

BEST PRACTICES GUIDE

Oracle Disaster Recovery on Nimble Storage



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Introduction

The purpose of this technical white paper is to discuss Oracle database Disaster Recovery using the Nimble Replication feature.

Tuning Oracle database performance is beyond the scope of this paper. Please visit <u>www.oracle.com</u> for *Oracle Performance Tuning Guide* for more information in tuning your database.

Audience

This guide is intended for Oracle database solution architects, storage engineers, system administrators and IT managers who analyze, design and maintain a robust database environment on Nimble Storage. It is assumed that the reader has a working knowledge of network design for iSCSI SAN, and basic Nimble Storage operations. Knowledge of Oracle Linux operating system, Oracle Clusterware, Oracle Data Guard, and Oracle database is also required.

Scope

Business continuity is critical to every CIO in today's informational age. Natural disasters such as earthquakes, hurricanes, or tornadoes could strike without notice. Preserving precious data in case of a disaster is crucial for businesses to stay afloat. This paper discusses how to setup and recover Oracle database using Nimble Storage Replication feature.

Using Nimble Efficient Replication for Oracle Database Disaster Recovery

Nimble Replication feature maintains a copy of data on a secondary system by only replicating compressed changed data on a set schedule. This reduces bandwidth costs for WAN replication and quickly deploys a disaster recovery solution that is affordable and easy to manage. Therefore, disaster recovery testing can be done on a regular basis to ensure a smooth transition in case of a real disaster. Not only the replicated image can be used for disaster recovery but it can also be used for test and development as well.



Configure Nimble Replication

Configuring Nimble Replication is a simple task. The below procedure shows how to setup Nimble replication in an Oracle database environment.

- 1. Setup replication partner on the source (upstream) array
- 2. Setup replication partner on the destination (downstream) array
- 3. Create a replication schedule on the source array

Nimble Replication Partners Configuration

Setup Replication Partner on Source (upstream) Array

- Launch the Nimble GUI on the source array.
- Go to "Manage", "Protection" and select "Replication Partners" button



• Click on the "New Replication Partner" button

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🝣 nim	ble storage	Home Manage - M	You are logged into: mu Ionitor ▼ Events Administr			-
Replication Partners		Overall Replication Lag:	0 minutes Overall Bandw	idth Limit: Unlimited	View/Edit	
Name	Address TEST 10.18.128.60	Status OK	Replication Lag	Replicated Volume Collection 3		
mkta-cs460qx2	TEST 10.18.128.60	UK	-	3		

• The "Create a replication partner" window appears. Fill out the information of the **downstream** partner and click "Next".

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	General Properties > QOS				
lame			Replicated me Collection		
<u>iktq-cs46</u>	Enter replication partner information other array) and configure this arra	n below. When you have completed the wizard, you must login to the replication partner (on the ay as its replication partner.	3		
		Enter name of partner array			
	Name	array2			
	Description	downstream array Optional			
	Hostname/IP Address	xxxx			
	Configure the same secret on th	e partner array when configuring this array as a partner			
	Shared Secret				
	Confirm shared secret	·····			
		Back Next Finish Cancel			

• The QOS Policy window appears. Click on "Add Policy" button and fill out the information and click "Finish" button when completed. If you don't want to set any QoS for replication then just leave it blank.

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		•

• When completed on the **source** array, it should show something similar to this.

Replication Partners							
New Replication Partner			Overall Replication Lag:	0 minutes	Overall Bandwidth Limit:	Unlimited	View/Edit
Name		Address	Status	Repli	cation Lag Volu	Replicated me Collectio	
mktg-cs460gx2	TEST	10.18.128.60	ОК	-			3

Setup Replication Partner on Destination (downstream) Array

The destination array needs to be setup similar to the source array EXCEPT the information such as array's name and IP address need to be changed.

- Launch the Nimble GUI on the destination array
- Go to "Manage", "Protection" and select "Replication Partners" button

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📚 nimblest	torage	Home	Manage Monitor	Events /	Administration 🔻	Help 🔻		
Home			Protection	Volume Coll	ections			
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		_	Initiator Groups		Category		Critical	м
	8	0-	CHAP Accounts		All		0	0
	6	0-			Hardware		0	0
					Service		0	0
	Das/BM	0-			Replication		0	0
	2	o-			Volume		0	0

• Click on the "New Replication Partner" button

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V	nimble <mark>storage</mark>	Home Manage 🔻	Monitor 🔻 Events Admini	stration ▼ Help ▼	
Replication Partne	ers				
New Replication Partne	er	Overall Replication Lag:	0 minutes Overall Band	width Limit: Unlimited	View/Edit
				Deplicated	
Name	Address	Status	Replication Lag	Replicated Volume Collection	_

• The "Create a replication partner" window appears. Fill out the information of the **upstream** partner and click "Next".

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\$	You are logged into: mktg- cs460gx2 Home Manage - Monitor - Events Administration - Help -		1
	Create a replication partner		
Replication Part	Create a replication partner General Properties > QOS Policy		
New Replication Pa	nited Vite Enter replication partner information below. When you have completed the wizard, you must login to the replication partner (on the other array) and configure this array as its replication partner. icated lection Enter name of partner array 0	iew/Edit	
	Name array 1		
	Description upstream array Optional		
	Hostname/IP Address xxxx		
	Configure the same secret on the partner array when configuring this array as a partner Shared Secret Confirm shared secret		
	Back Next Finish Cancel		

• The QOS Policy window appears. Click on "Add Policy" button and fill out the information and click "Finish" button when completed. If you don't want to set any QoS for replication then just leave it blank.

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\$	You are logged into: mktg- cs460gx2 Logout nimblestorage Home Manage - Monitor - Events Administration - Help -		1
	Create a replication partner		-
Replication Part	Create a replication partner General Properties > QOS Policy	/Edit	
Name mktq-cs01	You can optionally limit replication bandwidth during specified times and days. For example, you might want to limit replication bandwidth during business hours to reserve WAN bandwidth for other business-critical applications. NOTE: You can have either per-partner or overall QOS policy, but not both. O Click Finish/Save to complete replication partner configuration for this array. NOTE: You must also login to the replication partner and perform the equivalent replication partner configuration on that array.		
	Overall Bandwidth Limit : Unlimited POLICIES		
	Add Policy		
	Back Next Finish Cancel		
			-

• When completed on the **destination** array, it should show something similar to this.

Replication Partners							
New Replication Partner			Overall Replication Lag:	0 minutes	Overall Bandwidth Limit	Unlimited	View/Edit
Name		Address	Status	Repli	cation Lag Vol	Replicated ume Collection	
mktg-cs01	TEST	10.18.128.70	ОК	-		0	

Once the replication partners have been setup, the next step is to setup a replication schedule of a volume collection. A volume collection is a feature that allows a grouping of multiple volumes in a single set that can be snapshot simultaneously. Once a snapshot has been created for these volumes, they will be replicated to the downstream array based on a pre-defined schedule.

Nimble Replication Schedule Configuration

- Launch the Nimble GUI on the source array
- Go to "Manage", "Protection" and select "Volume Collection" button



• Click on "New Volume Collection" button.

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						You are log	ged into: mktg-cs01	Logout		
	🝣 nimbl	estorage	Home	Manage 🔻	Monitor •	• Events	Administration	▼ Help ▼		
Vol	ume Collections									
	New Volume Collection				Volume	e Collections:	7 Total Usage:	7.34 TB Free	6.64 TB	
	Name	Synchronization		Last Snapshot		Replication Partners		Last Replication		
6	Boot-Volumes	None		04/15 12:30 AM	•	mktg-cs460gx	2	04/15 12:34 AM		
6	<u>FileShares</u>	None		04/15 01:00 AM		mktg-cs460gx	2	04/15 01:00 AM		
6	oracledevdb	None		04/09 02:00 PM		None				
6	oracletestdb	None		04/15 10:55 AM		None				
6	racproddb	None		04/15 11:05 AM		mktg-cs460gx	2	04/13 12:01 AM		
-	TMLAB	None		04/15 12:15 AM		None				
e P		None		04/15 12:00 AM		None				

• The "Create a volume collection" window appears. Enter a name for this volume collection and use the blank schedule and click "Next". For example, I have used "racproddb" as a name.

reate a volume coll	ection	_
Create a volu	me collection	
Introduction >	Synchronization > Schedules > Volumes	
This wizard guides more volumes.	you through the creation of a volume collection. Volume collections are used to schedule sn	apshots for one or
Name	racprodddb	
Start from	C Blank schedule	
	C Protection template Exchange-Info-Store v	
		_
	Back Next Finish	Cancel

• Select the "None" radio button and click "Next".

Create a volume collection				_×
Create a volume collection				
Introduction > Synchronization >	Schedules	> Volumes		
SYNCHRONIZATION				
Volume collection snapshots can be synchroniz through Microsoft Volume Shadow Services (V creation, ensuring application-consistent backu	SS) or VMware APIs. T			
None				
C Microsoft® VSS				
○ VMware® vCenter				
O Oracle Database				
	Back	Next	Finish	Cancel

• Enter a schedule name, its schedule, snapshot retention, replicate to array, and number of snapshots to retain and click "Next".

Create a volume collection		-×
Create a volume collection		
Introduction > Synchronization	> Schedules > Volumes	
performance impact and are very space ef	tes that allow you to recover data from the past. Nimble snapshots can be taken with no ficient, allowing you to keep weeks or even months of backup copies on the array. y snapshots will be taken and how many snapshots will be retained for the volumes ts taken will be set to offline.	
"RAC" PROTECTION SCHEDULE		
Schedule Name	RAC Delete	
Repeat Every	1 hours v	
Starting at	12:00 HH:MM AM 🗸	
Repeat Until	11:59 HH:MM PM v	
On the following days	🕼 Mon 👽 Tue 👽 Wed 👽 Thu 🐨 Fri 🐨 Sat 🐨 Sun	
Number of snapshots to retain locally	24	
Synchronization	None	
Replicate to	mktg-cs460gx2 🗸	
Replicate every	1 Snapshots	
Number of snapshots to retain on the replica	24	
Alert if replication not complete in	24:00 HH:MM	
Add another Schedule		
	Back Next Finish Cancel	

• Select the appropriate Oracle volumes and click on the "Add" button. Click "Finish" when complete. It should look something similar to this.

	ollection			
troduction	Synchronization	Schedules	Volumes	
Unassocia	ated volumes			Associated volumes
Backups		<u>_</u>		racproddata1
DEMO		=		racproddata2
IOMETER				racprodfra1
IOMETER-P			Add >	racprodfra2
IOMETER-V			< Remove	
Infrastructu	ire		s realitive	
NS-ReFS				
NS-Test-St	orage			

Testing Disaster Recovery

Once replication has been setup and snapshots have been taken and replicated, proceed to testing Oracle DR by creating zero-copy clones from the snapshots on the destination (downstream) array. The steps below show an example of how to recover an Oracle ASM database on the destination array.

Prerequisite

Note: Before creating a zero-copy clone from an available snapshot on the destination array, the DR host

must have the following configured:

- Operating System installed
- Oracle ASM instance must be running
- Directories such as adump, dpdump, hdump, pfile must be created under \$ORACLE_BASE/admin/\$ORACLE_SID
- Production spfile and Oracle password file along with any other needed files must be copied to the DR host

Create Zero-Copy Clones on the Destination Array

- Launch the Nimble GUI on the destination array
- Go to "Manage", "Protection" and select "Volume Collection" button



Click on the "racproddb" volume collection name

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	🝣 nimblest		ou are logged into: mktg- cs460gx2 Events Administration + Help +
olume Collect	ions > racproddb		Status Snapshots Replication
Edit Tak	ke Snapshot Collection Delete	Promote Demote Handover, Validate	Volumes: 4 Total Usage: 95.3 GB Free: 21.29 TB
SYNCHRONIZATIO	N	PROTECTION STATUS	ASSOCIATED VOLUMES
Туре	1.=	Last Snapshot Time -	Volume/Clones
Server	N/A	Next Snapshot Time 04/08 09:50 AM	racproddata1
Application	N/A	Last complete replication 04/13 12:01 AM	racprodoata1
Username	N/A		racproddata2
Password	N/A	✓ "RAC" PROTECTION SCHEDULE	racprodfra1
		Snapshot every 1 weeks	racprodfra2
		Time 12:00 AM	
REPLICATION PA	RTNERS	Day of week Sat	
REPLICATION PA	RTNERS	Day of week Sat Number snapshots to retain 5 (on mktg-cs01)	

• On the right of the screen, click on the "snapshot" tab and select the appropriate snapshot for your clone.

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	🔹 usius kila atawa			You are	logged into: mktg- cs460gx2	Logout
	🝣 nimble <mark>stora</mark>	ge Home	Manage 🔻	Monitor • Event	s Administration	▪ Help ▪
lume	e Collections > racproddb				Status	Snapshots Replication
Set	Online Set Offline Clone Delete				Number of Snapshot Collections:	5 Usage: 1.31 GB
	Name	Time	Origin	Schedule	New Data	Compression
	racproddb-hourly-2013-04-15::13:20:00.000	04/15 01:21 PM	mktg-cs01	hourly	3.14 MB	2.87X
V 6			mktg-cs01	hourly	2.43 MB	2.47X
 ✓ ✓	racproddb-hourly-2013-04-15::13:05:00.000	04/15 01:06 PM				
-		04/15 01:06 PM 04/15 12:51 PM	mktg-cs01	hourly	711.81 KB	2.68X
	racproddb-hourly-2013-04-15::13:05:00.000		mktg-cs01 mktg-cs01	hourly hourly	711.81 KB 348.13 MB	2.68X 2.4X

• Click on the "clone" button and a window appears with all the volumes belong to that volume collection. Enter the names for the cloned volumes and click the "OK" button.

Image: Set Office: Set Office: Cone Con	📚 cs460 - Nimble Storage 🛛 🗙								
Control Name	> C fi 🖹 🕅	cs460/#manage_volume_collec	tion?volumeCollectionN	lame=racprodo	lb&tab=snapshots			5	
Status Snapsnots Repication Set Offine Clone Delete Number of Snapshot Collections: 5 Usage: 1.31 GB Name Time Delete Delete Naw Data Compression Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2 Image: racproddb-hourly-2			IGE Home	Manage 🔻		cs460gx2	2		
Name Time Origin Schedule Naw Data Image: Schedule Naw Data Compression Image: Schedule Naw Data 2.63X Image: Schedule Naw Data 2.45X Image: Schedule Image: Schedule 2.45X Image: Schedule Image: Schedule 2.45X Image: Schedule Image: Schedule 2.45X	Volume Collections > 1	acprodub				Status	Snapshots R	plication	1
Image: Construction of the second	Set Online Set Offline	Clone Delete					5 Usage: 1	.31 GB	
	racproddb-hourly-2 racproddb-hourly-2 racproddb-hourly-2 racproddb-hourly-2 racproddb-hourly-2 racproddb-hourly-2	Old volume name racprodfra2 racproddata1 racprodfra1	New volume na racprodfra2-clone racproddata1-clone racprodfra1-clone	me	C chadula		2.63X 2.87X 2.47X 2.4X	<u>on</u>	

• Go back to the "Volumes" screen by clicking on "Manage" then "Volumes". The cloned volume would look something similar to this.

e racproddata1	100.0 GB 39	9.34 GB	<u> </u>	217.92 MB		39.56 GB
C racproddata1-clone	100.0 GB	0 В _	<u> </u>	0 В _	\longrightarrow	0 B
e racproddata2	100.0 GB 39	9.42 GB	<u> </u>	204.38 MB		39.62 GB
Contractions of the second sec	100.0 GB	0 B	<u> </u>	0 B _		0 B
e racprodfra1	50.0 GB 7	.62 GB		462.33 MB	$ \longrightarrow $	8.07 GB
State of the second sec	50.0 GB	0 В	<u> </u>	0 B _		0 B
Contraction in the second seco	50.0 GB 7	.61 GB	<u> </u>	460.79 MB	\longrightarrow	8.06 GB
Contraction of the second seco	50.0 GB	0 В _		0 B	$ \longrightarrow $	0 B

- Present the cloned volumes to the DR server by clicking on each of the cloned volumes.
- For example, click on the first volume "racproddata1-clone".

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olumes > racproddat	📚 nimbl			
Edit Volume Take S	Snapshot Set	Status Snapsho Dnline Claim Delete Statu	Replication	
VOLUME SPACE		THROUGHPUT GENERAL		ĩ
Size Used	100.0 GB 0 B	Read Write Performance Policy default 100 Volume Collection Not Protein	ected	
Reserve Quota Primary Compression	0 B 100.0 GB N/A	80- 60- No Activity Connected Initiators Q Total Connections 0 Description Oracle RA	C data1 for p	
Primary Space Saved	0 B	Solution No Activity Description Oracle RA Parent Volume racproddat 20- Base Snapshot Name racproddat	1	- L
NAPSHOT SPACE		0		1
Jsed Reserve Juota	0 B 0 B Unlimited	IOPS Status Offline (ur 100 ₁ Read Write	er)	
ackup Compression lumber of Snapshots ast Snapshot	N/A 0 -	80- Colume	er Name	
REPLICATION STATUS		0 40- No Access No Access		
Replication Partner Las	10.	0 Snapshots 1 ISCSI Initiator Group CHAP Use No Access No Access		

• Click on the "Edit Volume..." button and select the "Access" tab and click on the "Add..." button.

Edit Volume						-×
General Properties	Volume Size	Protection	Access			
Allow multiple initial	ator access		initiator acc Cluster Ser	sing volumes that allow sin ess (such as VM ware VM ver), enable this feature. So ators does not require this t	FS or Microsoft erial access from	
Apply to		iSCSI Initiato	r Group	CHAP User Name	Add	
		No items to sh	10W.			
						=
					Save	Cancel
					0470	Contect

• The "Create Access Control Entry" window appears. Select the "Limit access to iSCSI initiator group" radio button and click the drop-down box to select the DR server then click "OK".

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	://cs460/#mana	ge_volume?volu	meName=rad	cproddata1-ck	one&tab=statu	IS				5	=
	🐟 niml	ble <mark>stor</mark>	age	Home	Manage 🔻	Monitor 🔻	You are log	gged into: mktg- cs460go Administratio	on ▼ Help ▼		
volumes > racprodda	Edit Volume							-	×		
volumes + racproduce	General Properties	Volume Size	Protection	Access					Snapshot	Replication	
Edit Volume Take	Allow multiple	initiator access		initiator acces	ng volumes that all is (such as VM wa r), enable this feat	re VMFS or M	icrosoft		Status: C	Offline (user)	
VOLUME SPACE		Create Access C	ontrol Entry	Cluster Server	r), enable this real	ure. Serial act	cess nom				
Size		croate Access C	ontroi Linu y							~	
Used	Apply to			/olume & Snapsho	ots 🗸						
Reserve		Apply to									
Quota											
Primary Compression										:a1 for p	
Primary Space Saved		C Allow u	unrestricted acce	:55							
		 Limit ac 	cess							rly-2013-0	
		🗸 Li	mit access to iSC	SI initiator group	None	~					
SNAPSHOT SPACE		- A	uthenticate using	CHAP user name	None						11
Used					ESRP01						
Reserve					ESRP02 ESRP03			ОК	Cancel		
Quota					ESRP04						
Backup Compression					mktg01 mktg02						
Number of Snapshots					mktg04						
Last Snapshot					OL6u3-24						
					oraclelinux2 penguin				CHAP User	Name	
					SanJose-HV1				No Access		
REPLICATION STATUS					w2k8perf1						
Replication Partner Li									CHAP User	Name	
No items to									No Access		
									-		
							-				
							Save	Cancel			
										1	
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- After all cloned volumes have been presented to the DR server, set the cloned volumes online.
- Proceed to scanning the cloned volumes on the DR host and mounting the ASM diskgroups and then start the database.



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