Logical Corruption Protection and Cyber Resiliency for Z

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The question is not IF you will be attacked but WHEN

\$170 B



Explosive growth of attacks on enterprise operations 2019 compared to 2018¹

+ 50+

Unique malware distributed in various Covid-19 themed campaigns ⁴ © 2021 IBM Corporation

X- force intelligence index report 2020 Forbes Aug 18 2020 nce news May 23 2017 1,XF IRIS internal data analysis IBM 2020 e Week July 8, 201

Predicted global ransomware demands WW forecast ⁶

\$8 Billion

Estimated global cost of WannaCry attack ³

67%

111K

Average increase in ransomware destructive attacks in 2019¹

Average ransomware cost

\$230 Million

GDPR fine for one data up from 6700 in 2018 ² breach ⁵



Honda Hackers May Have Used Tools Favored by Countries The New Hork Times



'Payment sent' - travel giant CWT pays \$4.5 million ransom to cyber criminals



The Garmin Hack Was a Warning

As ransomware groups turn their attention to bigger game, expect more high-profile targets to fall



BBC

NEWS

The **A** Register'

Major bank-logic bomber jailed for eight years

Real-life BOFH ordered to pay \$3.1m restitution

The Untold Story of NotPetya, the Most **Devastating Cyberattack in History**

Crippled ports. Paralyzed corporations. Frozen government agencies. How a single piece of code crashed the world.

Orion: More US government agencies hacked solarwinds

GDPS before Logical Corruption Protection

- 1. IBM defines IT resilience as the ability to rapidly adapt and respond to any internal or external disruption, demand, or threat, and continue business operations without significant impact.
- 2. IT resilience is related to, but broader in scope, than *disaster recovery*. Disaster recovery concentrates solely on recovering from an *unplanned* event. It encompasses the Recovery Time Objective (RTO) and the Recovery Point Objective (RPO).
 - RTO How long can the business afford to wait for IT services to be resumed following a disaster?
 - RPO How much data is the business willing to recreate following a disaster?
- 3. GDPS is a portfolio of several solutions, each addressing a different set of IT resiliency goals that can be tailored to meet your RPO and RTO.
- 4. GDPS was designed to provide **High Availability** and **Disaster Recovery** capabilities to protect against a range of planned and unplanned site and infrastructure component outages using a combination of Metro Mirror, Global Mirror, Freeze, HyperSwap, and Sysplex functionality.
- 5. In a world of ever-increasing cyber attacks, addressing these objectives alone is no longer sufficient.



GDPS with Logical Corruption Protection

- 1. GDPS now includes Logical Corruption Protection support to protect against cyber attacks and more.
- 2. A licensed offering that can be deployed in a range of different GDPS solutions.
 - LCP-Manager(MM) and LCP-Manager(GM)
- 3. Provides the ability to secure Point-In-Time captures of critical data using either FlashCopy or Safeguarded Copy.
- 4. These Point-In-Time captures can be used for a variety of purposes



Catastrophic

Recover the entire environment back to the point in time of the copy as this is the only recovery option



Recover the copy and use the copy to investigate the problem and determine what final recovery action is required.



Surgical

Extract data from the copy and logically restore back to the production environment



Validation

Regular analytics on the copy to provide early detection of a problem or reassurance that the copy is a good copy prior to a further action



Offline Backup

Backup the copy of the environment to offline media to provide a second layer of protection

Required Characteristics for Protection Copies







Granularity

LCP must be able to create multiple secure copies to minimize data loss in the event of a corruption incident

Isolation

The secure copies must be isolated from the active production data so that it cannot be corrupted by a compromised host system. This is also known as an Air Gap solution Immutability The secure copies must be protected against unauthorized manipulation .

The Anatomy of LCP

Source devices are where the copies are taken from. These could be production volumes in a virtual isolation environment or a staging volume where the environment is physically isolated. The source volumes inherit the security/protection provided by the production environment policies and capabilities.



Protection/Backup capacity provides one or more logical protection Point-In-Time copies which are not accessible by any systems. Additional security measures aim to protect these from inadvertent or malicious actions.

Virtual versus Physical Isolation



- The protection copies are created in one or more storage systems in the existing HA and DR topology.
- The storage systems typically reside in the same SAN and TCP/IP network as the production environment.
- Potential performance impact during the capture process.
- Additional storage systems are used for the protection copies.

Global

Mirror

AIR GAP

RS3

RC1

FCn

Safeguarded

Backup Capacity

- The storage systems do not typically reside in the same SAN or TCP/IP network as the production environment.
- The storage systems have restricted access and even different administrators to provide separation of duties.
- No performance impact during the capture process.

Metro

Mirror

RS1

RS2

Safeguarded Copy Sets



FlashCopy Copy Sets



Recovery Copy Sets



LCP Capture Frequency





Safeguarded Backup Capacity



Expanding Safeguarded Backup Capacity



Using the Expanded Safeguarded Backup Capacity



Backup Capacity

Safeguarded Backup T8 (Current)

Safeguarded Backup T4 (Gating)

Safeguarded Backup T5 (Gating)

Expanded Safeguarded **Backup Capacity**

- The newly expanded area of the Backup Capacity may not become immediately available to subsequent captures.
- There may be one or more existing backups that are gating the use of the expanded area.
- These gating backups must be released before new captures can extended in to the expanded Backup Capacity.

Monitoring Expanded Safeguarded Backup Capacity

GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Scheduling Safeguarded Copy Backup Volume Expansion Monitor GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Profile(GOLD SGC RS1) CopySet(1) Site(1) GEORPT * SafeGuarded Copy Backup Volume Expansion Report GEORPT * Report Token: 5F2A726C Date: 20218 Time: 10:48:45 * GEORPT * Copy Set: 1 Gated: 00008 * GEORPT * Operator Cnt Source Volume Pool vCapC vCapM Segno GEORPT * AUT1MT1 003 00BAZ11.03 02-04 0013 011130 00010 5F2A70D2 * GEORPT * AUT1MT3 001 00BAZ11.C5 03-03 0013 011130 00010 5F2A70D2 * GEORPT * AUT1MT4 001 00BAZ11.FA 17-17 0012 005565 00005 5F2A70D2 * GEORPT * AUT1MT4 003 00BAZ11.FA 18-1A 0012 016695 00015 5F2A70D2 * GEORPT * Pool: Backup Volume Storage Pool Identifier GEORPT * vCapC: Backup Volume Virtual Capacity (cylinders) GEORPT * vCapM: Backup Volume Virtual Capacity Multiplier GEORPT * Seque: Capture sequence number that is gating expansion * GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Safequarded Copy Backup Volume Expansion Monitor GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Profile(GOLD SGC RS1) CopySet(1) Site(1) AZK1P PH26334-VPCESGC3: 8 Safeguarded Copy Backup volumes are currently expanding GEOTRC AUTGEO GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Oldest sequence number is 5F291191 UTC(2020/08/04.07:43:13) GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Current sequence number is 5F2A70EB UTC(2020/08/05.08:42:19) GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Latest gating sequence number is 5F2A70D2 UTC(2020/08/05.08:41:54) GEOTRC AUTGEO AZK1P PH26334-VPCESGC3: Check Safequarded Copy Backup Volume Expansion Report Token (5F2A726C)

GDPS LCP Topologies

Тороlоду	Isolation	Comments
MM2SITE	Virtual	Requires APAR PH17926
MM2SITE	Physical	Requires APAR PH17927
MM3SITE	Virtual	Requires APAR PH17926
MM3SITE	Physical	Requires APAR PH17927
GM2SITE	Virtual	Requires APAR PH17927
GM2SITE	Physical	Requires APAR PH40027 – Target October 2021
MGM3SITE	Virtual	On Metro Mirror replication leg – Requires APAR PH26080
MGM3SITE	Virtual	On Global Mirror replication leg – Requires APAR PH26080
MGM3SITE	Physical	Requires APAR PH10357
MGM4SITE	Virtual	Not currently supported
MGM4SITE	Physical	Requires APAR PH10357
MZGM3SITE	Virtual	On Metro Mirror replication leg – Requires APAR PH17926
MZGM3SITE	Physical	Not supported
MZGM4SITE	Virtual	On Metro Mirror replication leg – Requires APAR PH17926
MZGM4SITE	Physical	Not supported

GDPS Metro – Virtual Isolation



- Captures can be taken on the Metro Mirror primary or secondary volumes.
- Extended Long Busy used to establish data consistency during capture.
- Response time user impact may be experienced.

GDPS Metro – Physical Isolation



- Global Mirror is a physically isolated cascaded replication leg.
- Captures can be taken on the Global Mirror secondary volumes.
- LCP managed coordination to pause Global Mirror, achieve data consistency, and take the capture.
- No response time user impact experienced.
- No elongated RPO observed whilst Global Mirror paused. This is not a Disaster Recovery solution.

GDPS Global – Virtual Isolation

GDPS Global – GM2SITE



- Captures can be taken on the Global Mirror secondary volumes.
- LCP managed coordination to pause Global Mirror, achieve data consistency, and take the capture.
- No response time user impact experienced.
- Elongated RPO observed whilst Global Mirror paused.

GDPS Global – Physical Isolation

GDPS Global – GM2SITE



- Global Copy is a physically isolated cascaded replication leg.
- Captures can be taken via the Global Copy secondary volumes.
- LCP managed coordination to pause Global Mirror, achieve data consistency, and take the capture.
- No response time user impact experienced.
- Elongated RPO observed whilst Global Mirror paused.

GDPS Metro Global – Virtual Isolation



GDPS Metro Global – MGM3SITE

- Captures can be taken via the Metro Mirror primary or secondary volumes, or the Global Mirror secondary volumes.
- LCP managed coordination to pause Global Mirror, achieve data consistency, and take capture on the Global Mirror secondary volumes.
- Extended Long Busy used to establish data consistency during capture on the Metro Mirror volumes.
- Response time user impact experienced when capturing on the Metro Mirror volumes.
- Elongated RPO observed whilst Global Mirror paused.

GDPS Metro Global – Physical Isolation



GDPS Metro Global – MGM3SITE

- Global Copy is a physically isolated cascaded replication leg.
- Captures can be taken via the Global Copy secondary volumes.
- LCP managed coordination to pause Global Mirror, achieve data consistency, and take capture on the Global Copy secondary volumes.
- Extended Long Busy used to establish data consistency during capture on the Metro Mirror volumes.
- No response time user impact experienced.
- Elongated RPO observed whilst Global Mirror paused.

GDPS Metro Global – Physical Isolation



GDPS Metro Global – MGM4SITE

- Global Copy is a physically isolated cascaded replication leg.
- Captures can be taken via the Global Copy secondary volumes.
- LCP managed coordination to pause Global Mirror, achieve data consistency, and take capture on the Global Copy secondary volumes.
- Extended Long Busy used to establish data consistency during capture on the Metro Mirror volumes.
- No response time user impact experienced.
- Elongated RPO observed whilst Global Mirror paused.

LCP Script Statements

LCP=CAPTURE PROFILE(profile_name)

- Schedule a capture for the specified profile name
- The LCP capture process differs depending on the operational LCP model implemented

LCP=RELEASE PROFILE(profile_name) VERSION(OLDEST|EXPIRED)

- Schedule a capture release based for the specified profile name
- OLDEST Release only the oldest capture
- EXPIRED Release all captures that are flagged expired

LCP=RECOVER PROFILE(profile_name)

- Schedule a recovery for the specified profile name
- Recovery is initiated in NOCOPY mode
- The capture to be recovered must be tagged for recovery via the capture panel
- Both FlashCopy and Safeguarded Copy captures can be recovered

LCP Script Statements

LCP=RESTORE PROFILE(profile_name) [PREPARECOPY]

- Schedule a restore or PrepareCopy for the specified profile name
- The capture to be restored must be tagged for restore via the capture panel
- Incremental restore of a Safeguarded Copy capture requires APAR PH37131

LCP Capture Flow

Metro Mirror Virtual Isolation

14:55:04 AAA CAP GOLD SGC RS2 PLANNED/STANDARD ACTION STARTED FROM STEP 1 14:55:04 LCP='CAPTURE PROFILE(GOLD SGC RS2)' STARTED 14:55:04 SCHEDULING LCP CAPTURE FOR MANAGEMENT PROFILE GOLD SGC RS2 14:55:04 EXCLUSIVE LCP FLAGSET SERIALIZATION OBTAINED BY LCP CAPTURE 14:55:04 GEO2777W 14 OF 134 VOLUMES ARE SAFEGUARD PROTECTED 14:55:05 SEQUENCE NUMBER 614884A8 HAS BEEN GENERATED FOR THIS SAFEGUARD CAPTURE 14:55:05 GEO2772I SAFEGUARD CAPTURE PHASE 1 RESERVATION STARTED 14:55:05 GEO2773I SAFEGUARD CAPTURE PHASE 1 RESERVATION ENDED SUCCESSFULLY 14:55:05 GEO2772I SAFEGUARD CAPTURE PHASE 2 RESERVATION SCAN STARTED 14:55:07 GEO2773I SAFEGUARD CAPTURE PHASE 2 RESERVATION SCAN ENDED SUCCESSFULLY 14:55:07 GEO2772I SAFEGUARD CAPTURE PHASE 3 CHECKIN STARTED 14:55:08 GEO2957I THE USER IMPACT TIME (UIT) FOR THIS SAFEGUARDED CAPTURE WAS 0.113 SECONDS 14:55:08 GEO2767W 14 OF 134 RS(2) VOLUMES WERE INCLUDED IN THE CAPTURE TO COPY SET SGC(1) 14:55:08 GEO2773I SAFEGUARD CAPTURE PHASE 3 CHECKIN ENDED SUCCESSFULLY 14:55:08 GEO2775I LCP SAFEGUARD CAPTURE ENDED SUCCESSFULLY 14:55:08 EXCLUSIVE LCP FLAGSET SERIALIZATION RELEASED 14:55:09 LCP='CAPTURE PROFILE(GOLD SGC RS2)' ENDED RC=0 14:55:09 AAA CAP GOLD SGC RS2 PLANNED/STANDARD ACTION ENDED

Global Mirror Virtual Isolation

15:36:25 AAA CAP GOLD SGC RS1 PLANNED/STANDARD ACTION STARTED FROM STEP 1 15:36:25 LCP='CAPTURE PROFILE(GOLD SGC RS1)' STARTED 15:36:25 SCHEDULING LCP CAPTURE FOR MANAGEMENT PROFILE GOLD SGC RS1 15:36:25 EXCLUSIVE LCP FLAGSET SERIALIZATION OBTAINED BY LCP CAPTURE 15:36:27 SEQUENCE NUMBER 61488E5B HAS BEEN GENERATED FOR THIS SAFEGUARD CAPTURE 15:36:27 GEO2772I SAFEGUARD CAPTURE PHASE 1 RESERVATION STARTED 15:36:27 GEO2773I SAFEGUARD CAPTURE PHASE 1 RESERVATION ENDED SUCCESSFULLY 15:36:27 GEO2772I SAFEGUARD CAPTURE PHASE 2 RESERVATION SCAN STARTED 15:36:28 GEO2773I SAFEGUARD CAPTURE PHASE 2 RESERVATION SCAN ENDED SUCCESSFULLY 15:36:28 GEO2949I SCHEDULING CGPAUSE FOR SESSION PRODUCTI 15:36:28 GEO2950I MONITORING COMPLETION OF CGPAUSE FOR SESSION PRODUCTI 15:36:29 GEO2951I SESSION PRODUCTI HAS BEEN SUCCESSFULLY CGPAUSED 15:36:29 GEO2772I SAFEGUARD CAPTURE PHASE 3 CHECKIN STARTED 15:36:30 GEO2957I THE CHECKIN TIME FOR THIS SAFEGUARDED CAPTURE WAS 0.160 SECONDS 15:36:30 GEO2767W 0 OF 12 RS(1) VOLUMES WERE INCLUDED IN THE CAPTURE TO COPY SET SGC(1) 15:36:30 GEO2773I SAFEGUARD CAPTURE PHASE 3 CHECKIN ENDED SUCCESSFULLY 15:36:30 GEO2949I SCHEDULING RESUME FOR SESSION PRODUCTI 15:36:32 MONITORING SESSION PRODUCTI FOR 'RUNNING' STATE 15:36:33 SESSION PRODUCTI WAS RETURNED TO 'RUNNING' STATE IN 3.048 SECONDS 15:36:33 GEO2951I SESSION PRODUCTI HAS BEEN SUCCESSFULLY RESUMED 15:36:33 RPO EXPOSURE FOR SAFEGUARD CAPTURE WAS 5.094 SECONDS 15:36:35 GEO2775I LCP SAFEGUARD CAPTURE ENDED SUCCESSFULLY 15:36:35 EXCLUSIVE LCP FLAGSET SERIALIZATION RELEASED 15:36:35 LCP='CAPTURE PROFILE(GOLD SGC RS1)' ENDED RC=4

List Management Profiles

VPCPMP00 Logical Co	rruption Pro	tection N	lanagei	ment Prof	iles	AZK
Actions: F lashCopy C aptures	S afeGuard B ackups	M odify V olumes	De 5 Po	lete In ols	ifo	
Management Profile PRODUCTI.RS1	Capture Type	Volume <u>Count</u>	Copy <u>Sets</u>	Capture <u>Count</u>	Expired Count	d —
GOLD_FC_RS1 GOLD_SGC_RS1 RECOVERY	FLASHCOPY SAFEGUARD	16 13 108	3 1 1	3 107 1	107	3 7 2
<pre>_ PRODUCTI.RS2 _ GOLD_FC_RS2 GOLD_SGC_RS2</pre>	FLASHCOPY SAFEGUARD	16 14	3	1 4	-	L 4
RECOVERY		109	1	1	(ð
Command (Filtor>						Pour 1 of 9
F1=Help F3=Return F5=R	efresh F6=R	011 F7=l	Jp F8	=Down F1	0=left	F11=Right

Create, Modify, or Delete Management profiles

Display LCP Captures

Display Safeguarded Copy Backup data, virtual and physical capacity statistics

Display LCP Volume Configuration data

Display Disk Subsystem Storage Pool statistics

Modify a Management Profile

VPCPMPMS	Logical Corruption	n Protection	AZK1
You have requested	the modification of an	LCP Management profile	
Management Profile: Consistency Group: Replication Site:	GOLD_SGC_RS2 PRODUCTI 2	Profile name Consistency Group name Replication site number	
Capture Type: Retention Period: Minimum Interval: Copy Set: Reservation Time: Check In Time:	SAFEGUARD MINUTE(1) MINUTE(1) 1 0600 010	SafeGuard capture profile Retention period for all ca Minimum interval between ca Copy set assigned to this p Maximum Reservation Scan el Maximum Check In elapsed tin	otures otures rofile apsed tim me
Enter NO to cancel	or YES to proceed with	the profile modification	

F1=Help F3=Return

Manage Profile name, consistency group, and replication site

Safeguarded Copy or FlashCopy profile

Retention period of LCP captures, days, hours, minutes

Minimum elapsed time between successive LCP captures

Maximum permissible time for the reservation scan before the LCP Capture is aborted

Maximum permissible time for Check In before the LCP Capture is aborted

List Captures

VPCPLCS	ð Lo	ogical Corruption	n Protect	ion	SafeGu	ard C	apture	s	AZK1
Manageme Consist Replic Action	ent Profile cency Group cation Site ns: V olu	e: GOLD_SGC_RS2 p: PRODUCTI e: 2 mes T ag U ntag	5	La Capt	Capturo test Ca ured/E	e Typ aptur xpire	e: SAF e: 202 d: 4/4	EGUARD 1/09/17	.12:59:19
Сору	Capture		Vol	ume	Flags		PCD	S2D	CID
<u>Set</u>	Seqno	UTC TimeStamp	Cou	nt	EITR.		Count	Count	<u>Count</u>
_ 001	61449127	2021/09/17.12:59):19	14	YNNN.		0	0	0
_ 001	6140DD63	2021/09/14.17:35	5:31	14	YNNN.		0	0	0
_ 001	6140DD5A	2021/09/14.17:35	5:22	14	YNYI.		0	0	0
_ 001	6140DD51	2021/09/14.17:35	5:13	14	YNNN.		0	0	0
Command,	/Filter ===	=>						R	ow 1 of 4
F1=Help	F3=Retur	n F5=	=Refresh	F6=	Roll	F7=Up	F8=D	own	

List all recorded captures for a specific management profile, data includes:

The Capture sequence number

The z/OS UTC timestamp (converted sequence number)

The number of volumes that participated in the LCP Capture

Flags – Expired, Invalidated, Tagged, Recovery

LCP Volume configuration flags, Pending Configuration Deletion, Safe To Delete, and Capture In Doubt

Tagging a Capture

VPCPLCS) Lo	ogical Corruption Pro	tection	SafeGuard	Captures	;	AZKI
Manageme Consist Replic Actior	ent Profile cency Group cation Site ns: Volur	e: GOLD_SGC_RS1 o: PRODUCTI e: 1 mes T ag U ntag	La Capt	Capture Ty test Captu ured/Expir	pe: SAFE re: 2021 ed: 107/	GUARD ./09/13. 107	16:22:05
Сору	Capture		Volume	Flags	PCD	S2D	CID
Set	Seqno	UTC TimeStamp	Count	EITR	Count	Count	Count
001	613F7AAD	2021/09/13.16:22:05	13	YNNN	0	0	0
001	6138E5FA	2021/09/08.16:34:02	13	YNNN	0	0	0
_ 001	6138E5A5	2021/09/08.16:32:37	13	YNNN	0	0	0
t 001	6123911E	2021/08/23.12:14:22	13	YNYN	0	0	0
001	60F6AFFA	2021/07/20.11:14:02	13	YNNN	0	0	0
001	60F6AFF6	2021/07/20.11:13:58	13	YNNN	0	0	0
001	60F6AFF3	2021/07/20.11:13:55	13	YNNN	0	0	0
001	60F6AFEF	2021/07/20.11:13:51	13	YNNN	0	0	0
 001	60F6AFEB	2021/07/20.11:13:47	13	YNNN	0	0	0
_ 001	60F6AFE8	2021/07/20.11:13:44	13	YNNN	0	0	0
 001	60F6AFE4	2021/07/20.11:13:40	13	YNNN	0	0	0
Sequence	e number 63	123911E in copy set S	GC(1) is	now tagge	d		
Command,	/Filter ===	=>				Row	1 of 107
F1=Help	F3=Return	n F5=Refr	esh F6=	Roll F7=U	p F8=Dc	wn	

A Capture must be tagged to identify it as the candidate for a Restore or Recover operation

List Volumes

VPCPLCSS Logical Corruption Protection Copy Set Volumes A									
Management Profile: GOLD_SGC_RS2Copy Set: 1Consistency Group: PRODUCTICapture Time: 2021/09/14.1Replication Site: 2Expired: YESActions: Q ueryCopy Set: 1									
UCB Volser	SafeGuard Source	Capture <u>Seqno</u>	State SRCCIRFP	Backup <u>Tracks</u>	Flags <u>PSC</u>				
15071 MM5071 06072 MM5072	00LHV41 04.01 00LHV41 04.02	6140DD5A 6140DD5A	YY.INY YY.INY	00000000 00000000	NNN NNN				
06073 MM5073	00LHV41 04.03	6140DD5A	YY.INY	00000000	NNN				
_ 06074 MM5074	00LHV41 04.04	6140DD5A	YY.INY	00000000	NNN				
_ 06075 MM5076	00LHV41 04.05	6140DD5A	YY.INY	00000000	NNN				
06077 MM5077	00LHV41 04.07	6140DD5A	YY.INY	00000000	NNN				
_ 06078 MM5078	00LHV41 04.08	6140DD5A	YY.INY	00000000	NNN				
_ 06079 MM5079	00LHV41 04.09	6140DD5A	YY.INY	000000000	NNN				
_ 0607A MM507A _ 060B1 MM50B1	00LHV41 04.0A 00LHV41 05.01	6140DD5A 6140DD5A	YY.INY YY.INY	000000000000000000000000000000000000000	NNN NNN				
Command/Filter ==	Command/Filter ===> Row 1 of 14								
F1=Help F3=Retur	n F	5=Refresh	F6=Roll F7	/=Up F8=Do	wn				

List all volumes for a particular capture, the data includes:

The Capture sequence number

The z/OS UTC timestamp (converted sequence number)

The number of volumes that participated in the LCP Capture

Flags – Expired, Invalidated, Tagged, Recovery

LCP Volume configuration flags, Pending Configuration Deletion, Safe To Delete, and Capture In Doubt

Query Safeguarded Volume

VPCPSGCQ	Safeguarded Copy Q	uery Report	AZK
Device: 5072 Volser: MM	5072 Hardware Des	cription: 00LHV3	1.03.02 SSID: 5103
Source Volume		Safegua	rded Backup
Thin Provisioning: E	SE	Safeguarded:	Yes
Pool Identifier: 1		Pool Identifi	er: 5
Capacity: 11	113	Virtual Capac	ity: 11130
Used Capacity: 21	1	Used Capacity	2247
Number of captures: 10	07	Multiplier:	10
Relationship flags: Ø	18000	Percentage Us	ed: 20.189
Recovery Flags: 80	C	Recovery Exis	ts: Yes
,			
SGC	Capture		Backup Flags
Cnt State Flags CU T [.]	ime Segno UTC	TimeStamp	Tracks EBIRP
001 CapCmplt 000000 613F	7AC6 613F7AAD 2021	/09/13 16:22:05	00000000 YYNNN
002 CapCmplt 000000 6138	E613 6138E5FA 2021	/09/08 16:34:02	00000000 YYNNN
003 CapCmplt 000000 6138	E5BD 6138E5A5 2021	/09/08 16:32:37	00000000 YYNNN
004 CapCmplt 400000 61239	9136 6123911E 2021	/08/23 12:14:22	00000000 YYNIY
005 CapCmplt 000000 60F6	B00B 60F6AFFA 2021	/07/20 11:14:02	00000000 YYNNN
006 CapCmplt 000000 60F6	B008 60F6AFF6 2021	/07/20 11:13:58	00000000 YYNNN
Command ===>			
F1=Help F3=Return F5=Re	efresh F6=Roll F	7=Up F8=Down	

Query a specific volume, the data includes:

Configuration and Capacity information for the Source and Safeguarded Backup volume

Backup sequence number

Backup tracks used

The number of volumes that participated in the LCP Capture

Flags – Expired, Backup configured, expanding, or gating, Backup invalid, Backup in recovery, Backup prepared for incremental restore

List Backups

VPCPLCS3	Logical	Corruption	Prot	ect	ion Sa	afeGuaro	ded Co	opy Stat	istics	AZK1
Management Profile: GOLD_SGC_RS1Latest Seqno: 613F7AADConsistency Group: PRODUCTIUTC TimeStamp: 2021/09/13.16:22Replication Site: 1Oldest Seqno: 60F6A6B3Volumes Protected: 13UTC TimeStamp: 2021/07/20.10:34Actions: Q uery P oolsDetected Captures: 107									L6:22:05 L0:34:27	
	Sat	feGuard	Pool	. ID		Source	Vir	rtual	0ldest	Flags
UCB Vo	olser Sou	urce	Src	Bkp	CapT	Cyls	CapM	Used%	Seqno	PBRP
05071 MM	15071 001	LHV31.03.01	001	005	0106	001113	0010	020.000	60F6A6B3	EYNN
05072 MM	15072 001	LHV31.03.02	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
05073 MM	15073 001	LHV31.03.03	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
05074 MM	15074 001	LHV31.03.04	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
05076 MM	15076 001	LHV31.03.06	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
05077 MM	15077 001	LHV31.03.07	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
05078 MM	15078 001	LHV31.03.08	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
	15079 001	LHV31.03.09	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
	1507A 00I	LHV31.03.0A	001	005	0107	001113	0010	020.189	60F6A6B3	EYIY
050B1 MM	150B1 00I	LHV31.04.01	000	004	0107	001113	0010	020.189	60F6A6B3	EYIY
Command/Fil F1=Help F3	lter ===> 3=Return	> F4=Monitor	F5	5=Re1	fresh	F6=Ro1	L1 F7	7=Up F8=	Row =Down	1 of 13

List all Safeguarded backups, the data includes:

Configuration and Capacity information for the Source and Safeguarded Backup volumes

Storage pool identifier for the source and backup

Capacity of source in cylinders

Multiplier for the backup

Virtual backup capacity utilization

Oldest sequence number

Flags – Full or Extent Space Efficient provisioning, Backup configured or expanding, Volume is participating in a recovery, Volume is prepared for an incremental restore

List Volume Configuration Data

VPCPFS	VPCPFSCØ Logical Corruption Protection Profile Volumes AZK1								
Management Profile: GOLD_SGC_RS1In Next Capture: 13Consistency Group: PRODUCTIPending Deletion: 0Replication Site: 1Safe to Delete: 0Actions: D etails									
		SafeGuard		Latest	Expiration	State			
UC	3 Volser	Source	CapT	Segno	UTC TimeStamp	IPS			
050	71 MM5071	00LHV31.03.01	0107	613F7AAD	Expired	YNN			
050	72 MM5072	00LHV31.03.02	0107	613F7AAD	Expired	YNN			
050	73 MM5073	00LHV31.03.03	0107	613F7AAD	Expired	YNN			
050	74 MM5074	00LHV31.03.04	0107	613F7AAD	Expired	YNN			
050	76 MM5076	00LHV31.03.06	0107	613F7AAD	Expired	YNN			
050	77 MM5077	00LHV31.03.07	0107	613F7AAD	Expired	YNN			
050	78 MM5078	00LHV31.03.08	0107	613F7AAD	Expired	YNN			
050	79 MM5079	00LHV31.03.09	0107	613F7AAD	Expired	YNN			
050	7A MM507A	00LHV31.03.0A	0107	613F7AAD	Expired	YNN			
050	31 MM50B1	00LHV31.04.01	0107	613F7AAD	Expired	YNN			
050	32 MM50B2	00LHV31.04.02	0107	613F7AAD	Expired	YNN			
Comman F1=Hel	d/Filter == p F3=Retur	==>	F5=Ref	resh F6=R	R oll F7=Up F8=Down	ow 1 of 13			

List the LCP volume configuration data, the data includes:

Expiration status based on defined retention period

State Flags – A volume will participate in the next capture, a volume is Pending Configuration Deletion (*it cannot yet be removed from the LCP configuration*), a volume is Safe To Delete (*it can now be removed from the LCP configuration*)

List Storage Pools

VP	CPLCS6			DS8000	Storage Pool	Capacity Rep	port	AZK
Ma	nagement Replicat	Prof ion S [.]	ile: (ite: 1	GOLD_SGC_I 1	RS1			
,	Actions:	D e	tail					
	Storage			Extent	Usable	Provisioned	Available	
	System	Pool	Туре	Size	Capacity	Capacity	Capacity	%Used
	00LHV31	0	CKD	21cyls	29,118.88	0.00	22,100.73	24.10
	00LHV31	4	CKD	21cyls	10,277.49	863.42	10,265.80	0.11
	00LHV31	1	CKD	21cyls	29,118.88	0.00	16,877.28	42.04
	00LHV31		CKD	21cyls	10,277.49	669.59	10,258.09	0.19
								Capacity=Gil
Co	nmand ===	=>						
F1:	=Help Fi	3=Retu	urn F	5=Refres	h F6=Roll	F7=Up F8=Dov	vn F9=Toggle	2

List Disk Subsystem Storage Pool Configuration and Capacity information, the data includes:

Storage pool identifier

Storage pool type

Extent Size

Capacity metrics in GiB, Extents, and GB providing Usable capacity, Provisioned capacity, Available capacity, and Percentage used

List Storage Pools Detailed

VPCPLCS7	DS8000 Stor	age Pool (Capacit	y Detail	Repoi	rt	AZK1
Storage System: Pool Identifier: Storage Type: Extent Size: Warning Threshold:	2107.994.00 0 CKD 21cyls 85	LHV41	Standar ES Rese Over	Capacity d Volume E Volume SGC rved Capa head Capa	Used Perce Perce Perce acity acity	Percentage: entage Used: entage Used: entage Used: Percentage: Percentage:	69.14 45.38 22.91 19.76 0.04 0.82
Capacity		GiB	E	xtents	(GB	
Usable		356,776	5.55	21,462,4	405	383,085,90	
Provisioned	ł	1,420,139	9.72	85,430,5	542	1,524,863.41	
Available		110,100	5.43	6,623,6	5 10	118,225.87	
Standard Vo	lume Used	161,893	3.02	9,738,9	907	173,831.31	
ESE Volume	Used	11,220	5.65	675,3	355	12,054.52	
ESE Volume	Provisioned	306,979	9.13	18,466,7	770	329,616.33	
SGC Used		70,495	5.98	4,240,7	787	75,694.49	
SGC Provisi	oned	951,267	7.57	57,224,8	365 3	1,021,415.77	
0verhead		2,916	5.00	175,4	416	3,131.03	
Reserved		138	3.47	8,3	330	148.68	
Command ===> F1=Help F3=Return	F5=Refresh	F6=Roll					

A detailed view of the selected Storage Pool

Provides detailed capacity information for a range of sub-categories

Notable GDPS LCP APARs

- PH17926 LCP Management Profiles + Basic MGM4SITE External support
- PH17927 LCP-Manager (GM) support
- PH10357 MGM3SITE/MGM4SITE Enhanced External LCP support
- PH26333 SGC Persistent Recovery Copy support
- PH26080 MGM3SITE Virtual Isolation + Global Mirror Virtual support
- PH26334 Dynamic Safeguarded Backup Volume expansion support
- PH26346 Multiple Recovery Copy Sets support
- PH32039 LCP FlagSet Enhancements
- PH37133 DS8000 Storage Capacity Reporting
- PH37253 Improved error handling for LCP=RECOVER
- PH40027 GM2SITE External LCP support Target October 2021
- PH35271 Performance improvement to Safeguarded capture operation Target November 2021
- PH37131 Safeguarded Copy Restore to Production Target November 2021