DELL APPASSURE 5: UNIFIED PLATFORM FOR BUSINESS RESILIENCY

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Backup applications with large user bases have been vendor cash cows because their customers are reluctant to change such deeply embedded products. As long as the backup worked, it was out of sight and out of mind.

But the field is rapidly changing.

The push to virtualize applications saw traditional backup foundering. Traditional backup in the virtual arena suffered from heavy operational overhead on server, application host, network, and storage levels. The growing amount of VMs and virtualized data had a serious impact on storage resources. For example, each VMDK file represented an entire VM file system image, typically at least 2GB in size. File sizes led to issues for bandwidth, monitoring, and storage resources.

In response, some vendors developed innovative virtual backup products. They made virtual backup much more resource-efficient and easily manageable. Increased performance shrank backup window requirements, provided effective RPO and RTO, simplified the backup process and improved recovery integrity. These tools changed the virtual data protection landscape for the better.

However, many of these startups offered limited solutions that only supported a single type of hypervisor and several physical machines. This left virtual and physical networks essentially siloed – not to mention the problem of multiple point products creating even more silos within both environments. Managing cross-domain data protection using a variety of point products became inefficient and costly for IT.

Traditional backup makers also scrambled to add virtualization backup support and succeeded to a point, but only a point. Their backup code base was written well before the mass appearance of the cloud and virtualization, and retrofitting existing applications only went so far to provide scalability and integration. There was also the inability to solve a problem that has plagued IT since the early days of backup tape – restore assurance. It has always been risky to find out after the fact that the backup you depended on is not usable for recovery. With data sets doubling every 18 months, the risk of data loss has significantly risen.

More modern backup solves some of these problems but causes new ones. Modern backup offers automated scheduling, manual operations, policy setting, multiple types of backup targets, replication schemes, application optimization, and more. These are useful features but they are also costly and resource-hungry: roughly 30% of storage costs go to IT operations alone. Another problem with these new features is their complexity. It is difficult to optimize and monitor the data protection environment, leading to a conservative estimate of about 20% failure in backup or recovery jobs.

In addition, most data protection products offer average-to-poor awareness and integration into their backup tape and disk targets. This results in difficulty in setting and testing Recovery Time

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Objectives (RTO) and Recovery Point Objectives (RPO) for business applications. The last thing that IT wants is to cripple application recovery, but it is challenging to set meaningful RTO and RPO settings across multiple environments and applications, and extremely difficult to test them.

Even newer VM backup products are inadequate for modern enterprise data centers with physical and virtual layers running critical applications. Combine this with complex and mixed IT environments and it presents a very serious challenge for IT professionals charged with protecting data and application productivity.

What we are seeing now is next generation data protection that protects both virtual and physical environments in one flexible platform. Dell AppAssure is a leading pioneer in this promising field. AppAssure is rewriting the data protection book from limited point products to a highly agile data center protection platform with continual backup, instantaneous restore, backup assurance and a host of additional benefits.

What Do Modern Environments Need?

To provide the level of protection that modern storage environments need, data protection platforms should be efficient, flexible, recoverable, scalable and reliable – with a twist: they must be all of these things within the context of different physical and virtual networks, operating systems, applications, data types, and backup targets ranging from DAS, to SAN, to NAS, to the cloud. Let's talk about these five requirements in that context.

1. **Highly efficient.** A truly efficient backup platform: 1) unifies IT administration across a variety of protected systems and recoverability needs, 2) uses fewer resources to protect data, and 3) provides ease-of-use for IT and users. These factors cut down on operational and capital costs, make backup simpler and, and lowers the risk of lost data throughout the data protection environment.
2. **Designed to be flexible.** We are talking about a highly flexible system where protected data can be recovered and restored in a physical, virtual and cloud environment. A backup solution for many different application and platform environments must be highly flexible and agile to protect a wide range of applications and user needs. The solution must be able to observe different priorities and data protection levels, provide both automated and manual choices.
3. **Quickly recoverable.** Backup systems are ultimately about recoverability. Both IT and users need to be confident that recoveries are near instantaneous and will meet application RTO (Recovery Time Objective) and RPO (Recovery Point Objective).
4. **Massively scalable.** Backup platforms for multiple environments must be capable of efficiently large and growing datasets. Petabyte levels will be standard. Scalability does not just include backup and recovery capabilities, but also easy to use retention policies and optimization features including deduplication, data encryption, replication and cloud integration.
5. **Exceptionally reliable.** Backup reliability technology has not changed much in the past 20 years and it is showing its age. Today's backup solutions must go above and beyond outdated hashing techniques to next generation technologies, where recoverability is determined by application requirements. These next generation technologies eliminate guesswork and can guarantee the recoverability of the data or application.

Dell AppAssure 5

AppAssure solves the expense and risk of patchwork backup products by protecting the entire application stack of OS, application and data. Dell AppAssure 5, a unified data protection platform, combines multiple next-generation technologies in a single data protection platform. AppAssure

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provides a simplified datacenter-wide protection platform that enables highly agile backup and recovery, and allows administrators to meet growing service level agreement requirements.

APPASSURE 5 SYSTEM

AppAssure Cores are the heart of the storage system and provide assurance testing of backups, near-continuous backup and recovery-on-demand. The Core software is installed onto servers to create distributed AppAssure systems. IT works with a web based GUI management interface to efficiently manage physical, virtual, cloud, replication, global deduplication and compression.

AppAssure agents running on protected systems are headless, light weight and track changed blocks between snapshots as frequently as every five minutes. Once identified, the agents copy the changed data blocks to their Core server that applies in-line deduplication and compression, creating a read and writeable image available for immediate restore. IT can manage all AppAssure deployments through a single AppAssure web console.

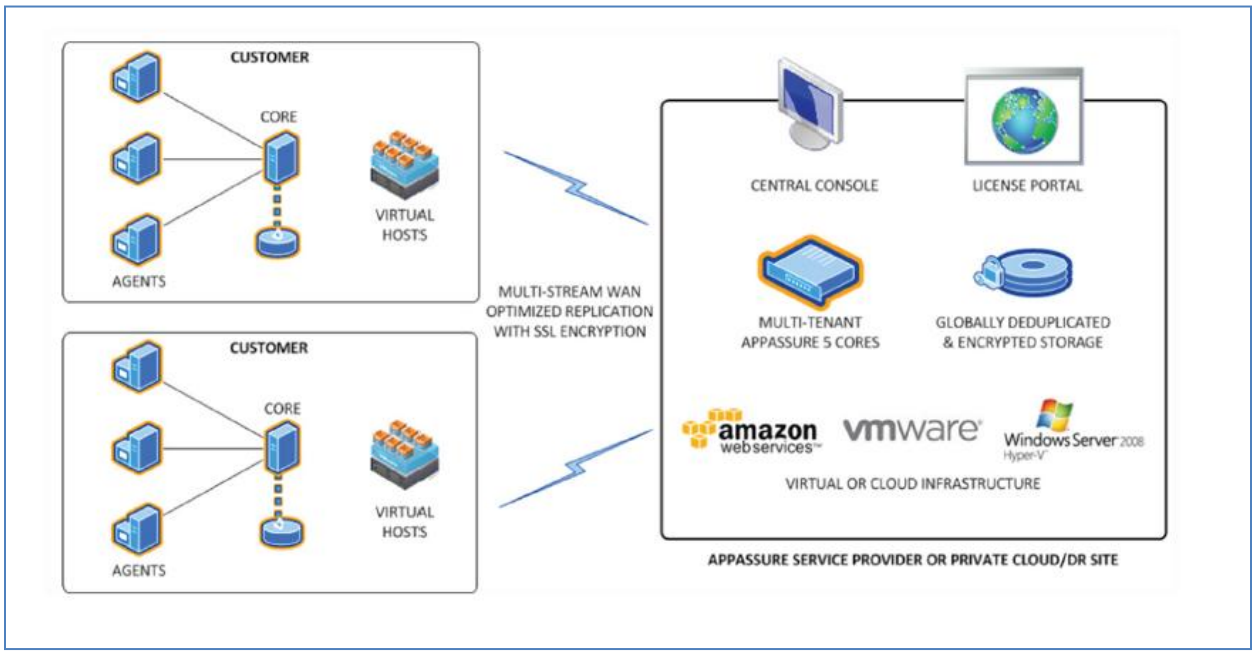

Figure 1. (Dell) AppAssure System

AppAssure TrueScale enables continuous backup by enabling extreme scaling and backup performance in the repository. It uses object-based storage repositories out of pre-allocated space on any supported disk volume that is available to the Core. Storage types may include any combination of DAS, SAN based storage, NAS or other disk media configured for Windows. This enables IT to schedule continuous backup without fear of performance degradation or capacity overruns.

AppAssure provides secure and optimized replication between two Cores with a source-target connection. The source identifies what blocks must be replicated or are missing from the target, and then asynchronously replicates only the unique blocks. The secondary Core may be located locally, in remote DR sites, with MSPs, or in the cloud. The Core can encrypt data with AES-256, which ensures the safety of data no matter where it resides.

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AppAssure protects the virtual and physical systems using unique smart agents. Besides tracking changed blocks between snapshots, the agents facilitate efficient data transfer to the core. The agents are tightly integrated with Windows machines, Microsoft VSS and applications to provide consistency necessary for reliable restores. The agents enable on-demand snapshots of block devices along with changed block tracking (CBT) to accelerate recovery granularity and speed. AppAssure Core updates the low-utilization capture in the storage repository and includes it in its incremental forever backups.

Customer Need	AppAssure feature
1. Needs continual backup at a variety of RPO and RTO points.	AppAssure tracks changed blocks between snapshots as frequently as every five minutes, copying the changed data blocks to the Core server and applying in-line deduplication and compression. The resulting image is available for immediate restore. True global deduplication dedupes data across the repository and replicates the deduped backups without first rehydrating. AppAssure performs incremental block-level backups forever, which dramatically reduces the amount of data kept on backup media.
2. Needs verifiable and near-instantaneous recovery	AppAssure stores multiple snapshots of all of its protected VMs and servers. Recovery Assure verifies backup data, and Live Recovery quickly restores application usage while data continues to restore in the background. Universal Recovery ensures bare metal recovery and cloned system movement between physical, virtual, and cloud machines.
3. Needs to support multiple backup locations with a single efficient platform.	Unified data protection includes Windows and Linux servers; Hyper-V, VMware and Xen hypervisors; cloud environments; and Microsoft Exchange, SQL and SharePoint. Storage types may include any combination of DAS, SAN based storage, NAS or other disk media configured for Windows.
4. Needs a scalable backup and recovery system.	AppAssure TrueScale enables continuous backup by enabling extreme scaling and backup performance in the repository. It uses object-based storage repositories out of pre-allocated space on any supported disk volume that is available to the Core.

5. Needs efficient data protection operations for business resiliency.	Virtual Standby clones production servers to fully bootable, standby VMs for immediate restores, migration, DR testing, and test/dev cloning. AppAssure continuously exports snapshots from the protected server to its virtual standby clone, validates the snapshot blocks, and updates them in the standby VM. Virtual Standby supports push-button restores in VMware Workstation, ESXi and Hyper-V virtual environments.

The Five Pillars

We will take a closer look at Live Recovery and Recovery Assure along with Universal Recovery, Virtual Standby, and Global Deduplication. These five pillars build a strong foundation for continual backup and recovery within a highly efficient environment.

LIVE RECOVERY

The AppAssure Core server stores multiple point-in-time snapshots of all of its protected VMs and servers. Live Recovery enables organizations to gain immediate access to the data in these snapshots virtually eliminating application downtime. The process works by making the volumes of the failed system appear as if they have been fully restored. The process takes minutes to begin.

The agent running on the target system redirects to the data within the repository. It immediately restores a volumes directory structure and security metadata from the storage repository, and then makes it appear to the application as if the backed up file systems and files are on the local drives. Live Recovery immediately begins restoring data, giving priority to blocks in response to application requests. Data continues to restore in the background, and the server can safely resume operations without waiting for the completed restore.

RECOVERY ASSURE

Many vendors find backup assurance very difficult to accomplish, leaving IT hoping that they can actually restore from their backups. AppAssure Recovery Assure enables backup assurance by mounting and validating backup data at the AppAssure core directly from backup repository. The algorithm examines each backup block for data integrity and checks data at an application point of view to ensure recoverability. Recovery Assure runs once every 24 hours or after every Exchange snapshot.

Recovery Assure is optimized for MS Exchange, SQL Server and SharePoint file systems. Application availability is crucial to business success but backup assurance tools are in the past, it was a manually intensive, frequently disruptive and can be costly to purchase and maintain.

IT does not need to launch Recovery Assure; it automatically runs along with AppAssure's continual incremental-forever backups. Validation or error reports with remediation appear on the AppAssure console. There is no impact on the production server as Recovery Assure runs from a separate Core.

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UNIVERSAL RECOVERY

Universal Recovery implements bare metal recovery (BMR) and creates cloned systems by recovering data from one source to another physical, virtual or cloud machine. It lets AppAssure users quickly restore entire physical servers and VMs, files and folders, and application objects. AppAssure abstracts data from its physical drive so there is no need to restore to a duplicate machine. In the case of non-identical target machines, IT would acquire the target storage controller drivers and inject them into the restored image to make it bootable. IT can choose any recovery point and restore from there to the new system.

Paired with Virtual Standby, Universal Recovery can also instantly restore systems to new physical (P), virtual (V), and cloud (C) machines. Within minutes the tool recovers data from one system to a variety of different options including P2V, V2V, V2P, P2P, P2C, V2C, C2P and C2V. It also enables recovering data to different hypervisors, such as VMware to Hyper-V or back. Recovery choices are flexible and can recover at the item, object, and application levels.

Dell DL4000 Appliance

The Dell DL4000 appliance is factory-installed with AppAssure V5 software, Windows Server 2012 and Integrated Dell Remote Access Controller 7 (iDRAC7). The appliance hardware is 12th generation Dell hardware, and the system includes Dell ProSupport and Remote Installation Services.

- *Scalable.* Appliance storage capacity is 5.5TB, expandable to 35.5TB with a Dell PowerVault MD1200 expansion.
- *Availability*. The DL4000 concurrently supports up to two virtual standby machines, which enable near-instant restores in the event of server failure.
- *Fast deployment.* First Time Boot Utility (FTBU) quickly sets up and configures the DL4000's storage, network and remote management components. The Appliance Configuration Wizard automatically provisions DL4000 storage.
- *High performance.* The DL4000 comes in a compact 1U form factor with two 6-core Xeon processors, Dell PowerEdge H710P and H810 RAID controllers, NICs from Intel and Broadcom, and 32GB RDIMM for exceptional memory performance.

VIRTUAL STANDBY

AppAssure creates and maintains standby virtual machines of production servers for immediate restores as well as migration, DR testing, and test/dev. The virtual machines are fully bootable and are exact clones of the production servers' most recent AppAssure snapshot image. The continuous export includes all backup data from a recovery point as well as data protection parameters, so that at the push of a button the virtual standby machine can immediately replace its production server.

AppAssure continuously exports snapshots from the protected server to its virtual standby clone, validates the snapshot blocks and updates them within the standby VM. This assures application consistency for all Windows workloads including MS Exchange, SharePoint and SQL. Virtual Standby is fully integrated with AppAssure replication.

Virtual Standby supports VMware Workstation, ESXi and Hyper-V virtual environments.

AppAssure can directly deliver standby VMs to ESX VMFS data stores, VMware's clustered file system for enterprise deployments.

TRUE GLOBAL DEDUPLICATION

Deduplication is a standard capability in any backup application. True global deduplication refers to AppAssure's integrated and comprehensive approach to deduping data across the repository. Instead of performing full weekly backups as do most

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traditional backup applications, AppAssure performs incremental block-level backups forever. Dispensing with weekly full backups and practicing dedupe dramatically reduces the amount of data kept on backup media.

When a protected system sends changed data blocks to a Core, the Core compresses, optionally encrypts, and dedupes the data. The Core is aware if a block has already been protected from any of the connected servers. If it is a unique block the Core writes it to the storage repository; if it has been previously deduped the Core replaces the block with a pointer to its existing location. In addition, the Core records discarded blocks and their original locations in case the block's protected system needs to be restored. This process engenders the term global deduplication. Deduped server backups can replicate to a secondary Core for greater protection.

Key Benefits of the AppAssure System

1. **Efficiency.** Efficiency is next to impossible in backup environments ruled by point products and patchwork solutions. AppAssure offers ease-of-use in unified backup, assured recovery and replication across domains, making the data protection process much simpler and far more agile. AppAssure offers true global deduplication and compression and practices replication by replicating only unique blocks. A single pane of glass manages backup, restore and recovery across physical and virtual environments. RTO and RPO oversight, which can be awkward and uncertain with other data protection products, becomes highly efficient with AppAssure's application awareness. This enables IT to finally set and keep SLAs for true business value.
2. **Flexibility.** Today's complex computing environments require highly flexible data protection. To expand AppAssure protection, simply install a new AppAssure Core server and replicate backups as needed to the new server no matter if the source and target servers are physical, cloud or virtual. These extremely flexible options minimize hardware costs and down time. AppAssure can assign different protection levels to different protected application systems for priority resource usage and savings on lower priority data. Cross-platform recoveries further expand the flexibility story across cloud, local and remote environments.
3. **Recoverability.** The AppAssure agent tightly integrates with MS SQL Server, Exchange and SharePoint to provide reliable and consistent recovery. Virtual Standby adds another layer of recoverability by exporting images to create fully cloned standby VMs. This level of integration enables AppAssure to quickly restore applications to working order in busy production environments. This enables users to keep using the restored application even as AppAssure is in the process of restoring backup files to the local drives.
4. **Reliability.** Data integrity is just as vital to business as fast recovery, and AppAssure provides recovery assurance by ensuring backups are usable from an application point of view. AppAssure automatically validates daily backup for SharePoint and SQL Server, and validates Exchange snapshots at each occurrence. This is no guessing game – AppAssure mounts and validates backups directly from the AppAssure backup repositories, granting 100% recoverability assurance.
5. **Scalability.** A unified data protection platform must efficiently protect a growing amount of information, including large data sets. AppAssure scales to the petabyte level across the entire platform with TrueScale object-based scalability. Single repositories are individually scalable and multiple repositories may be distributed across multiple locations and centrally managed for highly efficient growth. A single platform saves on operational and capital costs, economical licensing further lowers the cost, and TrueScale enables excellent capacity efficiency.

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Taneja Group Opinion

AppAssure provides basic backup and recovery and backup admins can use it that way. However, this is rather like using a racing Thoroughbred to pull a plow. Sure the horse can pull but you are missing out on a lot of power.

In fact, AppAssure's original developers designed it from the ground up to be highly scalable, uniquely fast and efficient, and easily useable across multiple locations and computing domains. Dell acquired AppAssure for that compelling proposition but did not stop there. Dell recognized that with some additional development, AppAssure's evolved architecture would fit smoothly into a larger strategic technology: Dell's Fluid Data architecture.

Fluid Data is the underpinning that provides integrated master services across AppAssure, Compellent, EqualLogic, and PowerVault product families. This allows Dell storage products and technology to work together, presenting consistent functionality across the Dell storage portfolio. AppAssure provides the near real-time data protection and recovery that the storage families need, delivering rapid, reliable and flexible protection based on intelligent agents with innovative snapshot integration.

This level of development and integration means that Dell AppAssure 5 is an evolution of data protection technology. Protecting data integrity and application availability are both critical and Dell has balanced them beautifully. At the same time AppAssure also solves the problems of complexity and cost of multiple data protection tools. In their place it offers its rich feature sets for fast backup and recovery, application-aware protection, extreme flexibility and scalability, and economical operations. Each of these components serves Dell's Fluid Data Architecture message of rapid, reliable, and flexible data delivery.

Many data protection environments these days are expensive and hard to manage. Sometimes the best that IT can do is to keep the figurative lights on, hope that backup is working and that they can recover on time. But that's not good enough. Not anymore. Instead of juggling point products across an unwieldy infrastructure, look to Dell AppAssure for a comprehensive, cross-domain data protection platform.