Sizing and Best Practices for Deploying Microsoft Exchange Server 2013 with Dell SC Series Storage Arrays

Dell Storage Engineering
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A Dell Deployment and Configuration Guide

Revisions

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Engineering: Mark Boeser

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Executive summary

This paper provides sizing and deployment best practices for Microsoft Exchange Server 2013 solutions leveraging the Microsoft Exchange Server Role Requirements calculator. These guidelines show how to use tools like Microsoft Exchange Server Profile Analyzer, Exchange PowerShell, and Dell Software MessageStats to estimate existing workload requirements and use that data to extrapolate storage IOPS for a given workload. This paper also provides performance and scalability guidance for email usage profiles, high availability (HA) and site resilience architecture, and RAID types for storage solutions. Finally, specific guidance is provided for validating SC Series SAN Exchange Server storage sizing using the Microsoft Jetstress tool.

Purpose and audience

The purpose of this guide is to assist messaging and storage staff in sizing and validating Exchange storage configurations on Dell SC Series SAN storage. Experience with Microsoft Exchange 2010/2013 design concepts as well as administrative permissions to Dell Storage Center and the Windows and Exchange environments are required.

How to use this paper

The following sections explain how to size and validate the Exchange configuration:

- **Sizing guidelines (section 2):** This section describes the methods and software tools used to gather and estimate the Exchange workload to be sized. Workload estimation helps when building an Exchange configuration using the Microsoft Exchange Server Role Calculator worksheet. The key elements of workload estimation are covered in the next sections.
- **RAID striping (section 3):** SC Series RAID striping and storage tiering information is provided, as well as best practices and considerations for different performance and data redundancy needs.
- **High availability (HA) (section 4):** This section discusses Exchange SAN designs, including HA, that use the built-in Exchange database availability groups (DAGs). RAID considerations for these configurations are also covered.
- **Running multiple workloads on the SAN with Exchange Server (section 5):** This section discusses the virtualization of Exchange servers and the storage they generate, plus additional workload and possible latency considerations.
- **Data Instant Replays (section 6):** Sizing considerations are discussed for SC Series Data Instant Replays, which protect and allow for quick recovery of lost data and are also a factor in determining overall sizing calculations.
- **Jetstress best practices (section 7):** After the overall storage workload has been estimated, this section shows how the standard testing tool, the Microsoft Jetstress testing harness, can be used on SC Series storage to verify that the design will provide acceptable performance to users.

1 Dell SC Series solution overview

Dell SC Series storage combines resilient hardware and software with world-class Copilot technical support helping enterprises realize continuous data availability.

SC Series next-generation solutions combine the benefits of proven Fluid Data architecture with a resilient Dell hardware design to provide:

- High density
- Enhanced performance
- High memory capacity
- Efficient power and cooling for OPEX savings
- A flexible architecture designed for future growth aligned with business needs
- Simultaneous iSCSI, Fibre Channel (FC), and Fibre Channel over Ethernet (FCoE) (SC8000 only) front-end interconnects
- SAS- and FC-controlled drive enclosures, including those with write-intensive single-level cell (SLC) and read-intensive multi-level cell (MLC) solid-state drives (SSDs)
- A portfolio that includes an entry-level, affordable model that provides great performance and ease of setup to get an organization running quickly

The Dell SC8000 is a 2U controller built on the Dell 12th-generation server hardware platform that offers customizable configurations. It supports full HA and failover capabilities with a dual-controller system which provides redundant front-end and back-end connections and also provides enhanced diagnostics capability with the integrated Dell Remote Access Controller (iDRAC).

A SAN built with the SC8000 Series scale up to 960 SAS drives per dual-controller system and scales out to multiple systems across multiple sites, monitored by a single console. This allows mixing and matching SSD, SAS, and FC drive technologies and upgrading storage array firmware to build a unified storage solution. This allows any combination of industry-standard technology to be used at any time, and enables adding capacity using Dell SC200/220/280 expansion enclosures, or making configuration changes without downtime or disruption. Incorporating the latest data center technologies is as simple as plugging in new components on the fly. Storage Center adjusts automatically, restriping data across all drives and updating in-flight use characteristics.

Dell SC4000 Series arrays are based on the flagship SC8000 platform. Offering similar benefits at a smaller scale, the multiprotocol-capable SC4020 all-in-one array and its optional expansion enclosures may be populated with any combination of hard disk drives (HDDs) or SSDs. The dual-controller array features a 2U all-in-one chassis with easy expansion using standard SC Series drive enclosures (up to 120 drives). Virtualized multi-tier, multi-RAID-level storage policies are applied quickly and automatically, taking full advantage of the unique characteristics of the disk, and allowing for target application-specific price and performance requirements with minimum of planning or effort. Up to 10,000 Microsoft Exchange Server 2013 mailboxes can be hosted in this quick-to-deploy 2U footprint.

The SCv2000 Series is an affordable introduction into the SC Series of products — an ideal solution for small and medium businesses needing entry-level storage. With a focus on high performance and high

quality, the SCv2000 Series brings the most important storage features to the entry level, leveraging the design expertise of the Dell enterprise storage family. By minimizing the total cost of ownership over the life of the product, the SCv2000 Series offers the opportunity to expand into the SC enterprise product line as business needs and data requirements grow. It offers many of the SC family's core software features, including proven data protection, RAID tiering to optimize capacity, data migration services, and multiprotocol connectivity.

Find more information on the Dell Storage SC Series product page.

2 Estimating the Exchange Server storage workload

There are several software tools and methods available to estimate an Exchange Server storage workload. The following subsections provides guidance for those most commonly used.

2.1 Permissions required

Gathering the existing Exchange storage workload from live environments requires Exchange Organization Management permissions. For information on assigning the Organization Management role, see the Microsoft article, Organization Management.

2.2 Existing Exchange Server environment analysis when migrating to Exchange Server 2013

Based on the version of the existing Exchange server environment, there are several options for gathering existing Exchange data throughput when sizing for a migration to a new SAN storage environment using Exchange Server 2013. The version of the existing Exchange Server environment determines the available tool options, which are described in the following sections.

2.2.1 Exchange Server Profile Analyzer

If the existing environment is Exchange Server 2003 or 2007, Exchange Server Profile Analyzer from Microsoft can be used to capture some statistics over time and can report email usage profiles. More information is available in the article, Microsoft Exchange Server Profile Analyzer.

2.2.2 PowerShell scripts for Exchange Server message tracking statistics reports

If the existing environment is Exchange Server 2007 or 2010, mailbox and message statistics can be gathered from message tracking logs using PowerShell.

The required script is available on the page, Exchange 2007/2010 Email stats.

For detailed instructions on interpreting the data with Excel functions using User Profile Analysis for Exchange Server 2010, see the page, User Profile Analysis for Exchange Server 2010.

2.2.3 Dell Software MessageStats for gathering Exchange Server message throughput data

For existing Exchange 2003–2013 environments, Dell Software (previously Quest) MessageStats is a great tool that can provide a comprehensive view in a familiar GUI interface. It is a non-PowerShell method to gather transaction log statistics needed for the Exchange Server Role Calculator.

MessageStats gathers data quickly from existing Exchange Message Tracking logs. Message Tracking Logs are copied from Mailbox Servers to a temporary location on the MessageStats server. Logs are then parsed for specific data over the specified period of time. The tool then provides customizable reports or Excel/CSV exports which can be used to provide the email messaging profile for the Exchange Server Role

Calculator. With a trial license, it can report on five mailboxes only. A full license is required to effectively gather all data.

Visit the [MessageStats page](#) to download the software.

2.3 Microsoft Exchange Server Role Calculator

The Exchange Server Role calculators are useful for representing the Exchange Server workload in the form of a server and storage design configuration. The calculators are typically completed during initial phases of an Exchange Server design. These are updated regularly, so always download and use the latest version from Microsoft.

- [Exchange Server 2010 Role Requirements Calculator](#)
- [Exchange Server 2013 Role Requirements Calculator](#)

These calculators are useful for estimating the Microsoft recommendations for storage, servers, and networks. Use the inputs gathered in the section, Estimating the Exchange Server storage workload. If the existing messaging environment is a non-Exchange Server environment that is migrating to Exchange Server, such as Lotus Notes®/Domino®, the existing workload must be estimated or gathered with tools native to that environment, such as Lotus Domino email throughput reports and Windows Performance Monitor. The workload must be expressed as required for the input to the Exchange Server Role Calculator as shown in the next section.

2.3.1 Exchange Server Role Calculator inputs

There are many inputs for this calculator, though there are some that can use default values. For more information on each input, hover the mouse over it to view the description (example shown in Figure 1).

Figure 1   Exchange Server Role Calculator input information (hover-over label shown)

The main inputs for the calculator are:

1. Number of mailboxes
2. Mailbox size quotas
3. Total send/receive messages per mailbox per day
4. Number of data center sites
5. Sites hosting active mailbox database copies as a preference

2.3.2 Calculator output

Table 1 shows an example from the **Role Requirements** tab on the Microsoft calculator. The most useful outputs for SC Series storage configurations are in **bold** text.

Table 1   Important values from Role Requirements output

Disk space requirements	/ Database	/ Server	/ DAG	/ Environment
Transport Database Space Required	--	15 GB	241 GB	1931 GB
Database Space Required	1160 GB	24360 GB	97439 GB	97439 GB
Log Space Required	110 GB	2300 GB	9201 GB	9201 GB
Database LUN Space Required	1595 GB	33495 GB	133979 GB	**133979 GB**
Log LUN Space Required	137 GB	2875 GB	11501 GB	**11501 GB**
Restore LUN Space Required	--	1587 GB	6348 GB	**6348 GB**
Host IO and Throughput Requirements	/ Database	/ Server	/ DAG	/ Environment
Total Database Required IOPS	223	4680	18720	**18720**
Total Log Required IOPS	49	1030	4118	**4118**
Database Read I/O Percentage	**60%**	--	--	--
Background Database Maintenance Throughput Requirements	7.5 MB/s	158 MB/s	630 MB/s	630 MB/s

The following points explain the data from Table 1:

- The three **LUN Space Required** values can be added together to get the total storage required in GB.
- The two **Total Database Required IOPS** and **Total Log Required IOPS** values, when added together, equal the total IOPS requirements for Exchange Server on the storage.
- The **Database Read I/O Percentage** calculates the expected read/write ratio that can be used for sizing the SC Series SAN.

3 Exchange Server and RAID type recommendations

Using a Dell SC Series SAN with Exchange Server has many benefits in RAID disk redundancy. Dell Storage Fluid Data tiered-disk solutions make use of multiple sizes and speeds of faster to slower disks using multiple RAID configurations in one Storage Center. RAID 10 is typically used in Tier 1 on 10K or greater spinning drives for all block writes and initial fast database reads. Tier 3 acts as the capacity tier that has 7K large-capacity disks that will store read-only Replays that have been moved through Data Progression to the lower tier. These lower tiers have pages almost always striped as RAID 5 or RAID 6 (dual parity).

Exchange Server 2013 has been designed with 99 percent lower IOPS requirements than Exchange Server 2003[1], which allows Microsoft support for much larger mailboxes hosted on larger and slower multi-terabyte disk drives.

Because these largest drives have 7.2K rotational speeds and higher latencies, the application-centric approach of Microsoft requires using the drives in a non-RAID/JBOD configuration. These mailbox databases must be part of an Exchange DAG to provide the only redundancy. This RAID replacement strategy, while recommended by Microsoft, can result in higher server counts to support the redundant copies, creating more complex DAG designs. Fortunately, when using Fluid Data Architecture tiering on a Dell SC Series SAN, the appropriate RAID striping, rotational speed, and capacity are managed automatically to provide both performance and capacity with the assurance of RAID.

For small to midsize organizations with lower capacity needs, RAID 5/6 striping can be used for Exchange Server 2013 as the main storage in a single-tier environment such as the SCv2000. Today, this will usually involve 7.2K or 10K spinning disks. RAID 5/6 offers greater disk capacity savings over RAID 10 and is a great choice for Exchange Server 2013 with its reduced IOPS requirements.

For most new larger Exchange 2013 environments, using 10K disks in Tier 1 provides the best mix of performance, capacity, and price over 15K drives. 7K drives in Tier 3 will then provide the larger capacity needed for today's multi-megabyte mailbox quotas. For smaller operational environments, a single tier of disk drives striped in RAID 5 or RAID 6 (for 1 TB drives and larger) provides high capacity and the performance needed for these workloads.

Exchange Server 2013 RAID type recommendations for Dell SC Series:

1. RAID 10 in tiered disk systems in Tier 1, on 10K drives (SC8000, SC4020)
2. RAID 5/ 6 in tiered disk systems in Tier 3 on higher capacity 7.2K drives (SC8000, SC4020)
3. RAID 5/ 6 in single tier systems/folders on 10K or 7.2K disks for small to midsize capacity needs (SC4020, SCv2000)

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[1] Source: "Exchange storage for insiders." Microsoft Exchange Conference 2014, session ARC306. April 1, 2014. http://channel9.msdn.com/Events/MEC/2014/ARC306

4 SAN HA and site resilience architecture guidance

Different sizing considerations apply when using a simple JBOD or taking advantage of SAN technology. Microsoft has a preferred architecture based upon JBOD that uses their DAG technology as the primary data redundancy mechanism. However, this architecture requires double the disk capacity, servers, and application software to accomplish a highly redundant system compared to the Dell-recommended architecture for an SC Series SAN.

4.1 Microsoft Preferred Architecture (PA) for HA (JBOD)

The Microsoft PA for Exchange HA is intended for non-SAN/non-RAID environments.

Exchange Server 2010/2013 uses DAGs for HA and site resilience as described by Microsoft:

Each database has four copies, with two copies in each datacenter, which means at a minimum, the PA requires four servers. Out of these four copies, three of them are configured as highly available. The fourth copy (the copy with the highest Activation Preference) is configured as a lagged database copy.[2]

There are many assumptions and concepts built into this Microsoft guidance, and the main one for storage is that the PA makes use of only high-capacity, slower 7K DAS drives in a JBOD configuration. Therefore, it has no other storage redundancy protections such as RAID. Additionally, the storage is an island to the specific servers it is connected to and is not managed along with other shared storage that IT organizations may use. Microsoft prefers that Exchange provides control of all storage redundancy through its DAG failover process, making server and software licensing costs higher due to the additional database copies needed.

4.2 Dell SC Series SAN storage advantages

With a Dell SC Series SAN hosting the database and log volumes, this PA guidance by Microsoft does not make the best use of storage resources. Using SC Series application consistent Replays on wide-striped RAID volumes along with a Microsoft Exchange Server DAG provides not only HA, but very fast performance as well as database recovery from the space-efficient Replays taken using Dell Replay Manager for Exchange.

A two-copy DAG within a site or a three-copy DAG that spans sites with a regular Replay schedule, based upon the organization's business requirements, provides a less complex design with fewer servers and a streamlined database recovery model using Replays to recover from logical or physical data corruption. Replays can also be used to recover individual mailboxes or mailbox items using Exchange Recovery

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[2] "The Preferred Architecture." The Exchange Team Blog. April 21, 2014.
http://blogs.technet.com/b/exchange/archive/2014/04/21/the-preferred-architecture.aspx

databases or Dell Software Recovery Manager for Exchange toolsets. Replays can be replicated to other Storage Centers for DR purposes.

Reliable Dell SAN storage has been the backbone of enterprise-class Exchange Server environments for many years. Enterprise messaging databases are mission critical to most organizations today. Keeping those databases available, reliable, and secure has been a goal of Dell SC Series storage. RAID technology and SAN technology are well known, proven solutions for Exchange Server and are fully supported by Microsoft as a platform for Exchange Server 2013 storage.

Management and monitoring of Exchange Server storage usage, along with other shared mission-critical application storage using Dell Enterprise Manager tools and reporting with Replay Manager for Exchange, provide advantages to the overall IT storage environment to keep it highly available across the organization.

5 Shared storage sizing

Exchange Server 2010/2013 can perform well in a shared application workload environment. The key to this performance is a well-planned storage design that considers the additional workload IOPS and capacity needs.

5.1 Heterogeneous application workloads

When hosting Exchange Server along with multiple heterogeneous workloads on Dell Storage Center, care must be taken to test Exchange Server alongside the other workloads prior to implementation of the new Exchange Server workload (see section 7, Verifying Exchange Server storage configuration using Jetstress).

If these combined workloads cause unacceptable latency, consider splitting the Exchange Server workload to its own Storage Center. Although Exchange Server 2013 IOPS are much lower than previous Exchange Server versions, acceptable user experience is still affected by read latencies above 20 ms and write latencies above 10 ms. Using these guidelines, Exchange Server should perform as expected.

5.2 Hypervisor host-based virtual infrastructure

Hypervisors such as VMware vSphere® or Microsoft Hyper-V® hosts rely upon high-performance shared storage to serve the workloads of multiple virtual servers. These hosts are typically managed as part of an enterprise virtualized infrastructure that gives IT organizations a highly flexible and managed server platform spreading the application workload to take full advantage of compute hardware.

The SAN provides the shared storage available to the hypervisor clusters that provide redundancy across the physical as well as virtual environments. Virtual infrastructures may have shared or dedicated application workloads, and care must be taken to plan for the storage and IOPS resources required for hosting the virtual infrastructure on the same storage array as Exchange.

5.3 Hosting Exchange Server on virtual infrastructure

Running Exchange Server on virtual servers can be great strategy to take full advantage of server hardware, as well as provide a managed server and storage framework for an organization's messaging needs. It is important to understand how adding Exchange Server on a virtual infrastructure will affect overall storage design, volume virtualization, Replay Manager options, and total IOPS required.

5.3.1 Virtual disk compared to raw device mappings (RDM/pass-through disks)

Using virtual disks on hypervisor-hosted virtual servers provides the most flexibility for storage in the virtual infrastructure, however there are trade-offs that must be noted. Using virtual disks adds some overhead in terms of disk latency and additional guest CPU requirements. For Exchange Server, an additional 10 percent should be added to IOPS requirements for virtual disks hosting Exchange databases. This additional requirement is characterized in the Exchange Server Role calculator in the Input tab entry option for **Server Role Virtualization**.

VMware raw device mappings or Hyper-V pass-through disks do not use the disk virtualization features of the hypervisor, and therefore do not have the same IOPS overhead. However, it should be noted that using these methods of guest storage access has some disadvantages. More information can be found in the VMWare blog post, [Virtualize Business Critical Applications](#).

Dell Storage Replay Manager, which provides Exchange Server application-consistent Replays (snapshots) offers two methods:

Exchange Server module: The Replay Manager for Exchange agent is installed on Exchange mailbox server VM guests. Only RDM or pass-through disks can have Microsoft Volume Shadow Service (VSS) application-consistent Replays taken using this method.

VMware or Hyper-V modules: The Exchange VM guests can have VSS application-consistent Replays taken of servers using virtual disks. With the VMware module, VMware tools must be loaded on the guest for this feature.

5.3.2 Storing and operating hypervisor guests on same storage pool as Exchange databases

As discussed in the previous sizing guidance for Heterogeneous application workloads, this configuration must be tested thoroughly to determine if performance will be acceptable for the specific workloads required.

6 Sizing factors for Replays with Exchange Server

There must to be some additional capacity to allow for Data Instant Replay space. Without insight into the details of your Replay configuration, it is recommended to start with an additional 20 percent for overhead.

When sizing for Replay capacity, there are multiple factors to consider, such as how often Replays will be taken, how long they will be retained, and the amount of data changing.

6.1 Block/page size

The SC Series array uses 2 MB page sizes by default. In most cases, this page size works well.

In organizations with a very high daily rate of change and high Replay frequency (for example, one Replay per hour), Replays could be larger than expected due to the small changes in the 2 MB page which flags the whole page as changed. If this becomes a major issue, some organizations may opt for a 512 K page size storage folder for volumes that experience capacity issues due to large amounts of Replay data (not available on the SCv2xxx Series array).

6.2 Daily rate of change

Rate of change is the major factor in sizing a storage array when Replays are used. Since the size of the Replays is dependent on the rate of change, knowing the rate of change is key to proper sizing.

Finding the rate of change requires determining how many pages in the active Replay are changing in a 24-hour period, including Exchange Server transactions in the form of transaction logs and all database page changes. Typically this is between 20−25 percent of the total mailbox database size.

For information on how the Exchange Server mailbox profile and the mailbox quota size affects the rate of change, see the Dell white paper, _Exploring Rate of Change for Exchange 2010 with Dell Compellent Storage Center_. Although it specifically discusses Exchange Server 2010, it generally applies to all current versions.

6.3 Scheduled Replay frequency

A best practice is for each volume to have at least one Replay taken every 24 hours. Additional Replays should be taken on Exchange Server database/log volumes on a schedule that matches the organization's recovery objectives. The frequency of these Replays can affect the sizing calculations.

6.4 Replay retention policy

The amount of time that Replays are retained before expiring affects capacity greatly. If more Replays are retained for longer periods of time, more capacity is required. It is a best practice is to retain the default 24-hour Replay for 25 hours before expiring because the Data Progression and data compression operations, which run daily starting at 7 p.m., require a volume to have at least one Replay.

7 Verifying Exchange Server storage configuration using Jetstress

After completing the SAN storage design and configuration for Exchange, use Jetstress to test and verify the configuration. This tool is the Microsoft-standard testing harness for Exchange Server storage and provides a number of tests for storage performance.

The following subsections contains best practices on testing an SC Series storage configuration for Exchange using Jetstress 2013, which is available for download on the page, [Microsoft Exchange Server Jetstress 2013 Tool](#).

7.1 Prerequisites for SC Series Jetstress testing on tiered storage

If using a tiered-disk SC Series system for Jetstress testing, it is *very* important that the following conditions are met to achieve successful test results:

Ensure there is adequate free capacity in Tier 1 for the actual configured size of the Jetstress database/log volumes. While the volumes will initially consume no space in Tier 1 due to thin provisioning, Jetstress may completely fill these volumes with active data during Jetstress database preparation. This data must stay in Tier 1 in order for the Jetstress test to return valid results. If Tier 1 capacity is exceeded, the default behavior of the Storage Center is to force new data to be written to lower tier disks, rather than suffer an outage. However, if this happens while Jetstress is running, the SC Series system performance will be significantly impacted, skewing the Jetstress test results. More details on sizing are provided in section 7.1.1.

Configure any Jetstress test volumes to use a storage profile that limits them to Tier 1 space only, using RAID 5. This is an additional safeguard to prevent Jetstress volume data from writing to lower-tier disks. However, even with a storage profile enforcing Tier 1 space for these volumes, the Jetstress database preparation will still fail if Tier 1 capacity is exhausted.

Do not configure any Replays on the Jetstress test volumes. There is no need for Replays in this situation as they provide no benefit in this use case, and can impact test results if they are configured.

See appendix A for detailed instructions on how to configure volumes for Jetstress testing.

7.1.1 Jetstress best practices

The following Jetstress best practices are recommended:

- For SC Series testing, contrary to the Jetstress Field Guides, it is recommended to use the **Test an Exchange mailbox profile** category in the **Define Test Scenario** page of Jetstress. This tests the specific mailbox profile that has been calculated in the Exchange Server Role Calculator.
- For Jetstress testing on SC Series volumes, ensure that the Mailbox Size and the resulting database sizes do not exceed the total capacity of the T1 disks in your disk folder. If the design is sized for T1 and T3, ensure that your Mailbox size is the correct percentage of what is expected to be the

maximum operational page capacity for T1.

For example, if the total capacity of the databases spanning T1 and T3 is 100 TB, and the expected capacity to be in T1 is 20 percent of that total, ensure that your total database sizing is 20 TB (100 TB * .2) maximum. If the Mailbox size is to be 10 GB, use a 2 GB (10 GB * .2) Mailbox size. Jetstress will prepare/build 75 percent of the total database size based upon the Mailbox size input. In this case, the databases that would be prepared would be 15 TB (20 TB * .75).

- If the T1 disk is filled past capacity with Jetstress databases, some of the pages will spill into the slower T3 disk pages. **This will cause the Jetstress tests to fail due to excess latency**, which is the most common mistake made. If this happens, the databases and volumes should be removed from the SC Series storage and remade with the above recommendations (see Figure 2).
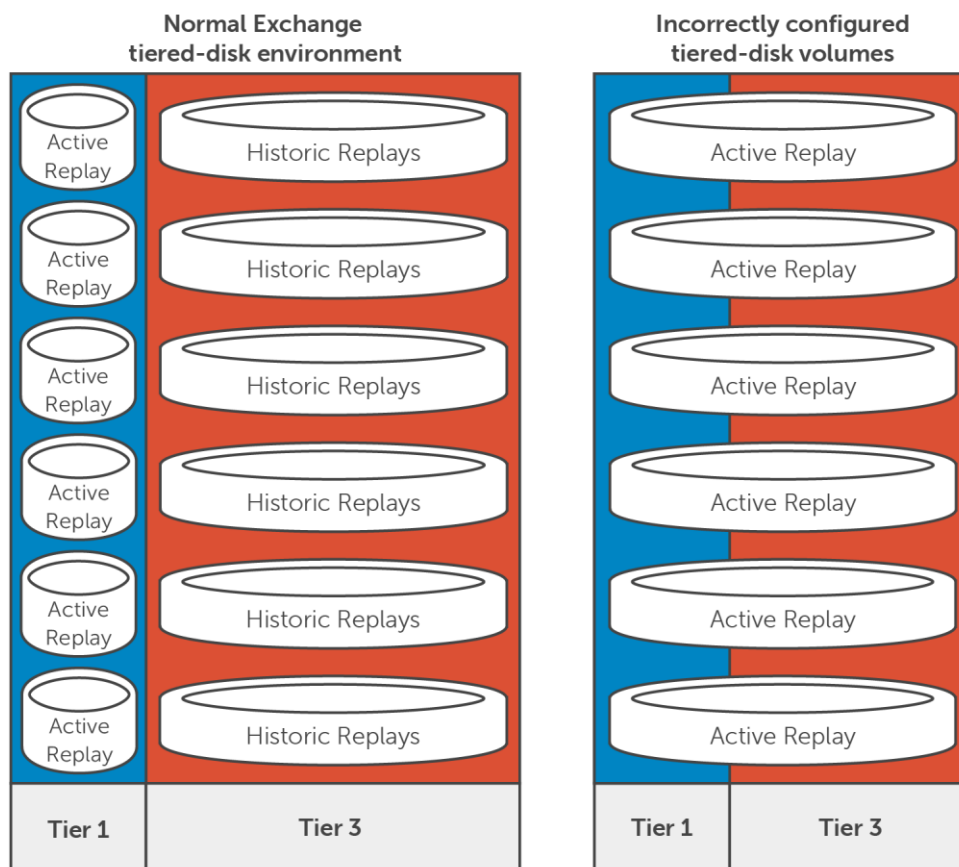
Figure 2   Representation of normal and incorrectly tiered disk volumes

- Because Jetstress creates full or 75-percent capacity databases all at once, and reads and writes randomly to the entirety of those databases, Jetstress is designed only to test disk performance, not capacity. Therefore, since T1 is the performance tier on SC Series, it is the only valid target for Jetstress testing.
- Data Progression of aged Replay data is the mechanism for these disk pages to migrate to T3. Pages in T3 are no longer in the Active Replay (read/write) for the volume, but are available for

reads only. Writes to pages progressed to T3 get copied back to the Active Replay in T1 and are modified by the new writes there. Tiering functionality, which is a core feature of SC Series systems, cannot be simulated by Jetstress.

- In a normal Exchange tiered disk environment, the Active Replay (read/write) will only be in Tier 1. Replays taken and aged into Tier 3 will be the read-only portion of the volumes. This can only happen over a longer period of time through Data Progression.
- Incorrectly attempting to test tiered-disk volumes with Jetstress will result in spillage of the Active Replay into Tier 3, which is an abnormal state for these volumes. This happens because the Jetstress databases are created and filled as a single operation.

7.2   Jetstress testing process

This section details how to use Jetstress to verify sizing after installation and configuration of storage and servers.

7.2.1   Installing Jetstress on test servers

1. Download the appropriate Jetstress for Exchange Server destination configuration:

    Jetstress 2010:
    –   [Download](#)
    –   [Jetstress Field Guide](#)

    Jetstress 2013:
    –   [Download](#)
    –   [Jetstress Field Guide](#)

2. Follow the installation instructions, including copying the following files from the Exchange Server installation media or current Exchange server to the C:\Program Files\Jetstress folder on the test server(s):
    –   Ese.dll
    –   Eseperf.dll
    –   Eseperf.hxx
    –   Eseperf.ini
    –   Eseperf.xml

3. Run **JetstressWin.exe**, go through the wizard to complete the initialization, and then restart JetstressWin.exe.

7.2.2 Configuring the profile and preparing Jetstress databases

1. Run the Jetstress GUI (Jetstresswin.exe) and click **Start new test**.
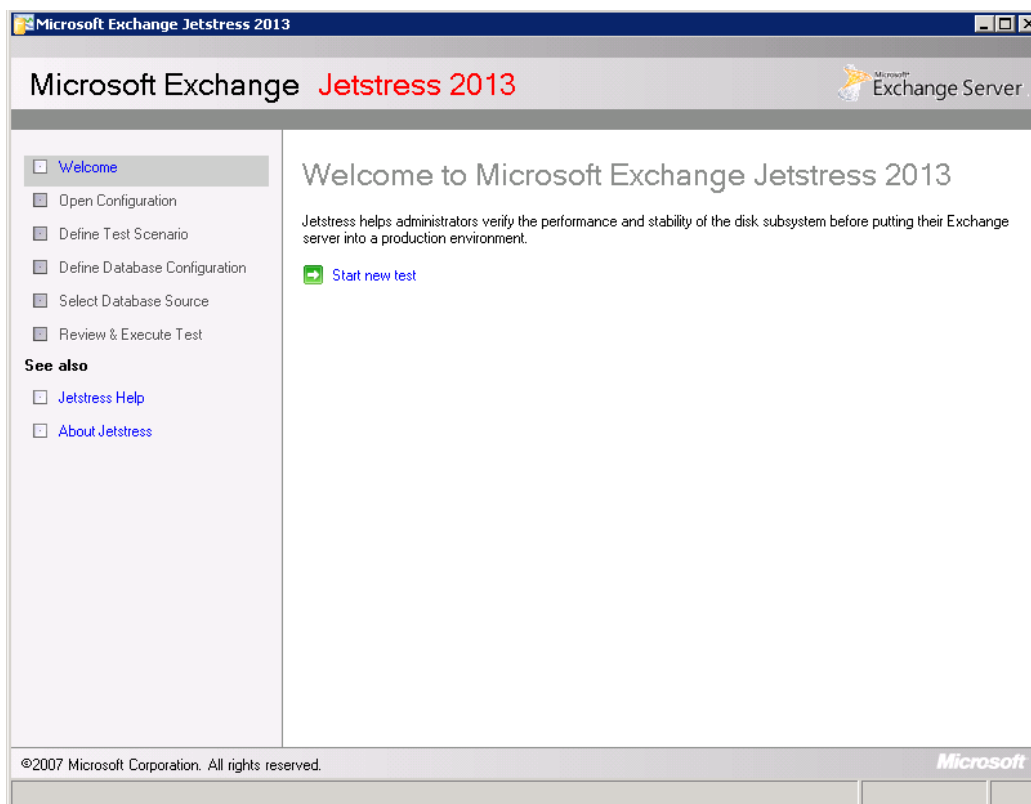
2. Jetstress checks the test system for Exchange Server DLLs.
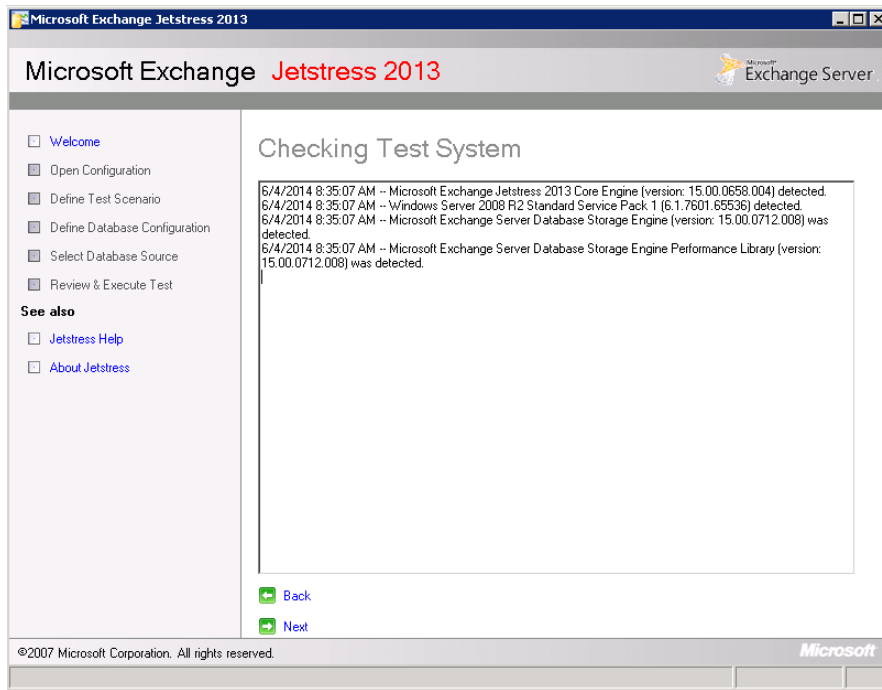
3. If creating a new configuration, choose **Create a new test configuration.** Otherwise, open an existing configuration file.
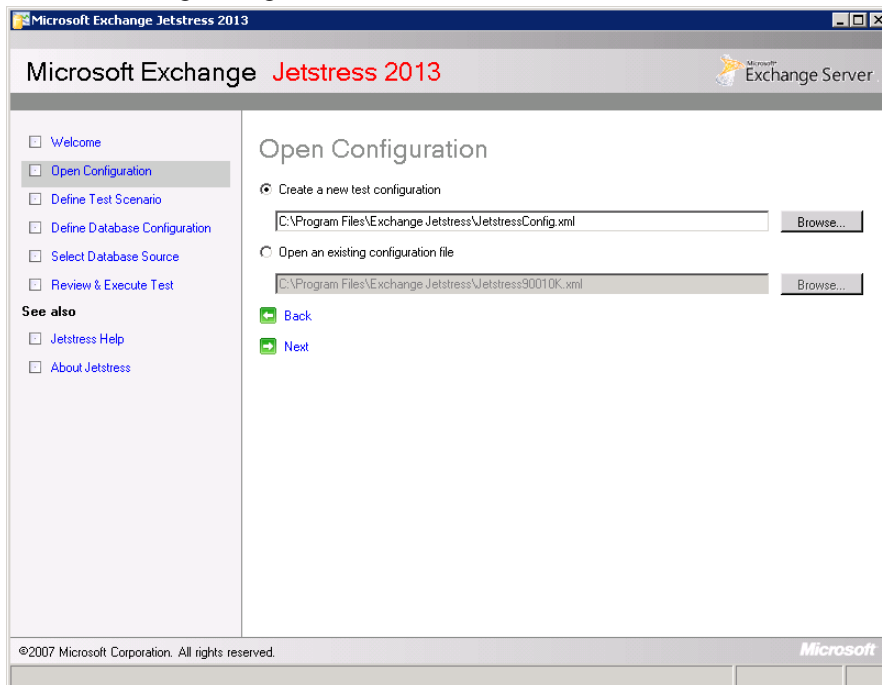
4. Select **Test an Exchange mailbox profile**.
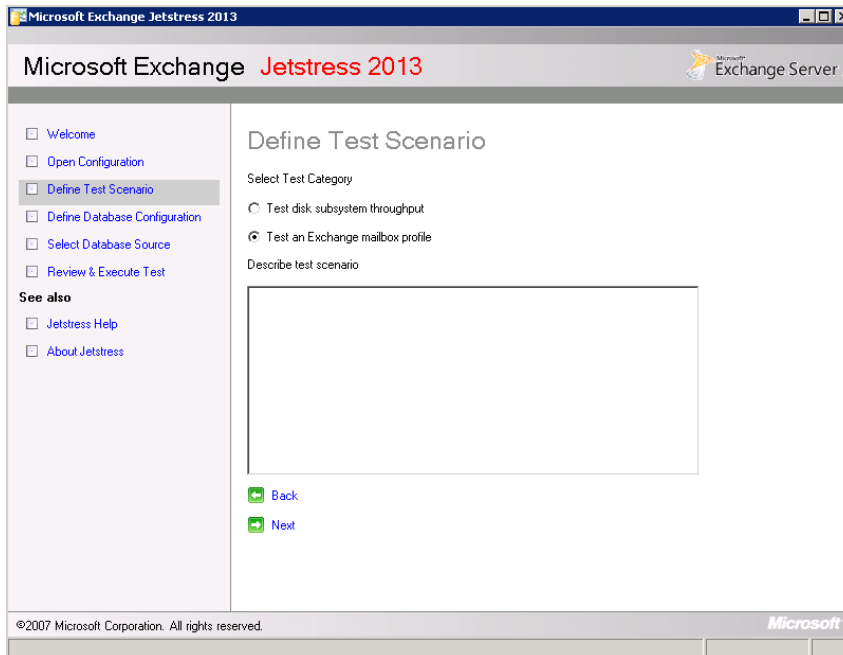
5. Enter the information for the Exchange Mailbox profile from analyses performed for **Number of mailboxes**, **IOPS/Mailbox,** and **Mailbox size**.

    Unless you are tuning manually or you have the correct thread count from previous runs, keep **Suppress tuning and use thread count (global)** unchecked. See the Jetstress Field Guide for the manual tuning process.
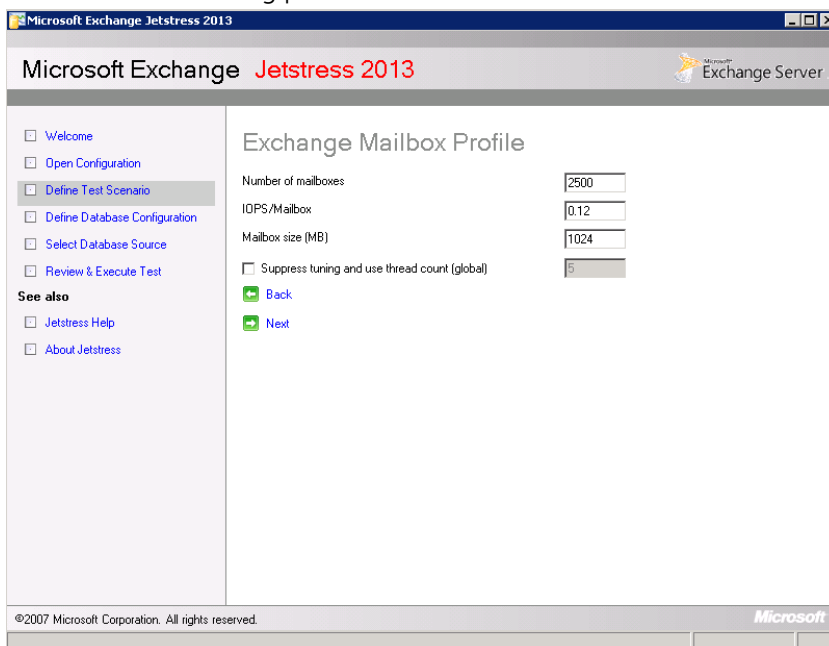
6. Select the **Performance** test type.
7. Select **Multi-host test** if testing with more than one server simultaneously. This option allows all servers to complete test logging by prompting to stop I/O after logging is complete on each server.
8. Select **Run background database maintenance** to simulate the 24x7 background database maintenance (BDM) of Exchange Server 2013.
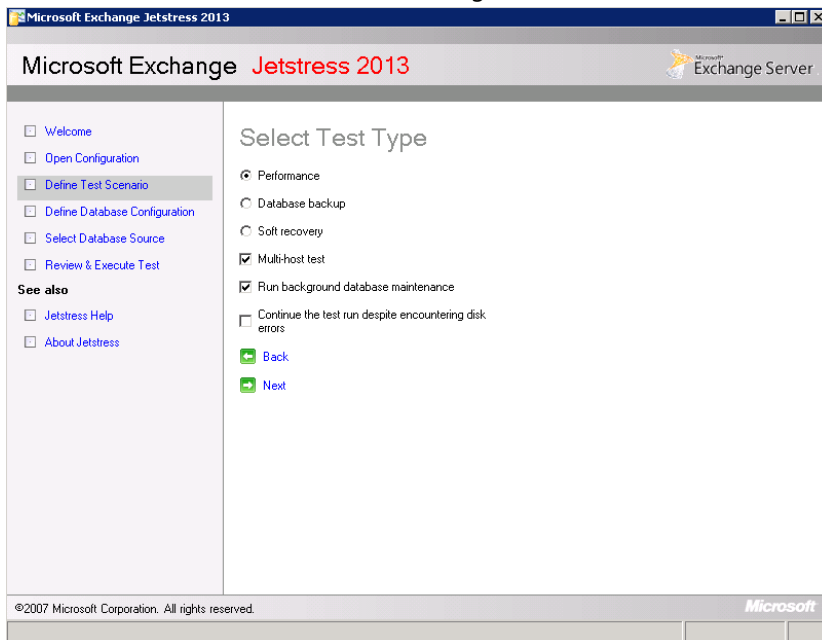
9. Choose an appropriate path for the report output. The test duration is two hours for the performance test (24 hours with stress test).
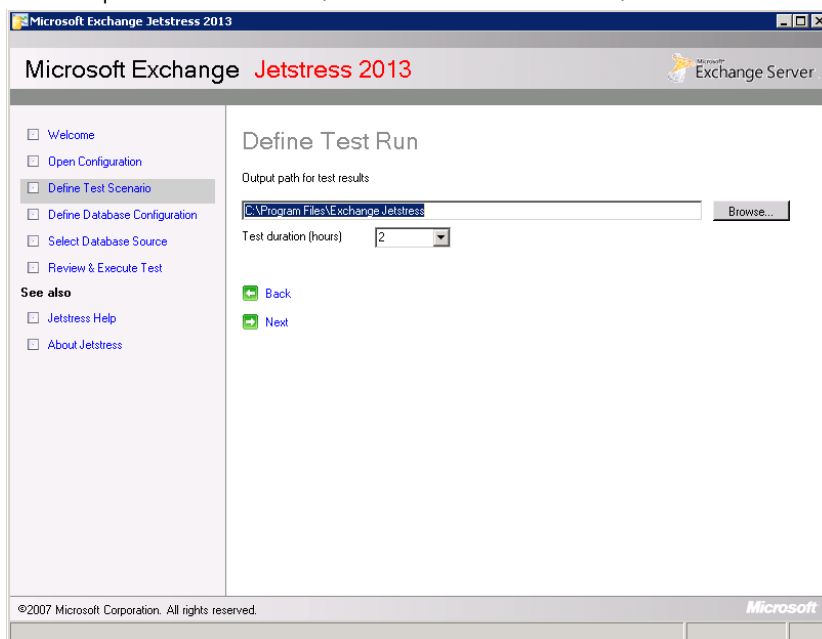
10. Ensure that the number of databases equals the total of active and passive databases that would reside on the mailbox server. The number of copies is given to simulate replication IOPS for the number of copies (including active copy) for each database.

11. If running the wizard for first time, select **Create new databases**. Otherwise, select **Attach existing databases**.

12. If this is the first run to create databases, click **Prepare test**. Otherwise, click **Run test**.
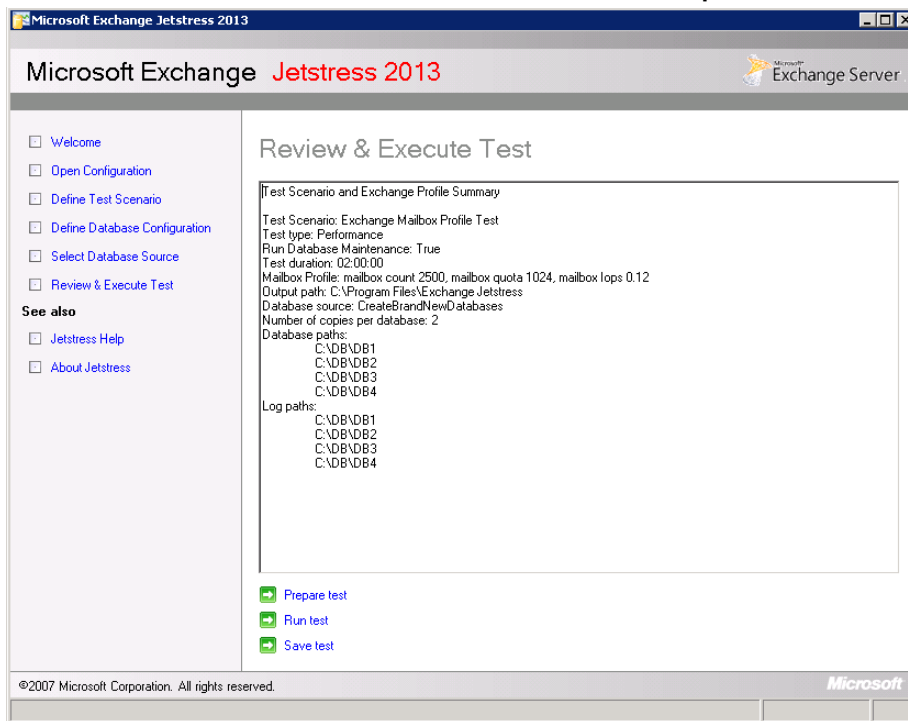
13. After each test has logged results to its performance counter logs, a dialog box displays, **Select OK to initial Jetstress database instance shutdown**.

Note: Wait until all servers show this box before clicking **OK** on any server.

When these servers show this dialog, they are still generating IOPS according to the mailbox profile. This allows all servers to finish logging performance results before shutting down the test IOPS and starting the database checksum process.

Note: If OK is selected before all servers show this dialog, the test results can be skewed, and tests can fail, especially if the checksum process starts on some servers while others are still logging test results.
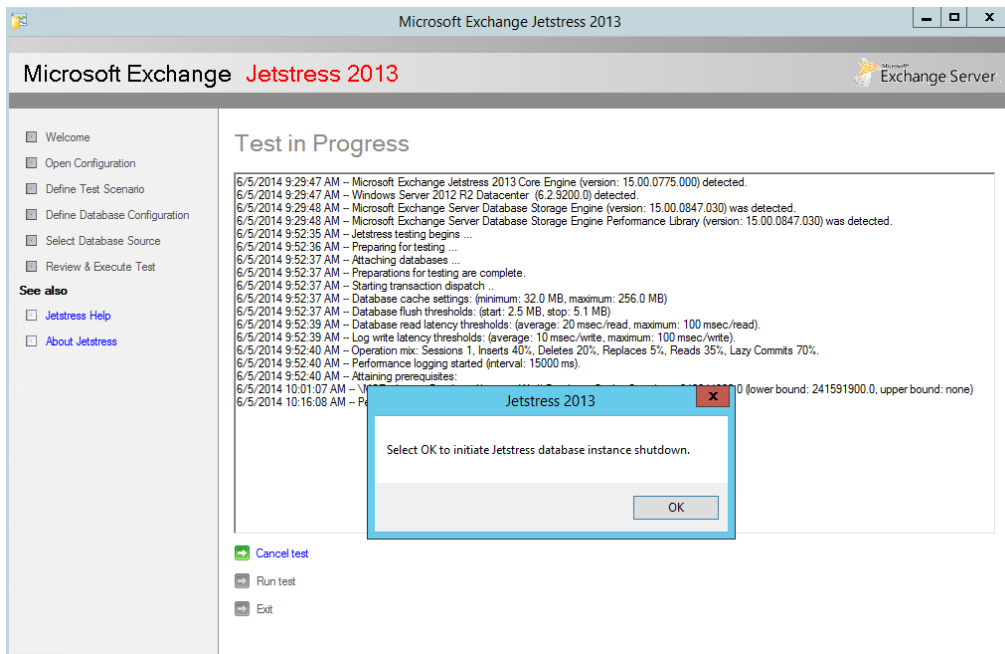
14. Review the Jetstress performance reports for pass/fail status. Performance tests will pass if the achieved IOPS meets or exceeds the target IOPS, and latencies are below the established maximums of 20 ms for reads and 10 ms for writes. Using the best practices described previously will greatly assist in achieving a passing Jetstress result. See the Jetstress Field Guide for additional details.

Microsoft Exchange Jetstress 2013

Performance Test Result Report

Test Summary

Overall Test Result	Pass
Machine Name	JS11
Test Description	5000 mailbox .12 IOPS trageted per mailbox
Test Start Time	7/17/2014 8:53:56 PM
Test End Time	7/18/2014 6:59:58 AM
Collection Start Time	7/17/2014 9:13:06 PM
Collection End Time	7/17/2014 11:12:36 PM
Jetstress Version	15.00.0775.000
ESE Version	15.00.0847.030
Operating System	Windows Server 2012 R2 Datacenter (6.2.9200.0)
Performance Log	C:\Program Files\Exchange Jetstress\1HR\Tuning_2014_7_17_20_55_30.blg C:\Program Files\Exchange Jetstress\1HR\Performance_2014_7_17_21_12_48.blg

Database Sizing and Throughput

|	
Achieved Transactional I/O per Second	350.726
Target Transactional I/O per Second	300

A   Creating Tier-1-only storage for Exchange Jetstress on SC8xxx and SC4xxx Series

The need for Tier-1-only storage is explained in section 7.1, Verifying Exchange Server storage configuration using Jetstress. This is not required or available on the SCv2xxx Series because only a single tier of disk drives is possible on those models.

A.1   Configure the user's volume defaults

To create and use Storage Profiles on Storage Center, change the user default configuration by completing the following steps for the user that will perform these operations on the Storage Center.

1. In the SC Series System Manager GUI, expand **Users**, right-click the desired user, and choose **Configure User's Volume Defaults**.
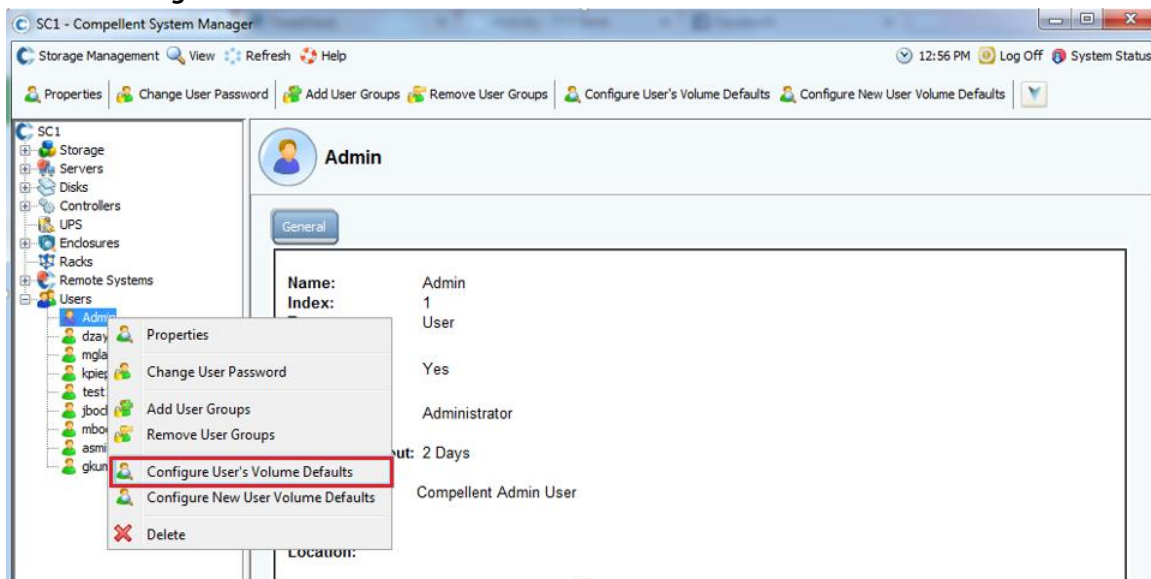
2. Click the **Advanced** button, and check the box for **Allow Storage Profile selection**. Check the **Allow removal of storage classes** box, which will allow the storage administrator to create and choose a Custom Storage Profile to use on Jetstress database/log volumes.
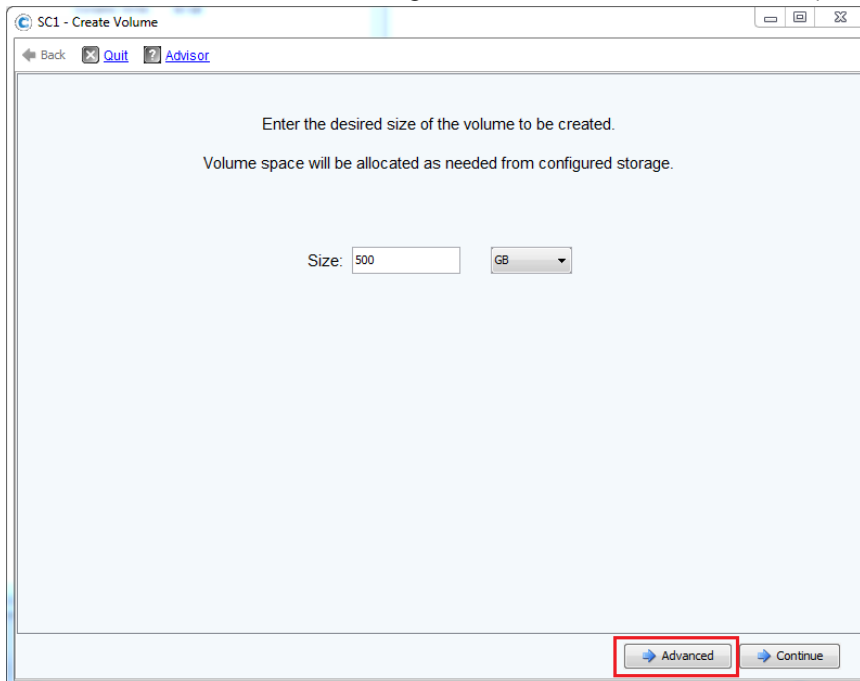
A.2 Create a Storage Profile

To create a new Storage Profile, right-click **Storage Profiles** and select **Create Storage Profile**. Ensure that only the storage classes for the RAID level desired in Tier 1 are selected. Do not select any for Tier 2 or Tier 3 Storage. Click **Dual-Redundant Settings** to ensure that only Tier 1 classes are selected for the Storage Profile that will be used for Jetstress database/log volumes.
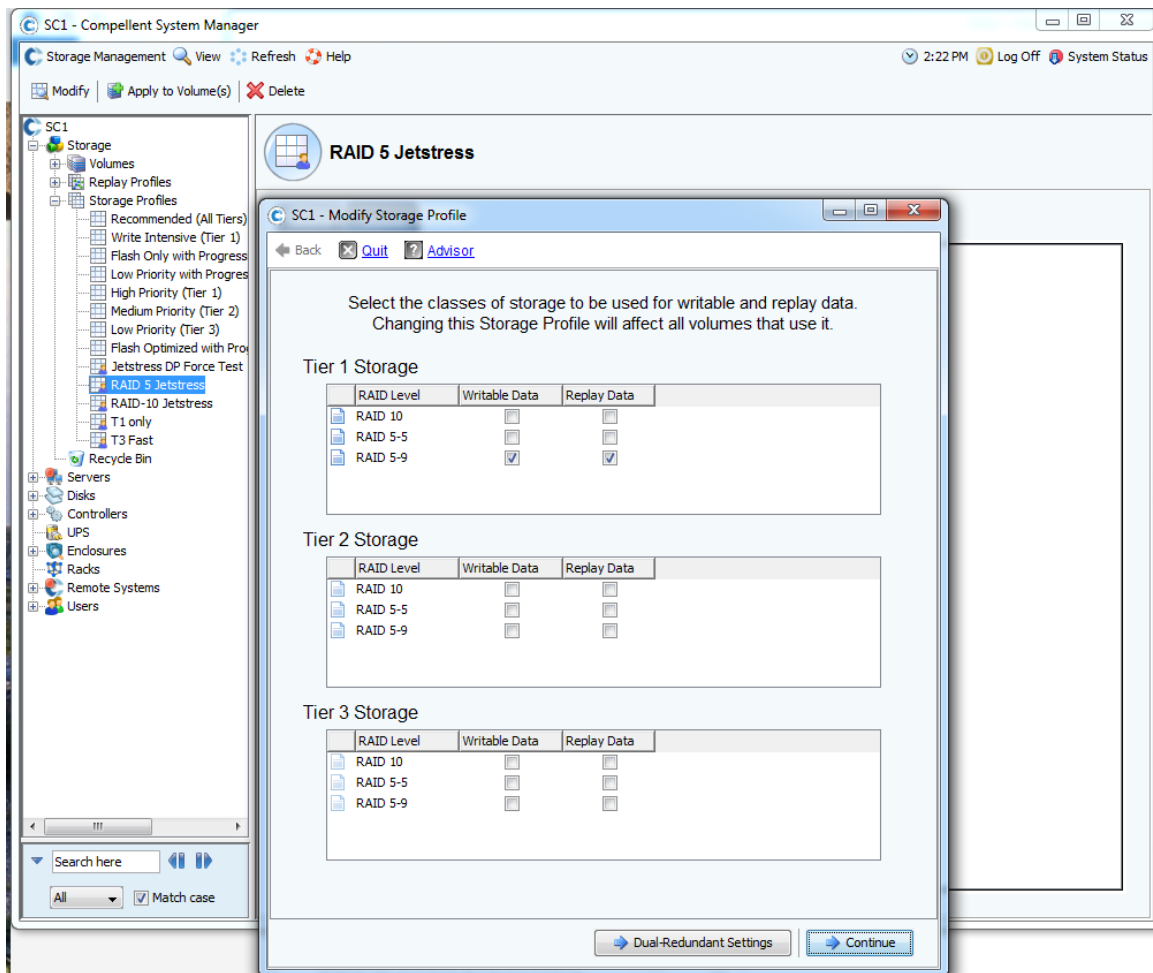
A.3 Create a database/log volume with a custom Storage Profile

1. When creating a new database/log volume, enter a value for **Size**, then click the **Advanced** tab to choose the custom Storage Profile that was created in the previous steps.
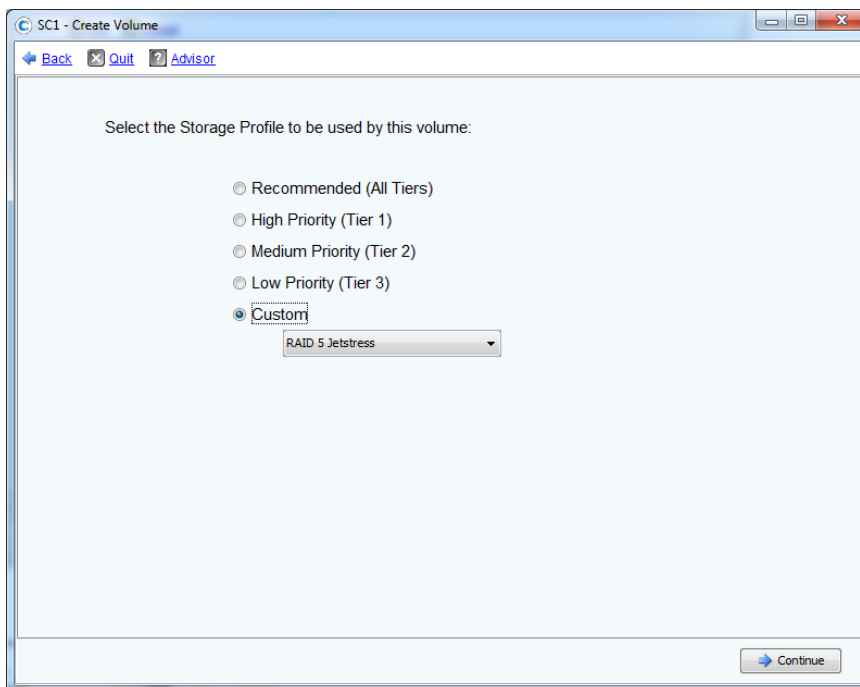

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2. Ensure that Replays are turned off for the new database/log volumes. While Replays on production volumes normally do not impact performance, Replays taken on Jetstress volumes while the test is running can negatively skew performance results. Therefore, test volumes subject to Jetstress testing should not have any Replay profiles assigned to them.
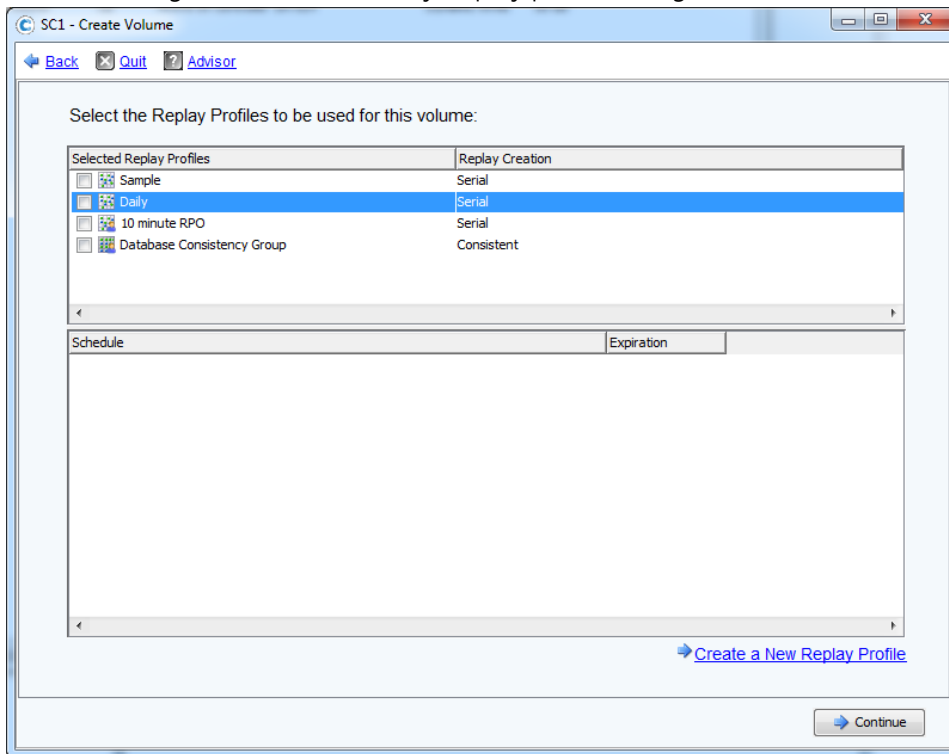
3. After databases are prepared with Jetstress, ensure that all data pages on each volume reside on active Tier 1 Storage, and not in Replays.
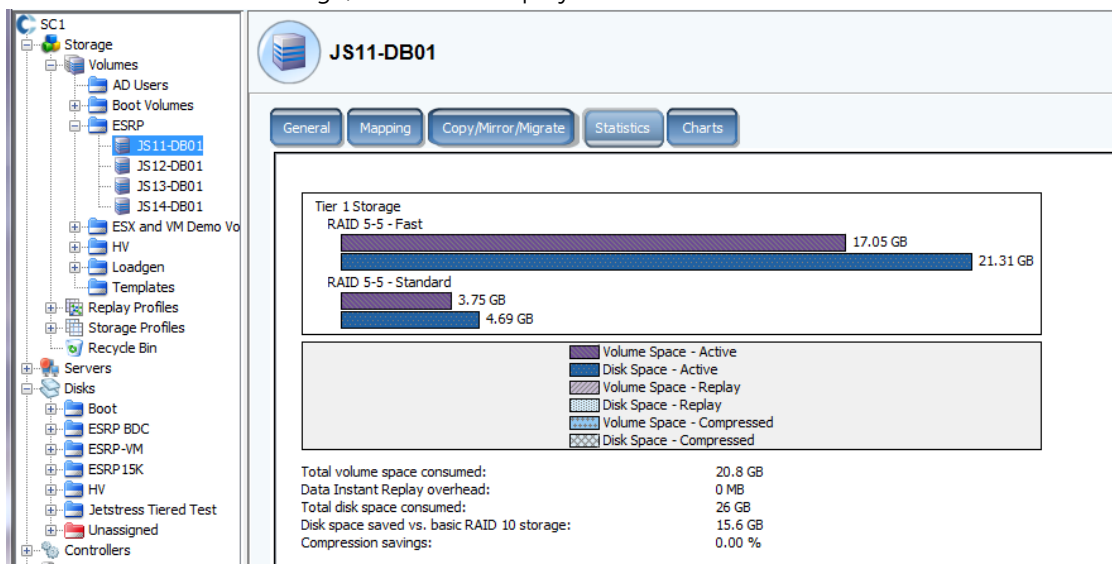
B   Additional resources

B.1   Technical support and resources

For Copilot support of Dell SC Series products:

- SC Series Customer Portal
- Email: support@compellent.com (non-emergency business hours)
- Phone: 866-EZ-STORE (866-397-8673) (United States only)
- Global online support

The Dell SC Series Customer Portal is an online portal for existing customers. A valid portal account is required to access the Knowledge Center. Once logged in to the portal, go to "Knowledge center".

Dell TechCenter is an online technical community for IT professionals and is a great resource to discover and learn about a wide range of technologies such as storage, servers, networking, software, and cloud management.

B.2   Related documentation

The following links to Dell technical documentation provide additional sizing details:

- Microsoft ESRP - Dell Compellent SC4020 v6.5 10,000 Mailbox Exchange 2013 Mailbox Resiliency Solution
- Microsoft ESRP - Dell Compellent SC4020 v6.5 4,500 Mailbox Exchange 2013 Mailbox Resiliency Solution
- Microsoft ESRP - Dell Compellent Storage Center 6.4 / 25,000 mailboxes
- Microsoft ESRP - Dell Compellent Storage Center 6.4 / 50,000 mailboxes
- Dell Compellent Jetstress Overview - Testing Best Practice Requirements
- Dell SC Series Storage and Microsoft Exchange Server 2013 Best Practices
- Dell Compellent SC8000 Controller Details — Data Center SAN
- Dell Storage SC4020 all-in-one array