Deploying Microsoft Exchange Server 2016 with Dell PS Series Arrays

Configuration and management best practices for Exchange 2016 and the PS Series SAN

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Revisions

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Executive summary

This document provides best practices for deploying Microsoft® Exchange Server 2016 with a Dell™ PS Series SAN. This guide builds upon best practices provided by Microsoft and industry experts, and includes deployment requirements and recommendations for performance, reliability, scalability, flexibility, and recoverability. While these best practices are applicable to all versions of Microsoft Exchange, the examples provided were created using Microsoft Exchange Server 2016 running on Microsoft Windows Server 2012 R2.

Key issues addressed by this guide are:

- Design considerations, including availability, performance, scalability, and management
- How to set up a PS Series group and volumes
- Benefits of booting servers from a SAN
- How to set up Exchange Server 2016, including optimizing the server and connecting to volumes
- Configuring Exchange Server 2016 to use PS Series volumes
- Expanding SAN capacity and file systems without affecting availability
- Backing up Exchange Server 2016 data
- Using very large mailboxes and mailbox quotas

Audience

This guide is intended for technology professionals using Dell PS Series storage in a Microsoft Windows environment who have deployed or plan to deploy Exchange Server 2016.
1 Introduction

1.1 Exchange Server 2016

Microsoft Exchange Server 2016 is a messaging and collaboration server with many features that may impact an organization’s storage needs. Exchange Server 2016 offers a range of enhancements including performance improvements, large mailbox sizes, and built-in high-availability (HA) features that are designed to advance user productivity and simplify manageability. These enhancements include:

**Increased mailbox sizes:** Traditionally, end users have had to spend significant amounts of time managing email because of mailbox size limits. Exchange Server 2016 supports an unlimited mailbox quota, which can enhance user productivity by reducing the time spent to manage and search email. Also, increased mailbox sizes combined with performance enhancements such as reduced disk I/O enable mailboxes to be stored on high capacity, cost-effective storage arrays.

**Built-in high-availability (HA) and disaster recovery (DR) features:** Exchange Server 2016 offers several HA and DR features including built-in storage replication. A DAG (Database Availability Group) provides native HA and DR features that increase Exchange uptime without complex or expensive third-party solutions. The DAG allows up to 16 replicas (including the original) to exist for each mail database. A separate server node owns each copy in the DAG for a 1:1 ratio of database replicas to servers. Of the potential 16 replicas, they may be used as HA or DR copies. HA copies assume automatic-failover, up-to-date copies that are typically local to users. DR copies are off-site or time-lagged copies that will become active only in a disaster scenario. These built-in features offer a simple option to help ensure application uptime.

1.2 Dell PS Series storage

By deploying Exchange Server 2016 with a PS Series SAN, organizations combine an industry-leading messaging and collaboration application with reliable, scalable, and high-performance disk storage to meet the ever-expanding needs of email users.

With any SAN, you can consolidate storage resources can be consolidated and provide a more scalable configuration than DAS, while also improving performance and simplifying management. In addition, a SAN can deliver high-end functionality like snapshots and data replication that not only improve data protection and recovery capabilities, but also enhance Exchange operations. To provide storage consolidation for any enterprise, PS Series storage arrays from Dell enable an IP-based (iSCSI) SAN that delivers performance, scalability, recoverability, and resilience. To work with a PS Series SAN, a server simply requires a standard iSCSI initiator. Once connected to a PS Series SAN over an IP network, volumes on the SAN appear as regular disks, which can be formatted and managed as usual.

Integrated virtualization software makes a PS Series SAN easy to manage, providing automatic RAID configuration, disk sparing, data provisioning, replication, and load balancing. For reliability, PS Series storage arrays include redundant hot-swappable hardware, including disks, control modules, fans, and power supplies. Increasing volume size, like most SAN-management tasks, is a point-and-click operation.
To expand SAN capacity and performance, multiple arrays can be grouped together and performance can scale linearly. With multiple arrays in the SAN, this allows creation of a tiered storage solution along with pools — in effect, SANs within the SAN.

1.3 Benefits of deploying Exchange with PS Series storage

The many benefits of deploying Exchange Server 2016 with a PS Series SAN include:

**Rapid deployment and configuration of storage:** A PS Series SAN can quickly deploy to provide storage for Exchange Server 2016. A simple setup utility allows rapid configuration of an array on the network and creation of a PS Series group. Automation of complex operations such as RAID configuration, disk sparing, data provisioning, and load balancing means that even users new to SAN technologies can effectively manage the SAN.

**Redundant hardware and hot-serviceable configuration:** PS Series storage arrays are fully redundant with dual controllers, power supplies, and fans, all of which can be serviced online and without disrupting applications.

**Data protection:** All data is protected with RAID and spare disks. Combined with hot-service capabilities, online operation is assured. Volume snapshot, clone, and replication protection capabilities are available and included at no extra cost.

**Simple and immediate storage expansion:** Using modular PS Series storage arrays as the Exchange Server 2016 storage solution, SAN storage capacity and performance can be increased online, without server or application disruption.

**SAN boot capability:** iSCSI host bus adapters (HBAs), along with certain Intel® and Broadcom® NICs, provide the ability to install and boot the Windows operating system from a PS Series volume, increasing disaster tolerance. When server hardware fails, the unit can be quickly removed and replaced with a similarly-configured spare hardware platform. This new platform can be directed to the SAN boot volume and resume providing application services in minutes. Other benefits of SAN boot include centralized storage management and reliable and highly available storage resources that eliminate the need for mirrored boot volumes.

**Network path protection and load balancing:** Using multiple NICs or iSCSI HBAs, multipath I/O (also known as MPIO) enables the dynamic load balancing of iSCSI SAN traffic across redundant paths between the Exchange Server 2016 and the PS Series SAN. PS Series MPIO DSM coordinates activity between the MPIO drivers and PS Series group storage, maximizing the capabilities of both the operating system and the iSCSI SAN. The PS Series MPIO component works with the Microsoft iSCSI initiator and MPIO driver to improve both reliability and performance.

**Excellent performance:** PS Series arrays provide excellent performance and scaling automatically, as demonstrated by Exchange Solution Reviewed Program (ESRP) results. The [Microsoft ESRP – Storage](#) site contains detailed information on specific Exchange solutions operations.
**Advanced Management features**: PS Series storage comes standard with a comprehensive set of features including:

- Automatic load balancing
- Virtual volume management
- Thin provisioning
- Space-efficient snapshots for instant backup and restore
- Snapshot Space Borrowing
- Volume cloning for rapid server provisioning
- Thin clones
- Multipath I/O (MPIO) support
- Volume Undelete
- Volume Unmap
- Volume Mount Point support
- Auto-replication for a comprehensive disaster recovery solution
- Storage pools creating a SAN within a SAN
- Member-by-member RAID level control
- Volume collections (consistency groups) tying volumes together across arrays and pools

**VSS-based backups**: The PS Series Host Integration Tools for Windows is a toolkit for Windows systems that installs host tools and utilities including a VSS-provider and a VSS-requestor data-protection application called Auto-Snapshot Manager / Microsoft Edition, (ASM/ME). This interacts with the PS Series storage volume snapshot function to dramatically improve data-protection operations by creating flexible, space-efficient, and application-consistent, point-in-time copies of data called Smart Copies.

**Thin provisioning database and log volumes**: With the PS Series thin provisioning capability, administrators have the option to provision storage resources for Exchange servers without actually allocating physical storage before it is required. This type of storage allocation eliminates the pains of expanding available storage when the application requires it. Repeated data growth operations can be avoided and the result is improved utilization of physical storage resources.

**Remote site volume replication**: With the PS Series auto-replication capability, Exchange Server data can be automatically transferred to a remote data center, protecting the data from serious failures — ranging from the corruption of the volume to a complete site disaster — with no impact on local data availability or performance.
2 Planning and design considerations

When designing an Exchange Server 2016 environment, it is important to understand these requirements:

- Reliability, availability, and serviceability
- Performance
- Scalability
- Recoverability
- Ease of management
- Service-level commitments

It is critical to focus on these requirements before beginning the initial Exchange installation, or they may become serious challenges to the future growth and stability of the Exchange environment. The best practice guide, [Using Dell EqualLogic Storage with Microsoft Windows Server 2012](#), describes how to design a robust server and network environment that uses PS Series storage to overcome the storage challenges IT managers face today.

In addition, the [Planning and deployment](#) article for Exchange 2016 explains how deployment could affect the existing network and Exchange organization. It provides a list of decisions that need to be made before deployment begins.

2.1 Reliability, availability, and serviceability

An Exchange environment should be robust, resilient, and easily repaired without impacting the SLA to the users. One way this is accomplished is by using hardware that enables hot swapping of components while the system remains available. In a SAN configuration, the server, network, and storage arrays should all have a high level of fault tolerance to avoid costly unplanned downtime and allow scheduled maintenance to take place without unacceptable amounts of service disruption. Special attention should be placed on fault isolation and overall operations while system components are being serviced.

Fault tolerance is easy to build into the Exchange Server 2016 storage environment by using PS Series storage arrays, which provide high availability and scalability in addition to hot-swappable hardware and MPIO support.

2.2 Performance

The Exchange environment must provide optimal performance and response time. Access to Exchange data is crucial to day-to-day operations, and under-performing storage can have a devastating effect on the overall performance of Exchange and on productivity.

A SAN built with PS Series storage automatically optimizes its own performance and improves that performance as additional arrays are added to the SAN. If planning a large deployment, the Exchange workload can be isolated from other application workloads. This can be done by creating separate storage pools for Exchange-related volumes within the PS Series group. The [ESRP results](#) from Dell demonstrate the performance offered by PS Series arrays.
2.3 **Scalability**
As the workload grows and storage capacity needs increase, the environment must accommodate changes without affecting users. Storage used in an Exchange Server environment must be highly scalable to accommodate not only the growing numbers of users, but also the increasing amount of data each user needs to store in Exchange. Modular PS Series storage arrays provide easy, online scalability.

2.4 **Recoverability**
One important part of business-continuity planning involves recovery from situations that cause data loss. These situations can range from a corrupted volume or virus-infected file to the loss of an entire data center due to an act of nature or other cause. Because Exchange is often a critical component of user productivity, it is important to have a multi-layer plan to protect this information asset.

PS Series storage arrays deliver snapshots and auto-replication technology as standard features. Combined with the VSS support of the Host Integration Toolkit for Microsoft and the application-consistent Smart Copies provided by ASM/ME, PS Series storage makes it easy to configure and administer automatic data protection including restore from snapshot, backup using VSS-integrated backup applications, and disaster recovery for critical data.

2.5 **Ease of management**
Setup and configuration, data protection and recovery, and day-to-day administration of the storage environment should be handled easily and have minimal impact on operations and users. PS Series storage automates complex tasks like RAID configuration and provides both graphical and command-line user interfaces for easy and intuitive storage management. The PS Series SAN also can be proactively monitored using the included SAN HeadQuarters (SANHQ) software to provide a comprehensive view of PS Series storage use and performance.

2.6 **Service-level commitments**
Organizations often have varying service-level requirements across applications. One application might be critical to business results, while another might require segregation of storage resources to meet application best practices or organizational needs.

PS Series storage allows for differing performance and availability levels through the choice of SAS, NL-SAS, or SSD disks and RAID levels including RAID 10, 50, and 6. Also, PS Series storage allows data-segregation commitments to be met by storing data on physically discrete pools.
3 Deploying Exchange Server 2016 with PS Series storage

This section describes the requirements, recommendations, and basic tasks for deploying Exchange Server 2016 with a PS Series SAN.

3.1 Pre-deployment

Before beginning deployment, Dell recommends reviewing the following materials:

- Exchange 2016 Planning and Deployment
- Using Dell EqualLogic Storage with Microsoft Windows Server 2012
- Dell EqualLogic Configuration Guide v15.2

3.1.1 Exchange 2016 system requirements

In previous versions of Exchange, the Client Access server role and the Mailbox server role could be installed on separate servers. In Exchange 2016, the Client Access server role is automatically installed as part of the Mailbox server role, and the Client Access server role is no longer available as a separate installation option. The following points can assist with deployment:

- Active Directory must be at or above Windows Server 2008 with forest functionality mode.
- The Domain Controllers must be running Windows Server 2008 or higher.
- The Schema Master must be running on Windows Server 2008 or higher.
- Exchange Server 2016 should be deployed as a member server, similar to previous versions of Exchange.
- Exchange Server 2016 is supported on Windows Server 2012 Standard or Datacenter and Windows Server 2012 R2 Standard or Datacenter.
- Exchange 2016 includes two server roles: the Mailbox server role and Edge Transport server role (see Exchange 2016 system requirements)

3.1.2 High availability with DAG

A database availability group (DAG) is the fundamental element of the high availability and site resilience framework that is built into Exchange 2016. A DAG is a group of Mailbox servers that host a set of databases and provides automatic, database-level recovery from database, network, and server failures.

3.1.3 Server requirements and recommendations

This section provides additional Exchange server requirements and recommendations for a configuration that uses a PS Series SAN.
The following points assume that a PS Series array has been configured with local CHAP account authentication.

- Configure two or more 1 GB or 10 GB Ethernet NICs or HBAs. Consult the vendor initiator documentation for installation instructions, and check the Knowledge Base on eqlsupport.dell.com (login required) for the latest initiator information.
- Properly configure the SAN network for best performance. For more information, see the best practice guide, EqualLogic PS Optimizing your SAN Environment for High Availability.

Configure Host Intergration Tools as follows:

1. Configure Dell PS Series Multi-Path I/O DSM. Dell has developed a DSM that plugs into the Microsoft MPIO framework and is used to optimize the Windows Server usage of Dell PS Series storage arrays.

   For more information on Multipath I/O DSM, See the PS Series best practice guides, Configuring and Deploying the Dell EqualLogic Multipath Device Specific Module with Microsoft Windows Servers and PS Series Architecture: MPIO with Devices That Have Unequal Link Speeds.

To set up MPIO, perform these steps:

   a. Launch the Dell PS Series Auto-Snapshot Manager.
   b. Select Settings at the bottom left and click MPIO Settings in the left-hand object tree.
   c. Under Network Connections, select the subnet(s) not associated with your SAN. Under Action, click Exclude. See Figure 1.
   d. Set the Fail Over Policy and then set the Minimum Adapter Speed.

![Configure Dell Multipath I/O DSM](image)
2. Set up PS Series group access as follows:
   a. Launch the Auto-Snapshot Manager.
   b. Select Settings at the bottom left and click PS Group Access in the left-hand object tree.
   c. Click the Add PS Group button on the right-hand side of the PS Group Access window.
   d. Enter the PS Group Name and Group IP, then save.
   e. Select and enter VDS/VSS Access settings (CHAP user name and password from PS Group), then save.
   f. Set Smart Copy access (CHAP user name and password from PS Group), then PowerShell/SMP access (PS Group Username and PS Group Password). See Figure 2.

   For more information on this step, see the paper, *Exchange 2013 Data Protection with EqualLogic Auto-Snapshot Manager / Microsoft Edition and PS Series Arrays*.

![Configure PS Series group access](image-url)
3. Set up volume(s) for Exchange database and logs adding an Access Control List (ACL) record for each interface the host will use to connect to the volume. See Figure 3 and Figure 4.

Figure 3  Set up the volume

Figure 4  Adding a second access control to ACL
4. Using the Microsoft iSCSI Initiator Configuration Tool, persistently connect the server to the PS Series volume(s) created for the Exchange configuration and enable multi-path. See Figure 5.

Figure 5  Persistently connect a PS Series volume
5. Initialize the connected PS Series volume and format with the drive letter as follows:
   a. Open **Computer Management > Disk Management** and select **new volume** (click **Action > Rescan Disks** if the new volume is not visible).
   b. Right-click the new disk number and select **Online**.
   c. Right-click the new disk number and select **Initialize Disk**.
d. Right-click the new disk and select **New Simple Volume**.

e. Click **Next** on the **New Simple Volume Wizard** screen and **Next** on the **Volume Size** screen.

f. Assign the drive letter or path and click **Next**.

![Assign Drive Letter or Path](image)

**Figure 6** Assign Drive Letter or Path
g. Format with the settings shown in Figure 7, apply the volume label, and click **Next**.

h. Review the settings and click **Finish**.

![New Simple Volume Wizard](image)

**Figure 7** Format the volume

For information about improving network performance between PS Series storage arrays and Exchange servers, consult the *Windows Server 2012 NIC Optimization and Best Practices with EqualLogic SAN* Best Practice guide.

### 3.2 Deployment

The following basic steps describe how to deploy Exchange Server 2016 with a PS Series SAN:

1. Install Dell Host Integration Tools for Microsoft on Exchange servers.
2. Set up a PS Series group and create the volumes required for the Exchange environment.
   - Be sure to create access control records for each volume to allow the appropriate servers access to the volume.
   - Set reserve snapshot space for each volume if you will be creating snapshots or using Auto-Snapshot Manager for Smart Copies.
   - Set up Dell Host Integration Tools for Microsoft to configure and manage property-level attributes such as the location of the Smart Copy backup documents, the CHAP authentication used to communicate with the PS Series Group, default Smart Copy settings, and alert information.


3.2.1 Installing Exchange on the server and configuring it to use PS Series storage
In the following examples, PowerShell is used to install Exchange 2016 prerequisites, run Exchange setup, and configure the initial mailbox database name as well as volume and folder names for both database and logs on the PS Series volume created previously.

Exchange Server 2016 installation and deployment requirements are well documented in the article, Install Exchange 2016 Using Unattended Mode.

3.2.1.1 Mailbox server installation prerequisites
To install an Exchange Server 2016 Mailbox server on Windows Server 2012 R2, perform the following prerequisite steps:

1. Open an elevated PowerShell console (run as administrator) and run the following command to install the operating system roles and features:


   After installation, a successful exit code indicates the need to restart the server to complete setup.

2. When the server completes reboot, download and install the prerequisite software in this order:
   a. .NET Framework 4.5.2
   b. Unified Communications Managed API 4.0 Runtime

3. Install the AD DS Remote System Administration Tools with the following command:

   Install-WindowsFeature RSAT-ADDS

4. Prepare the forest using the following command:

   ./Setup.exe /PrepareAD /OrganizationName: "Your Org Name Here" /IAcceptExchangeServerLicenseTerms
5. To configure the initial mailbox database name and the location of the initial mailbox database (and catalog) files or log files, incorporate the following parameters in the setup command line:
   - **MdbName**: The name of the initially created mailbox database, (for example, MDB01)
   - **DbFilePath**: The full path of the initially created mailbox database file (for example, E:\MDB01DB\MDB01.edb)
   - **LogFolderPath**: The folder used to store the database log files (for example, E:\MDB01LOG)

   **Note**: You must use the complete filename of the edb file, including the .edb extension. Folders do not need to be created because Exchange performs this during setup.

### 3.2.1.2 Exchange Server 2016 PowerShell installation

To set up the Exchange Mailbox server role with a custom initial mailbox database name and a PS Series Array volume location for database and log files, use the following command-line example:

```bash
./Setup.exe /m:Install /Role:Mailbox /IAcceptExchangeServerLicenseTerms /InstallWindowsComponents /DbFilePath:"E:\MDB01DB\MDB01.edb" /LogFolderPath:"E:\MDB01LOG" /MdbName:"MDB01"
```

![Exchange Server 2016 PowerShell installation](image.png)

**Figure 8** Exchange Server 2016 PowerShell installation
The following screen shows the volume (folder), database, and log layout configured from the PowerShell script.

After deployment, you can expand iSCSI disks online, expand PS Series group capacity, and protect data. For more information, see the best practice guide, *Using Dell EqualLogic Storage with Microsoft Windows Server 2012.*
3.3 Configuring Exchange to use PS Series storage after Exchange is installed

Two basic types of volume architectures can be leveraged within Exchange 2016: 1 volume per database and 2 volumes per database.

- **One volume per database:** In this architecture, both the database and its corresponding log files are placed on the same volume. To deploy one volume architecture that utilizes a single volume per database, you must have a DAG that has two or more copies. This strategy offers simplified storage administration with fewer volumes to manage.

- **Two volumes per database:** This architecture places transaction logs on their own volume and each database on its own volume. With Exchange Server 2016 and in the maximum use case of 100 databases, the number of volumes provisioned may exceed the number of available drive letters, requiring the use of volume mount points.

Some of the benefits of this strategy include flexibility to isolate the performance between database and logs and increased reliability — a capacity or corruption problem on a single volume will only impact one database. This is an important consideration when not leveraging the built-in mailbox resiliency features.

The following sections describe using Exchange Server 2016 with PS Series storage. The steps assume the group and volume have already been created, the server is persistently connected to the volumes, the new disks associated with the volumes have been initialized, the disks have been formatted, and the drive letters or mount points have been assigned.

Note: If deploying a DAG, all copy paths must match. As an example, if the path of the active database is E:\Mdb01\Mdb01.edb, all copies on mailbox servers in the DAG (up to 16 total including active) must be E:\Mdb01db\db01.edb.

3.3.1 Specifying Exchange log and database locations

When first installing an Exchange 2016 Mailbox Database using the GUI-based setup, there is a default database (for example, Mailbox Database 1639390555.edb). In the example used here, the default log and database path for the first database is C:\Program Files\Microsoft\Exchange Server\V15\Mailbox\Mailbox Database 1639390555\Mailbox Database 1639390555.edb.
To access this database, go to the Exchange admin center (for example, https://eqlexcas/ecp, Servers, Databases), or use the EMS command, Get-MailboxDatabase. See Figure 9.

![Exchange admin center](image)

**Figure 9** New database in Exchange admin center

The example in this paper uses the following data locations to move the first Mailbox Database:

Transaction log location:  R:\MDB02\log
Exchange database: R:\MDB02\db

Now, the log and database path can be renamed and moved to the R volume as outlined in section 3.4.

### 3.4 Migrating Exchange mailbox database and logs to PS Series storage

If direct attached storage (DAS) or a local system drive is used for storage in the Exchange implementation, mailbox databases and logs can easily be migrated to a PS Series group. It is recommended to perform this during a planned maintenance period because the mailboxes must be offline and exclusive access is required to the mailbox database being moved during the migration.

**Note:** When modifying the configuration of a critical application such as Exchange, it is strongly recommended to perform a full backup of all mailbox databases and logs before performing the migration.

In the example used in this paper, an Exchange mailbox database and logs will move from a local drive (C:) to the MDB02\log and MDB02\db folders on a PS Series volume labeled as the (R:) drive.

The installation of the Exchange 2016 mailbox role creates a new mailbox database with the name, Mailbox Database *, where * represents a long number. Exchange administrators who prefer to use a naming convention can use the following steps.
3.4.1 Renaming the mailbox database

To rename the new mailbox database before it is moved:

1. Open the Exchange admin center.
2. Click Servers > Databases.
3. Click Edit (pencil icon).
4. Enter the new name and click Save.

Figure 10 Edit database in Exchange admin center

Figure 11 Renamed database
When renaming the database, it will not change the .edb name (see Figure 12). To change the name, dismount the database and run the EMS cmdlet: `Move-DatabasePath -Identity "NewDBName" -EdbFilePath "<path>\NewDBName.edb" -LogFolderPath "<path>\NewLogFolder"`. Then, mount the database with: `Mount-Database "NewDBName"`.

![Mailbox Database 1639390555](image)

Figure 12 .edb name

### 3.4.2 Moving the database

To move a database to a new location, use the `Move-DatabasePath` cmdlet in the Exchange Management Shell. Before proceeding, be aware that:

- The command must be run while logged on to the mailbox server hosting the database.
- This process requires that the database be dismounted while the move takes place, making it unavailable for mailbox users.
- This process should not be followed for databases that are replicated within a DAG.
- This process cannot be run at the same time as a backup is in progress.
Follow these steps to move the database:

1. Configure a volume and folders to hold the Exchange database and logs, as described in section 3.3.1. See Figure 13.

Figure 13  New folders created

2. To move a database to a new location and rename the .edb, use the Move-DatabasePath cmdlet by opening the Exchange Management Shell.
As an example, to move an Exchange 2016 database named MDB06 to a new .edb file location of R:\MDB06db and a new logs folder of R:\MDB06log, and to rename the .edb, use the steps that follow. Both the rename and move can be done by dismounting (see Figure 14).

**Note:** Folders must be created first, which differs from using PowerShell to deploy Exchange with a custom initial mailbox database name on a PS Series array volume.

3. Dismount the database and run the EMS cmdlet: Move-DatabasePath

```
Move-DatabasePath -Identity "MDB06" -EdbFilePath "R:\MDB06db\MDB06.edb" -LogFolderPath "R:\MDB06log"
```

See Figure 15.

4. Mount the database with Mount-Database MDB06.
The database and .edb file are now renamed, and the .edb and logs are moved to PS Series. See Figure 16.

3.5 Very large mailboxes and mailbox quotas

Appropriate mailbox quotas can be difficult to calculate without historical data to determine the trend for mailbox growth in your organization. A simple approach is to run a mailbox size report, then wait one month and run another report. You can then insert the data side-by-side in Microsoft Excel® and calculate the average mailbox growth rate.

3.5.1 Why big mailboxes can slow down Outlook 2010

Most computers can manage a 10Gb mailbox with Outlook 2010 without any issues, even a few-year-old computer with a slow spinning hard drive. With mailbox sizes above 10Gb, it is more likely that the size of the mailbox is slowing down Outlook.

When Outlook 2010 connects to your Exchange mailbox, it downloads a copy of everything in the mailbox and creates a single large file. The .OST file compresses the contents, but it is nearly as large as the mailbox. That is why it is time consuming to set up Outlook 2010 on a new computer. Outlook is not very usable until all of the mail and other items have been downloaded, which requires waiting for multiple gigabytes to download.

Every time something occurs with a mailbox — a new message, an updated appointment — the computer is manipulating the 15Gb or 20Gb .OST file. Older computers in particular slow down dramatically when opening and closing a large file, especially when other programs are running.

3.5.2 How Outlook 2013 improves performance

Outlook 2013 introduced the Cached Exchange Mode Sync Slider, a new feature that limits the amount of mail synced to the computer. Everything in the mailbox continues to be on the server online, but the computer only downloads the last 12 months of mail by default.
Only mail is affected by the slider; Outlook always downloads the entire contents of the calendar and contacts folders. Outlook automatically adjusts mail folders so they always have the last 12 months of messages.

3.5.3 Setting 10GB mailbox quotas
Mailbox storage quotas at the database-level will be inherited by all of the mailboxes hosted on that database, except for the mailboxes that are specifically marked as exempt from the database-level quotas. In this example scenario, a database is set to use the chosen quota of 10GB. Also chosen is the warning threshold and a prohibit send/receive threshold (the latter is important because an unattended mailbox that continues to receive email will keep growing otherwise).

The Set-MailboxDatabase cmdlet is used to configure the desired quota level:

```powershell
[PS] C:\>Set-MailboxDatabase DB01 -ProhibitSendReceiveQuota 12GB -ProhibitSendQuota 10GB -IssueWarningQuota 9.5GB
```

When creating or moving a mailbox, it is optional to select a target database. When a target database is not chosen, Exchange will select one using a basic load-balancing approach that tries to keep approximately the same number of mailboxes on each available database.

The databases with special sizing quotas should be exempt from that automatic mailbox provisioning load balancer, because in this case, only approved users are moved to DB01 and other special quota databases. Use the following PS script:

```powershell
[PS] C:\>"database name01","database name02" | Set-MailboxDatabase -IsExcludedFromProvisioning:$true
```
Summary

As Exchange Server 2016 adds complex new features from HA and DR to archiving, Dell PS Series arrays simplify storage deployment and management. With built-in automation, storage virtualization with non-disruptive load balancing and scale-out, tight management integration with virtual machines and operating systems, and application-level data protection, PS Series storage provide an optimal solution for Exchange deployment in both large and small environments.
A  Configuration details

Table 1  Software and firmware

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Model</th>
<th>Software Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft</td>
<td>Windows Server 2012 R2</td>
<td>Datacenter</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Exchange Server 2016</td>
<td>RTM</td>
</tr>
<tr>
<td>Dell</td>
<td>Host Integration Tools Kit for Microsoft Windows</td>
<td>Version 4.9 and later*</td>
</tr>
<tr>
<td>Dell</td>
<td>PS Series Firmware</td>
<td>Version 5.2, 8.1.1, and later*</td>
</tr>
</tbody>
</table>

* For a complete version support list, see the Host Integration Tools Release Notes available on eqlsupport.dell.com (login required).

**Note:** You may not be running the latest versions of the tools and software listed in this paper. If you are under valid warranty or support agreements for your PS Series array, you are entitled to obtain the latest updates and new releases as they become available.
B PS Series features and terminology

B.1 PS Series array software

PS Series array software includes:

**Firmware** installed on each array is software that is used to manage the storage environment and provides capabilities such as volume snapshots, clones, and replicas to ensure data hosted on the arrays can be protected in the event of an error or disaster. The array can be managed using the Group Manager GUI or CLI.

**Manual Transfer Utility (MTU)** runs on Windows and Linux host systems and enables secure transfer of large amounts of data to a replication partner site when configuring disaster tolerance. Portable media can be used to eliminate network congestion, minimize downtime, and quick-start replication.

B.2 Host software for Windows

PS Series Host Integration Tools for Windows include:

**Remote Setup Wizard (RSW)** are used to initialize a PS Series SAN array and set up or expand a PS Series group. An alternate command-line interface (RSWCLI) can also be used from the Windows command prompt.

**Multipath I/O Device Specific Module (MPIO DSM)** includes a connection-awareness module that understands PS Series network load balancing and facilitates host connections to PS Series volumes.

**Volume Rethinning Tools** can perform rethinning and optional defragmentation operations on one or more volumes.

**VSS and VDS Provider Services** allow third-party backup software vendors to perform off-host backups.

**PowerShell Tools** allow management of one or many PS Series groups through a comprehensive set of PowerShell cmdlets.

**Auto-Snapshot Manager/Microsoft Edition (ASM/ME)** provides point-in-time SAN protection of critical application data using PS Series snapshots, clones, and replicas of supported applications such as Microsoft SQL Server®, Exchange Server, SharePoint®, Hyper-V®, and NTFS file shares.

**SMP Provider** can manage Dell PS Series storage through native Windows storage interfaces such as PowerShell cmdlets, File Services UI in Windows Server 2012, 2012 R2, and WMI.

**Virtual Disk Service (VDS) Provider:** enables Microsoft VDS and Microsoft Storage Manager to be used for SANs to create and manage volumes in a PS Series group.
SAN HeadQuarters (SANHQ) provides centralized monitoring, historical performance trending, and event reporting for multiple PS Series groups.

For additional information on the Dell PS Series Host Integration Tools for Microsoft, including operating-system support and Dell PS Series product compatibility, refer to the *Dell PS Series Host Integration Tools for Microsoft Installation and User’s Guide* at eqlsupport.dell.com (login required).
C Additional resources

C.1 Technical support and customer service

Offering online and telephone-based support and service options, Dell support service can answer your questions about PS Series arrays, groups, volumes, array software, and host software. Availability varies by country and product, and some services might not be available in your area.

Visit Dell.com/support or call 800-945-3355 (United States and Canada).


Note: If you do not have access to an Internet connection, contact information is printed on your invoice, packing slip, bill, or Dell product catalog.

For PS Series software and documentation, visit eqlsupport.dell.com (login required).

C.2 Dell PS Series storage solutions

To learn more about Dell PS Series solutions, visit the PS Series Dell TechCenter page. Here you can find technical documentation and more details about the PS Series product family.

For PS Series technical content, visit the PS Series Technical Content page on Dell TechCenter.

Dell Storage technical content can be found on the Storage Solutions Technical Documents page.

C.3 Related documentation

The following table lists the documents referred to in this paper.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell</td>
<td>Dell PS Series Configuration Guide</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Release Notes for Exchange 2016</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Planning for Exchange 2016</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Deploying Exchange 2016</td>
</tr>
<tr>
<td>Microsoft</td>
<td>Understanding Exchange 2016 Setup</td>
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