



# The Most Comprehensive Infrastructure Solution for Hosting SAP HANA: Why SAP HANA Running on 3PAR StoreServ and Protected by HPE StoreOnce Storage Platforms Beats the Competition

By Jerome Wendt

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## Executive Summary

Perhaps no application other than Microsoft Exchange better typifies the definition of “mission critical” in enterprises today than SAP HANA. Load petabytes of data into memory and then complete transactions without ever needing to write to persistent storage, SAP HANA’s architecture changes the game in terms of how enterprises analyze their data and make business decisions. By eliminating the need to wait days, weeks, or even months to analyze their data, executive management can make more informed decisions better and faster than ever before.

But here’s the rub. Once executive management becomes accustomed to having this information available at their fingertips on a moment’s notice, God help the person(s) who put in place an underlying infrastructure that results in SAP HANA becoming unresponsive or going off-line for any period. Yet a careful examination of the infrastructure solutions that enterprises often put in place to support SAP HANA reveals that this is exactly what will occur. These solutions cannot guarantee SAP HANA will remain online.

The root of this issue lies not in the individual components that enterprises deploy to support SAP HANA. Plenty of Tier 1 hardware vendors provide highly available storage platforms for SAP HANA that ensure it can perform at peak levels. Similarly, there is no shortage of Tier 1 providers who offer backup software with the necessary features to protect SAP HANA and its data.

Rather SAP HANA’s availability issues stem from the inability to cohesively manage these various infrastructure components used to host and protect SAP HANA. Each storage device and platform has its own software that does not interact with another or, if it does, it is limited.

This lack of a comprehensive, cohesive solution that can centrally do device management, job scheduling, and/or data movement results in a disjointed, complex infrastructure management scheme. This ultimately puts the availability of SAP HANA and the protection of its data at risk.

HPE’s 3PAR StoreServ and StoreOnce hardware platforms, along with their respective Recovery Manager Central (RMC) and Catalyst Plug-in software, address this situation. By respectively using HPE’s 3PAR StoreServ and StoreOnce storage systems to host and backup SAP HANA, enterprises get the hardware platforms that provide the Tier 1 levels of availability, data protection, and performance that they need.

More importantly, HPE’s RMC and StoreOnce Catalyst Plug-in software tools specific to SAP HANA environments give enterprises the solution they need. These tools centrally and efficiently manage the infrastructure to minimize the possibility that management complexity leads to an SAP HANA outage.

Knowledge is power and the sooner that enterprises have the right information in their hands, the more quickly they can make the best decisions. In today’s world, that means creating an environment where SAP HANA resides in an infrastructure where uninterrupted operations is as close to a guarantee as possible. HPE 3PAR StoreServ and StoreOnce hardware platforms and accompanying software tools provide the comprehensive infrastructure solution that enterprises require to have the confidence that their SAP HANA deployment and its data remains continually highly available, well protected, and performing well.

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### SAP HANA Defines the Highly Available Enterprise Application

Consciously or subconsciously, enterprises make assumptions about their mission critical applications and the data stored in them. These include:

- They are highly available.
- They perform extremely well.
- The data in them is protected.
- They can recover the application and its data with minimal to no disruptions in operations.

SAP HANA exemplifies the type of enterprise application to which these expectations apply. Using SAP HANA, business executives may better understand the current state of their business by accessing and viewing data in real-time. These views into the data can give them access to information critical to making informed business decisions. This insight empowers them to capitalize on emerging trends and/or acting more swiftly than their competitors.

To create these views, SAP HANA loads large volumes (*typically terabytes*) of data into memory to facilitate the fast processing and analysis of data. Further, as SAP HANA applications add or update information, it replicates this transactional data back to the data sources to keep the data in sync. More importantly, applications running on SAP HANA perform their calculations and create views using real-time data. These calculations and views give business executives unprecedented abilities to view this information in context since it draws upon the data in real-time.

### Real-time Information Translates into Real World Results

The flexibility to create these real-time views has already improved business processes and operations for major enterprises. T-Mobile recently built more precise marketing campaigns based upon the predictive insights that its applications running on SAP HANA provided.

T-Mobile micro-targeted existing and prospective customers by loading data from customer calls and social media interactions into SAP HANA to support its *“Listen, Engage, and Resolve”* customer engagement strategy. It then used data from social media sources such as Facebook and Twitter to improve its customer service as well as target customers with offers that align with product feature needs

### Side Bar #1: The Role of Persistent Storage in SAP HANA vs Traditional Relational Databases

SAP HANA operates like other relational databases, such as Oracle or SQL Server, etc. albeit with one important difference: it operates in-memory. This is a subtle but important difference.

Traditional relational databases load some of their database or even their entire database into memory depending on the size of the database and the amount of memory available. However, the relational database and the data in it permanently reside on persistent storage such as disk and/or flash. This architecture necessitates that as traditional databases process transactions such as changes, adds, or deletes, the data associated with the completed transaction must be stored to disk before the next transaction can occur.

SAP HANA is not subject to this requirement to copy or store data to persistent storage before it starts the next transaction. By loading and retaining its entire database in memory, it does not need to momentarily pause processing to write data to persistent storage to maintain the consistency of its database. Since its entire database is in-memory, once a transaction completes, it may immediately start to process the next transaction without writing to persistent storage. Its in-memory database represents the most current and up-to-date version of the database and is in a consistent state.

However, SAP HANA does leverage persistent storage to store copies of its in-memory database, its logs, and copies or backups of the database created using its Backint and Savepoint utilities. SAP HANA's technique of keeping its entire database in-memory and only storing backups and copies of its in-memory database on persistent storage dictates that enterprises employ a different type of solution to protect their SAP HANA deployments.

or desires that they previously expressed through these social media outlets.<sup>1</sup>

Lockheed Martin Space Systems similarly leveraged SAP HANA to more accurately predict lead times for components from its suppliers. Lockheed Martin Space Systems had incomplete and inaccurate lead-time forecasts as it relied upon its buyers to estimate lead times for parts based upon each buyer's previous experiences with the suppliers with which he or she dealt. This situation had grown untenable given that Lockheed Martin Space Systems acquired 60,000+ products from a supply chain of over 5,200 suppliers.

Using SAP HANA and its predictive analytics engine, the application pre-loaded a materials list and planned delivery dates from each supplier. This gave each buyer the option

1. T-Mobile Engages Customers Like Never Before with SAP and the Cloud. Dir. SAP Cloud Solutions Follow. Share and Discover Knowledge on LinkedIn SlideShare. T-Mobile, 25 Sept. 2013. Web. 26 Dec. 2016

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to accept the predicted delivery date or modify it if needed. This eliminated the need for the buyers to manually complete lead times for the thousands of parts that they ordered daily. By automating this part of the process and better managing the lead-time forecasts of parts from its suppliers, Lockheed Martin Space Systems improved its lead-time accuracy by 25% and realized an 80% reduction in lead-time maintenance for its buyers.<sup>2</sup>

## The Side Effects of SAP HANA Becoming the “New Normal”

Fifteen percent increases in productivity such as T-Mobile experienced or 80 percent reductions in lead-time maintenance such as Lockheed Martin Space Systems achieved immediately become the “new normal” in terms of how an enterprise expects to operate its applications. Once an enterprise experiences these new efficiencies that SAP HANA delivers, it cannot imagine going back to its old way of doing business. However, the challenge is more acute than that. It **cannot** go back to running the business the way it did before even for a short period.

The implementation of SAP HANA creates one and/or both of these two side effects.

1. An enterprise requires less people and resources to operate its core business processes.
2. The enterprise becomes accustomed to delivering the same or greater amounts of goods and/or services more effectively and with greater efficiency

Once an enterprise relies upon SAP HANA to successfully run its mission critical operations, it will no longer have the people, processes, or resources in place to revert to its prior way of business operations. This transformation that SAP HANA brings about forces enterprise to take steps to ensure that SAP HANA continually remains operational.

Due to the operational efficiencies that SAP HANA affords, an enterprise may find that it makes more sense to wait until SAP HANA is up and running than try to temporarily implement any manual or alternative processes to try to replace SAP HANA’s capabilities during an outage.

The level of dependency that everyone from top-level management down to operational personnel has on SAP

## Side Bar #2: A Closer Look at SAP HANA’s Business Continuity and High Availability Options

Applications intended for use as enterprise-wide platforms also tend to provide their own tools that can provide business continuity and high availability at some level. Here again, SAP HANA delivers. Consider:

- **Business Continuity.** Using SAP HANA’s native Host Auto-failover feature, enterprises may configure one or more standby hosts to assume operations in the event the primary system fails or becomes responsive. By default, a failover happens if the primary system is unresponsive for at least 60 seconds.<sup>3</sup>
- **High Availability (HA).** To deliver high availability for SAP HANA, enterprises must rely upon both hardware and software.

**1. Hardware HA.** As SAP is a software company and SAP HANA a software application, enterprises must rely upon hardware configurations from various hardware providers in the industry that offer highly available configurations. Hardware providers such as Hewlett-Packard Enterprise (HPE) partner with SAP to deliver redundant, reliable hardware configurations that both HPE and SAP mutually certify and support as being a highly available solution.

**2. Software HA.** SUSE Linux Enterprise 11 and Red Hat Enterprise Linux (RHEL) are two Linux operating systems that can underlie the SAP HANA database. To provide HA at the OS level, SUSE Linux and RHEL include various Watchdog daemons that monitor the services that support SAP HANA. In the event these services unexpectedly stop or become disabled, the Watchdog daemons automatically restart these services that SAP HANA needs to continue to operate without interruption. Alternatively, enterprises may also use a third party clustering solution such as HPE Serviceguard that provides for failover of an application from one system to another.

HANA to perform their jobs creates a heightened level of visibility for SAP HANA. Should it go off-line for even a few minutes, everyone will quickly become aware of the outage and have their job affected to one degree or another. These heightened levels of trust and dependency that an enterprise places in SAP HANA makes it imperative that SAP HANA never go off-line in the first place, regardless of the reason.

2. Gerall, Steve. SAP HANA Helps Lockheed Martin Space Systems Predict More Accurate Lead Times. SAP, 6 Apr. 2015. Web. 26 Dec. 2016.

3. “SAP HANA - Host Auto-Failover.” SAP, Dec. 2015. Web. 01 Jan. 2017. Pg10.

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## SAP HANA Comes Equipped to Deliver Data Protection, High Availability, and Performance

SAP HANA has both the tools and/or partnerships in place to enable enterprises to achieve the levels of data protection, high availability, and performance that they expect when deploying it. Consider:

1. At an application level, SAP HANA aggregates data from multiple data sources and then keeps this data in-memory. This approach accelerates the creation of reports and real-time analysis of the business. *(Side Bar #1: The Role of Persistent Storage in SAP HANA vs Traditional Relational Databases)*
2. At an operating system level, SAP HANA relies upon SUSE Linux Enterprise Server that includes built-in services such as high availability clustering and automated failover as well as daemons that monitor and restart critical services should they fail or go off-line. *(Side Bar #2: A Closer Look at SAP HANA's Native Business Continuity and High Availability Features)*
3. At a data protection level, it includes its own utilities as well as partners with enterprise backup software providers to create snapshots of its database and backups of its logs using SAP HANA's native utilities. *(Side Bar #3: A Deeper Dive into SAP HANA's Native Backup and Recovery Tools)*
4. At a hardware level, SAP partners with multiple hardware providers to create highly available configurations that offer hardware redundancy to mitigate outages caused by component failures. *(Side Bar #2: A Closer Look at SAP HANA's Native Business Continuity and High Availability Features)*

The availability of these features within SAP HANA explains why enterprises will first look to use them for data protection, business continuity, high availability, and/or recovery. However, as enterprises examine them, they will quickly uncover that centralizing the management of these tools and orchestrating the scheduling of the tasks within each one can quickly become very complicated. This complexity can stand in their way of achieving long term success and stability with SAP HANA in their environment.

### Side Bar #3: A Deeper Dive into SAP HANA's Native Backup and Recovery Tools

Applications intended for use as enterprise-wide platforms tend to natively ship with their own tools that can provide data protection and/or recovery at some level. SAP HANA follows this historical pattern. Consider:

- **Backup.** SAP HANA natively provides three options to protect data: Snapshots through its Savepoint utility; transaction logging; and, backups via its Backint utility.
  1. Using its Savepoint tool, SAP HANA by default creates snapshots of its database every 300 seconds (5 minutes). Savepoint first ensures that the data in its in-memory database is in a consistent state. It then flushes this data from SAP HANA's in-memory database to data volumes that reside on persistent storage such as physical HDDs or SSDs.
  2. Between Savepoints, SAP HANA records or logs all database transactions using its automatic log backup feature that stores these transactions to Log Volumes which also reside on persistent storage.
  3. Finally, its native Backup Interval utility (referred to as Backint) can back up and recover the snapshots and transaction logs to other media. Further, the Backint utility includes APIs so third party backup tools may call upon Backint and leverage it to perform backups and recoveries of SAP HANA.
- **Recovery.** Each of SAP HANA's native data protection utilities include accompanying features to perform recoveries.
  1. SAP HANA Savepoint includes an option to recover a database to its Most Recent State. Using this option, a database administrator (DBA) recovers the most recently saved Savepoint snapshot and applies any redo logs that were written after the creation of that Savepoint to ensure a recovery with zero data loss. Savepoint also provides a Point in Time recovery option so a DBA may select and recover a specific Savepoint.
  2. Using Backint, DBAs gain the flexibility to perform database recoveries using Savepoints or logs residing on other media types that physically store the data elsewhere. Savepoints and logs residing on Data or Log Volumes may become corrupted and unrecoverable as they reside on disk or flash. Using Backint, DBAs can still recover SAP HANA databases by retrieving them from other media. Using this utility, they can select a specific database to recover and then only apply specific logs.

4. SAP HANA Database Backup and Recovery SAP, Dec. 2015. Web. 01 Jan. 2017. Pg4.

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### **Orchestration and Simplicity of Data Protection and HA Functionality Notably Absent within SAP HANA Deployments**

SAP itself seems to recognize the limitations of its utilities. Its support documentation advises SAP HANA users that “it is essential to have a well-planned strategy for backup and recovery” as SAP HANA offers no protection against the “damage of data stored on persistent storage” or “if logical errors occur.”<sup>4</sup> The shortcomings of SAP HANA’s native tools become evident as enterprises look to achieve advanced levels of backup, recovery, business continuity, and high availability for their SAP HANA deployment without first employing an army of SAP HANA experts and breaking the bank to accomplish these objectives. Consider:

- **Partnerships with hardware providers are needed to deliver the full range of business continuity and high availability features to ensure SAP HANA’s uninterrupted availability.** SAP HANA natively offers features such as Host Auto-failover and Watchdog utilities to provide uninterrupted application availability. However, SAP HANA only offers business continuity and HA features at the software level. SAP HANA partners with hardware providers to deliver the specific data management services that only hardware providers offer. These include hardware redundancy and replication to create the type of highly available environment that enterprises expect.
- **SAP HANA’s backup utilities are complex to configure and manage.** Enterprises may use SAP HANA’s native Backint and Savepoint utilities to periodically create backups of the applications running on SAP HANA to protect against events such as data corruption or power failures. Once backups are created, enterprises may rollback to earlier, clean copies of the database and/or recover the application and its data. However, it falls upon a combination of backup administrators, DBAs, and system administrators to write the scripts that call upon these utilities. They must then test the scripts to confirm they work, schedule the backups and recoveries, and manage these scripts over time.
- **3rd Party backup software is a point solution.** To overcome this complexity associated with creating and managing backup using SAP HANA’s utilities, enterprises often turn to enterprise backup software. Each of SAP HANA’s utilities include APIs that these backup software products may call upon. Further, some enterprise backup software includes the scripts needed to simplify

the setup and management of these backups as well as place and move backup data on different media over time. However, this backup software incurs additional licensing costs. It may also require DBAs to use the backup software to create, schedule, and manage backup jobs over time which may become another point of management complexity.

- **Recoveries from backups are disruptive.** As enterprises focus on backing up and then recovering SAP HANA, they may overlook that their primary goal is for SAP HANA to continually remain available. Performing backups should ideally be an item on a check list with manual recoveries from a backup viewed as an anathema.

A recovery implies that the production SAP HANA database is off-line and that users cannot access it until the recovery completes. While an enterprise must have a recovery plan in place, the need for a recovery should be a remote possibility at best. As such, they should expect to spend as little time as possible planning for, testing, and supporting an event they never expect to occur.

Ideally they should test a recovery early on when they deploy SAP HANA and before they formally use it in production. Once SAP HANA is in production, they are better served by relying upon a highly available solution that always keeps SAP HANA online knowing that they have a recovery solution in place should the need to recover ever arise.

### **Fragmented Approach to the Management of SAP HANA’s Data Protection and HA Features Puts Enterprises at Risk**

Enterprises today more so than ever recognize that to succeed and thrive in today’s business environment they need to quickly adapt to changing conditions both externally and internally. This reality is often what motivates them to introduce SAP HANA into their environment in the first place. SAP HANA enables them to achieve greater business agility by quickly and easily providing them the levels of insight and information they need about their business operations when they need it.

The challenge emerges when enterprises look to manage and orchestrate SAP HANA’s individual data protection and HA options and tasks from a central interface. While SAP HANA and/or its partners provide the tools and/or utilities to individually manage SAP HANA’s backup, business continuity, high availability, and/or recovery functions, SAP

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HANA does not natively offer enterprises a single interface from which to centrally manage each of these tools.

This fragmented approach to managing the data protection and HA features needed to support SAP HANA creates a gap akin to the one that enterprises faced prior to deploying SAP HANA. Enterprises deploy SAP HANA to help them better manage and understand their own data by creating a central portal that automates the process of accessing and updating data across multiple data silos.

Yet as enterprises look to manage and orchestrate SAP HANA's underlying data protection and high availability features, they find themselves in a similar predicament. They lack a cohesive strategy to manage SAP HANA's data protection and high availability features as they do not possess a solution that seamlessly brings its data protection and HA features together under a single management interface.

This management complexity is a risk that enterprises must address and mitigate. It requires they identify a solution that simplifies, centralizes, orchestrates, and ideally automates the management of SAP HANA's various data protection and HA features. Only by doing so can enterprises hope to achieve their broader objectives of creating an agile IT infrastructure which is critical to have in place when supporting a mission critical application such as SAP HANA.

**The Keys to Configuring SAP HANA for Optimal Performance and Uptime with Minimal Management Overhead**

To create and maintain an environment where SAP HANA operates non-disruptively, enterprises need to implement a solution that can centrally and effectively manage SAP HANA's multiple data protection and HA features. This solution will need to facilitate the implementation and ongoing management of:

- Automated failover and high availability clustering software on the operating system.
- Snapshots of the database to provide clean, recoverable copies of the database.
- Replication on the primary storage arrays hosting the production SAP HANA database.
- Backing up and/or archiving database copies and log files to disk, tape, and/or cloud storage for long term retention.

Each of these data protection and HA layers for SAP HANA provide specific functionality that enterprises need to ensure its ongoing availability and recoverability. The keys to making this a reality starts by identifying a single solution that offers the breadth of features needed to host SAP HANA and can then protect its data, keep it in a highly available state, and centrally and effectively manage these features over time.

Identifying a solution that provides this breadth of functionality is no simple task. As Table 1 below shows, enterprises require multiple technologies to protect against the different types of failures that may occur so they may quickly and as non-disruptively as possible recover from them. Enterprises will also have other reasons to access and retain copies of this data. They may need to satisfy certain regulatory requirements, recover from the types of disasters that no one foresaw, and do performance and client acceptance testing.

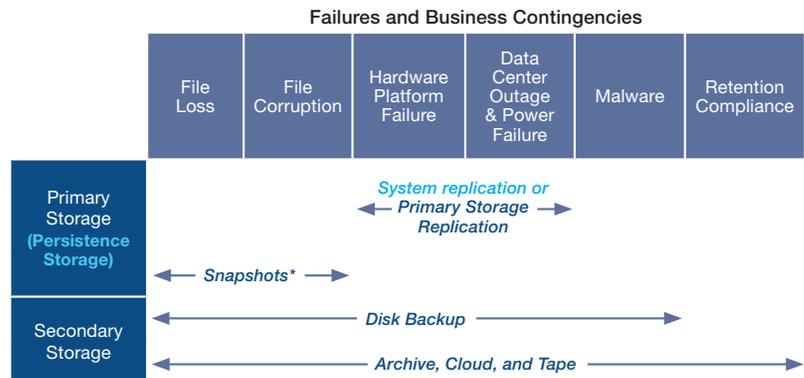
Minimally this solution must offer a hardware platform on which SAP can reliably run fast and well. It must be an all-flash array to offer the highest levels of performance, be highly available and reliable, and be backed by enterprise caliber support. SAP must also certify it to run SAP HANA.

The storage component of this solution must also include top-notch data management features. Enterprises need features such as snapshots to protect against file loss and

**Table 1**

**Different technologies protect against different failures, but none of them can do it all**

Source: HPE



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file corruption as well as array-based replication to protect against failures of the hardware platform or the data center.

However, enterprises may find these data management features either missing on all-flash arrays or immature and untested. In the case of SAP HANA, finding out that these features are absent or do not work as expected after SAP HANA is deployed is not an outcome that enterprises can easily rectify or undo.

Enterprises will also need secondary storage technologies such as disk arrays, tape, and/or cloud storage that offer cost-effective media to store backups and archives and enable long-term data retention. The good news in this case is that multiple providers offer quality secondary storage devices. Most enterprises will find that any of these products will meet enterprise requirements for backup or long-term retention. In circumstances where regulatory requirements for secure data retention exist, they may additionally want to identify storage devices that manage user access and offer data control features.

Hence, the concern around secondary storage is less about finding a storage device with quality hardware. These exist in abundance. Rather, enterprises should concern themselves with identifying secondary storage devices that their broader software solution may easily and seamlessly manage as part of their SAP HANA deployment to ensure its uninterrupted operations with minimal management overhead.

Adding this management requirement into the mix suddenly complicates the equation for finding the right secondary storage devices. Storage devices typically ship with their own device management software with each one operating independently of the another. Introducing a requirement that the overarching software platform

manage the data management features on each of the secondary storage devices eliminates many of these devices from consideration.

Yet managing the storage devices themselves still does not completely solve the problem. Enterprises must also manage the deletion, movement, storage, retention, and retrieval of data on both primary and secondary storage devices. This requires the creation of policies that work across these various storage devices and handle this responsibility. The introduction of this requirement makes the list of available solutions short indeed.

Managing secondary storage devices as part of enterprise's overall strategy to support SAP HANA and keep it constantly available is critical. Enterprises need this functionality if they want to provide an environment in which SAP HANA operates without interruption and with minimal management intervention.

Yet as enterprises bring SAP HANA into their environment, they often end up with an infrastructure that creates:

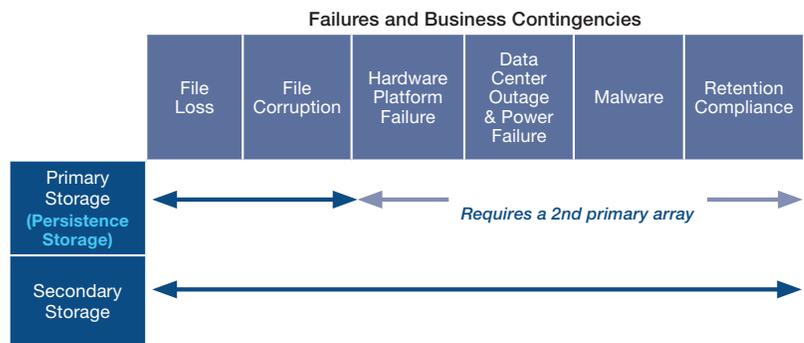
- A complex configuration that requires experts to implement and manage
- Uncertainty about the reliability of availability and recovery even after it is running in production
- Doubt about the overall stability of their SAP HANA deployment.

It is as enterprises select a platform to host SAP HANA, they must do more than simply select some combination of hardware and/or software products from Tier 1 providers. Each of these products will individually provide enterprises with point solutions that provide for the availability, data protection, and/or performance of their SAP HANA deployment. This approach is insufficient to deliver the type of

**Table 2**

**Combination of primary and secondary storage provides comprehensive data protection for SAP HANA**

Source: HPE



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comprehensive solution that SAP HANA needs to ensure its reliability and stability.

Enterprises will find themselves better served by selecting hardware and software that plug into a comprehensive management framework to ensure SAP HANA's ongoing availability, data protection, and performance. Enterprises that wish to achieve this objective will currently find only one solution from one Tier 1 provider that delivers on these specific requirements.

**HPE's Comprehensive, Cohesive Storage Infrastructure Ensures SAP HANA's Availability, Performance, and Protection**

Enterprises rely upon Tier 1 providers to provide solutions to meet the needs of their mission critical applications, especially when it comes to delivering the highest levels of products, services, and support that these applications need. Tier 1 providers such as EMC, Hewlett Packard Enterprise (HPE), NetApp, and Pure Storage each offer hardware, software, and services in their support of SAP HANA. However, HPE differentiates itself from these competitors with its Recovery Manager Central (RMC) that uniquely positions enterprises to

comprehensively and cohesively protect SAP HANA and its data across multiple storage devices.

RMC enables enterprises to centralize the management of data and storage devices in their SAP HANA environment. However, as part of its functionality, it also provides enterprises with a platform to centrally manage availability and backup services across these devices.

On the storage device side, RMC integrates with both the HPE 3PAR StoreServ and StoreOnce platforms. This integration provides a common, central console to perform device management on either of these two storage platforms. But as part of RMC's integration with these two devices, enterprises may also implement and achieve faster backups and restores for SAP HANA than traditional approaches. In this way, administrators may create a single set of policies on a single interface and apply them to any of the 3PAR StoreServ or StoreOnce devices under RMC's management.

Perhaps more impressively, RMC can also schedule and control the movement of data in data files from one HPE platform to another. For example, using RMC, a database administrator may schedule the creation of a snapshot

**Table 3**

**SAP HANA Solution Set Data Protection, Mgmt, and HA Feature Comparison**

| Provider Hardware for SAP HANA                 | ARRAY-BASED TECHNOLOGIES  |                                 |                                |                     |  |  |                         |  |                           |                                 |
|--|---------------------------|---------------------------------|--------------------------------|---------------------|--|--|-------------------------|--|---------------------------|---------------------------------|
|  | Management Console(s)     | Asynchronous Replication        | Synchronous Replication        | Snapshots           | Automated Copy of Snapshots to Secondary Disk/PBBA | SAP HANA Plug-in                               | SAP HANA Studio Plug-in | SAP HANA Plug-in License               | Data Protection (DP) Mgmt | Single Mgmt Console (Disk & DP) |
| <b>HPE 3PAR StoreServ<br/>HPE StoreOnce</b>    | RMC                       | (Async) Remote Copy             | Remote Copy                    | Virtual Copy        | RMC  | StoreOnce Catalyst Software Plug-in            | ✔                       | Plug-in: Free RMC: Per 3PAR Array      | RMC                       | ✔                               |
| <b>Dell EMC Data Domain<br/>Dell EMC Unity</b> | Unisphere™                | Native Asynchronous Replication | Native Synchronous Replication | Unified Snapshots   | ●  | DD Boost with SAP HANA Plug-in (license costs) | ✔                       | Per TB License                         | NetWorker®                | ●                               |
| <b>Dell EMC Data Domain<br/>Dell EMC VMAX</b>  | Unisphere™                | SRDF /A                         | SRDF                           | SnapVX              | Protect Point**                                    | DD Boost with SAP HANA Plug-in (license costs) | ✔                       | Per TB License + Professional Services | NetWorker®                | ●                               |
| <b>NetApp FAS Series</b>                       | Snap Creator SnapProtect™ | SnapMirror                      | SnapMirror                     | SnapShot            | SnapVault  | Snap Creator Plug-in for SAP HANA              | ✔                       | ●                                      | Snap Creator SnapProtect™ | ●                               |
| <b>Pure Storage FlashArray//m Series*</b>      | Purity Mgmt Console       | Purity FlashRecover             | ●                              | Purity FlashRecover | Purity FlashRecover***                             | ●  | ●                       | ●                                      | Purity Mgmt Console       | ●                               |

● Undetermined/Unsupported

\* Uses 3rd party host-based replication software

\*\* OEM of Commvault

\*\*\* SAP HANA support undetermined and/or unsupported

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on an HPE 3PAR StoreServ array. Once the snapshot completes, the DBA may create and schedule a separate job that moves the data in the HPE 3PAR StoreServ snapshot to the HPE StoreOnce storage device for backup and longer term retention purposes. Then, once the data is on the HPE StoreOnce device, it can replicate this data to a HPE StoreOnce device at a remote location without any intervention by the SAP HANA server.

HPE also offers its StoreOnce Catalyst software plug-in to improve the speed and efficiency at which it moves data from SAP HANA nodes to StoreOnce storage devices. Using the Catalyst software, administrators may install this plug-on the SAP HANA nodes to deduplicate data such as the SAP HANA database or log files before it is backed up. Deduplicating this data before moving it serves to reduce the network overhead as SAP HANA nodes will send less data over the network. It also reduces the amount of storage capacity needed to store this data on the StoreOnce storage device as it only moves and stores changed blocks of data.

As DBAs access and control the backups of the SAP HANA nodes to the StoreOnce devices as well as the restores from them, they may even find that they do not need to use backup software to manage this process. Rather, using either RMC 4.0's GUI or RMC with its REST API scripts, they can schedule deduplicated backups and send them directly to the StoreOnce storage device as well as perform recoveries from them. These capabilities simplify backup management, accelerate backups, and lead to significant cost reductions since they may no longer need backup software to perform backup and restore tasks.

This RMC and StorOnce Catalyst software combined with HPE's 3PAR StoreServ and StoreOnce hardware platforms provides enterprises with an SAP HANA solution that is currently one of a kind in the industry. HPE delivers the highly available, highly performing, and highly reliable 3PAR StoreServ all-flash storage platforms that they need to confidently host their SAP HANA deployment. Then using HPE's StoreOnce hardware platform, they similarly get the availability, reliability, and features they need to store and recover their data.

However, it is HPE's RMC and Catalyst software that provides enterprises with the means to initially implement and manage data availability, data movement, and data protection across these two platforms and then manage these functions over time. HPE includes RMC with its 3PAR StoreServ arrays at no cost to provide enterprises with an easy and cost-effective means to implement it and makes

**Side Bar #4: HPE's Superior Storage Platforms Satisfy Enterprise Requirements for SAP HANA High Availability, Data Protection, and Performance**

Many may be aware of HPE's all-flash 3PAR StoreServ storage arrays as the all-flash 8400 series and high end 20000 series consistently rank as either Recommended or Best in Class in the various editions of the DCIG All-Flash Array Buyer's Guides. On the sales front, the HPE 8000 All Flash arrays now rank among the leaders in enterprise all-flash arrays while, on the technical front, the HPE 3PAR StoreServ models are among the few arrays available that may be configured as all-HDD, hybrid, and/or all-flash without compromising on managing and optimizing the attributes of either HDDs or SSDs.

The HPE 3PAR StoreServ arrays achieved these rankings and market leadership due to its superior hardware and software technologies. On the hardware side, the ASIC found in all HPE 3PAR StoreServ models gives them the flexibility to be programmed for optimized HDD and SDD management and performance while the full-mesh controller backplane minimizes latency issues associated with bus architectures.

On the software side, the breadth of data management features supported by the HPE 3PAR StoreServ models are only exceeded by their superior feature implementations. The snapshot and replication features on the HPE 3PAR StoreServ arrays are the most scalable and technically efficient implementations of these features of any arrays in the industry. Further, the HPE 3PAR StoreServ models give enterprises the flexibility to replicate between its midrange 8400 and high end 20000 arrays, a feature available from few other providers in the industry.

Perhaps less well known to many are the HPE StoreOnce data protection platforms though these storage devices do equally well in DCIG's product evaluations. DCIG ranks the HPE StoreOnce 6600 and 5500 appliances as Recommended among enterprise deduplicating backup appliances with the StoreOnce 6600 able to scale to multiple petabytes of raw capacity and dozens of petabytes of logical capacity.

Key software features that these HPE storage devices offer include the flexibility to directly offload snapshots taken on HPE 3PAR StoreServ arrays to HPE StoreOnce models. HPE StoreOnce also offers virtual appliances. These give enterprises the option to create VMs on virtualized servers located at remote and branch offices that have the StoreOnce deduplicating technology on them. Using this technology, data may be deduplicated remotely and then replicated back to the primary HPE StoreOnce implementation.

These two HPE product lines align with enterprise requirements for SAP HANA's high availability, business continuity, and data protection needs as each of these product lines provide the levels of availability, capacity, performance, and/or scalability needed to satisfy enterprise demands.

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its Catalyst plug-in for SAP HANA available via a low-cost licensing model to enable direct data movement between SAP HANA nodes and HPE StoreOnce storage devices.<sup>5</sup>

### **HPE's Infrastructure Solution for SAP HANA Positions Enterprises for Ongoing Business Agility**

Enterprises love what SAP HANA delivers in terms of how it accelerates their ability to access and mine data in real-time to better equip them to make both tactical and strategic decisions about their business. But to achieve this outcome of improved business agility, SAP HANA was purposefully designed to load all needed application data into memory. This eliminated the need for humans to manually analyze data which could take weeks or months to complete if it could be done at all.

HPE is on track to accomplish a similar objective in its design of an infrastructure solution to host and support SAP HANA. HPE could have limited its focus to delivering the individual hardware and software components needed for SAP HANA's specific availability, performance, and data protection requirements. While HPE provides each of these individual components, HPE simultaneously created a comprehensive, cohesive solution that can both host SAP HANA and then seamlessly manage the supporting infrastructure once it is in place.

Using HPE RMC, enterprises may capitalize on the key features found on the HPE 3PAR StoreServ and StoreOnce platforms to centrally manage these hardware components as well as facilitate the movement of SAP HANA's data between them. Alternatively, using HPE's Catalyst deduplication software, DBAs can access and schedule the movement of deduplicated database and log files directly from SAP HANA nodes to StoreOnce devices.

HPE chose not to focus solely on providing point products that met specific SAP HANA needs for availability, data protection, and performance. Rather, it raised its sights and sought to create a solution that made it as seamless and straightforward for enterprises to implement, maintain, and operate SAP HANA from an infrastructure perspective as it now is for enterprises to access and gain insight into their data using SAP HANA.

By keeping its eye on the ball to provide a comprehensive infrastructure solution to host and support SAP HANA, enterprises:

- Reduce their SAP HANA backup window to no more than four (4) hours
- Minimize or eliminate the need to create and maintain scripts for backup and data movement
- Minimize or eliminate the need for third party backup software as SAP HANA backups may be completed using the tools provided by HPE without licensing third party backup software
- Minimize the administrative complexity associated with managing SAP HANA's data protection and recovery

Using RMC and the Catalyst software plug-in tools that are available with the HPE 3PAR StoreServ and StoreOnce platforms, enterprises create an infrastructure solution that supports SAP HANA with the highest levels of availability, performance, and data protection that SAP HANA needs. Further, they can implement this solution in a manner that does more than simplify and improve how enterprises protect SAP HANA. Using HPE's infrastructure solution, enterprise IT may continue to meet escalating demands for business agility more easily and at a lower cost regardless of how the enterprise grows and evolves its SAP HANA deployment into the future. ■

5. HPE includes RMC at no charge beginning in February 2017.

#### **About DCIG**

DCIG empowers the IT industry with actionable analysis that equips individuals within organizations to conduct technology assessments. DCIG delivers informed, insightful, third party analysis and commentary on IT technology. DCIG independently develops and licenses access to DCIG Buyer's Guides and the DCIG Analysis Suite. It also develops sponsored content in the form of blog entries, competitive advantage reports, customer validations, executive white papers, special reports and white papers. More information is available at [www.d cig.com](http://www.d cig.com).



DCIG, LLC // 7511 MADISON STREET // OMAHA NE 68127 // 844.324.4552  
[d cig.com](http://d cig.com)