

Primera 存储系统技术文档

Primera 同步远程复制配置参考指南

声明:

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存储产品支持部

——伍雅宁

版本编号: 20200701



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同步远程复制原理和拓扑

主机发送 I/O 到主存储缓存后,主存储会立即把数据同步到目标存储缓存,然后目标存储做完缓存镜像后向主存储确认接收到 I/O 后,最后主存储向主机回复接收到 I/O。

Synchronous mode

Continuous operation and synchronization

- Real-time Mirror
 - Highest I/O currency
 - Lock-step data consistency
- Space Efficient
 - Thin provisioning/Thin deduped/Compression aware
- Targeted Use
 - Campus-wide business continuity
- Guaranteed Consistency



- 1 : Host server writes I/O to primary write cache
- 2 : Primary array writes I/O to secondary write cache
- 3 : Remote array acknowledges the receipt of the I/O
- 4 : Host I/O acknowledged to host

本次以 RCFC 作为远程复制链路,把两个节点的远程复制端口连接到不同 SAN 交换机上,主存储和目标存储的的 0:3:4 端口连接到 1 号交换机,主存储和目标存储的 1:3:4 端口连接到 2 号交换机。



Cable the RCFC ports for Remote Copy



远程复制链路配置

默认情况下存储FC端口模式为Target,也就是主机端口,使用showportdev命令确认当前这些端口没有被使用,然后把主存储和目标存储端口一对一划分WWPN Zone。把端口离线之后配置为RCFC端口,在命令行下需要使用controlport offline和controlport config rcfc进行配置。配置之后端口模式变为Initiator,查看端口参数可见当前IntCoal参数默认为Enabled。IntCoal解释: "Interrupt coalescing" (IntCoal) allows the device driver to delay delivery of the interrupt to the kernel by waiting a short while (around 0.2 ms by default) in order to coalesce other interrupts.

C630 cli% showport 0:3:4 1:3:4 N:S:P Mode State ----Node_WWN---- -Port_WWN/HW_Addr- Type Protocol Label Partner FailoverState 0:3:4 target ready 2FF70002AC025C02 1:3:4 target ready 2FF70002AC025C02 20340002AC025C02 free FC 1:3:4 21340002AC025C02 free 0:3:4 C630 cli% controlport offline 0:3:4 1:3:4 Are you sure you want to run controlport offline on port 0:3:4? select q=quit y=yes n=no: y Are you sure you want to run controlport offline on port 1:3:4? select q=quit y=yes n=no: y C630 cli% controlport config rcfc 0:3:4 1:3:4 Are you sure you want to run controlport config rcfc on port 0:3:4 (connection type point)? select q=quit y=yes n=no: y Are you sure you want to run controlport config rcfc on port 1:3:4 (connection type point)? select q=quit y=yes n=no: y C630 cli% showport 0:3:4 1:3:4 N:S:P Mode State ----Node WWN---- -Port WWN/HW Addr- Type Protocol Label Partner FailoverState 0:3:4 initiator ready 2FF70002AC025C02 20340002AC025C02 free FC - - - -1:3:4 initiator ready 2FF70002AC025C02 21340002AC025C02 free FC - - -C630 cli% showportdev all 0:3:4 1:3:4 Illegal integer argument 0:3:4 C630 cli% showportdev all 0:3:4 Ptid LpID Hadr ----Node WWN---- -Port WWN/HW_Addr- ftrs svpm bbct flen ----vp_WWN----- Name 0xa0600 0x00 0x00 2FF70002AC025C02 20340002AC025C02 0x8800 0x0032 n/a 0x0800 20340002AC025C02 0:3:4 1 total C630 cli% showportdev all 1:3:4 PtId LpID Hadr ----Node_WWN---- -Port_WWN/HW_Addr- ftrs svpm bbct flen ----- Name 0x140600 0x00 0x00 2FF70002AC025C02 21340002AC025C02 0x8800 0x0032 n/a 0x0800 21340002AC025C02 1:3:4 1 total C630 cli% showport -par 0:3:4 1:3:4 N:S:P Connmode ConnType CfgRate MaxRate Class2 UniqNodeWwn VCN IntCoal TMW0 Smart SAN disabled enabled disabled unsupported 0:3:4 rcfc 32Gbps disabled disabled point auto 32Gbps disabled disabled 1:3:4 rcfc disabled enabled disabled unsupported point auto

目前 Primera 远程复制手册没有提及这个参数,但参考 3PAR Remote Copy 手册还是建议使用 controlport intcoal disable 禁用这个参数。

C630 cli% showport -par 0:3:4 1:3:4 N:S:P Connmode ConnType CfgRate MaxRate Class2 UniqNodeWwn VCN IntCoal TMW0 Smart_SAN disabled enabled disabled unsupported 0:3:4 rcfc 32Gbps disabled disabled point auto 32Gbps disabled disabled 1:3:4 rcfc point auto disabled enabled disabled unsupported C630 cli% controlport intcoal disable -f 0:3:4 C630 cli% controlport intcoal disable -f 1:3:4 C630 cli% showport -par 0:3:4 1:3:4 N:S:P Connmode ConnType CfgRate MaxRate Class2 UniqNodeWwn VCN IntCoal TMWO Smart_SAN disabled disabled unsupported 0:3:4 rcfc 32Gbps disabled disabled point auto 1:3:4 rcfc 32Gbps disabled disabled disabled disabled disabled unsupported point auto C630 cli%



在 SSMC 中也可以选中 FC 端口后点击编辑,把端口连接模式改为 RCFC,然后点击 OK。这里可见在 SSMC 配置 RCFC 端口时 IntCoal 的设置为禁用。

\otimes	Primera	& 3PAR SSMC	Edit 0:3:4 General	?	? 🗘 🖉 & :	
Port	s 28	Status v All	General		C670_CN701503MR ~	
•	Port ID A	Label S	System Port ID (N:S:P) Port type	C670_CN701503MR 0:34 Free		
•	0:0:1 0:0:2 0:0:3 0:0:4 0:1:1	DP-1 C DP-2 C DP-3 C DP-4 C C	Connected devices Mode change State			
•	0:2:1 0:3:1 0:3:2		Settings Connection mode	RCFC v		
•	0:3:3 0:3:4 0:5:1	- C - C DP-1 C	Connection type Unique node WWN	Point v Disabled v		
•	0:5:2 0:5:3 0:5:4 1:0:1	DP-2 C DP-3 C DP-4 C — C	Configured rate	Auto v Disabled v		
•	1:0:2 1:0:3 1:0:4 1:1:1					
•	1:2:1 1:3:1 1:3:2			OK		610.27

但配置完成之后 IntCoal 参数仍旧是启用状态。

\otimes	Search SPAR SSMC - Search B a ?										
Ports	28	Status 🗸	All v Port ID (N:S:	P) ~	Label v					C670_CN	√701503MR ~
						Þ	9 1:3:4 S	ettings ~ 🗧			Actions ~
•	Port ID (N:S:P)	Label	System	Port Type	Port State	UID / Locate	Edit FC Port	t Completed	3paradi	n Jul 1, 2020 4:22:49	PM CST 🗸 🗸
•	0:2:1	_	C670_CN701503MR	Free	Offline						
•	0:3:1	-	C670_CN701503MR	Host	Ready		Settings		FC Settings		
•	0:3:2	-	C670_CN701503MR	Free	Loss Sync		Node WWN	2FF70002AC025C03	Connection mode	RCFC	
•	0:3:3	-	C670_CN701503MR	Free	Loss Sync	- 11	Topology	Fabric Attached	Connection type	Point	
•	0:3:4	-	C670_CN701503MR	RC	Ready		Max rate	32 Gbps	Configured rate	Auto	
•	0:5:1	DP-1	C670_CN701503MR	Free	Loss Sync		Class	3	Class 2	Disabled	
•	0:5:2	DP-2	C670_CN701503MR	Free	Loss Sync				VCN	Disabled	
•	0:5:3	DP-3	C670_CN701503MR	Free	Loss Sync				Unique node WW	N Disabled	
•	0:5:4	DP-4	C670_CN701503MR	Free	Loss Sync				Interrupt coalesc	Enabled	
•	1:0:1	-	C670_CN701503MR	Free	Loss Sync						
•	1:0:2	-	C670_CN701503MR	Free	Loss Sync						
•	1:0:3	-	C670_CN701503MR	Disk	Ready						
•	1:0:4	-	C670_CN701503MR	Disk	Ready		Persistent Port		SEP Details		
•	1:1:1	_	C670_CN701503MR	RC	Ready		r crossrent r orr		off Defails		
•	1:2:1	_	C670_CN701503MR	Free	Offline		Partner (N:S:P)	-	State	 Normal 	
•	1:3:1	_	C670_CN701503MR	Host	Ready		Partner WWN/IP	-	Max speed	28 Gbps	
•	1:3:2	_	C670_CN701503MR	Host	Ready		Failover state	-	Serial number	6C6850G041	
•	1:3:3	_	C670 CN701503MR	Free	Loss Sync				Model	Q2P62A	
•	1:3:4	_	C670_CN701503MR	RC	Ready				Tx fault	No	
•	1:5:1	_	C670 CN701503MR	Free	Loss Sync				Rx loss	No	
	1:5:2	_	C670 CN701503MR	Free	Loss Sync				Rx power low	No	
	1:5:3	_	C670 CN701503MR	Free	Loss Sync						
	1:5:4	_	C670_CN701503MR	Free	Loss Sync	- H.					
			00.0_0.0.010001410		2000 0 ,						3.6.1.0.27



建议编辑端口手动禁用此参数。

\otimes	Primera	& 3PAR S	Edit 0:3:4 General	?	Q V 8 ?
Ports		Status	General		C670_CN701503MR ~
			System	C670_CN701503MR	
•	Port ID 🔺	Label	Port ID (N:S:P)	0:3:4	
	(N:S:P)		Port type	RC	
•	0:0:1	DP-1	Connected devices	1	
•	0:0:2	DP-2	Mode change	Allowed	
•	0:0:5	DP-3	State	Posty	
	0.0.4	UP-4	Sidle	• Reduy	
	0.1.1		Sottings		
	0:3:1		Serings		
	0:3:2	_	Connection mode	RCFC v	
	0:3:3	_	connection mode		
•	0:3:4	-	Connection type	Point v	
•	0:5:1	DP-1	Lisiave node MOMN	Displad	
•	0:5:2	DP-2	Unique node www		
•	0:5:3	DP-3	Configured rate	Auto 🗸	
•	0:5:4	DP-4	Interrunt coalesce	Dicabled	
•	1:0:1	—	interrupt coalesce	Enabled	
•	1:0:2	-			
•	1:0:3	-			
•	1:0:4	-			
•	1:1:1	-			
•	1:2:1	-			
•	1:3:1	-		OK Cancel	
•	1:3:2	_			3610.27

把端口配置为 RCFC 之后需要对端口进行初始化。

ts	28	Status ~	All V Port ID (N:S:	P) v	Label	~				C670_CN701503MI
						Þ	0:3:4 Settings ∨ \$		Actions ~ Edit	Tasks Edit FC Port
	Port ID A (N:S:P)	Label	System	Port Type	Port State	UID / Locate	Settings	FC Settings	Edit label	1:3:4
	0.24	_	C670_CN701503MR	Eree	Offline		Node WWN 255700024C025C03	Connection PCEC	Disable	 Edit FC Port 1.7.4
	0.3.1	_	C670_CN701503MR	Host	Pondy		Topology Fabric Attached	mode	Enable	Edit EC Bort
	0.3.2	_	C670_CN701503MR	Eree	Loss Sunc		Max rate 32 Gbps	Connection Point	Initialize	1:3:4
	0.3.2	_	C670_CN701503MR	Free	Loss Sync		Class 3	type Configured Auto	Clear	 Edit FC Port
	0.3.4	_	C670_CN701503MR	RC	Ready			rate Auto	Reload firmware	0:3:4
	0:5:1	DP-1	C670_CN701503MR	Free	Loss Sync			Class 2 Disabl	Sync to name server	
	0:5:2	DP-2	C670 CN701503MR	Free	Loss Sync			VCN Disabl	Ping	
	0:5:3	DP-3	C670 CN701503MR	Free	Loss Sync			Unique node Disabl WWN		
	0:5:4	DP-4	- C670 CN701503MR	Free	Loss Sync			Interrupt Enabled		
	1:0:1	_	C670_CN701503MR	Free	Loss Sync			coalesce		
	1:0:2	_	C670_CN701503MR	Free	Loss Sync					
	1:0:3	_	C670_CN701503MR	Disk	Ready		Persistent Port	SFP Details		
	1:0:4	_	C670_CN701503MR	Disk	Ready					
	1:1:1	_	C670_CN701503MR	RC	Ready		Partner -	State • Norma	I	
	1:2:1	_	C670_CN701503MR	Free	Offline		Partner —	Max speed 28 Gbps	0/5	
	1:3:1	-	C670_CN701503MR	Host	Ready		WWN/IP	Model 02P62A	104E	
	1:3:2	-	C670_CN701503MR	Host	Ready		Failover state 🛛 —	Tx disable No		
	1:3:3	-	C670_CN701503MR	Free	Loss Sync			Tx fault No		
	1:3:4	-	C670_CN701503MR	RC	Ready			Rx loss No		
	1:5:1	-	C670_CN701503MR	Free	Loss Sync			Rx power low No		
	1:5:2	_	C670_CN701503MR	Free	Loss Sync					
	1:5:3	-	C670_CN701503MR	Free	Loss Sync					



如果两端 RCFC 端口都初始化完成并且 Zone 配置正确则可以看到对端 RCFC 端口已经 Login。

orts 2	8	Status 🗸	All V Port ID (N:S:	P) ~	Label	~						C670_CN701503MR
•	Port ID (N:S:P)	Label	System	Port Type	Port State	UID / Locate	O:3:4Initialized	Overview ~ \gtrless	aradm Jul 1, 2	Ac 2020 4:41:53 PM C	ctions ×	Tasks Initialize Port 0:3:4 Edit FC Port
	0:2:1 0:3:1 0:3:2 0:3:3 0:3:4 0:5:1 0:5:2 0:5:3 0:5:4 1:0:1 1:0:2 1:0:3 1:0:4		C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR	Free Host Free Free Free Free Free Free Free Disk Disk	Offline Ready Loss Sync Loss Sync Loss Sync Loss Sync Loss Sync Loss Sync Loss Sync Loss Sync Loss Sync Ready Ready		General Port ID (N:S:P) System Label Node Protocol Rate Adapter type CNA port WWN Port type Mode change	0:3:4 	Health State State description Resources Throughput rate 0.00 KBp	Normal Ready 0.00 KBps (<1%) No KBps 0.00 KBps	32 Gbps	1:3:4 • Edit FC Port 1:3:4 • Edit FC Port 1:3:4 • Edit FC Port 0:3:4
•	1:1:1 1:2:1 1:3:1 1:3:2 1:3:3 1:3:4 1:5:1 1:5:2 1:5:3 1:5:4	-	C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR C670_CN701503MR	RC Free Host Free RC Free Free Free	Ready Offline Ready Loss Sync Ready Loss Sync Loss Sync Loss Sync		Smart SAN Zone name Zone state	Unsupported — —	Connected I Connected devices System C630	Devices 1 system Port Port W ID Port W 0:3:4 203400	WN 002AC025C0	

在命令行下可以使用 showportdev 确认 FC 端口 Login 状态。使用 showrctransport – rcfc 确认 RCFC 端口状态, 两端 RCFC 端口都初始化完成并且 Zone 配置正确后 RCFC 端口状态从 New 变为 ready。

630 cli% showport 0:3:4 1:3:4	
:S:PMode StateNode_WWNPort_WWN/HW_Addr- Type Protocol Label Partner FailoverState	
:3:4 initiator ready 2FF70002AC025C02 20340002AC025C02 rcfc FC	
:3:4 initiator ready 2FF70002AC025C02 21340002AC025C02 rcfc FC	
2	
630 cli% showportdev all 0:3:4	
PtId LpID HadrNode_WWN Port_WWN/HW_Addr- ftrs svpm bbct flenvp_WWN Name	
xa0600 0x00 0x00 2FF70002AC025C02 20340002AC025C02 0x8800 0x0032 n/a 0x0800 20340002AC025C02 0:3:4	
xa0700 0x04 n/a 2FF70002AC025C03 20340002AC025C03 0x0000 0x0032 0x0000 n/a 20340002AC025C02 -	
530 Cll% showportdev all 1:3:4	
PTIG LPID HadrVp www	
x140600 0x00 0x00 2FF/0002AC025C02 21340002AC025C02 0x8800 0x0032 n/a 0x0800 21340002AC025C02 1:3:4	
x140/00 0x05 n/a 2FF/0002AC025C03 21340002AC025C03 0x0000 0x0032 0x0000 n/a 21340002AC025C02 -	
2 total	
2 local	
0.0 Cita Showreeransport - rere	
(3): Peer node www Peer Port www State	
:3:4 2FF70002AC025C03 20340002AC025C03 new	
(3) 4 ZFF/000ZACU2SCU3 ZI34000ZACU2SCU3 New	
030 clis controlport rcrc init -f 0:3:4	
030 clis churchport reie init -T 1:3:4	
030 CLI% SNOWFCTFANSPORT - FCTC	
S:P Peer Node www Peer Port www State	
:3:4 2FF70002AC025C03 20340002AC025C03 Incomplete	
1314 ZFF/000ZAC0Z5C03 ZI34000ZAC0Z5C03 Incomplete	
030 CLIS SNOWFCTFANSPORT - FCTC	
S:P Peer Node www Peer Port www State	
:3:4 2FF/0002AC025C03 20340002AC025C03 feady	
:3:4 ZFF/000ZAC022C03 ZI34000ZAC022C03 Incomplete	
030 CLIX Showretransport -reie	
SiP Peer Node WWN Peer Port WWN State	
:::4 2F7/0002AC022C05 20340002AC022C03 Tealy	
:314 2FF70002AC022C03 2I340002AC022C03 Incomplete	
0.50 Deservice Andre Marken - Charter	
SiP Peer Node www. Peer Port www. State	
1314 2FF70002AC022C03 20340002AC022C03 Teady	
:314 ZFF7000ZAC02SC03 Z134000ZAC02SC03 Teady	



RCFC 端口配置完成后,使用 checkrclink 命令检查两端连通性和吞吐量,在其中一台存储上使用 checkrclink startserver 本地端口命令,把本地存储作为服务器。这里注意 Local IP Addr 后面的 IPv6 地址,后面要使用到。

—	
C670_CN701503MR cli% c	heckrclink startserver 1:3:4
Starting Server	
Test length (secs):	172800
Time now (secs):	1593595001
Min run time (secs):	1593767801
Running link test on:	1:3:4
Local IP Addr:	fe80::2134:2:ac02:5c03
Local Device name:	fcnet2

把另外一端作为客户端,使用 checkrclink startclient 本地端口 对端 IPv6 地址开始检测,300 单位是秒。

C630 cli% checkrclink startclient 1:3:4 fe80::2134:2:ac02:5c03 300 Running Client Side Running link test on: 1:3:4 Test length (secs): 300 Destination Addr: fe80::2134:2:ac02:5c03 Local IP Addr: fe80::2134:2:ac02:5c02 Local Device name: fcnet2	
Measuring link latency	
Average measured latency: 0.108 ms Pings Lost: 0 %	
Starting throughput test, from 1:3:4 -> fe80::2134:2:ac02:5c03	
 Client connecting to fe80::2134:2:ac02:5c03%fcnet2, TCP port 5001 TCP window size: 1285 KByte (default)	
<pre>[5] local fe80::2134:2:ac02:5c02 port 48870 connected with fe80::2134:2:ac02:5c03 port 5001 [4] local fe80::2134:2:ac02:5c02 port 48864 connected with fe80::2134:2:ac02:5c03 port 5001 [3] local fe80::2134:2:ac02:5c02 port 48866 connected with fe80::2134:2:ac02:5c03 port 5001 [6] local fe80::2134:2:ac02:5c02 port 48868 connected with fe80::2134:2:ac02:5c03 port 5001</pre>	

测试完成后会显示当前两套存储通过此链路产生的吞吐量以及是否适合配置远程复制,使用相同方法测试所有端口确认所有端口可以正常配置远程复制。

<pre>[ID] Interval Transfer Bandwidth [5] 0.0-300.0 sec 238319104 KBytes 6507648 Kbits/sec [4] 0.0-300.0 sec 238240128 KBytes 6505520 Kbits/sec [3] 0.0-300.0 sec 238240768 KBytes 6505549 Kbits/sec [6] 0.0-300.0 sec 238298240 KBytes 6507036 Kbits/sec [SUM] 0.0-300.0 sec 953098240 KBytes 26025559 Kbits/sec</pre>
TEST SUMMARY from 1:3:4 -> fe80::2134:2:ac02:5c03 Test Started: Wed Jul 1 17:17:19 CST 2020 Test Finished: Wed Jul 1 17:22:21 CST 2020
Latency: 0.108 ms Lost pings: 0 % Through-put: > 26025559 Kbits/second FC Invalid Words (ne): 0 FC CRC Errors (ne): 0 FC Invalid Words (fe): 0 FC CRC Errors (fe): 0
Link 1:3:4 is SUITABLE for Remote Copy Use



远程复制目标配置

当前远程复制端口配置完成,使用 startrcopy 启用远程复制功能,在主存储上配置了远程复制目标后,由于目标存储还没有进行配置,所以 Link 状态为 Down。



在目标存储上配置远程复制目标后,使用 showrcopy 可见 Target 状态为 ready, Link 状态为 Up。

C670 CN701503MR cli% showport -rcfc N:S:P Mode State ----Node WWN---- ----Port WWN----Rate 0:3:4 initiator ready 2FF70002AC025C03 20340002AC025C03 32Gbps 1:3:4 initiator ready 2FF70002AC025C03 21340002AC025C03 32Gbps 2 C670_CN701503MR cli% creatercopytarget C630 FC 2FF70002AC025C02 0:3:4:20340002AC025C02 C670 CN701503MR cli% showrcopy Remote Copy System Information Status: Started, Normal Target Information Name ID Type Status Options Policy C630 3 FC ready 2FF70002AC025C02 mirror_config Link Information
 Target
 Node
 Address
 Sta

 C630
 0:3:4
 20340002AC025C02
 Up

 receive
 0:3:4
 20340002AC025C02
 Up
 Status Options C670 CN701503MR cli%



使用 admitrcopylink 把另外一条链路也加入到远程复制目标中。

C630 cli% showrcopy

Remote Copy System Information Status: Started, Normal

Target Information

Name ID Type Status Options Policy C670_CN701503MR 3 FC ready 2FF70002AC025C03 mirror_config

Link Information

 Target
 Node
 Address
 Status
 Options

 C670_CN701503MR
 0:3:4
 20340002AC025C03
 Up

 receive
 0:3:4
 20340002AC025C03
 Up

 C630
 cli% admitrcopylink
 C670_CN701503MR
 1:3:4:21340002AC025C03

 C630
 cli% showrcopy

Remote Copy System Information Status: Started, Normal

Target Information

Name ID Type Status Options Policy C670_CN701503MR 3 FC ready 2FF70002AC025C03 mirror_config

Link Information

Target	Node	Address	Status	Options
C670_CN701503MR	0:3:4	20340002AC025C03	Up	
C670_CN701503MR	1:3:4	21340002AC025C03	Down	
receive	0:3:4	20340002AC025C03	Up	
receive	1:3:4	21340002AC025C03	Up	

两套存储都做完此操作后所有复制目标和链路状态显示正常。

C670_CN701503MR cli% showrcopy
Remote Copy System Information Status: Started, Normal
Target Information
Name ID Type Status Options Policy C630 3 FC ready 2FF70002AC025C02 mirror_config
Link Information
Target Node Address Status Options C630 0:3:4 20340002AC025C02 Up - receive 0:3:4 20340002AC025C02 Up - C670_CN701503MR cli% admitrcopylink C630 1:3:4:21340002AC025C02 C670_CN701503MR cli% showrcopy
Remote Copy System Information Status: Started, Normal
Target Information
Name ID Type Status Options Policy C630 3 FC ready 2FF70002AC025C02 mirror_config
Link Information
Target Node Address Status Options C630 0:3:4 20340002AC025C02 Up - C630 1:3:4 21340002AC025C02 Up - receive 0:3:4 20340002AC025C02 Up -



也可以使用 SSMC 配置,选中两套存储后点击 Remote Copy Configurations,点击 Create configuration,左侧选中主存储并勾选端口,右侧选择目标存储并勾选端口,然后点击 Create。

😂 Primera & 3PAR SSMC	Create Configuratio	n Systems ~		?	A 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Remote Copy Configurations 0	Systems				C630,C670_CN7015 ~
Create configuration Name No remote copy configurations	Select a system in each port selection to create New links are automatic. Ink port pairs in the Port of the Porto	oo to display available remote copy ports. Th dditional links. IV) assigned to targets. To reassign the new li Pairs section. 034 1354 034 1354 0354 1354 0670_CN70	en select a port in each of two boxes to create a lini nks to different targets, or to rename any new targe 1503MR v	k. Repeat	
	Port Pairs			_	
	System 🔺 Po	t Target Name	Target Port Target IP/WWN		
	C630 0:3	4 C670_CN701503MR	0:3:4 20340002AC025C03	0	
	C630 1:3	с <i>670_</i> СN701503MR	1:34 21340002AC025C03	Cancel	

远程复制目标创建完成。

😂 Primera & 3PAR SS	MC 🗸 🔍 Search			()
Remote Copy Configurations	1 Status v /	All v Name v		C630,C670_CN7015 ∨
+ Create configuration	⊘ C630, C670_C1	V701503MR Overview	~	Actions ~
Name C630_C670_CN701503MP	General		Remote Copy Links	
	<u>C630</u> • FC	• EC C670 CN7015	250,000,000 KB/h 200,000,000 KB/h 150,000,000 KB/h 100,000,000 KB/h 50,000,000 KB/h 0 KB/h	
	System 🔺 OS Ve	rsion Targets Links	Jun 26	Jul 01
	C630 4.2.0	1 Ready 2 Up	C670_CN7015	C630
	C07_C17013 4.2.0	i Ready 2 Op		
				3.6.1.0.27



远程复制组配置

可以在主存储上使用 creatercopygroup 命令建立模式为同步的远程复制组,以下为示例:

Creatercopygroup -usr_cpg ForVmware C670_CN701503MR:SSD_r6 -snp_cpg ForVmware C670_CN701503MR:SSD_r6 ForVmware C670_CN701503MR:sync

可以使用 admitrcopyvv 命令把卷加入远程复制组,以下为示例:

admitrcopyvv -createvv VMFS5 ForVmware C670_CN701503MR:VMFS5.r (createvv 可以自动创建远程卷)



在主存储执行过 admitrcopyvv 命令后,目标存储上也创建了相同 WWID 的远程卷。

C670	_CN701503N	IR cl:	i% shov	wvv -ro	сору						-Rsv	d(MiB)-	-(MiB)	_			
Id 2 1 0 478	Name .mgmtdata .srdata admin VMFS5.r	Prov full full full tpvv	Compr NA NA NA NA No	Dedup NA NA NA NA	Type base base base base	Copy0f 	BsId 2 1 0 478	Rd RW RW RW RW	-Detailed_ normal normal normal normal	State-	Snp 0 0 512	Usr 524288 102400 10240 512	VSiz 52428 10240 1024 10240	e Rco 8 non 9 non 9 non 9 sec	pyStatus le le condary	RcopyGroup ForVmware.n	154626
4 C670 Remo Stat Grou	total _CN701503M te Copy Sy us: Starte p Informal	1R cl: /stem ed, No cion	i% show Inform ormal	wrcopy	-d gr	roups					512	637440	73932	8			
Name For\ Lc VM C67@	mware.r154 calVV IFS5.r _CN701503M	1626 ID 471 1R cl:	ID Ta 6 Ca Remo† 3 VMFSS i%∎	arget 630 teVV 5	St Ne ID 2	tatus ew Syncs 23 New	Role Secor Status	ndar S	Mode y Sync Resync_ss none	Loca SSD_ Sync_ none	lUser r6 ss V N	Cpg Loc SSD V_iter A	alSnapC _r6 R_iter : NA I	pg Rm Fo S_ite NA	NUserCpg prVmware er LastSyr NA	RmSnapCpg ForVmware ncTime	Options



在 SSMC 或使用 creatercopygroup 命令创建远程复制组。选择主存储并给远程复制组命名,选择自动创建远程卷,设置远程复制组的 User CPG 和 Copy CPG, auto synchronize 策略可以让远程复制 组在故障转移后自动反向同步, auto recover 可以在远程复制链路恢复后自动启动远程复制组。

😂 Primera & 3	Create Group Source	e v	?
Remote Copy Group	Source	Advanced opt	ions i0,C670_CN7015 ~
+ Create group	System	C630 v	
Name	Domain	< None > v	
No remote copy groups	Group	ForVmware	
	Remote virtual volumes	Create automatically	
	User CPG	ForVmware × Q.	
	Copy CPG	ForVmware X Q	
	Auto synchronize	Disabled	
	Auto recover	Disabled	

选择复制目标,模式选择同步,选择复制目标的 User CPG 和 Copy CPG,选择是否在创建复制组后自动启动开始同步,本次不配置 Peer Persistence 所以不勾选 Path management。

😂 Primera & 3	Create Group Source	e v	?	⊋│▼│8│?
Remote Copy Group	Source		Advanced options	i0,C670_CN7015 ~
+ Create group	Target			
Name	Target	C670_CN701503MR(FC) v Select the target system for the remote copy.		
No remote copy groups	Mode	Synchronous ~		
	User CPG	SSD_ró × Q		
	Copy CPG	SSD_ró × Q		
	Start group after completion	No		
	Peer Persistence			
	Path management			



往复制组添加卷,并点击 Create。

😂 Primera & 3	Create Group	Target ~					?	? ⊠ ב
Remote Copy Group	Target oup after compl					Advance	ed options	0,C670_CN7015 ∨
Create group Name No remote copy groups	Peer Persistence Path manager	ment 🗌						
	Volume Pairs Add source volumes. Click are already synchronized,	the edit icon to select a tar deselect the Initial Sync che	get volume for e	ach source volume. To skip	o the initial synchroniza	tion for volume pai	rs that	
	Source Volume	▲ Source System	Virtual Size (GiB)	Target	Target Volume	Initial Sync		
	VMFS5	C630	100.00	C670_CN701503MR	auto-create	~	×	
	vmfs5test	C630	150.00	C670_CN701503MR	auto-create		×	
	vmfsótest	C630	200.00	C670_CN701503MR	auto-create		×	
	Add source volu	mes						
	Changed: Volume	e pairs table		Creat	te Create	+ Ca	ncel	36102

远程复制组创建完成。

		Search				₽ 8 ?
Remote Copy Groups 1	Status	✓ IIA ✓	Name 🗸	State v All v		C630,C670_CN7015 ∨
+ Create group		Þ	ForVmwa	are Overview - 🗧		Actions ~
■ Name ▲ C	Configuration Sta	te	• Create RC G	Group (ForVmware) Completed	3paradm J	ul 1, 2020 6:50:15 PM CST 🛛 🗸
 Porvinware 	1050, C070_CN Nev	v				
			General		Health	
			Name Configuration Domain Mode Source system Source role Source user CPG Source copy CPG Writable LUNs Target system Target role Target role Target copy CPG	ForVmware Co30, C670_CN701503MR — Sync C630 Primary ForVmware ForVmware C630 C670_CN701503MR Secondary SSD_r6 SSD_r6	State State description Group state DR state Policies Auto synchronize Auto recover Over period alert Multi-target Peer Persistence Path management Auto failover	• OK Normal New Normal No No No



远程卷同步原理

使用 showrcopy 命令可以比较直观的看到远程复制组的状态,由于还没有开始同步所以主存储当前 同步状态为 New。

C630 cli% showvv -s VMFS5 Id Name Prov Compr Dedup Type 23 VMFS5 tpvv No No base	Snp (MiB)(% VSize) Rsvd Used Used Wrn L 8064 0 0.0 0	Usr (MiB)(% im Rsvd Used Used 0 72448 62223 60.8	VSize)(Mi VSize)(Mi Wrn Lim Rsvd Used H 0 0 80512 62223	al B)Efficiency ostWr VSize Compact Compress 62222 102400 1.65
1 total C630 cli% showrcopy -d groups	8064 0 ForVmware	72448 62223	80512 62223	62222 102400
Remote Copy System Information Status: Started, Normal	1			
Group Information				
Name ID Target ForVmware 7 C670_CN70156 LocalVV ID RemoteVV VMFS5 23 VMFS5.r vmfs5test 26 vmfs5test, vmfs6test 27 vmfs6test	Status Role 03MR New Primary ID SyncStatus 479 New r 480 New r 481 New	ModeLocalUsSyncForVinwaResync_ssSync_ssnonenonenonenonenonenone	erCpg LocalSnapCpg RmU re ForVmware SSD VV_iter R_iter S_iter NA NA NA NA NA NA NA NA NA	serCpg RmSnapCpg Options _r6 SSD_r6 LastSyncTime NA NA NA
C630 cli% showvv -d VMFS5 Id Name Rd Mstr Prnt Roch Rv 23 VMFS5 RW 1/0/	ch PPrnt SPrnt PBlkRe	mainV 60002AC000000	V_WWN 0000000001700025C02 202	CreationTime Udid 0-06-19 20:03:49 CST 23
1 total C630 cli% showvv -d rcpy* no vv listed C630 cli% ∎		θ		

目标存储当前同步状态也为 New。

C670_CN701503MR cli% showrcopy -d	l groups				
Remote Copy System Information Status: Started, Normal					
Group Information					
Name ID Target ForVmware.r154626 7 C630 LocalVV ID RemoteVV VMFS5.r 479 VMFS5 vmfs5test.r 480 vmfs5test vmfs6test.r 481 vmfs6test	Status Role New Secondary ID SyncStatus 23 New 26 New 27 New	Mode Locall y Sync SSD_r(Resync_ss Sync_s: none none none none none none	JserCpg LocalSnapC 5 SSD_r6 5 VV_iter R_iter NA NA NA NA NA NA	pg RmUserCpg RmSnapCpg O ForVmware ForVmware S_iter LastSyncTime NA NA NA NA NA NA	ptions
C670_CN701503MR cli% showvv -s VM	1FS5.r				
	Snp (MiB)(% VSiz	Us ze)(MiB)	^ (% VSize)	Total (MiB)Fffic	iencv
Id Name Prov Compr Dedup Type 479 VMFS5.r tpvv No No base	e Rsvd Used Used Wri e 512 0 0.0 (n Lim Rsvd Used Us 0 0 512 0 (sed Wrn Lim Rsvd U 0.0 0 0 1024	sed HostWr VSize Compact 0 0 102400 0.00	Compress
1 total C670_CN701503MR cli% showvv -d VM Id Name Rd Mstr Prnt Roch Rw 479 VMFS5.r RW 1/0/	512 0 NFS5.r vch PPrnt SPrnt PBl	512 0 kRemain	1024	0 0 102400 CreationTime 25C02 2020-07-01 18:54:45 0	Udid CST 479
1 + + + -]					
C670_CN701503MR cli% showvv -d rc no vv listed C670_CN701503MR cli%	сру*	0			



在主存储上使用 startrcopygroup 启动复制组,启动会生成任务 ID,使用 showtask -d 可查看任务 详情,此时使用 controlport offline 禁用两个 RCFC 端口。

C630 cli% startrcopygroup ForVmware Group ForVmware starts, task ID = 6995 6996 6997 C630 cli% showtask -d 6995 Id Type Name Status Phase StepStartTimeFinishTimePriorityUser- 6995 remote_copy_sync vmfs6test active 2/3 0/204800 2020-07-01 19:55:49 CST - n/a n/a
Detailed status: 2020-07-01 19:55:49 CST Created task. 2020-07-01 19:55:49 CST Startup adding full sync of volume vmfs6test in group ForVmware to target C670_CN701503MR to t e synchronization list. 2020-07-01 19:55:49 CST Started full sync of volume vmfs6test (offset 0MB length 204800MB) in group ForVmware to targ t C670_CN701503MR has started. (sync_vol: none resync_vol: none.)
C630 cli% showrcopy -d groups
Remote Copy System Information Status: Started, Normal
Group Information
NameIDTargetStatusRoleModeLocalUserCpgLocalUserCpgRmUserCpgRmSnapCpgOptionsForVmware7C670_CN701503MRStartedPrimarySyncForVmwareForVmwareSSD_r6SSD_r6LocalVVIDRemoteVVIDSyncStatusResync_ssSync_ssVV_iterR_iterS_iterLastSyncTimeVMFS523VMF55.r479Syncing (18%) nonenoneNANANAvmfs5test26vmfs5test.r480Syncing (31%) nonenoneNANANAvmfs6test27vmfs6test.r481Syncing (0%) nonenoneNANANA
C630 cli% controlport offline -f 0:3:4 1:3:4

使用 showalert 可见在两端复制链路心跳超过 5s 后提示远程复制链路宕,在复制链路宕掉 10s 后系 统提示远程复制目标宕,

Id :	86
State :	New
Message Code:	0x03a00fa
Time :	2020-07-01 19:56:35 CST
Severity :	Major
Type :	Component state change
Message :	Remote Copy Link 14(C670 CN701503MR 1 3 4) Failed (Down Due To Send Error Or Missing Heartbeat {0x1})
Id :	85
State :	New
Message Code:	0x03a00fa
Time :	2020-07-01 19:56:35 CST
Severity :	Major
Type :	Component state change
Message :	Remote Copy Link 13(C670_CN701503MR_0_3_4) Failed (Down Due To Send Error Or Missing Heartbeat {0x1})
Id :	87
State :	New
Message Code:	0x03900fa
Time :	2020-07-01 19:56:45 CST
Severity :	Major
Type :	Component state change
Message :	Remote Copy Target 4(C670_CN701503MR) Failed (All Links To Target Are Down {0x2})
Id :	88
State :	New
Message Code:	0x00e000a
Time :	2020-07-01 19:56:45 CST
Severity :	Minor
Type :	Task <mark>failed</mark>
Message :	Task <mark>failed</mark>
for details.	Task 6997 (type "remote_copy_sync", name "VMFS5") has <mark>failed</mark> (could not sync volume). Please see task status



此时在主存储上查看远程复制任务已经失败,由于第一次完整复制没有完成所以同步状态为 NotSynced,主存储上此时没有创建任何快照。

C630 cli% showrcopy -d groups
Remote Copy System Information Status: Started, Normal
Group Information
NameIDTargetStatusRoleModeLocalUserCpgLocalSnapCpgRmUserCpgRmSnapCpgOptionsForVmware7C670_CN701503MRStoppedPrimarySyncForVmwareForVmwareSSD_r6SSD_r6LocalVVIDRemoteVVIDSyncStatusResync_ssSync_ssVV_iter R_iterS_iterLastSyncTimeVMFS523VMFS5.r479NotSyncednonenoneNANANAvmfs5test26vmfs5test.r480NotSyncednonenoneNANANAvmfs6test27vmfs6test.r481NotSyncednoneNANANANA
C630 cli% showvv -d rcpy* no vv listed C630 cli% showtask -d 6995 Id Type Name Status Phase StepStartTimeFinishTimePriorityUser- 6995 remote_copy_sync vmfs6test failed 2020-07-01 19:55:49 CST 2020-07-01 19:56:45 CST n/a n/a
Detailed status: 2020-07-01 19:55:49 CST Created 2020-07-01 19:55:49 CST Startup e synchronization list. 2020-07-01 19:55:49 CST Started task. adding full sync of volume vmfs6test in group ForVmware to target C670_CN701503MR to th full sync of volume vmfs6test (offset 0MB length 204800MB) in group ForVmware to target t C670_CN701503MR has started. (sync_vol: none resync_vol: none.) 2020-07-01 19:56:45 CST Stopped 2020-07-01 19:56:45 CST Failed , volume has status UNSYNC.
C630 cli% showvv -d rcpy* no vv listed C630 cli% ▋

在目标存储上查看复制组状态也为 NotSynced,目标存储上没有创建快照。

C670_CN701503MR cli% showrcopy -d groups

Remote Copy System Information Status: Started, Normal

Group Information

Name	II) Target	Sta	tus	Role	Mode	LocalUs	erCpg Lo	calSnapC	pg RmUs	serCpg	RmSnapCpg	Options
ForVmware.r154	626	7 C630	Stop	pped	Secondary	/ Sync	SSD_r6	SS	D_r6	For	Vmware	ForVmware	
LocalVV	ID	RemoteVV	ID	Sync	Status	Resync_ss	Sync_ss	VV_iter	R_iter	S_iter	LastSy	ncTime	
VMFS5.r	479	VMFS5	23	NotS	ynced	none	none	NA	NA	NA	NA		
vmfs5test.r	480	vmfs5test	26	NotS	ynced	none	none	NA	NA	NA	NA		
vmfs6test.r	481	vmfs6test	27	NotS	ynced	none	none	NA	NA	NA	NA		
C670_CN701503M no vv listed C670_CN701503M no vv listed C670_CN701503M	२ cliश २ cliश २ cliश	áshowvv -d r áshowvv -d r á∎	ср у * сру*										



在主存储上上启用 RCFC 端口然后启用复制组,此时系统再次生成复制任务,使用 statrcopy 可以在 主存储和目标存储上看到复制吞吐量。

C630 cli% controlport rst -f 0:3:4 1:3:4 C630 cli% startrcopygroup ForVmware Group ForVmware starts, task ID = 6999 7000 7001 C630 cli% statrcopy									
20:07:35 Target	07/01/202 Node	0 Address	IPC	Total(KBytes)	-Throughput(K Current	Bytes per sec) Averag	Write Same Zero e Current	(KBytes per sec)- Average	
C670_CN7015 C670_CN7015	503MR 0:3: 503MR 1:3:	4 20340002AC025C0 4 21340002AC025C0	03 RCs01 03 RCs11	3 1252981.32 4 1244917.09	0.00 0.00	0.0 0.0	0 0.00 0 0.00	0.00 0.00	
C670_CN701	503MR			2497898.40	0.00	0.0	0.00	0.00	
receive receive	0:3: 1:3:	4 20340002AC025C0 4 21340002AC025C0	03 RCr01 03 RCr11	5 76863.95 6 72534.66	13.25 13.01	13.2 13.0	5 0.00 1 0.00	0.00 0.00	
Receive Send				149398.60 2497898.40	26.26 0.00	26.2 0.0	6 0.00 0 0.00	0.00 0.00	
Total				2647297.01	26.26	26.2	6 0.00	0.00	
C670_CN701 20:08:51 0 Target	503MR cli% 7/01/2020 Node	s statrcopy Address	IPC	۔ Total(KBytes)	Throughput(KBy Current	tes per sec)- Average	-Write Same Zero(K Current	Bytes per sec)- Average	
C630 C630	0:3:4 1:3:4	20340002AC025C02 21340002AC025C02	RCs013 RCs114	154980.76 150825.73	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	
C630				305806.48	0.00	0.00	0.00	0.00	
receive receive	0:3:4 1:3:4	20340002AC025C02 21340002AC025C02	RCr015 RCr116	32617892.53 32493836.42	138838.89 138344.49	138838.89 138344.49	100112.82 101401.17	100112.82 101401.17	
Receive Send				65111728.95 305806.48	277183.38 0.00	277183.38 0.00	201513.99 0.00	201.51 0.00	
Total				65417535.43	277183.38	277183.38	201513.99	201.51	

在主存储和目标存储上使用 showrocpy -d 确认同步完成。

C630 cli% showrcopy -d groups

Remote Copy System Information Status: Started, Normal

Group Information

Name	ID	Та	arget	Sta	tus	Role	Mode	LocalUs	erCpg Lo	calSnap	Cpg RmUs	serCpg	RmSnapCpg	Options
ForVmware	7	C	570_CN701503MR	Sta	rted	Primary	Sync	ForVmwa	re Fo	rVmware	SSD	_r6	SSD_r6	
LocalVV	IL		RemoteVV .	ID	Sync	Status	Resync ss	Sync ss	VV iter	R iter	S iter	LastSy	ncTime	
VMFS5		23	VMFS5.r	479	Synce	ed	none	none	NA	NĀ	NĀ	NA		
vmfs5test		26	vmfs5test.r	480	Synce	ed	none	none	NA	NA	NA	NA		
vmfs6test		27	vmfs6test.r	481	Synce	ed	none	none	NA	NA	NA	NA		
C630 cli% sh	owvv	-d	rcpy*											
no vv listed														
C630 cli% sh	630 cli% showtask -d 6999													
Id Type			Name St	tatu	s Phas	se Step -	Stari	Time		Finis	hTime		Priorit <mark>v-</mark> -	User-
6999 remote	copy_	syı	nc vmfs6test do	one		20	020-07-01 2	20:07:28	CST 2020	-07-01 2	20:08:03	3 CST n,	/a r	ı/a
Detailed sta	tus:													
2020-07-01 2	0:07:	28	CST Created	ta	ask.									
2020-07-01 2	0:07:	28	CST Startup	a	dding	full syn	c of volume	vmfs6te	st in gr	oup For	Vmware t	to targe	et C670 CN7	01503MR to th
e svnchroniz	atior	l	ist.		5	,			5			5		
2020-07-01 2	0:07:	28	CST Started	fı	ull sv	vnc of vo	lume vmfs6t	est (of	fset OMB	lenath	204800	MB) in (aroup ForVm	ware to targe
t C670 CN701	503MF	ha	as started. (s	vnc	vol: i	none res	vnc vol: no	one.)		J			5	
2020-07-01 2	0:08:	03	CST Completed		vnc of	fvolume	mfs6test()	mfs6test) in aro	up ForV	mware to	o targe	t C670 CN70	1503MR has co
moleted. 262	MB of	20	04800MB transmi	itte	d.				, <u> </u>			90		indo co
mp.co.cou) 202		~~ `	Cruitonia											

C630 cli% 📕



再次断开 RCFC 端口并确认远程复制组停止,此时主存储上会创建快照(Resync SS)。所以,根据手册和白皮书介绍,无论是手动停止远程复制组还是 I/0 错误导致远程复制组被终止主存储都会创建快照,然后回复主机继续发送 I/0,主存储创建快照之后,如果之前有 I/0 正在同步到目标存储但最终因为远程复制组被停止而失败,则这些 I/0 会被单独记录到主存储的失败 I/0 列表中,注意远程复制组停止之后的 I/0 不会被记录在失败 I/0 列表中。远程复制组再次启动后,主存储会先送失败 I/0 列表中的数据,然后通过当前数据(据手册和白皮书描述在重新启动远程复制组后主存储也会新建立快照记录最新数据状态,但实际操作中远程复制组启动后并没有看到新的新快照),最新数据状态与旧快照做对比后进行增量复制,把数据同步到目标存储。

C630 cli% showrcopy -d groups

Remote Copy System Information Status: Started, Normal

Group Information

Name ID Target Stat ForVmware 7 C670_CN701503MR Stan LocalVV ID RemoteVV ID VMFS5 23 VMFS5.r 479 vmfs5test 26 vmfs5test.r 480 vmfs6test 27 vmfs6test.r 481	us Role Mode LocalUs ted Primary Sync ForVmwa SyncStatus Resync_ss Sync_ss Synced none none Synced none none Synced none none	erCpg LocalSnapCpg RmUserCp re ForVmware SSD_r6 VV_iter R_iter S_iter Last NA NA NA NA NA NA NA NA NA NA NA NA NA NA NA	g RmSnapCpg Options SSD_r6 SyncTime
C630 cli% controlport offline -f 0:3:4 C630 cli% showrcopy -d groups	1:3:4		
Remote Copy System Information Status: Started, Normal			
Group Information			
NameIDTargetStatForVmware7C670_CN701503MRStopLocalVVIDRemoteVVIDVMFS523VMFS5.r479vmfs5test26vmfs5test.r480vmfs6test27vmfs6test.r481	us Role Mode LocalUs ped Primary Sync ForVmwa SyncStatus Resync_ss Sync_s Stopped rcpy.7.23.4 none Stopped rcpy.7.26.4 none Stopped rcpy.7.27.4 none	erCpg LocalSnapCpg RmUserCp re ForVmware SSD_r6 s VV_iter R_iter S_iter La NA NA NA 20 NA NA NA 20 NA NA NA 20	g RmSnapCpg Options SSD_r6 stSyncTime 020-07-01 20:15:07 CST 020-07-01 20:15:07 CST 020-07-01 20:15:07 CST
C630 cli% showvv -d rcpy* Id Name Rd Mstr Prnt Roch Rwo	h PPrnt SPrnt PBlkRemain	VV_WWN	·····CreationTime····· Udi
d 494 rcpy.7.23.4 R0 1/0/- 23	60002AC	000000000000001EE00025C02 2	2020-07-01 20:15:07 CST 49
4 495 rcpy.7.26.4 R0 1/0/- 26	60002AC	0000000000000001EF000025C02 2	2020-07-01 20:15:07 CST 49
496 rcpy.7.27.4 R0 1/0/- 27 6	60002AC	000000000000001F000025C02 2	:020-07-01 20:15:07 CST 49

此时由于没有新数据,目标存储上不会创建快照,但会在远程复制组启动的时候把主存储失败 I/0 列表的数据进行同步。

C670_CN701503MR cli% showrcopy ·	670_CN701503MR cli% showrcopy -d groups							
emote Copy System Information tatus: Started, Normal								
Group Information								
Name ID Target	Status Role Moo	de LocalUserCpg Local	SnapCpg RmUserCpg RmSnapCpg	Options				
ForVmware.r154626 7 C630 LocalVV ID RemoteVV VMFS5.r 479 VMFS5 vmfs5test.r 480 vmfs5test vmfs6test.r 481 vmfs6test	Stopped Secondary Syr ID SyncStatus Resyr 23 Stopped none 26 Stopped none 27 Stopped none	nc SSD_r6 SD_ri nc_ss Sync_ss VV_iter R_ none NA NA none NA NA none NA NA	Action Action<	8 CST 8 CST 8 CST 8 CST				
C670_CN701503MR cli% showvv -d r	^сру*							
no vv listed								
C670_CN701503MR cli%								



在主存储卷写入数据后再次启动远程复制组,同步完成前远程复制组再次停止,此时主存储创建新的快照(Resync_ss)并在远程复制组再次启动时与当前最新数据做对比之后把增量数据同步到目标存储,由于复制速度很快下图中快照已经被删除。

C630 cli% startrcopygroup ForVmware Group ForVmware starts, task ID = 7009 7010 7011 C630 cli% showrcopy -d groups								
Remote Copy System Information Status: Started, Normal								
Group Information								
Name ID Target ForVmware 7 C670_CN70150 LocalVV ID RemoteVV VMFS5 23 VMFS5.r vmfs5test 26 vmfs5test. vmfs6test 27 vmfs6test.	Status Role 3MR Started Primary ID SyncStatus 479 Synced r 480 Synced r 481 Synced	Mode Loca Sync ForV Resync_ss Sync_ none none none none none none	lUserCpg LocalSnap mware ForVmware ss VV_iter R_iter NA NA NA NA NA NA	DCpg RmUserCpg SSD_r6 rS_iter LastSyr NA NA NA NA NA NA	RmSnapCpg Options SSD_r6 ncTime			
C630 cli% showvv -d rcpy* no vv listed C630 cli% ∎								

目标存储在主存储启动同步时也会生成快照记录当前数状态,在同步过程中如果出现同步意外终止 可以使用此快照回滚到之前数据状态。在同步完成前如果复制组再次停止不会创建新的快照,快照 在同步完成后被删除。鉴于同步复制技术在远程复制组停止(主存储)和启动(目标存储)会使用 快照技术,一个远程复制组不建议加入太多卷,避免大量卷同时建立快照造成的 I/0 等待导致主机 I/0 超时。

C670_CN701503MR cli% showrcopy -d groups	
Remote Copy System Information Status: Started, Normal	
Group Information	
NameIDTargetStatusRoleModeLocalUserCpgLocalSnapCpgRmUserCpgRmSnapCpgOptionsForVmware.r1546267C630StartedSecondarySyncSSD_r6SSD_r6ForVmwareLocalVVIDRemoteVVIDSyncStatusResync_ssSync_ssVV_iter R_iterS_iterLastSyncTimeVMFS5.r479VMFS523Syncingrcpy.7.479.4noneNANANAvmfs5test.r480vmfs5test26Syncedrcpy.7.480.4noneNANANAvmfs6test.r481vmfs6test27Syncedrcpy.7.481.4noneNANANA	
C670_CN701503MR cli% showvv -d rcpy* Id Name Rd Mstr Prnt Roch Rwch PPrnt SPrnt PBlkRemainVV_WWNCreationTime l id	Jd
485 rcpy.7.479.4 R0 1/0/- 479 60002AC0000000000000001E500025C03 2020-07-01 20:29:18 CST	4
486 rcpy.7.480.4 R0 1/0/- 480 60002AC00000000000000001E600025C03 2020-07-01 20:29:18 CST	4
487 rcpy.7.481.4 R0 1/0/- 481 60002AC000000000000000000000000000000000	4
	-
C670_CN701503MR cli% showvv -d rcpy* no vv listed	
C670_CN701503MR cli% showrcopy -d groups	
Remote Copy System Information Status: Started, Normal	
Group Information	
NameIDTargetStatusRoleModeLocalUserCpgLocalSnapCpgRmUserCpgRmSnapCpgOptionsForVmware.r1546267C630StartedSecondarySyncSSD_r6ForVmwareForVmwareLocalVVIDRemoteVVIDSyncStatusResync_ssSync_ssVV_iter R_iter S_iterLastSyncTimeVMFS5.r479VMFS523SyncednoneNANANAvmfs5test.r480vmfs5test26SyncednoneNANANAvmfs6test.r481vmfs6test27SyncednoneNANANA	



远程复制卷验证

由于远程卷无法直接映射并使用,所以需要对远程卷做快照来进行验证数据有效性。首先确认远程复制组中卷的 同步状态是 Synced。如果链路经常存在不稳定情况,可以使用 checkrcopyvv 检查一下远程卷的数据一致性,语法 是 checkrcopyvv –v 本地 VV 名称 复制目标:远程卷名称,比如 checkvv –v VMFS5 C630:VMFS5.r。

\$	Primera &	3PAR SSMC \sim	Q Search						Q 8 ?	
Rer	mote Copy Grou	ips 1	Status v All v	Name v	State	e v All v			C630,C670_CN7015 ~	
+	Create group		₽	ForVmwa	re Volu	me Pairs 🗸	2		Actions ~	
•	Name	▲ Configuration	State	Source Volume 🔺	Sync State	Target Volume	Sync Percent	Last Synced	Backlog	
•	ForVmware	C630, C670_CN.	Started	VMES5	Synced	VMES5 r	_	_	((0))	
				vmfs5test	Synced	vmfs5test.r	_	_	_	
				vmfsótest	Synced	<u>vmfsótest.r</u>	-	-	-	
									3.6.13	о.

在远程卷上创建快照。

\otimes	Primera	Create Snapshot	General ~	?	3 8 ?
Virtu	ual Volumes	General			70_CN7015 ~
٠	Create virtua	System	C670_CN701503MR		
•	Name .srdata	Domain	-		
•	admin	Parent volume	VMFS5.r		
•	admin baremetalv	Dedup	No		
•	baretdvv1 huaweic63	Volume snapshot policy	none		
•	hyper-v	Create snapshot	Once Assign policy		
•	racdata.0	Snapshot name pattern	Parent Volume & Time Stamp 🗸 🗸		
•	racdata.1 racdata.2	Snapshot name	VolumeName:170605141808		
•	racdata.3	Schedule pattern	Once now 🗸		
•	stdc test	Schedule Time on the array	07/01/2020 08:39:54 PM CST		
•	testwindov				
•	VMFS5	Additional Settings			
•	vmfs5test	Snapshot			
•	vmfsótest			_	
	xfsdata		Create Cancel		



然后映射给主机,此处使用 Vmware ESXi 环境作为测试,其他环境方法类似。

\otimes	Primera	Export Virtual Volume	s General ~			?	ଛ∣ ଥ ∣ ?
Virtua	I Volumes	General					70_CN7015 ∨
+ C	reate virtua	System (C670_CN701503MR				
•	Name .srdata	Domain -	_				
• • •	admin admin baremetalv baretdvv1	Virtual Volumes 1 Virtual volumes Volume Name	 Volume Set 	Virtual Size (GiB)			
•	huaweicó3 hyper-v perfvv	VMFS5.r.200701204205		100.00			
•	racdata.0 racdata.1	Export To 1 Hosts					
•	racdata.3	Host Name	▲ Host Set	Host OS			
•	stdc test	ESXI6.7	_	VMware (ESXI) 🗙			
•	VMFS5	Export With					
•	VMFS5.r.20 VMFS5.r.20 vmfs5test	LUN	0 × Ô	Z Auto	numeric value. If		
•	vmfs5test.r vmfsótest vmfsótest.r	Checked: Auto			Export	Cancel	5/31027

在 Vmware ESXi 主机上确认已经扫描到远程卷的快照。

vm vSphere Client Menu ∨	Q Search in all environments C ^I (?) ~ Administrator@VSPHERE	.local 🗸		٢
	№ 10.12.173.255 ACTIONS ~			
 Interface Int	IN12.173.255 ACTIONS ✓ Summary Monitor Configure Permissions VMs Datastores Networks Updates Storage Storage Adapters Storage Devices Image: Configure Refresh Image: Configure Image: Configure Refresh Image: Configure <td> ✓ ✓</td> <td>× </td> <td>Type disk disk disk disk disk disk disk tems</td>	 ✓ ✓	×	Type disk disk disk disk disk disk disk tems
	Authentication Servi Certificate Power Management Advanced System S System Resource Re			
Recent Tasks Alarms				*



挂载 Datastore,这里注意由于源卷仍旧在使用,所以需要分配一个新的签名。

vm vSphere Client	Menu V Q Search in all e	nvironments C (?) v Adm	ninistrator@VSPHERE	elocal V
vm vSphere Client	 Menu V Q Search in all of Al	Important Important Important Mount option Select VMFS mount option. Important An unresolved VMFS volume with signature 5eeeledb-0db7ee34-893f-6cc217375620 has been detected on this disk. Specify whether you want to mount the detected VMFS volume with the same with a new signature, or format the disk. Important Important Assign a new signature Data on the disk will be retained. A new signature will be assigned to the and references to existing signature from VM configuration files will be Datastore will be mounted using the original name. Important Keep existing signature Data on the disk will be retained. The datastore will be mounted using signature. Datastore will be mounted using the original name. Important Format the disk Important The current disk layout will be destroyed and all data will be lost permitting the original mater of the current disk layout will be destroyed and all data will be lost permitting the original mater of the current disk layout will be destroyed and all data will be lost permitting the original mater of the current disk layout will be destroyed and all data will be lost permitting the original mater of the current disk layout will be destroyed and all data will be lost permitting the original mater of the current disk layout will be destroyed and all data will be lost permitting the original mater of the disk mater or the disk mater of the disk mater or the d	ninistrator@VSPHERE	ELOCAL V Free: 148.64 GB Capacity: 149.75 GB Refresh
		CANCEL BACK	< NEXT	No items to display
Recent Tasks Alarms				~

Datastore 挂载完成后可以尝试关闭之前的虚拟机并注册此 Datastore 的虚拟机。

vm vSphere Client Menu ∨	Q Search in all environments	C	? ✓ Administrator@V	SPHERE.LOCAL 🗸	\odot
[] []	Summary Monitor Config	IFS5 ACTIONS ~	VMs		
Dalian Lab datastore1 snap-leeeOcb8-VMFS5 VMFS5 VMFS5 VMFS5TEST vmfs6test	Q Search ✓ Snap-leeeOcb8-VMFS5 > ∴ .sdd.sf	New Folder ⊥ Upload Files ⊥ Upload → Move to)] Rename to X Delete]	Folder 💕 Register VM	🛓 Download 📋 Cop	েন্দ্র yy to
	> Clonetest	Name	⊤ Size ⊤	Modified y	Туре
UVYNforVmware	Clonetest2	Windows Server 2012 R2.nvram	8.48 KB	07/02/2020, 4:	Non-v
		Windows Server 2012 R2.vmdk	12,141,506 KB	07/02/2020, 4	File
		Windows Server 2012 R2.vms	3.72 KB	07/02/2020, 4:	Virtua
		Windows Server 2012 R2.vmx.lck	0 KB	06/27/2020, 12:	File
		Windows Server 2012 R2.vmxf	3.55 KB	06/21/2020, 5:5	File
		4			
					14 items
Recent Tasks Alarms					♦
 Status 				~	
✓ Completed					
Completed					1.00
↓ Completed					
				١	More Tasks





启动虚拟机时需要回答问题,这里选择 I Copied it。

vm vSphere Client Menu ∨				/SPHERE.LOCAL ✓
□ □ □ □ ○ ○	G Windows Server 2012	R2 snap b = 🔮	Image: Book of the second	
✓ 🛄 Dallan Lab ✓ 🛄 Dallan Cluster 🚡 10.12.173.255	Guest OS: Compatibility V/Wware Too	Microsoft Windows Server 201 ESXi 6.7 and later (VM version Not running, version:11265 (Cur	2 (64-bit) 14) rept)	CPU USAGE O Hz
B clonetest2 Answer G B nimble-witness-5 B VMware vCenter This virtual machi	Windows Server 2012 R2	snap to configure certain management :	and networking features.	OB STORAGE USAGE 11.58 GB
聞 Windows Server VMware ESX nee 日 Windows Server O Cancel	ds to know if this virtual machine was moved or	r copied. If you don't know, answer	"I Copied It".	Answer Question
I Moved It I Copied It				
Recent Tasks Alarms	er virtual machines with the same pending ques	ition that need your attention.	CANCEL	^ . ×
- Status		_	_	• + + + + + •
				66% ⊗
✓ Completed				More Tasks

确认虚拟机可以正常启动。

vm vSphere Client Menu ∨	Q Search in all environments C	Administrator@VSPHERELOCAL V
	🕞 Windows Server 2012 R2 snap 🛛 🕨 🛢 🦻	🕲 ACTIONS 🗸
∼ 🗗 10.12.174.255	Summary Monitor Configure Permissions Datastores Netw	works Updates
V 🔝 Dalian Lab	Guest OS: Microsoft Windows Server 2012 (64-	bit) CPU USAGE
10.12.173.255	₩ Windows Server 2012 R2 snap - VMware Remote Console	X
🗗 clonetest	VMRC() ▼ ▼ 母 □	*
日 clonetest2		
VMware vCenter Server Appliance		
🗄 Windows Server 2012 R2		
Windows Server 2012 R2 snap	Press Ctrl+Alt+Delete to sign in.	
	$\Lambda \cdot \cap \cap$	
Recent Tasks Alarms		
Status	$\neg \neg \leftarrow J$	
	Thursday, July 2	
✓ Completed		
		
✓ Completed		
All		More Tasks



故障转移和恢复

由于并没有配置 Peer Persistent,卷只从主存储中映射,所以即使是同步复制,故障转移也需要先停止业务。

🍓 Failover Cluster Manager								- 🗆 ×
File Action View Help								
🗢 🄿 🙍 📰 🖬								
🝓 Failover Cluster Manager	Roles (5)		Actions					
 cpzcstorage.cpzcstorage.co 	Search						🔎 Queries 🔻 🔛 👻 👽	Roles
Nodes	Name	Status	Туре	Owner Node	Priority	Information		🧑 Configure Role
🗸 📇 Storage	🔒 File Server	Running	File Server	Node01	Medium			Virtual Machines
🔠 Disks	RMC6	Off	Virtual Machine	Node02	Medium			Create Empty Role
Enclosures	SQL Server (MSSQLSE	Stopped	Other	Node02	Medium			View
Networks	🛵 SQL-TDC	Stopped	DTC	Node02	Medium			G Refresh
Cluster Events	🛃 Windows Server	Off	Virtual Machine	Node02	Medium			
								SQL Server (MSSQLSERVER)
								C‡ Start Role
	<						>	Ci Stop Role
							Professed Oversen Annuards	Move •
	SQL Server (MSSQLSERVER) Preterred Own							Startup Priority ►
	Status: St	opped	👪 Information Details					
	Priority: M	edium						Show Critical Events
	Owner Node: N	ode02						😩 Add Storage
	Client Access Name: S	QLServer						🚰 Add Resource 🕨
	IP Addresses:	0.12.1/3.24/						More Actions
								🗙 Remove
								Properties
								1 Help
< >	Summary Resources							I

然后取消主存储的卷映射。

\otimes	Primera & 3PAR SSN	1C ~	Unexport	/irtual	Volume S	Sets		_		?	2 2 2	3 ?
Virtua	I Volume Sets 10	Sta									C630,C670_CN7015	. ~
+ Cr • •	eate virtual volume set Name racvvset racvvset	System C630 C670_C	The virtual One or membe To prev virtual	volume set more selec er virtual vo vent data lo volume.	s selected be ted virtual v olumes. oss, ensure tl	elow will be unexpo olume sets have ac nat the host softwa	rted. tive exports that all re is already configu	ow the host to ured to stop usi	access ing these			
• • • •	RCP_ForLinux RCP_ForLinux.r154626 RCP_ForVmware RCP_ForVmware.r154626 RCP_ForWindows	C630 C670_C C630 C670_C C630	1 of 1 selected Name windowsvvs		System C630	Domain —	Members 3	Exports Active	Exported To set:windows			
•	RCP_ForWindows.r154626	C670_C						Unexpo	rt Cancel			
•	windowsvvset	C630	201507110	_				_				
	WINGUWSYYSH	000_00	O SUSANK									
												3.6.1.0.27



在 SSMC 中确认远程复制组中卷的状态为已同步,然后停止远程复制组。

\otimes	Primera & 3P/	AR SSMC \sim	Q Sear	rch							
Rem	ote Copy Groups	3 5	Status v A	v II	Name v	State	V All V				C630,C670_CN7015 ~
+	Create group			•	ForWindo	ws Volu	ıme Pairs 🗸	\$			Actions ~ Create
•	Name 🔺	Configuration	State		Source Volume 🔺	Sync State	Target Volume	Sync Percent	Last Synced	Backlog	Edit
•	ForLinux	C630, C670_CN	Started							(GIB)	Delete
•	ForVmware	C630, C670_CN	Started		<u>hyper-v</u>	Synced	hyper-v.r	_	-	-	Start
•	ForWindows	C630, C670_CN	. Started		<u>sql-server</u>	Synced	sql-server.r	_	-	-	Stop
					<u>stdc</u>	Synced	stdc.r	-	-	-	Sync
											Failover
											Switch failover
											Switchover
											Revert failover
											Recover
											Restore
											Start Peer Motion
https://10	0.12.174.33:8443/#/rc-gr	oups/stop/r/remote	copy/REST/rcvi	ewservice/	/clusters/55ded7156cda0)7219beb43e3a	ab4b58cc/groupcor	nbos/0a6796559d	bea6aa309ee83ae22	2dc832?f_sort=sourceGroupName%3Aas	5C 3610.23

当前主存储角色为 Primary,目标存储角色为 Secondary,点击 Actions-Failover。

\otimes	Primera & 3	PAR SSMC	✓ Q Sear	ch				8 2
Remo	ote Copy Group	s 3	Status v A	II ~ Name ~	State v All v		C63	i0,C670_CN7015 ~
+ 0	Create group			ForW	indows Overview -> \$			Actions ~ Create
	Name ForLinux ForVmware ForWindows	Configuratic C630, C670_ C630, C670_ C630, C670_ C630, C670_	on State CN Started CN Started CN Stopped	General Name Configuration Domain Mode Source system Source role Source ouser C Source ouser C Source system Source ouser C Source ouser C Source system Source ouser C Target system Target system Target system Target copy C Target copy C	ForWindows C630, C670_CN701503MR — Sync n C630 Primary PG ForWindows SCPG ForWindows s C630 n C670_CN701503MR Secondary PG SSD_r6	Health State State description Group state DR state Policies Auto synchronize Auto recover Over period alert Multi-target Peer Persistence Path management Auto failover	Warning Replication stopped Stopped Normal No	Create Edit Delete Start Stop Sync Failover Switch failover Switchover Revert failover Restore Start Peer Motion
								3.61.0.27



点击 Failover。

😂 Primera & 3PAR SSN	Failover ForWindows		?
Name Configu ForLinux C630, C0 ForVinware C630, C0 ForVindows C630, C0	A failover will change the group role on the target system from Se LUNs associated with volumes in the group will become writable i system. In the case of Synchronous Long Distance configurations Remote Copy to synchronize data from other targets and start re- complete.	econdary to Primary-Rev. All by hosts connected to the target i, the operation will also cause plication to those targets when	C630,C670_CN7015 ~
	A Name Configuration Sour ForWindows C630, C670_CN701503MR C630	ce System DR State Writable LUNs Target System) Normal C630 C670_CN701503 MR	
		Failover Cancel	1.01.0227

勾选 I have read and understood all the implications, 点击 Yes, failover。

\otimes	Primera &	3PA	R SSN	Fa	ilover ForWin	dows		?	🚇 🎦 8 ?
Rem	ote Copy Grou	ps 3							C630,C670_CN7015 ~
+	Create group Name ForLinux		Configu C630, C4		A failover will chang LUNs associated wit system. In the case of Remote Copy to syn	e the group role on the target sy h volumes in the group will becc f Synchronous Long Distance co chronize data from other targets	rstem from Secondary to Primary-Rev. All ome writable by hosts connected to the target onfigurations, the operation will also cause and start reolization to those targets when		
•	ForVmware	(C630, C(complete.	, in the second s			
•	ForWindows	(C630, Ca		▲ Name	Configuration	Continuing will make the LUNs writable from hosts connected to both the target system and the original source system.		
				•	ForWindows	C630, C670_CN701503MR	I have read and understood all the implications.		
				(1)	Checked: I have r	ead and understood all the impl	Yes, failover Cancel		
									3.6.1.0.27



此时主存储角色仍旧为 Primary,目标存储角色为 Primary-Rev,此时两端均可读写。

Search		↓ 🎾 🔏 ?
Remote Copy Groups 3 Status All	Name v State v All v	C630,C670_CN7015 ~
+ Create group	▲ ForWindows Overview ~ ₹	Actions v
Name Configuration State ForLinux C630, C670_CN Started ForVmware C630, C670_CN Started	Remote Copy Failover (ForWindows.r154626) Completed	3paradm 🛛 Jul 1, 2020 9:22:24 PM CST 🚽 🗸
▲ ForWindows C630, C670_CN Stopped	Verter atNameForWindowsConfigurationC630, C670_CN701503MRDomain—ModeSyncSource systemC630Source colePrimarySource copy CPGForWindowsSource copy CPGForWindowsWritable LUNsC630, C670_CN701503MRTarget rolePrimary-RevTarget rolePrimary-RevTarget copy CPGSSD_róTarget copy CPGSSD_ró	State • Warning State description Secondary has become primary-rev Group state Stopped DR state Failover Policies Auto synchronize No Auto recover No Over period alert Perisistence Path management No Auto failover No
		361027

此时除了主存储上在停止远程复制组时创建快照,目标存储在故障转移后也创建了快照。

\otimes	Search									
Virtua	Volumes 40	Status v All v Nam	Type v All v		C630,C670_CN7015 ~					
+ C	reate virtual volume		⊘ rcpy.8.490.4 Settings ∨ ≥		Actions ~					
•	Name 🔺	System	Capabilities	Special attributes						
•	racdata.2.r	C670_CN701503MR								
•	racdata.3	C630	Adaptive flash cache —	Stale snapshots	Not allowed					
•	racdata.3.r	C670_CN701503MR	Adaptive optimization —	Restrict export to one	No					
•	rcpy.8.7.4	C630	Priority optimization — Remote copy ForWindows	Zero detect	Disabled					
•	rcpy.8.16.4	C630	remote copy <u>Porvindows</u>	Data integrity field	3PAR DIF					
•	rcpy.8.17.4	C630								
•	rcpy.8.490.4	C670_CN701503MR								
•	rcpy.8.491.4	C670_CN701503MR								
•	rcpy.8.492.4	C670_CN701503MR								
•	sql-server (1)	C630								
•	sql-server.r (1)	C670_CN701503MR								
•	stdc (1)	C630	Allocation	History						
•	stdc.r (1)	C670_CN701503MR	, notation	morery						
•	test	C630	User space warning —	Creation time	Jul 1, 2020 9:22:24 PM CST					
•	testwindows	C630	User space limit —	Retention time	-					
•	VMFS5	C630	Copy space warning —	Expiration time	_					
•	VMFS5.r (1)	C670_CN701503MR	Copy space limit —							
•	VMFS5.r.200701204205	C670_CN701503MR								
•	vmfs5test	C630								
•	vmfs5test.r	C670_CN701503MR								
•	vmfsótest	C630								
•	vmfsótest.r	C670_CN701503MR								
•	xfsdata	C630			3.6.1.0.27					



如果此时想回退故障转移前的状态,可以使用 Revert failover。

Search	Solution Primera & 3PAR SSMC \sim \bigcirc Search \bigcirc										
Remote Copy Groups 3 Status ~ All ~	Name ~ State ~ All ~	C630,C6	570_CN7015 ~								
Create group Name Configuration State	▲ ForWindows Overview ~ ২	Health	Actions ~ Create Edit								
 ForLinux Có30, Có70_CN Started ForVmware Có30, Có70_CN Started A ForWindows Có30, Có70_CN Stopped 	GeneralNameForWindowsConfigurationC630, C670_CN701503MRDomain—ModeSyncSource systemC630Source colePrimarySource copy CPGForWindowsSource copy CPGForWindowsWritable LUNsC630_CS70_CN701503MRTarget systemC670_CN701503MRTarget rolePrimary-RevTarget copy CPGSSD_róTarget copy CPGSSD_ró	Frearm State Warning State description Secondary has become prim Group state Stopped DR state Fallover Policies Auto synchronize Auto recover No Over period alert — Persistence — Path management No Auto failover No	Delete Delete Start Stop Sync Failover Switchover Revert failover Recover Restore Start Peer Motion								
			3.6.10.27								

点击 Revert failover。

\otimes	Primera & 3P	PAR SSN	Reve	ert Failover	ForWindows	_		_	_	?		8 ?
Remo	Create group Name ForLinux ForVmware ForWindows	3 Configu C630, C4 C630, C4	F b v t	Reverting a failover v secome Primary and rolumes in the group arget system.	vill revert a previous failover opera the groups on the target system S will become writable by hosts on t	tion. The groups on the econdary. All LUNs ass the source system and	e source system ociated with non-writable o	n will n the	Tarant Sustam		C630,C670_CN70	15 v
			•	ForWindows	C630, C670_CN701503MR	C630	Failover	C630, C670_CN7 O1503MR Revert failover	C670_CN701503 MR]		
												3.6.10.27



勾选 I have read and understood all the implications, 点击 Yes, revert failover。

SPrimera & 3PAR SSN	Revert Failover ForWindows ?	💭 🎝 8 ?
Remote Copy Groups 3		C630,C670_CN7015 ∨
+ Create group	Reverting a failover will revert a previous failover operation. The groups on the source system will	
● Name ▲ Configu ● ForLinux C630, Cr	become Primary and the groups on the target system Secondary. All LUNs associated with volumes in the group will become writable by hosts on the source system and non-writable on the target system.	
ForVmware C630, Cr ForWindows C630, Cr	A Name Configuration Continuing will make the LUNs writable from hosts connected to the original source system.	
	▲ ForWindows C630, C670_CN701503MR	
	Continue with revert failover?	
	Checked: I have read and understood all the impli	
		361027

此时主存储角色仍旧为 Primary,目标存储角色为 Secondary。

😂 Primera & 3PAR SSMC 🗸	Q Search			2 2 ?
Remote Copy Groups 3	Status v All v Name v	State v All v		C630,C670_CN7015 ∨
+ Create group	ForWindow	ws Overview ∨ ₹		Actions ~
Name Configuration	State General		Health	
ForLinux C630, C670_CN ForLinux C630, C670_CN	Started Name	ForWindows	State	Warping
ForWindows Có30, Có70_CN	Stopped Configuration Domain Mode Source system Source role Source user CPG	Coston Control	State description Group state DR state	Replication stopped Stopped Normal
	Source copy CPG Writable LUNs Target system Target role Target user CPG Target copy CPG	ForWindows Có30 Có70_CN701503MR Secondary SSD_ró SSD_ró	Policies Auto synchronize Auto recover Over period alert Multi-target Peer Persistence Path management Auto failover	No No No



此时由于远程复制组仍旧在停止状态,主存储上保留的快照仍旧是故障转移前停止远程复制组时创 建的快照。

⊗ I	Primera & 3PAR S	SMC ~ Q Sear	ch				<u> </u>	3 8 ?
Virtual	Volumes 40	Status v All v	Nam	e v	Type 🗸 All 🗸		C630,C67	'0_CN7015 ~
+ Cr	eate virtual volume		Þ	rcpy.8.7.4	Settings 🗸 💲			Actions ~
•	Name	⊾ System		Capabilities		Special attributes		
•	racdata.2.r	C670_CN701503MR						
•	racdata.3	C630		Adaptive flash cache	-	Stale snapshots	Not allowed	
•	racdata.3.r	C670_CN701503MR		Adaptive optimization	-	Restrict export to one	No	
•	rcpy.8.7.4	C630		Priority optimization	- EorWindows	Zero detect	Disabled	
•	rcpy.8.16.4	C630		Kenore copy	POLYMINGOWS	Data integrity field	3PAR DIF	
•	rcpy.8.17.4	C630						
•	rcpy.8.490.4	C670_CN701503MR						
•	rcpy.8.491.4	C670_CN701503MR						
•	rcpy.8.492.4	C670_CN701503MR						
•	sql-server (1)	C630						
•	sql-server.r (1)	C670_CN701503MR						
•	stdc (1)	C630		Allocation		History		
•	stdc.r (1)	C670_CN701503MR		,				
•	test	C630		User space warning	-	Creation time	Jul 1, 2020 9:18:28 PM CST	
•	testwindows	C630		User space limit	-	Retention time	-	
•	VMFS5	C630		Copy space warning	-	Expiration time	-	
•	VMFS5.r (1)	C670_CN701503MR		Copy space limit	-			
•	VMFS5.r.200701204205	C670_CN701503MR						
•	vmfs5test	C630						
•	vmfs5test.r	C670_CN701503MR	- 1					
•	vmfsótest	C630						
•	vmfsótest.r	C670_CN701503MR						
•	xfsdata	C630				 		3.6.1.0.27

目标存储也仍旧保留故障转移后创建的快照。

\otimes	Primera & 3PAR SS	MC 🗸 🔍 Search					3 8 ?
Virtua	al Volumes 40	Status v All v Nar	me v	Type 🗸 All 🗸		C630,C67	70_CN7015 ∨
+ C	reate virtual volume	Þ	⊘ rcpy.8.490.4	4 Settings ∽ ≳			Actions v
•	Name 🔺	System	Capabilities		Special attributes		
•	racdata.2.r	C670_CN701503MR					
•	racdata.3	C630	Adaptive flash cache	-	Stale snapshots	Not allowed	
•	racdata.3.r	C670_CN701503MR	Adaptive optimization	-	Restrict export to or	e No	
•	rcpy.8.7.4	C630 C670_C	N701503MR primization		Zero detect	Disabled	
•	rcpy.8.16.4	C630	Kentore copy	<u>r or windows</u>	Data integrity field	3PAR DIF	
•	rcpy.8.17.4	C630					
•	rcpy.8.490.4	C670_CN701503MR					
•	rcpy.8.491.4	C670_CN701503MR					
•	rcpy.8.492.4	C670_CN701503MR					
•	sql-server (1)	C630					
•	sql-server.r (1)	C670_CN701503MR					
•	stdc (1)	C630	Allocation		History		
•	stdc.r (1)	C670_CN701503MR			,		
•	test	C630	User space warning	-	Creation time	Jul 1, 2020 9:22:24 PM CST	
•	testwindows	C630	User space limit	-	Retention time	-	
•	VMFS5	C630	Copy space warning	_	Expiration time	-	
•	VMFS5.r (1)	C670_CN701503MR	copy space initi				
•	VMFS5.r.200701204205	C670_CN701503MR					
•	vmfs5test	C630					
•	vmfs5test.r	C670_CN701503MR					
•	vmfsótest	C630					
•	vmfsótest.r	C670_CN701503MR					
•	xfsdata	C630					3.6.1.0.27



再次故障转移并映射远程卷。

😂 Primera & 3PAR S	Export Virtual Volume Set General ~ ?	
Virtual Volume Sets 10	General	C630,C670_CN7015 ~
+ Create virtual volume se	System C670_CN701503MR	
Name raccosset	Domain —	
racvvset racvvset RCP_ForLinux RCP_ForLinuxr154626 RCP_ForVmware RCP_ForVmware.r154626 RCP_ForVmindows.r154622 windowsvvset windowsvvset	Virtual Volume Set 1 Virtual volume set Volume Set A windowsvvset 3 State Export To 1 Host set	
	Host Set A Members Volumes Exported To Hosts Volumes Exported To Host Set WindowServer 2 0 0 × Add 1 added	
	Export With LUN 0-2 × Q Z Auto LUN value may be any numeric value. If	
	Changed: LUN to "Auto" Export Cancel	3.61.0.27

确认主机挂载远程卷可以正常启动应用,然后写入新数据。

Eailover Cluster Manager											- C	1 ×
File Action View Help												
 Failover Cluster Manager Cpzcstorage.cpzcstorage.co 	Roles (5)							Actions				
Roles	Search							Roles				•
Nodes	Name	Status	Туре	Owner Node	Priority	Information		🧑 Cor	figure Role			
V A Storage	FileServer	Running	File Server	Node01	Medium			Virt	ual Machines			· ·
P	RMC6	(🗊 Running	Virtual Machine	Node02	Medium	-	1	Crea	ate Empty Role			
📰 E 🛃 Microsoft S	SQL Server Management St	udio (Administrator)		Quick Launch (Ctrl+	+Q) 4	P = = ×		Viev	v			•
Netw <u>File</u> Edit <u>Vie</u>	ew <u>P</u> roject <u>T</u> ools <u>V</u>	<u>V</u> indow <u>H</u> elp						🗋 Refr	esh			
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Connect 👻 🏺 👌	¥ = 🕆 🖒 🔸			File	Home	Share View					~ 🕐	
🖃 🔂 SQLSERVE	ER (SQL Server 15.0.2000.5 -	CI		~	→ * ↑	≪ ClusterStorage ⇒	Volume1 > testdata	~ Ö	Search testdata		Q	
	itv					^ Name	^		Date more	dified	Type	
🗉 💼 Server	r Objects			*	Quick access	- 1.64			£ (25 /202)	12:02 014		•
🕀 🛑 Replic	ation				_ Desktop	* 2.vhd			6/26/2020	12:02 PIVI	Hard	•
E PolyB	ase /s On High Availability				- Downloads	* 3.vhd			6/26/2020	0 12:02 PM	Hard	
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🗉 🛑 Integr	ration Services Catalogs				Pictures	*						
± ±6 SQLS	erver Agent ht Profiler				etc							•
				<u>.</u>	System (C:)							•
					testdata							
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					Documents							
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此时使用 Recover 功能反向同步主存储上的卷。

Search		(B)	3 8 ?
Remote Copy Groups 3 Status All	Name v State v All v	C630,C6	70_CN7015 ~
+ Create group ● Name ▲ Configuration State ● ForLinux C630, C670_CN Started ● ForVmware C630, C670_CN Started ▲ ForWindows C630, C670_CN Stopped	ForWindows Overview	Health State A Warning State description Secondary has become prim Group state Stopped Do dotate Science	Actions ~ Create Edit Delete Start Stop
	Mode Sync Source system C630 Source role Primary Source user CPG ForWindows Source copy CPG ForWindows Writable LUNs C630, C670_CN701503MR	DR state Failover Policies	Sync Failover Switch failover Switchover Revert failover
	Target system C670_CN701503MR Target role Primary-Rev Target user CPG SSD_r6 Target copy CPG SSD_r6	Auto synchronize No Auto recover No Over period alert — Multi-target Peer — Persistence Path management	Recover Restore Start Peer Motion
https://10.12.174.33:8443/#/rc-groups/recover/r/remotecopy/REST/rcviewser	rice/clusters/55ded7156cda07219beb43e3ab4b58cc/groupcombos/0a6796559dbe	Auto failover No	3410.27

点击 Yes, recover。





此时主存储角色变为 Secondary-Rev,目标存储角色仍旧为 Primary-Rev。

\otimes	Primera & 3I	PAR SSMC \sim	Q Search				
Remot	te Copy Groups	3 S	itatus 🗸 🛛 All 🤊	v Name v	State v All v		C630,C670_CN7015 ∨
+ CI	reate group			ForWindo	ws Overview ~ 🗧		Actions ~
•	Name	Configuration	State	General		Health	
•	ForLinux	C630, C670_CN	Started				
•	ForVmware	C630, C670_CN	Started	Name	ForWindows	State	 Warning
	ForWindows	C630, C670_CN	Started	Configuration	C630, C670_CN701503MR	State description	Direction of replication reversed
				Domain	_	Group state	Started
				Mode	Sync	DR state	Recover
				Source system	Cosu Secondary: Pay		
				Source user CPG	ForWindows		
				Source copy CPG	ForWindows		
				Writable LUNs	C670_CN701503MR	Policies	
				Target system	C670_CN701503MR	Auto synchronize	No
				Target role	Primary-Rev	Auto recover	No
				Target user CPG	SSD_r6	Over period alert	_
				Target copy CPG	SSD_r6	Multi-target Peer Persistence	-
						Path management	No
						Auto failover	No
							3.6.1.0.27

同步完成后两端存储上的快照都被删除。

\otimes	Primera & 3I	PAR SSMC \sim	Q Searc	ch							P 8 ?
Remo	ote Copy Groups	3 St	atus ~ All	- V	Name v	State	e v All v				C630,C670_CN7015 ~
+ (Create group			•	🔺 ForWindo	ws Volu	ume Pairs 🗸	\$			Actions ~
•	Name	▲ Configuration	State		Source Volume 🔺	Sync State	Target Volume	Sync Percent	Last Synced	Backlog	
•	ForLinux	C630, C670_CN	Started							(00)	
•	ForVmware	C630, C670_CN	Started		hyper-v	Synced	hyper-v.r	-	-	-	
	ForWindows	C030, C070_CN	Started		sqi-server	Synced	sqi-server.r	_	_	_	
					5100	oyneed	STOCK				
											3.6.1.0.27



在做 Restore 前停止业务。

									~	
🍓 Failover Cluster Manager								-		×
<u>File Action View H</u> elp										
🗢 🄿 🙍 📅 🚺 🖬										
📲 Failover Cluster Manager	Roles (5)		Actions							
cpzcstorage.cpzcstorage.co	Search						🔎 Queries 🔻 🔛 👻 😪	Roles		
Nodes	Name	Status	Type	Owner Node	Priority	Information		len Configure Role		
🗸 📇 Storage	FileServer	Running	File Server	Node01	Medium			Virtual Machines		•
Disks	RMC6	Off	Virtual Machine	Node02	Medium			📷 Create Empty Role		
Enclosures	SQL Server (MSSQLSE.	Stopped	Other	Node02	Medium			View		•
Networks	🛵 SQL-TDC	Stopped	DTC	Node02	Medium			Q Refresh		
Cluster Events	🔒 Windows Server	Off	Virtual Machine	Node02	Medium			Help		
								Windows Server		
								- Connect		
								() Start		
	·						,	O Save		
	Vindows Serv	er					Preferred Owners: Any node	Shut Down		
								Turn Off		
	Virtual Machine Windows	s Server						Settings		
		Status:	Off					Manage		
		CPU Usage: Memory Demand:	e: 0%		Up Time:	Mamoor	0:00:00 0 MB	1 Replication		
		Integration Services	c	UMB		canory.	No contact	Move		
		Computer Name:			Operating S	ystem:		Cancel Live Migration		
		Date Created:			Operating S	system Version:		Change Startup Priority		
		version.						Information Details		
		Monitored Services:						Show Critical Events		
	F	Replication						Add Storage		
5	F	Replication State:	Not enable	d				Add Resource		•
								More Actions		
								× Remove		
								Properties		
								Help		
< >	Summary Resources									

把远程卷取消映射。

🔗 Primera & 3PAR SS	MC ~	port Virtual Volume Sets			?	9
Virtual Volume Sets 10	Sta					C630,C670_CN7015 ∨
Create virtual volume set Name racvvset racvvset	The • • • • • • • • • • • • •	e virtual volume sets selected below will One or more selected virtual volume s member virtual volumes. To prevent data loss, ensure that the h virtual volume.	be unexported. ets have active exports that allo host software is already configu	ow the host to access red to stop using these		
RCP_ForLinux RCP_ForLinux:r154626 RCP_ForVmware RCP_ForVmware.r154626 RCP_ForVmware.r154626 RCP_ForWindows RCP_ForWindows:r154626	C630 1 of 1 sele C670_C Name C630 windo C670_C C630 C670_C	ected ne 🛦 System dowsvvset C670_CN701503MR	Domain Members — 3	Exports Exported To Active set:WindowServer		
windowsvvset	C630			Can	ei	
• Windowsvoor	COULERVISIOSMR					



使用 Restore 恢复两端存储原始角色和流向。

Remote Copy Groups 3 Status ~ All ~ Name ~ State ~ All ~ C630,C670_C1	N7015 ~
Remote Copy Groups 3 Status All Name State All Costop Corp. • Create group • All Overview < > > Create group Create group > > Create group Create group <th>Actions × Actions × eate it lete art op nc lover itch failover itch failover itch failover store extremested art Peer Motion</th>	Actions × Actions × eate it lete art op nc lover itch failover itch failover itch failover store extremested art Peer Motion
https://10.12.174.338443/#/rr-oroups/restore/r/remotecony/RFST/rrvjewsevice/clusters/55ded7156cda07219heb43e3ab4b58cc/oroupcombos/0a6796559dbea6aa300ee83ae224-8222f contecourseGroupName@20.ecc	

点击 Yes, restore。





Restore 完成后主存储恢复 Primary 角色,目标存储仍旧为 Secondary 角色。

Remote Copy Groups 3 Status v All v Name v State v All v C630,C670_CN7015 v	
+ Create group Overview ~ >	~
Name Configuration State • ForLinux C630, C670_CN Statted • ForVmware C630, C670_CN Statted • ForVmodes C630, C670_CN Statted • ForWindows Configuration C630, C670_CN • Configuration C630, C670_CN.701503MR State • OK • ForWindows Configuration C630, C670_CN.701503MR State description Normal • Domain - Group state Started • Name Source system C630 C630 Source user CPG ForWindows Source user CPG ForWindows Source copy CPG ForWindows Source copy CPG ForWindows Virtable LUNs C630 C630 Policies	
Target systemC670_CN701503MRAuto synchronizeNoTarget roleSecondaryAuto recoverNoTarget user CPGSSD_r6Over period alert-Target copy CPGSSD_r6Multi-target Peer Persistence-Path managementNoAuto failoverNo	

此时挂载卷确认业务正常并可以看到新写入的数据。

📲 Failover Cluster Manage \times File Action View Help 🔶 🄿 🖄 📰 🚺 📲 Failover Cluster Manager Roles (5) Actions cpzcstorage.cpzcstorage Queries 🔻 🔛 👻 😪 Roles 🐻 Roles len Konfigure Role... Nodes Name Status Туре Owner Node Priority Information 🗸 📒 Storage File Server Bunning Virtual Machines... File Server Node01 Medium • Disks Pools 損 RMC6 Running Virtual Machine Node02 Medium 🛗 Create Empty Role Image: Second 📙 | 🛃 📕 🖛 | testdata × 0 Home Share View 🌀 🗸 🖸 📩 📩 🗧 🚔 🔛 🔐 💭 New Query 🔎 🔝 🔝 ← C Search testdata ρ 8 # NF | 🛛 🖒 Execute 🔳 🗸 🛗 Documents 🖈 ^ Name Date modified Туре Pictures * 6/26/2020 12:02 PM Har Object Explorer 🕳 1.vhd Connect - # ¥ = ▼ ♂ -* etc 🕳 2.vhd 6/26/2020 12:02 PM Hard 6/26/2020 12:02 PM Hard 🕳 3.vhd 🏪 System (C:) 🖃 🐻 SQLSERVER (SQL Server 15.0.2000.5 - CI 🕀 🛑 Databases testdata 🗄 📕 Security 3 Volume1 🕀 📕 Server Objects This PC 📃 Desktop ۲ Always on Figh Availability Management Integration Services Catalogs SQL Server Agent Documents ъ 🕹 Downloads Music XEvent Profiler • E Pictures 📑 Videos 🏪 System (C:) III Ouerum Vele]== | 3 items • More Actions 🔀 Remove Properties Help 🗇 Ready > Summary Resources <