefficiencies associated with distributed backup environments.

NetVault Backup can target Dell deduplication appliances beginning with the DR4100, which can help achieve a data-reduction level of up to 15:1.



Recovery Manager for Exchange works with NetVault Backup to make discovering and exporting email data fast and easy—and it does not require a dedicated recovery server.

Consolidated tape storage –
Decentralized tape libraries are expensive and require onsite IT staff to maintain — especially if the user has a distributed business with multiple remote offices. By replicating backup data from many DR appliances to one central appliance and then archiving that data to tape, an organization can reduce overhead, IT staff time and potential for human errors.

Remote setup and centralized management – The Dell DR appliance is designed to easily drop into any NetVault Backup environment. The intuitive, remote setup and management capabilities make installation simple. And from the NetVault WebUI, the administrator has full control over when data is backed up, when it's copied and when it can be expired. He or she will be able to reduce the administrative overhead that is typically associated with backup and recovery.

EMC Data Domain—NetVault Backup offers plug-and-play integration with EMC's Data Domain DD Boost software. Users can configure their NetVault Backup jobs to stream directly from clients to an EMC Data Domain system. The new integration delivers significantly faster throughput, reduced network traffic, and shortened backup windows for NetVault customers backing up to a Data Domain system. EMC DD Boost can distribute parts of the deduplication process to the NetVault Backup server and its clients. As a result, NetVault streams only unique data to the Data Domain system, significantly reducing backup times.

NetVault Backup and Data Domain users can also benefit from network-efficient replication for offsite data storage and disaster recovery. Data Domain systems send only the unique backup data over the wire to the secondary (DR) Data Domain system. The process is controlled by NetVault Backup and the new locations for each save set are stored in the NetVault catalog.

Encryption

NetVault Backup provides support for CAST-128, AES-256 and CAST-256 algorithms to meet regulatory data security requirements. When installed on the NetVault client, the Plug-in for Encryption encrypts and transfers data across the network to the backup device, where it remains encrypted until it is restored to the NetVault client.

If encryption is required only for secondary storage, NetVault Backup's job level encryption offers the choice of encrypting only the secondary copy while the primary backup remains unencrypted to shrink the backup window. When used with NetVault SmartDisk, NetVault Backup's job-level deduplication allows the organization to separate deduplicated from non-deduplicated unencrypted data for optimal deduplication ratios and performance.

Additional recovery solutions from Dell

Dell Software offers additional recovery options to complement NetVault Backup. These offer deep application-level support for critical applications, helping their users to minimize application outages, and begin restoring lost data in seconds, allowing end users to resume operations without having to wait for a full recovery.

Recovery Manager for Exchange

Recovery Manager for Exchange works with NetVault Backup to make discovering and exporting email data fast and easy—and it does not require a dedicated recovery server.

Administrators can find exactly what they need with intelligent search based on sender, recipient, date, attachment type, subject, message keyword, attachment keyword, or even advanced pattern searching and other custom queries. They can also compare the contents of an online mailbox with a backup mailbox to identify any differences. After the search, Recovery Manager can export the results in a variety of formats to facilitate email discovery requests.



Recovery Manager for SharePoint

Much of the content stored in SharePoint is critically important to an organization and needs protection. Organizations must be able to quickly restore that content, or even the entire SharePoint service, in case of accidental deletion, corruption or full farm failure.

Recovery Manager for SharePoint leverages your existing NetVault Backup infrastructure to deliver rapid, scalable SharePoint content restores and full farm recovery. Organizations can be sure that their critical business information will be preserved, whether a single file or an entire farm was lost. Recoveries will be fast and simple, saving time and money.

Recovery Manager for SharePoint enables you to:

- Meet SharePoint SLAs
- Granularly recover objects to the site collection
- Perform full farm recovery
- Capitalize on your existing investment in backup infrastructure
- Reduce your administrative workload
- Eliminate complexity
- Increase reliability

Recovery Manager for SharePoint can be deployed as a standalone product or to complement NetVault Backup.

Reporting

NetVault Backup includes comprehensive reporting capabilities that allow administrators to quickly and easily retrieve information on backup and restore jobs, online and offline media, clients and devices, and other common queries. These reports are generated using built-in HTML templates. Administrators can run and view these reports from the Reports window.

NetVault Backup licensing options

To offer the greatest flexibility, NetVault Backup can be licensed in two ways: by capacity or by component.

Capacity-based editions

With the capacity-based model, licensing is based on the total amount of data

being protected (the number of front-end terabytes of data on clients and NAS devices). Front-end TBs are calculated by totaling the amount of data on each client that will be included in all backup jobs. It does not matter how many times a week the data is backed up, how many copies are made, or how long that data is under management by NetVault. Customers have unlimited use of all product components included in each capacity offering for the number of TBs licensed. As their requirements grow, they can add additional client, application and device support as needed.

Component-based editions

With the component-based model, NetVault Backup is licensed based on the components required to meet the customer's needs. Minimum requirements are one NetVault Backup server package (Starter or Enterprise) and one license for each client connected to the server. Additional licenses may be required for tape or disk target support, optional configuration components and application integration support. The benefit of this model is that customers can buy exactly what they need to meet their requirements.

Conclusion

NetVault Backup safeguards your data and applications in both physical and virtual environments, all from one easy-to-use web interface. By simplifying backup and recovery across your IT environment, the solution helps ensure the availability of critical applications and databases such as Oracle, SQL Server, Exchange, SharePoint, MySQL and DB2. Moreover, it integrates seamlessly with a wide range of storage devices. When combined with the Dell DR deduplication appliance, organizations can see backup speeds of up to 22 TB/hr. Visit DellSoftware.com/netvault-backup/ to learn more or to request a live demo.

Recovery Manager for SharePoint leverages your existing NetVault Backup infrastructure to deliver rapid, scalable SharePoint content restores and full farm recovery.

For More Information

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Quote #: 733450214
Customer #: 113622275
Contract #: 74777
Customer Agreement #: One Time Reseller
Quote Date: 08/29/2016
Customer Name: ADVANTAGE TECHNOLOGY

Date: 8/29/2016

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Email Address: Nancy_Giansante@Dell.com **Phone Ext:** 5130630

GROUP: 1 QUANTITY: 2

Description	Quantity
PowerEdge R730xd Server (210-ADBC)	2
PE R730/xd Motherboard MLK (329-BCZK)	2
Dell Hardware Limited Warranty Plus On Site Service (976-9007)	2
ProSupport: 7x24 HW / SW Tech Support and Assistance, 5 Year (976-9018)	2
ProSupport: Next Business Day Onsite Service After Problem Diagnosis, 5 Year (976-9019)	2
Thank you choosing Dell ProSupport. For tech support, visit http://www.dell.com/support or call 1-800- 945-3355 (989-3439)	2
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On-Site Installation Declined (900-9997)	2
Declined Remote Consulting Service (973-2426)	2
PowerEdge R730xd Shipping (340-AKPM)	2
R730/xd PCIe Riser 2, Center (330-BBCO)	2
R730/xd PCIe Riser 1, Right (330-BBCR)	2
Broadcom 5720 QP 1Gb Network Daughter Card (540-BBBW)	2
iDRAC8 Enterprise, integrated Dell Remote Access Controller, Enterprise (385-BBHO)	2
Chassis with up to 24, 2.5 Hard Drives and 2, 2.5" Flex Bay Hard Drives (350-BBFE)	2
Bezel (350-BBEJ)	2
Performance BIOS Settings (384-BBBL)	2
RAID 6 for H330/H730/H730P (4-24 HDDs or SSDs) (780-BBLL)	2
PERC H730 Integrated RAID Controller, 1GB Cache (405-AAEG)	2
Intel Xeon E5-2640 v4 2.4GHz, 25M Cache, 8.0GT/s QPI, Turbo, HT, 10C/20T (90W) Max Mem 2133MHz (338-BJDL)	2
Intel Xeon E5-2640 v4 2.4GHz, 25M Cache, 8.0GT/s QPI, Turbo, HT, 10C/20T (90W) Max Mem 2133MHz (338-BJDN)	2
32GB RDIMM, 2400MT/s, Dual Rank, x4 Data Width (370-ACNS)	16
2400MT/s RDIMMs (370-ACPH)	2
Performance Optimized (370-AAIP)	2
200GB Solid State Drive SAS Write Intensive MLC 12Gbps 2.5in Flex Bay Drive, PX04SH (400-AMFF)	4
2TB 7.2K RPM NLSAS 12Gbps 512n 2.5in Hot-plug Hard Drive (400-AMUC)	24
No Trusted Platform Module (461-AADZ)	2
Electronic System Documentation and OpenManage DVD Kit, PowerEdge R730/xd (631-AAJG)	2

ReadyRails Sliding Rails With Cable Management Arm (770-BBBR)	2
Dual, Hot-plug, Redundant Power Supply (1+1), 750W (450-ADWS)	2
NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP, 10 Feet (3m), Power Cord, North America (450-AALV)	4
No Operating System (619-ABVR)	2
No Media Required (421-5736)	2
DIMM Blanks for System with 2 Processors (370-ABWE)	2
Standard Heatsink for PowerEdge R730/R730xd (374-BBHM)	2
Standard Heatsink for PowerEdge R730/R730xd (374-BBHM)	2