

Oracle MaxRep for SAN Configuration Sizing Guide



FLASH STORAGE
SYSTEMS

Part Number E68489-01
release 1.0
2015 November

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Oracle MaxRep Configuration Sizing Calculator

Oracle MaxRep Configuration Sizing Calculator

The Oracle MaxRep Configuration Sizing Calculator enables you to create an Oracle MaxRep replication system configuration for a new or an existing Oracle Flash Storage System.

The Oracle MaxRep Configuration Sizing Calculator was created to assist you in developing a proposed MaxRep replication system configuration in two main scenarios:

- An existing Oracle Flash Storage System customer
This customer already has an Oracle Flash Storage System setup and is looking to add an Oracle MaxRep Replication Engine to replicate the existing LUNs.
- A new Oracle Flash Storage System customer
This customer is purchasing an Oracle Flash Storage System and wants to add Oracle MaxRep Replication Engines for data replication protection.

The OracleMaxRep Configuration Sizing Calculator is designed to inform you that your customer's proposed replication system configuration has the following:

- The required storage space at the primary location
- The required storage space at the secondary location
- The required processing power on the MaxRep Replication Engines to handle the expected workload
- The required bandwidth between the primary and secondary location to replicate the amount of data your customer wants to replicate

Compatible Replications

Replication Configurations

Oracle MaxRep for SAN supports three types of replication configurations: synchronous, asynchronous, and multi-hop. The Oracle MaxRep Configuration Sizing Calculator is designed to create replication system configurations for synchronous and asynchronous replication environments.

Synchronous Replication

Synchronous replication involves saving source and replicated data simultaneously in primary storage and in secondary storage. The location of the primary storage and secondary storage are usually in the same campus or metropolitan area. However, the two locations can be separated up to 62 miles (99.8 km). Synchronous replication can be configured for standard or high availability environments.

A typical synchronous replication configuration at a local site consists of one Oracle MaxRep Replication Engine and two Oracle FS Systems that are located in the same SAN fabric.

Synchronous replication requires at least one Replication Engine and is supported when the source LUN, the target LUN, and the Replication Engines are all attached to the same SAN fabric. Replication can also be synchronous when the source LUN and the target LUN are located in two data centers that are connected by an extended SAN fabric. Whenever data is written to primary storage, the data is simultaneously replicated to secondary storage.

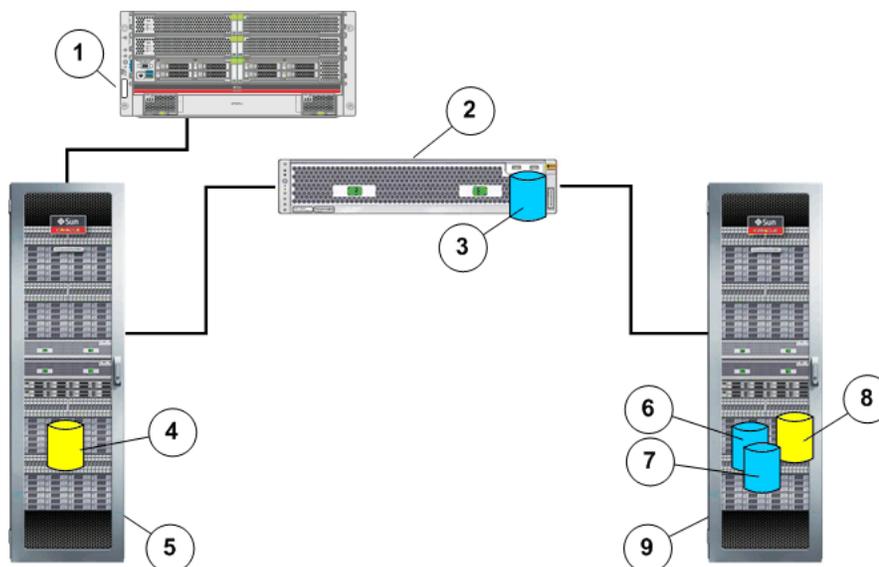
Table 1: Oracle FS System LUN descriptions

LUN	Description
Home LUN	A LUN on the Oracle FS System that stores the configuration data and cache for the Replication Engine. Also called <i>cache LUN</i> .
Secondary home LUN	The home LUN associated with the secondary, or passive, Replication Engine.
Retention LUN	The LUN on the Oracle FS System that holds the retention journal for a protection plan.

Table 1: Oracle FS System LUN descriptions (continued)

LUN	Description
Source LUN	The LUN designated for replication that is located on the primary Oracle FS System.
Target LUN	The LUN on the Oracle FS System identified as a destination for replication. This LUN must be created on the Oracle FS System prior to configuring replication.
Backup LUN	A LUN that contains the automated Oracle MaxRep Replication backup information vital to the recovery of a Replication Engine.

The following figure shows the configuration of an Oracle MaxRep for SAN synchronous replication environment.

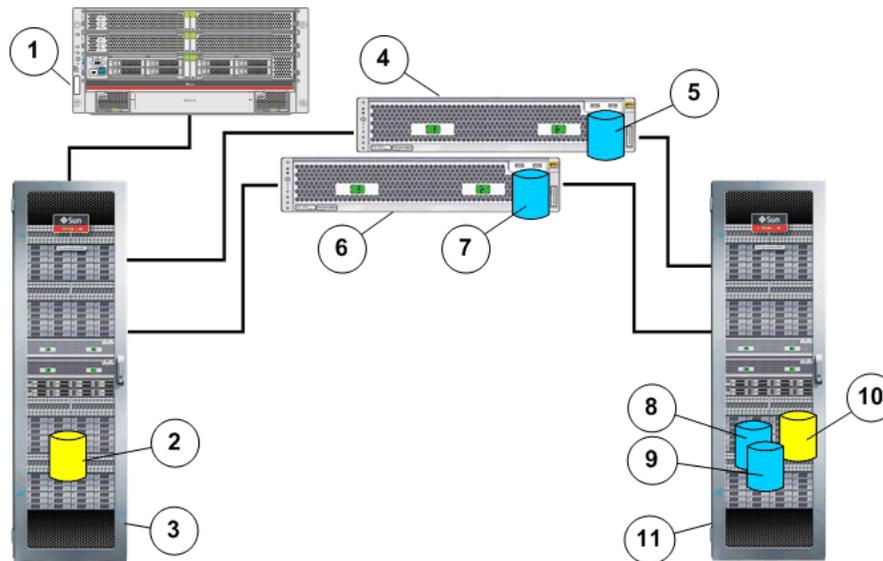
Figure 1: Standard configuration for synchronous replication

Legend		
1 Host	6 Retention LUN	
2 Replication Engine	7 Backup LUN	
3 Home LUN	8 Target LUN	
4 Source LUN	9 Secondary Oracle FS System	
5 Primary Oracle FS System		

Another example of synchronous replication includes adding a secondary, or passive, Replication Engine to support the existing Replication Engine, and to provide a high availability configuration. The primary Replication Engine and the secondary Replication Engine form an active-passive cluster. The first Replication Engine is in active mode. The second Replication Engine is in passive mode, ready to take over if the active Replication Engine should fail.

The following figure shows the configuration of an Oracle MaxRep for SAN high availability, synchronous replication environment.

Figure 2: High availability configuration for synchronous replication



Legend	1 Application Server	7 Secondary Home LUN
	2 Source LUN	8 Retention LUN
	3 Primary Oracle FS System	9 Backup LUN for configuration file
	4 Active Replication Engine	10 Target LUN
	5 Home LUN	11 Secondary Oracle FS System
	6 Passive Replication Engine	

Asynchronous Replication

Asynchronous replication writes a copy of the data to the secondary storage. The replicated data is often located remotely from the primary storage.

Asynchronous replication requires at least two Replication Engines. Asynchronous replication is supported, in most cases, when the primary storage site and the secondary storage site are geographically distributed, and the communication between the two locations is over a wide area network (WAN). Whenever data is written to the primary storage, a copy of that data is prepared for later transfer over a WAN connection to the secondary storage.

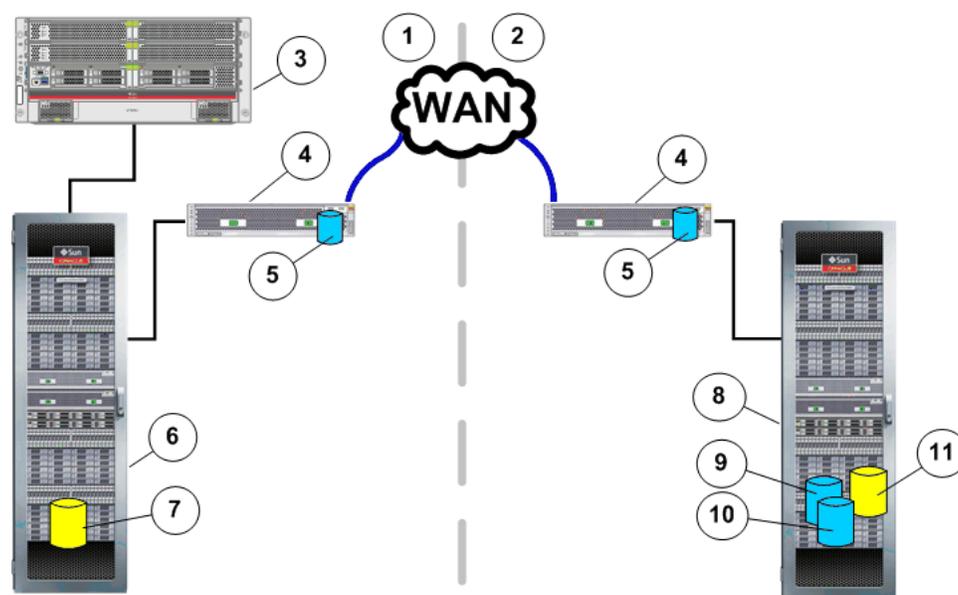
When data from the application host is written to the primary Oracle FS System, a copy of the data, along with any necessary journal information, is prepared for transfer to the primary Replication Engine. The primary Replication Engine, after receiving the copied data, transfers that data to the secondary Replication Engine, which writes the data to the secondary Oracle FS System.

Multiple LUNs are present in the Oracle FS System MaxRep Replication Engine configuration.

Table 2: Oracle FS System LUN descriptions

LUN	Description
Home LUN	A LUN on the Oracle FS System that stores the configuration data and cache for the Replication Engine. Also called <i>cache LUN</i> .
Secondary home LUN	The home LUN associated with the secondary, or passive, Replication Engine.
Retention LUN	The LUN on the Oracle FS System that holds the retention journal for a protection plan.
Source LUN	The LUN designated for replication that is located on the primary Oracle FS System.
Target LUN	The LUN on the Oracle FS System identified as a destination for replication. These LUNs must be created on the Oracle FS System prior to configuring replication.
Backup LUN	A LUN that contains the automated Oracle MaxRep Replication backup information that is required to recover of a Replication Engine.

For example, a typical asynchronous replication configuration consists of a primary storage site and a secondary storage site that are connected by an Internet Protocol (IP) WAN. Each primary storage site and each secondary storage site consists of an Oracle MaxRep Replication Engine and an Oracle FS System.

Figure 3: Basic configuration for asynchronous replication

Legend	1 Primary site	7 Source LUN
	2 Secondary site	8 Secondary Oracle FS System
	3 Application Server	9 Retention LUN
	4 Active Replication Engine	10 Backup LUN
	5 Home LUN	11 Target LUN
	6 Primary Oracle FS System	

Another example of asynchronous replication includes adding a secondary, or passive, Replication Engine to support the existing Replication Engine and to provide a high availability configuration. The primary Replication Engine and the secondary Replication Engine form an active-passive cluster. The first Replication Engine in each clustered pair is in active mode. The second Replication Engine in each clustered pair is in passive mode, ready to take over if the active Replication Engine should fail.

Access and Understand the Calculator

Download the Sizing Calculator

Locating and downloading the Oracle MaxRep Configuration Sizing Calculator is a simple process. Once you have downloaded the calculator, it can be saved to your desktop for future use.

- Prerequisites:
- Your desktop has Internet access.
 - Microsoft Excel is installed on your desktop.
- 1 In an Internet browser, navigate to the Oracle FS1–2 Flash Storage Systems website: <http://my.oracle.com/site/pd/sss/storage/san/cnt2206835.html>.
 - 2 Scroll down to Sales Tools.
 - 3 Select Oracle MaxRep Sizing Calculator.
Result: The calculator downloads into a Microsoft Excel spreadsheet that has macros enabled.
 - 4 Save the spreadsheet to your desktop.

When you are ready to configure an Oracle FS System replication protection plan, open the spreadsheet to begin populating the fields.

Understanding the Sizing Calculator

The Oracle MaxRep Configuration Sizing Calculator allows you to input your customer's information and to develop a MaxRep replication system configuration that best fits their needs.

The Configuration Sizing Calculator has multiple tabs that are macro-enabled, allowing you to capture your customer's current Oracle FS System information in one spreadsheet. Information that is entered on one tab of the spreadsheet helps to populate the information on other tabs of the spreadsheet. The end result provides you the configuration sizing details that can assist you in creating an ideal MaxRep replication system configuration.

Replication Overview Tab

The Replication Overview tab of the Oracle MaxRep Configuration Sizing Calculator allows you to fill in information that describes the data storage

environment you are working with. Entering this initial data is an important starting point.

The sizing calculator aggregates the information that you enter on the Replication Overview tab and combines that aggregate with the information on the Application Overview tab. The sizing calculator combines and interprets this information in order to create a replication system configuration that is ideal for your customer.

Application Overview Tab

The Application Overview tab of the Oracle MaxRep Configuration Sizing Calculator allows you to fill in the characteristics of the applications that are either currently running on a customer's Oracle FS System, or that a customer plans to run on the Oracle FS System. These characteristics include the number of source LUNs on the system, total LUN capacity, and estimates of the performance requirements for the applications.

The sizing calculator aggregates the information that you enter on the Application Overview tab and combines that aggregate with the information on the Replication Overview tab. The sizing calculator combines and interprets this information in order to create a replication system configuration that is ideal for your customer.

Required Configuration Tab

On the Required Configuration tab, you will see the requirements for your configuration, the environmental requirements, and the feasibility of the wide area network (WAN) to support the workload that you have configured.

The fields on the Required Configuration tab contain calculated data that is based on the information you filled in on the Replication Overview tab and on the Application Overview tab. When you select the Required Configuration tab, you will learn immediately whether the data that you entered on the previous tabs is sufficient to build a valid configuration.

Data and Limits Tab

Important: Do not change any content on this tab while using the configuration sizing calculator.

The Data and Limits tab is used only by the Oracle MaxRep Engineering team for updating the configuration sizing calculator. You do not need to reference any content on this tab while using the calculator.

Use the Configuration Sizing Calculator

Data Collection Requirements

In order to create a MaxRep replication configuration plan, Oracle recommends that you first collect detailed information about the storage environment. Understanding your customer's current environment and needs for replication will assist you to size the replication configuration most accurately.

Replication Overview

The first step in creating a replication configuration for a customer is to begin entering their current Oracle FS System information, along with basic information about their storage environment, onto the Replication Overview tab. The Replication Overview tab is designed to receive this information, and to automatically calculate sizing requirements for the proposed replication configuration.

Note: If you are working with a new customer that does not have an Oracle FS System in place, you will need to begin by configuring the customer's Oracle FS System. To do that, download the Oracle FS1 Performance Sizing Calculator from the Oracle Systems website: <http://my.oracle.com/site/pd/sss/storage/san/cnt2206835.html>.

Tip: Refer to the checklist in Table 3 to begin gathering the information that you will need to know about your customer's current storage environment. Having this information at hand will allow you to create your customer's replication configuration more efficiently.

Table 3: Replication Overview requirements checklist

Environment characteristics	Response
Is application consistency required?	
Will compression be used?	
Will replication be local or remote?	
Is this a Synchronous or an Asynchronous environment?	
Will the Oracle Flash Storage System be attached to the Replication Engine via FC?	

Table 3: Replication Overview requirements checklist (continued)

Environment characteristics	Response
Will the system be connected through Ethernet bonding on a wide area network (WAN) connection?	
Is this a high availability configuration?	
Will WAN encryption be used?	
What is the total amount of bandwidth, in Mbps, between the source and target Replication Engines?	
What percent of the link will be used for replication?	
Is there a requirement for multiple data replication sites for the data set?	
Is there a requirement for multi-site replication?	
How will the site be characterized? Will the remote data center contain active servers or other production applications (hot site); data replication servers on standby (warm site); or no servers, only storage (cold site)?	
Will Sparse Bookmarks be used? (Advanced Mode)	

User Mode

The Oracle MaxRep Configuration Sizing Calculator is designed to accept information in one of two user modes. You will select a user mode depending on the amount of information you have at hand.

Basic Mode Basic Mode should be used by Oracle Sales Consultants (SCs) who do not have all of the detailed information on the Replication Overview requirements checklist for their customer, and want to estimate a MaxRep solution with the information that is currently available to them at that time. Basic Mode will allow the SC to build a replication system configuration proposal based on fields populated by default in the Basic Mode view.

Advanced Mode Advanced Mode is used by SCs who have collected all data detailed on the Replication Overview requirements checklist specific to their customer. Using this mode will produce the most accurate quote based on the customer's actual information.

Note: Using Advanced Mode without fully understanding a customer's environment can result in highly inaccurate results.

Enter Replication Overview Information

When you have the required information about your customer's storage environment, you will enter that information into the Response column on the Replication Overview tab. Entering in this information will assist you in proposing a MaxRep replication system configuration.

- Prerequisites:
- (Optional) Data collected in the Replication Overview requirements checklist
 - Required information about your customer's storage environment
 - Appropriate User Mode selected at the top of the Replication Overview tab

Entering in this information is required for creating your customer's MaxRep replication system configuration with the Configuration Sizing Calculator.

- 1 Ensure that you have gathered all current information regarding your customer's Oracle FS System environment.
- 2 In the Response column, select the first yellow box.
- 3 Click the drop-down arrow that appears, and then select the appropriate answer for your customer's environment.

Note: Not all fields will contain a drop-down arrow that allows you to make a menu selection. In instances where a drop-down menu is not present, enter in the response manually.

- 4 Repeat Steps 2 and 3 to fill in all remaining fields in the Response column. It is important that all fields are filled in. If any fields on the Response column are left blank, you might receive invalid results.

Result: When each field is filled in, its background color will change to green. The information that you enter into this tab will be translated onto the Required Configuration tab, and will be combined with the information you enter onto the Application Overview tab to give you the final replication system configuration results.

Important: If at any time you enter a response into a field and the field background color turns red, the red color indicates that the information you have entered will not produce a valid configuration for replication. Ensure that you have entered the correct information, and that you have gathered accurate information regarding your customer's current environment.

Proceed to fill in the required information on the Application Overview tab.

Application Overview

On the Application Overview tab of the Oracle MaxRep Configuration Sizing Calculator, you will fill in more detailed information about the application characteristics of your customer's Oracle FS System environment.

The process of entering in information about the current Oracle FS System enables you to create a replication configuration in an efficient timeframe. On the Application Overview tab, you will input characteristics about the current Oracle FS System environment.

Tip: [Table 4](#) enables you to begin gathering the required information that you will need to know about your customer's current storage environment in order to populate the fields on the Application Overview tab. Having this information at hand will allow you to create your customer's replication configuration more efficiently.

Note: While filling in the Application Overview tab, you will be asked for data that is relative to three areas of your customer's storage environment: application agent data characteristics, source LUN characteristics, and data recovery objectives.

Table 4: Application Overview requirements checklist

Application data characteristics:	Response
Name of the Data Set	
Type of Data	
Average Write Mbps	
Application Consistency	
Synchronous or Asynchronous environment	
Source LUN characteristics:	
Use Sparse Bookmarks Data Retention?	
What is the quantity of source LUNs?	
LUN capacity in GB	
The percentage of the daily change rate of the LUN	
The percentage of the average growth rate of the LUN	
Data recovery objectives:	
Days of continuous data retention	
The percentage of the change rate of data in sparse retention	
Total days of sparse retention	

Table 4: Application Overview requirements checklist (continued)

Application data characteristics:	Response
Will the system use basic sparse retention?	
Target hours for Recovery Time Objective (RTO)	
Target hours for Recovery Point Objective (RPO)	

Enter Application Overview Information

When you have the information about your customer's storage environment, you will enter that information into the fields on the Application Overview tab. Fill in one row per application on the Oracle FS System.

- Prerequisites:
- (Optional) Data collected in the Application Overview requirements checklist
 - Required information about your customer's storage environment

Entering in this information is required for creating your customer's replication system configuration with the Configuration Sizing Calculator.

- 1 Ensure that you have gathered all current information regarding your customer's Oracle FS System environment.
- 2 Navigate to the Application Overview tab on the Configuration Sizing Calculator.
- 3 In the Application/Data Set Name column, select the first yellow box.
- 4 Enter the name of the application data set.

Note: Some fields will present a drop-down arrow when selected. In these instances, click the drop-down arrow that appears and select the appropriate answer for your customer's environment.

- 5 Continue to navigate to the right and fill in the remaining fields on the Application Overview tab.
- 6 Repeat Steps 1 - 5 on the proceeding rows for each additional application you want to configure.

Result: This information will be combined with the information you enter onto the Replication Overview tab. Information from both tabs will be translated onto the Required Configuration tab to give you the final replication system configuration.

Proceed to review the proposed configuration on the Required Configuration tab.

Required Configuration

After you have entered the required information on the Replication Overview and Application Overview tabs, select the Required Configuration tab to view the results of your proposed MaxRep replication system configuration.

Verify Data is Sufficient

When you have finished entering the required information onto the Replication Overview tab and onto the Application Overview tab, confirm that the storage environment has sufficient capacity to incorporate a valid MaxRep replication system configuration.

Prerequisite: The required information on the Replication Overview tab and the Application Overview tab on the Configuration Sizing Calculator spreadsheet has been entered.

When you select the Required Configuration tab, you will know instantly if your storage environment has sufficient data to build a valid MaxRep replication system configuration.

- 1 On the Configuration Sizing Calculator spreadsheet, navigate to the Required Configuration tab.
- 2 View the top row.

If the cell of the top row is green, it will display **The Data Entered is Sufficient to Build a Valid Config**. This means that you have sufficient capacity on the source LUN and target LUN. You can to move forward with the configuration.

If the cell of the top row is red, it will display **The Data Entered is NOT Sufficient to Build a Valid Config**. Review the data you have entered into the Replication Overview tab and the Application Overview tab.

Tip: A cell that is red in color indicates that the information entered in that cell is not compatible, which will result in an invalid configuration. When reviewing the data that you entered into the Configuration Sizing Calculator for validity, refer to cells that are red as a good starting point.

View Data Collection Results

View the results of the data that you entered on the Replication Overview and Application Overview tabs.

- Prerequisites:**
- The required information has been entered into the Replication Overview tab.
 - The required information has been entered into the Application Overview tab.

- 1 On the Configuration Sizing Calculator spreadsheet, navigate to the Required Configuration tab.
- 2 Navigate to Configuration Requirements to view the sizing results of the primary and secondary locations.
- 3 Navigate to Environmental Requirements to view results for properly setting the environment.
- 4 Navigate to WAN link Feasibility Estimate to view size and bandwidth requirements for the wide area network connection, as well as the estimated compression ratio that could be achieved on the data set that will be replicated.

Verify Data Capacity

Verify Data Capacity

When you receive a successful MaxRep replication system configuration based on the data that you entered into the Configuration Sizing Calculator, you will compare the final sizing information with the current information you have about the customer's existing, or planned, Flash Storage environment.

If you are using the Configuration Sizing Calculator to add additional replication plans to an existing MaxRep replication system configuration, make sure to verify information on retention LUN capacity and sufficient MaxRep licenses in the Oracle MaxRep for SAN GUI. Estimate and verify available IOPS on the Oracle FS System with the Oracle FS1 Performance Sizing Calculator.

Verify Retention LUN Capacity

In order to verify that sufficient space is available on the system's retention LUNs, you will access the Oracle MaxRep for SAN GUI.

- Prerequisites:
- The information required on the Replication Overview tab has been entered.
 - The information required on the Application Overview tab has been entered.
 - You have verified on the Required Configuration tab that the data is sufficient for building a valid configuration.

- 1 Log in to the Oracle MaxRep for SAN GUI.
- 2 Navigate to Monitor > System Performance, and view Free Space. The Free Space bar indicates what percentage of free space is available on the retention LUNs.

Verify Sufficient Licenses

The type of licenses required for a particular MaxRep replication system configuration is determined by the type of replication used (synchronous or asynchronous), and whether application consistency will be used.

- Prerequisites:
- The required information on the Replication Overview tab and the Application Overview tab on the Configuration Sizing Calculator spreadsheet has been entered.
 - You have confirmed that you have received a valid configuration.

- 1 Log in to the Oracle MaxRep for SAN GUI.
- 2 Navigate to **Settings > License Utilization > License Utilization Details** to view the available MaxRep licenses.

Verify Available IOPS

If you are working with a Oracle FS System, you can view the estimated IOPS load on the Configuration Sizing Calculator, and compare the estimate to the total read/write IOPS information that is shown on the Oracle FS1 Performance Sizing Calculator or in the Oracle FS System Manager GUI. The Performance Sizing Calculator is filled out to configure a customer's initial Oracle Flash Storage System plan.

Verify Available IOPS on the Performance Calculator

- Prerequisites:
- The required information on the Replication Overview tab and the Application Overview tab on the Oracle MaxRep Configuration Sizing Calculator spreadsheet has been entered.
 - You have confirmed that you have received a valid configuration.

- 1 On the Configuration Sizing Calculator, navigate to **Requires Configuration > Configuration Requirements**.
- 2 View the values for Additional READ IOPS generated by replication and Additional WRITE IOPS generated by replication.
- 3 On the Oracle FS1 Performance Calculator, navigate to System Summary Grey > Projected Performance Metrics.
- 4 View the values for Total Random Read IOPS and Total Random Write IOPS.

The values calculated by the Configuration Sizing Calculator need to be equal to, or less than, those values on the Oracle FS1 Performance Calculator.

Note: If the values calculated by the Configuration Sizing Calculator are greater than those values on the Oracle FS1 Performance Calculator, then either the

MaxRep replication system configuration will need to be downsized, or the size of the Oracle FS System will need to be increased.

Verify Available IOPS in the Oracle FS System Manager

- Prerequisites:
- The required information on the Replication Overview tab and the Application Overview tab on the Oracle MaxRep Configuration Sizing Calculator spreadsheet has been entered.
 - You have confirmed that you have received a valid configuration.

- 1 Log in to the Oracle FS System Manager.
- 2 Navigate to SAN > Statistics and Trending > LUNs.
- 3 View the values for the Read IOPS and Write IOPS.
- 4 Verify that the existing Oracle FS array has adequate performance capability to manage the IOPs workload indicated on the Configuration Sizing Calculator.

The values in the Oracle FS System Manager need to be equal to, or greater than, those values on the Configuration Sizing Calculator.

Glossary

Glossary

The following terms are used with these meanings in this Oracle MaxRep document.

application consistency	The MaxRep for SAN capability to load an application agent on the host Oracle FS System and allow the application data to sync with the MaxRep replication process.
asynchronous replication	The process of providing time-lagged copies of data. Asynchronous replication uses a combination of three protection schemes to ensure data integrity: a data change map, a write journal, and a drive cache on the Oracle MaxRep for SAN system.
bookmarks	Application consistency markers that are created within a LUN and are used in the retention log to create a synchronized recovery point.
data set	Collection of data.
high availability configuration	When a MaxRep environment contains two nodes (one active, and one passive) that are waiting to assume replication functions if the active node fails.
Oracle MaxRep for SAN	(1) A block-based replication solution that provides the following benefits: <ul style="list-style-type: none"> • Disaster recovery • Business continuity • Application consistent recovery (2) The graphical user interface (GUI) that provides the configuration, control, and monitoring operations for Oracle MaxRep for SAN.
Oracle FS System	The Oracle FS System is a complete and integrated full-featured network storage system.
recovery point objective (RPO)	The maximum time period of acceptable data loss before a disaster has an adverse impact on data recovery. The maximum desired time period prior to a failure or disaster during which changes to data might be lost as a

	consequence of attempts to recover data. Data changes preceding the failure or disaster by at least this time period are preserved by recovery actions. The RPO default value is zero and is equivalent to a "zero data loss" requirement.
recovery time objective (RTO)	The maximum acceptable amount of time to become fully operational after an interruption of service.
remote capacity	The capacity required at the secondary (remote) location in order to replicate the requested data from the primary location. The total capacity includes the size of the target LUNs, the retention volume, and the estimated growth of the source LUN; which by way of extension, also applies to the target LUNs.
source LUN	The LUN designated for replication that is located on the primary Oracle FS System.
sparse bookmarks data retention	See <i>sparse retention</i> .
sparse retention	Retains fewer bookmarks (recovery fallback points) for older data in the specified retention period. This feature retains less older data than newer data.
supplemental remote write IOPS	The amount of write IOPS necessary on the target Oracle FS System to support the workload that has been configured.
supplemental source capacity	The required available capacity required on the source FS System in order to accommodate the MaxRep replication configuration that has been entered into the Configuration Sizing Calculator.
supplemental source read IOPS	The amount of write IOPS necessary on the source FS System to support the workload that has been configured.
supplemental source write IOPS	The amount of read IOPS necessary on the source FS System to support the workload that has been configured.
synchronous replication	Ensures that a write operation to the primary Oracle FS System will not be acknowledged until it has been written to both the primary Oracle FS System and the remote Replication Engine.

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