ABSTRACT

This white paper highlights how IT environments relying on Mission Critical SAP implementations running on Oracle Databases can benefit from efficient backup with a Dell EMC Backup and Recovery solution. A high-level description of the features included in this solution and how they are beneficial is the goal of this paper. In particular, information on newly enhanced SAP with Oracle client plug-ins/modules and their features are discussed.

November, 2016
# TABLE OF CONTENTS

## EXECUTIVE SUMMARY
- Audience

## INTRODUCTION
- Dell EMC Data Protection Suite for Backup overview
- Benefits of using Dell EMC Data Protection Suite for Backup in an SAP Environment
- Component overview: Dell EMC Avamar
- Component overview: Dell EMC NetWorker
- Component overview: Dell EMC Data Domain Boost for Enterprise Apps

## DELL EMC DATA PROTECTION SUITE FOR BACKUP DEPLOYMENT ARCHITECTURE AND DETAILS
- Typical Dell EMC Data Protection Suite for Backup workflow feature highlights for protecting SAP on Oracle
- Deployment scenario: Dell EMC Avamar
- Deployment scenarios: Dell EMC NetWorker
- Deployment scenarios: Dell EMC Data Domain Boost for Enterprise Apps

## CONCLUSION

## REFERENCES
EXECUTIVE SUMMARY

Oracle is currently the number one implemented database in use by SAP customers globally. Similar to other business critical applications and data structures within a company’s IT environment, SAP data stored within each deployed SAP instance is experiencing tremendous growth. This growth is just one of the difficulties facing BASIS Administrators today. When coupled with shrinking backup windows due to a worldwide user base expecting a 24x7 highly available database and more stringent SLAs, finding the time that is dedicated solely for backup and recovery operations seems nearly impossible. Not to mention, even with data protection utilities included in SAP, facilitating, orchestrating, and complete end-to-end backup and recovery of an SAP instance is still a manual task.

Traditionally, large SAP with Oracle environments have not been an ideal fit for client-side deduplication. High CPU requirements typically needed to perform deduplication analysis on the production host simply did not provide the backup performance desired without the trade-off of slowing production transaction-processing load.

Internal regulations are not the only factors in determining what requirements you will be looking for in a solution that optimally protects your SAP data across your enterprise. Government and healthcare regulations require that you store backups of your SAP data offsite for example. Given your entire SAP landscape you are now talking about consolidating backups from various instances into one consolidated backup site. From a backup policy management perspective, this is especially important in providing you the flexibility to choose custom designed policies that sufficiently meet your data backup and recovery needs across your SAP instances enterprise-wide. This includes isolating those parts of the SAP landscape that you do not need to protect, avoiding protection storage capacity waste.

Dell EMC Data Protection Suite for Backup features tight integration for SAP with Oracle. With this tight integration Dell EMC can provide administrators with effective, flexible, and efficient backup and recovery tools, which leverages the industry’s leading high-speed, inline deduplication Dell EMC Data Domain systems. Dell EMC Data Protection Suite for Backup also delivers simplified management and configuration via configuration wizards, centralized monitoring, and reporting and retention policy management.

In this white paper, we will review the various features contained within the components of Dell EMC Data Protection Suite for Backup specific to SAP implemented on Oracle Databases. We will highlight when appropriate, where specific components of the Suite should be utilized for different deployment scenarios, providing the most efficient workflow possible. Finally, we will cover how the features of the “SAP with Oracle Plug-ins and Modules” bring simple, flexible, efficient, and optimized data protection for your enterprise wide SAP deployment.

AUDIENCE

This white paper is intended for those BASIS and Database Administrators looking at deploying efficient backup solutions for enterprise wide SAP with Oracle business critical implementations. Knowledge of SAP, Oracle Databases and their overall architecture including its built in backup and recovery tools, terminology and methods are required.

INTRODUCTION

DELL EMC DATA PROTECTION SUITE FOR BACKUP OVERVIEW

Dell EMC Data Protection Suite for Backup makes it easier than ever for organizations to access Dell EMC’s broad portfolio of backup, and compliance software solutions. Like an “IT survival kit”, Dell EMC Data Protection Suite for Backup provides advantages for multiple types of users. It includes tier-based licensing options that are cost effective and designed to simplify management and deployment.

Dell EMC Data Protection Suite for Backup enables fast, reliable deduplicated backup and recovery for many data types. In this paper we concentrate on SAP data residing inside of an Oracle Database, however Dell EMC Data Protection Suite for Backup can protect a wide array of data types: file systems, desktops/laptops, and other mission critical applications. Dell EMC Data Protection Suite for Backup also includes support for industry leading NAS as well as snapshot management and backup of EMC arrays. Access to Dell EMC’s best in class backup software portfolio within the Dell EMC Data Protection Suite for Backup includes Dell EMC Avamar, Dell EMC NetWorker, Dell EMC Data Domain Boost for Enterprise Applications (DDBEA), Dell EMC CloudBoost, Dell EMC DP Search, and Dell EMC Data Protection Advisor. These components offer tight integration with Dell EMC’s industry leading protection storage, Dell EMC Data Domain, which delivers the time-critical performance and reliability required by enterprise companies.
BENEFITS OF USING DELL EMC DATA PROTECTION SUITE FOR BACKUP IN AN SAP ENVIRONMENT

As mentioned in the introduction to this whitepaper, using a client-side deduplication backup solution for backing up large databases has traditionally been perceived as a challenge. SAP environments pose quite a backup challenge, not only because of their large sizes but also because of daily change rate, and management factors that make backing them up a fairly demanding task.

Some examples of these challenges include the fact that business data stored in different SAP software components (ERP, CRM, etc.) can be distributed over several systems. This “different data silo” characteristic often brings backup storage efficiency challenges with similar data potentially being redundantly stored in two separate backups. Storage efficiency challenges aside, end-to-end daily management and automation of backup and retention policies can be an even bigger problem.

In addition to the various factors involved with managing the application, which is already a sizeable responsibility, IT administrators are increasingly being pushed to virtualize their mission critical applications. This clearly involves the participation of application administrators who are responsible for an SAP deployment that ensures SAP is deployed optimally within a virtualization environment. Whether your virtualization infrastructure is custom built, implemented via reference architectures such as VSPEx, or leveraging integrated infrastructure solutions like VCE Vblock, VxRack or VxRail, the Dell EMC Data Protection Suite Family provides the tightest integration in the industry for virtual infrastructure and is proven in these deployments. All of the deployment options discussed in this whitepaper apply to SAP running within any of these virtualization infrastructure environments.

When deploying Dell EMC Data Protection Suite for Backup together with Dell EMC Protection Storage for SAP implementations, backup data is stored and deduplicated globally, so any redundancies between SAP backup datasets stored to the same Avamar Data Store or Data Domain system, will be addressed. With Dell EMC Data Protection Suite for Backup and Data Domain systems customers gain flexibility and throughput. For example, you can direct certain instances of the SAP landscape to the Avamar Data Store while others are directed to a Data Domain system; based on performance and scalability requirements for backup of each individual database.

Backups orchestrated with Dell EMC Data Protection Suite for Backup components, when paired with Dell EMC Protection Storage, only store the changed data on a daily basis, however the backups are logically stored on the Avamar Data Store or Data Domain system as a full backup. This greatly simplifies the backup administrator’s management of backup schedules, but more importantly streamlines the recovery process. If a full database recovery is required there is no need to compose the recovery from a sequence of full and incremental backups. Simply select the last backup taken and begin the recovery of that entire database.

Dell EMC Avamar, NetWorker and DDBEA bring value through orchestration and automation of the SAP BR*Tool commands. This greatly reduces the management headache often found between integrating backup packages with SAP and assuring consistency between SAP and the underlying database that is backed up. In other words Dell EMC’s certification with SAP assures you that all the proper application level commands are performed to prepare the underlying database for a consistent backup.

In the following sections we will look deeper into the details of the deployment of the various Dell EMC Data Protection Suite for Backup components within an SAP on Oracle environment and the various feature details included in client plug-ins and modules built specifically for this application.

COMPONENT OVERVIEW: DELL EMC AVAMAR

Developed to solve the challenges associated with traditional backup, Dell EMC Avamar deduplication backup software and system, equipped with integrated global, client-side data deduplication technology, provide fast, next-generation daily full backups for virtual environments, NAS systems, desktops/laptops, remote offices and business critical applications. Dell EMC Avamar reduces the size of backup data at the client—before it is transferred across the network and ultimately stored. Unlike traditional backup, Avamar delivers fast, daily full backups via existing IP networks, and makes recovery fast and easy with single-step restore.

Avamar also deduplicates backup data globally across applications, and sites worldwide to reduce the total required backup storage by up to 30x. As a result, Avamar provides the benefits of efficient long-term retention on disk while dramatically lowering capital and operating expenses including floor space, power, and cooling.

Avamar backups can be quickly recovered in just one step—eliminating the hassle of restoring the last good full and subsequent incremental backups to reach the desired recovery point. Avamar’s intuitive interface allows desktop and laptop users to quickly recover their own data, reducing the burden on IT staff. In addition, Avamar’s centralized web-based management and at-a-glance dashboard view make it easy for administrators to protect hundreds of offices from a single location via existing networks. Data can be encrypted in flight and at rest for added security.
Avamar’s grid architecture provides online scalability, and patented redundant array of independent nodes (RAIN) technology provides high availability. Avamar, similar to the other components in the Dell EMC Data Protection Suite for Backup, is also integrated for multi-streaming backups to Dell EMC DataDomain systems for efficient and highly scalable backup of specific data types and applications, simplifying management and maximizing existing IT investments.

COMPONENT OVERVIEW: DELL EMC NETWORKER

Dell EMC NetWorker backup and recovery software centralizes, automates, and accelerates data backup and recovery. NetWorker delivers record-breaking performance and a wide range of data protection options to safeguard critical business data. Both physical and virtual environments can be protected with NetWorker.

NetWorker simplifies data protection of SAP on Oracle environments by providing centralized policy management, client configuration wizards, cluster support – including Active/Active, as well as creating copies of the backups for off-site storage – ensuring adherence to long term data retention requirements.

Dell EMC NetWorker provides client/application side deduplication when leveraging Data Domain Boost. In this scenario, Data Domain is configured as the backup target. Deduplication will occur on the SAP server, reducing network traffic by 90% while also reducing the backup times up to 50%.

COMPONENT OVERVIEW: DELL EMC DATA DOMAIN BOOST FOR ENTERPRISE APPS

DD Boost for Enterprise Applications provides SAP App owners direct control of backup to Data Domain using BR*Tools. Distributing parts of the deduplication process to the application server enables client-side deduplication for faster backups. By also giving the App owner control of the recovery process through native utilities, he does not need to go through the Backup Admin, enabling faster recovery. DD Boost for SAP is supported over both IP and Fibre Channel, so customers in either environment can benefit from this integration without needing to change their infrastructure. DDBEA components include the application agent installed on the server being protected, a local Data Domain system, and a remote Data Domain system for disaster recovery.

DELL EMC DATA PROTECTION SUITE FOR BACKUP DEPLOYMENT ARCHITECTURE AND DETAILS

TYPICAL DELL EMC DATA PROTECTION SUITE FOR BACKUP WORKFLOW FEATURE HIGHLIGHTS FOR PROTECTING SAP ON ORACLE

The SAP for Oracle Plug-ins/Modules of the Data Protection Suite for Backup automate the backup and restore processes delivered through BR*Tool, as well as RMAN. Backup support includes:

- Entire Database (All data files in a database)
- Tablespaces
- Data files
- Database Controle File (This is always backed up when a backup of a database file is performed)
- Archived Redo Logs

**Note:** Each backup operations also backs up the BR*Tools profile and backup catalog by default.

The ability to backup entire databases, individual tablespaces, or log files, provides the flexibility of only targeting those tablespaces and/or databases that are essential to meet IT service level agreements (SLAs) in your environment. With this flexibility you are not forced to backup data you are not required to backup and further take up valuable processing time within your backup windows.

Further highlighted capabilities of the SAP with Oracle Client Plugin/Modules include:

- Ability to perform Oracle database backups within an SAP environment either “Hot” or “Cold” – With the increasing demand on SAP data and diminishing acceptance of “downtime”, “Hot” backups become increasingly important and a must-have feature.
• Ability to perform both scheduled and on-demand backups. This provides the user with the flexibility to perform a backup as required by last minute events or planned SAP implementation changes.

• Tight integration with SAP BR*Tools allowing Avamar and NetWorker to perform backup of Oracle database directly from within SAP. Likewise, BR*Tools can kick off a specific Avamar on-demand backup or restore request directly from the BR*Tools CLI interface without requiring the backup software interface.

• Ability to perform relocated restores. This provides the ability to recover a database or tablespace on an entirely different SAP environment or server, which is typically useful in disaster recovery and testing scenarios.

In each respective component’s plug-in/module settings are specific configuration parameters to identify to Dell EMC’s Data Protection Suite for Backup the location of the BR*Tools executable. This allows the plugin to be fully integrated with the BR*Tools CLI for both backup and recovery operations. Keep in mind, these are the configuration options from the point of view of the client plug-in/module. There is some configuration required from the BR*Tools point of view as well. Please reference the user documentation for the specific Data Protection Suite for Backup component you are using for detailed steps on configuring both the plug-in/module as well as BR*Tools.

Finally, once the plugin and configuration of BR*Tools is complete, backup and recovery operations can now be performed. Figure 1 below illustrates an example of a BRRECOVER operation from the BR*Tools CLI interface.

Figure 1: Example BRRECOVER output from BR*Tools
With the flexibility and variations found from deployment to deployment of SAP environments, the Dell EMC Data Protection Suite for Backup covers each deployment in a slightly different fashion to assure the most efficient backup methods are employed. This is especially true given the permutations of data-types besides the SAP data that require enterprise wide protection.

**DEPLOYMENT SCENARIO: DELL EMC AVAMAR**

Figure 2 below is an illustration of the most typical SAP deployment and highlights where Dell EMC Avamar components are implemented to provide a complete backup solution. This illustration covers both stand-alone SAP deployments as well as clustered SAP implementations. While there are some subtle differences between the two architectures and how Avamar’s client plug-ins function in these environments, the overall concept and high-level backup architecture is the same. Also, keep in mind that in today’s next generation datacenters, your SAP application and included database architectures could also be hosted on a virtual application server environment such as a VCE Vblock System converged infrastructure. The features and methods discussed in this whitepaper apply for virtual servers as well as their physical counterparts.

Dell EMC Avamar is a deduplication backup software and system. The software sends data to either an Avamar Data Store or a Data Domain system. The Avamar Client software component and appropriate plug-in comes with the system and is easily deployed to the application server hosting SAP. In the SAP use case, it is required that the appropriate plug-in be installed on the SAP application server hosting the underlying database. For those SAP deployments leveraging Oracle Databases it is also required to install the proper BR*Tools components. Once the proper backup policies and datasets are configured for backing up the various SAP databases, the Avamar server will work in concert with the Avamar client plug-ins to issue the proper application commands and APIs to assure database consistency at time of backup. We will explore the client plug-in configuration in more detail where you will clearly see proper tie-ins with the BR*Tools executable.

Figure 3 shows a screenshot of the plug-in options menu to properly specify the location and service info for the desired database to back up along with proper database credentials and locale information.

**Figure 2: Dell EMC Avamar for SAP Deployment**

**Figure 3: Database Information Options Dialog**
Once specifying the database being targeted for backup, Figure 4 below illustrates the advanced options and settings that enable the more advanced features of the plug-in which were detailed above.

Figure 4: Linux SAP with Oracle Advanced Options
Looking closer at these plug-in settings we can see the flexibility of being able to specify either online or offline. One can even specify an “Online Consistent” backup type that will work to keep track of the log while the backup of the database is processing. Before completing the backup job, Avamar can also be configured to back up the logs to assure a complete and consistent version of the database is preserved at the time the backup finishes processing.

**DEPLOYMENT SCENARIOS: DELL EMC NETWORKER**

Dell EMC NetWorker Module for SAP with Oracle (NMSAP) is an SAP certified module for NetWorker and provides the backup and restore interface between the SAP BR*Tools programs and the NetWorker server. BACKINT which is part of NMSAP is the mechanism utilized in this interface.

Figure 5 illustrates a typical configuration using NetWorker to protect SAP applications that benefit from client side deduplication.

---

**NetWorker SAP Configuration with Client Direct**

NetWorker simplifies the client creation and modification process. The NetWorker Client Configuration Wizard will auto-detect the environment and populate the fields as appropriate. The backup administrator can easily create/modify clients with limited knowledge of SAP, and will be guided through each step necessary to ensure that the SAP client is properly configured. The wizard reflects the integration with BR*Tools, allowing for NetWorker to fully automate the otherwise manual steps required by the native BR*Tool interface.

Figure 6 below illustrates an example of a NetWorker Client Configuration Wizard, including the integration with BR*Tools.
The NetWorker integration with BR*Tools provides the following benefits:

- Backup and restore for complete databases, individual data files, table spaces, and logs
- Automated and flexible backup:
  - Online and offline backup
  - Block-level incremental backups (with Oracle RMAN feature)
  - Verification of backup media readability
  - Verification of backup consistency
- Automated and flexible recovery:
  - Automated application of logs to bring the database back to a point-in-time
  - Restartable restore from the point of failure for interrupted restores
  - Recovery to original or alternate location

To further enhance the data protection of SAP environments, NetWorker delivers the ability for customers to leverage Dell EMC array based snapshots, as well as customized event based backups.

SAP customers leverage hardware snapshots/clones when their environment requires a point in time copy of the data. For example, the data protection solution must accommodate for the system to be restored to a point in time. A customer may require that multiple snaps be taken throughout the day. To further enhance the data protection of SAP environments, NetWorker brings value by supporting snap and replicate technologies of Dell EMC arrays and RecoverPoint. NetWorker Snapshot Management is an integral...
configuration option that allows for the snapshot process and backups of those snaps to be fully automated. Recovery from a snap is made easy with NetWorker. NetWorker will catalog the replica – the administrator can quickly identify the data needed for the recovery.

Figure 7 shows an example of multiple snaps being taken on an Dell EMC array, and managed by NetWorker.

![Figure 7: NetWorker Snapshot Management example](image)

SAP customers may also require that a backup be taken based on an event rather than the normal backup time. NetWorker provides the option of event-based backups. For example, an event-based backup may be scheduled if log files are greater than 100 GB, a backup has not occurred in 6 days, or a database merge was completed.

DEPLOYMENT SCENARIOS: DELL EMC DATA DOMAIN BOOST FOR ENTERPRISE APPS

As illustrated in Figure 8 below, DD Boost for SAP provides App owners direct control of backup to Data Domain using BR*Tools. Dell EMC Data Domain Boost distributes parts of the deduplication process to the backup server or application clients, enabling client-side deduplication for faster, more efficient backup and recovery. Without it, the backup server or application client would send all data unique or redundant to a Dell EMC Data Domain system for deduplication processing. With Data Domain Boost, the server only sends unique data segments to a Data Domain system. This dramatically increases the aggregate throughput by 50 percent and reduces the amount of data transferred over the network by 80 to 99 percent.

![Figure 8: Data Domain Boost for Enterprise Apps](image)
DD Boost aggregates multiple links into dynamic interface groups between the application and Data Domain system. The Data Domain system then transparently balances the backup load between links in the group and automatic link failover keeps backup jobs operational in case of temporary network glitches. In addition, the Data Domain system can improve network utilization by dynamically routing clients between networks.

With DDBEA, backup administrators can control replication between multiple Data Domain systems from a single point of management to track all backups and duplicate copies. This allows administrators to efficiently create disaster recovery (DR) copies of their backups over a wide area network (WAN) using Dell EMC Data Domain Replicator as well as keep track of all the copies in the backup application’s catalog for easy disaster recovery.

DDBEA integrates seamlessly with SAP to provide application owners and database administrators with complete control of their own backups, using their native application utilities such as DBA Cockpit shown in Figure 9 below. This empowers applications owners with the control they desire and eliminates storage silos for application protection.

![DBA Cockpit: System Configuration Maintenance](image)

Figure 9: DBA Cockpit provides visibility & control for DDBEA

DDBEA for SAP supports scheduling backups using DBA Cockpit, multi-stream backups and restores, backup and restore of Fulls, partials, full & logs, and manual backup & restores via CLI (brbackup or brarchive), and Active/Passive clusters.

Data Domain Boost provides secure access to enable data protection as a service in private and public cloud deployments. For large enterprise and service provider environments, Data Domain systems provide multiple Data Domain Boost users with secure, logical data isolation and access to data.

**CONCLUSION**

Backup of business critical applications have been a pain point for many IT operations for some time now. Particularly with SAP, backup is critical given the valuable business data, which is leveraged each and every day for vital business decisions. For this reason, SAP environments tend to be seen as the most critical from an IT resource perspective, as well as the most data growth of any application in the data center.
Dell EMC’s Data Protection Suite for Backup and its integration with Dell EMC Data Domain has introduced industry proven next-generation deduplication technology for critical IT backup operations for business critical applications such as e-mail, and other data warehousing applications. This includes Oracle databases that store SAP data. In this paper we have reviewed differentiating plug-in/module features such as event-based backups, client configuration wizards, array-based snapshot support, and multi-streamed backup support to both Dell EMC Avamar Data Store and Dell EMC Data Domain. Dell EMC Data Protection Suite for Backup provides the necessary support and integration with SAP to make backup and recovery as efficient as possible and easy to manage. The flexibility and various options detailed here, clearly solidify Dell EMC Data Protection Suite for Backup as an industry unique approach over implementing, and more importantly, integrating several different point solutions.

REFERENCES

For additional information please review the following User Guides found on Dell.com:

- Dell EMC Avamar for SAP with Oracle
- Dell EMC NetWorker and Data Domain Integration Guide
- Dell EMC NetWorker Documentation Portfolio
- Dell EMC NetWorker Module for SAP with Oracle

For additional information please review the following EMC White papers found on Dell.com:

- Integrating NetWorker with Data Domain Secure Multi-Tenancy
- Dell EMC Avamar Integration with Dell EMC Data Domain – A Detailed Review
- NetWorker Snapshot Management
- Dell EMC Data Domain Boost for SAP with Oracle – A Technical Review
- DD Boost for SAP with Oracle - Technical Review

For additional information please review the following Dell EMC videos found on YouTube:

- Dell EMC Data Domain Boost for Enterprise Applications – Lightboard Video
- Dell EMC Data Protection Suite Family Overview – Lightboard Video