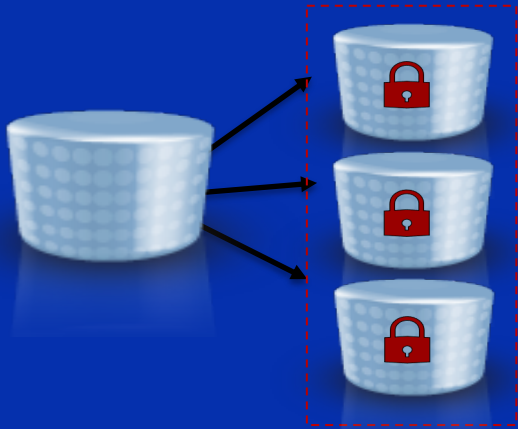# SafeGuarded Copy on IBM i

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IBM i consultant Lab Services

Let's
Create

Protected Copies of Data: Safeguarded Copy backups

Can **not** be mapped to a host

Immutable:
Can **not** be written or read by an application

Automatically created and deleted based on a predefined **schedule**

Protected Copies of production volumes

Thinly-provisioned point-in-time

Built on existing FlashCopy snapshot technology

Stored in a **Safeguarded backup location**:

- Uses existing **Child Pool** technology

- Logical separation from other volumes

- Capacity control

- Access restrictions (separation of duties)

Safeguarded Copy Automation - IBM Copy Services Manager (CSM)
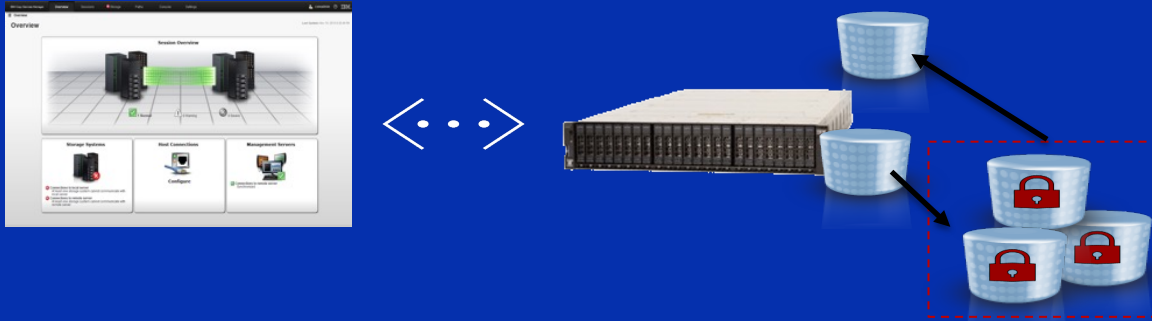
External software (CSM) run on a client provided Virtual Machine or x86 server (Java App)

Spectrum Virtualize handles automatic deletion of expired backups internally

No external APIs on delete for security

Spectrum Virtualize creates the Safeguarded Policy and CSM automatically discovers it

CSM contains the copy schedule and how long to keep each backup

Copy schedule: Minutes, Hourly, Daily, Weekly, Monthly

Retention time: X days

Coordinate and catalog copies across **multiple clusters**

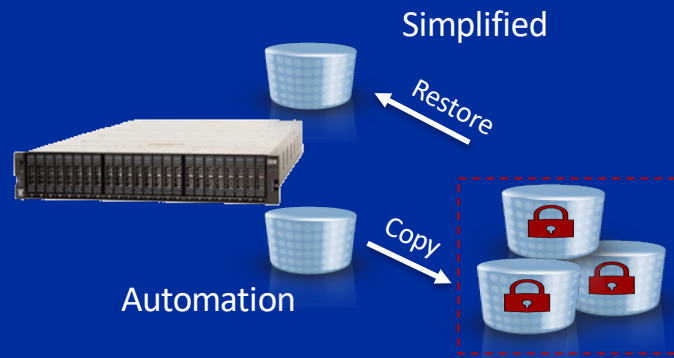Connects via SSH and uses CLI as Administrator user

IBM Safeguarded Copy solution

Safeguarded Copy prevents point in time copies of data from being modified or deleted due to user errors, malicious destruction or ransomware attacks

Protected Copies

Simplified

Restore

Automation

Copy

Access and Control

Separation of duties
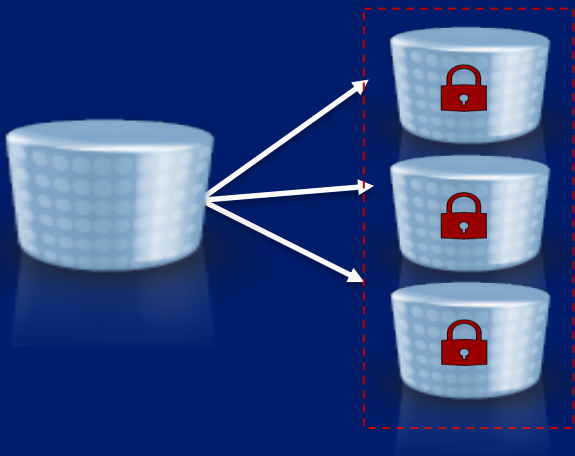
Provides **immutable and isolated** point in time copies of the data

Automatically creates point in time copies; and a **simplified** recovery and restoration process

Provides **additional security** capabilities to prevent non-privileged users from compromising protected data

The **Cyber Vault offering** is based on the **IBM Safeguarded Copy solution**

Safeguarded Copy prevents point in time copies of data from being modified or deleted due to user errors, malicious destruction or ransomware attacks
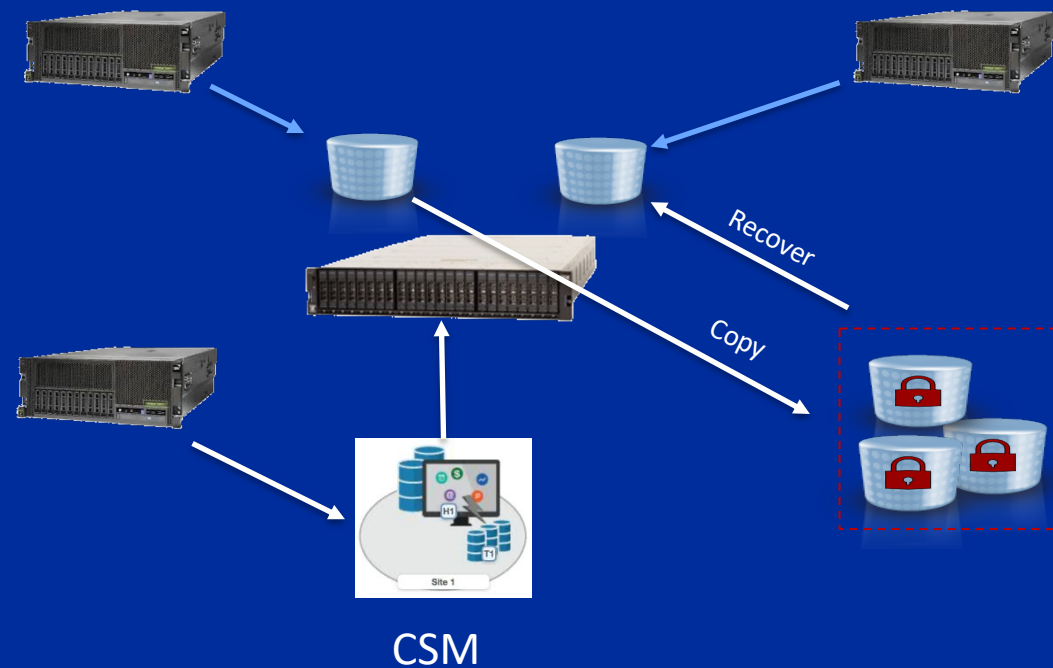
IBM i Cyber Vault automation

Production partition

Recovery partition
Automatically fixes TCP/IP and other resources per configuration
- Validation
- Forensic analysis
- Surgical recovery

Recover

Copy

Management partition
Orchestration of Safeguarded copy actions
- Start
- End
- Recover
- Restore
- Monitor

CSM

Safeguarded Copy - Use Cases

Validation

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

Forensic

- Start a copy of the production systems from the copy and use this to investigate the problem and determine what the recovery action is

Surgical

- Recover a subset of volumes/LUNs or extract data (i.e. specific corrupted tables in a dbase using dbase utilities) from a recovered copy and restore back to the production environment

Catastrophic

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

Offline Backup

- Performing an offline backup of data from a consistent point-in-time copy can be used to build a second line of defense, providing a greater retention period and increased isolation and security

CSM : Copy Services Manager

Links : CSM – IBM i - Storage

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Backup/Restore from IBM i

Let's Create

PowerHA Tools for IBM i with CSM

➤ PowerHA tools HA has integrated with CSM (TPC-R) for over 10 years

➤ Uses RestAPIs to manage sessions

➤ Manages CSM HA for the customer.
  - ➤ Performs automated takeover is the primary is unavailable
  - ➤ Performs automated reconnect or define secondary once after a failure

➤ Supports Dual Control via 2 separate profiles entered into the IBM i credentials list
  - ➤ When Dual Control is enabled, potentially malicious tasks like expiring copies is disabled

Management Partition(s)

PowerHA tools credentials list

USER   *CSM
USER2 *CSMAUTH (only for dual control)

RestAPI

Site 1

PowerHA Tools for IBM i configuring SGC for Flash Systems

➤ A Volume group is created in the Flash System

➤ A policy is assigned to the volume group

➤ Flash System is configured to use CSM as the scheduler

➤ IBM i customers can use the scheduler as configured or disable the schedule and use PowerHA tools to issue the Safeguarded Copies

➤ STRSGCPY will use a default expiration configured in the tools or allow a custom expiration interval.

```
Environment name . . . . . . :     SGC_DEMO
Storage Type . . . . . . . . :     SVC

Primary ASP  . . . . . . . .      *SYSTEM

CSM Safeguarded copy /
  FlashCopy  . . . . . . . .      *YES
  CSM Primary server . . . .      ▓▓▓▓▓▓▓
  CSM Secondary server . . .      _____
  CSM Safeguard session name
    IBMi_iASP1_FLASHSYSTEM5200
  CSM FlashCopy session name      *NONE
  Default retention period        1

Flash SVC IP Address . . . .      ▓▓▓▓▓▓▓
GMCV Source SVC IP Address         _____
```

PowerHA Tools for IBM i configuring SGC for Flash Systems (cont)

➤ Optional.. Add hosts to the configuration for automated recovery

➤ PowerHA tools retrieves the hosts from the Flash System to chose from

```
Environment  .  :    SGC_DEMO
Type . . . . . :    FLASH
                   ...........................
...........................................
:                                  Select host
:
:  Type option, press Enter.
:    1=Select Target Host
:
:  Opt       Host name
:   _        Linux_NVMe
:   _        Guillaume_host
:   1        IBMi_Recov_Server
:   _        Windows1
:   _        AIX_SAP_PROD
:   _        AIX_SAP_DEV
:   _        dstallard_host
:
```

➤ Recovery hosts should have no volumes when a recovery is not in progress

```
Environment  .  :    SGC_DEMO
Type . . . . . :    FLASH

Type options, press Enter.
  1=Add    2=Change    4=Delete    6=Change host volume list

                                              Volume
  Opt       Host name                         Count
           _____
   _        IBMi_Recov_Server                     2
   _
```

PowerHA Tools for IBM i – Safeguarded Copy screen

➢ WRKSGCPY shows the information from the CSM server

IBMi_iASP1_FLASHSYSTEM5200

Session Actions: ▾

Status	☑ Normal
State	Protected
Session Type	Safeguarded Copy
Active Host	H1
Recoverable	Yes
Description	Automatically created Safeguarded Copy session(modify)
Copy Sets	2 (view)
Group Name	Automatically Generated Session

Backup Schedule	Every 1 days
Last Recoverable Backup	2022-06-13 00:00:03 CEST
Last Restored To Backup	2022-05-30 00:00:00 CEST
	at 2022-06-01 11:51:17 CEST
Volume Group	IBMi_iASP1

Backup Info | Recover Backup Info

Total Number Backups: 6 **Total Recoverable Backups:** 6 **Total Unrecoverable Backups:** 0

Backup Time	▲	Backup ID	Recoverable	Copy Sets	Last Result	Expiration
2022-06-08 00:00:04 CEST		1654639202	Yes	2	☑ IWNR2800I	2022-06-15 00:00:04 ...
2022-06-09 00:00:04 CEST		1654725603	Yes	2	☑ IWNR2800I	2022-06-16 00:00:04 ...
2022-06-10 00:00:05 CEST		1654812003	Yes	2	☑ IWNR2800I	2022-06-17 00:00:05 ...
2022-06-11 00:00:03 CEST		1654898401	Yes	2	☑ IWNR2800I	2022-06-18 00:00:03 ...
2022-06-12 00:00:03 CEST		1654984803	Yes	2	☑ IWNR2800I	2022-06-19 00:00:03 ...
2022-06-13 00:00:03 CEST		1655071200	Yes	2	☑ IWNR2800I	2022-06-20 00:00:03 ...

```
                         Safeguarded Backups

   Environment name . . . . . :    SGC_DEMO
   CSM session name . . . . . :    IBMi_iASP1_FLASHSYSTEM5200
   Number of backups  . . . . :    6

Type options, press Enter.
   6=Recover

Opt   Backup ID    Backup Date/Time          Copy Sets   Recoverable
 _    1654639202   2022-06-08 00:00:04 CES       2           Yes
 _    1654725603   2022-06-09 00:00:04 CES       2           Yes
 _    1654812003   2022-06-10 00:00:05 CES       2           Yes
 _    1654898401   2022-06-11 00:00:03 CES       2           Yes
 _    1654984803   2022-06-12 00:00:03 CES       2           Yes
 _    1655071200   2022-06-13 00:00:03 CES       2           Yes
```

PowerHA Tools for IBM i – automated backups

STRSGCPY ENVIRONMENT( ) RETENTION(*DFT)

1. IBM i connects to CSM, validates the session

2. CSM issues the Make Backup to the Flash System

3. CSM returns successful or error to IBM i.

Production

Managing
partition

Copy

CSM
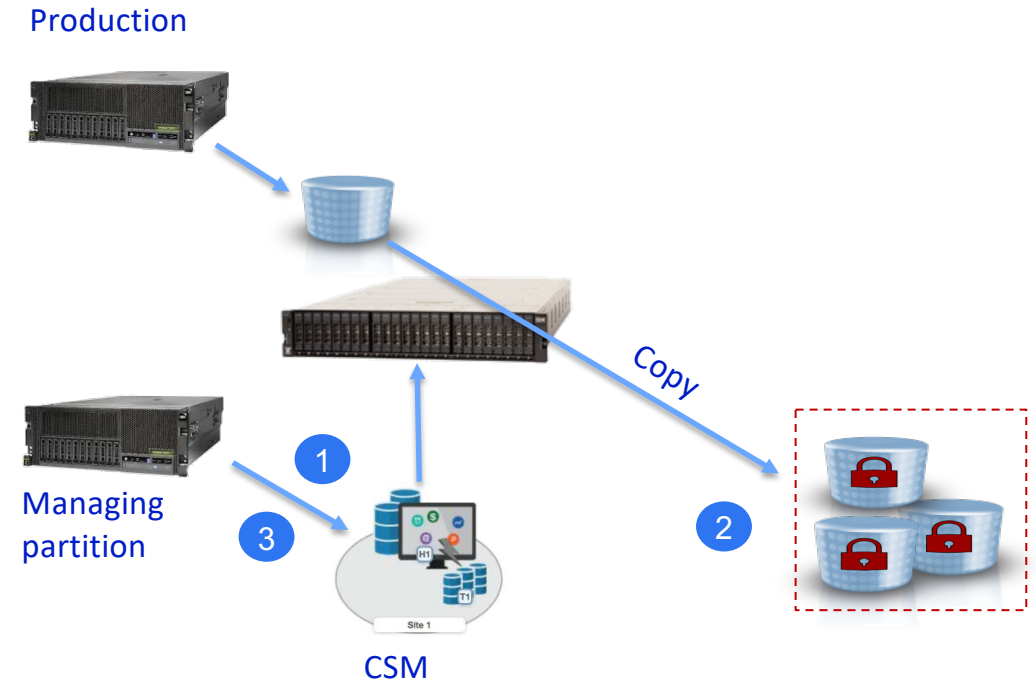
Note. Prior to issuing this command, if the Safeguarded Copy is part of
replication, use PowerHA commands or RTVCSMSSN from PowerHA Tools to
check the direction and state of the replication.
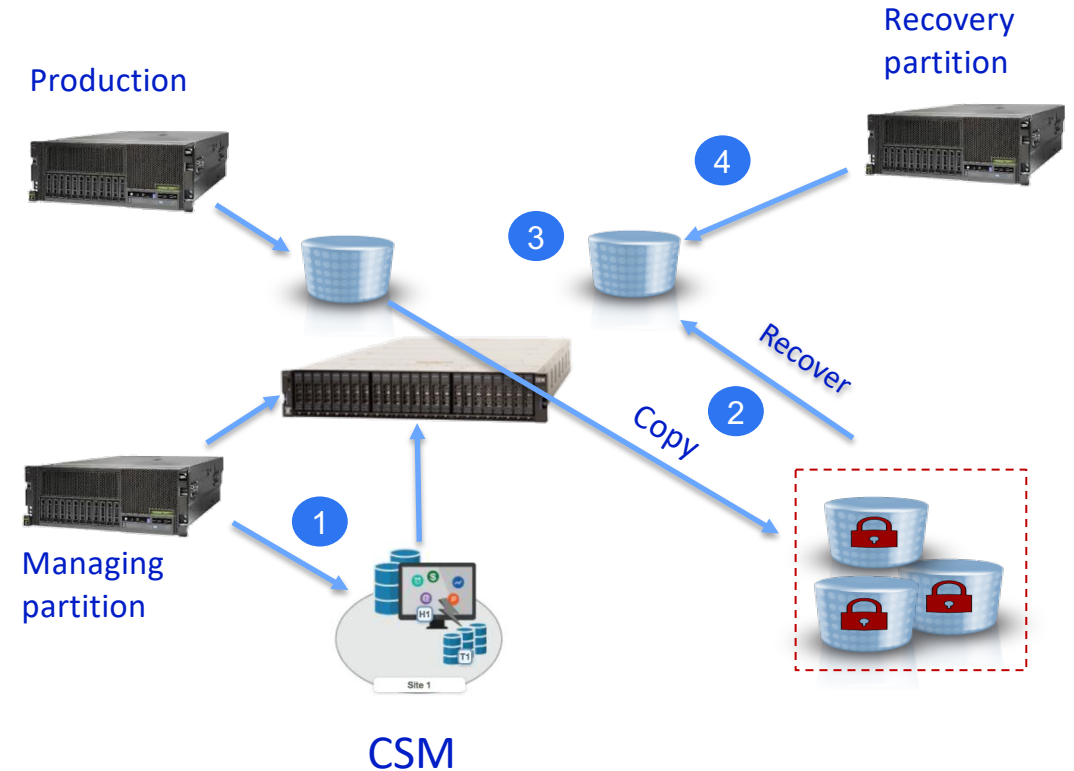
PowerHA Tools for IBM i - automated recovery

STRSGRCY ENVIRONMENT( ) BACKUPID(*LAST)

1. IBM i connects to CSM, validates the session
    1. Checks that the BACKUPID provided is valid or uses *LAST
    2. Ensures that no other recovery is in progress

2. CSM issues the Recovery to the Flash System
    1. This creates a new set of volumes

3. PowerHA tools retrieves the new recovery volumes from CSM

4. PowerHA Tools maps the new recovery volumes to the recovery partition host(s) in the FlashSystem via ssh

5. Customer issues an IPLLPAR command from PowerHA Tools to bring up the recovery partition

Production

Recovery partition

Managing partition

CSM

Copy

Recover

PowerHA Tools for IBM i - automated recovery (cont)

1. PowerHA tools provides startup processes to automate
   1. Attach a new IP addresses to designated communication resources
   2. Change gateway and routes
   3. Attach tape units, update BRMS

2. Submit validation routines as required once startup completed

3. Power down partition after validation successful

4. Management partition waits for power down, then issues ENDSGRCY to terminate H1-R1

Production

Recovery partition

Managing partition

CSM

Copy

Recover
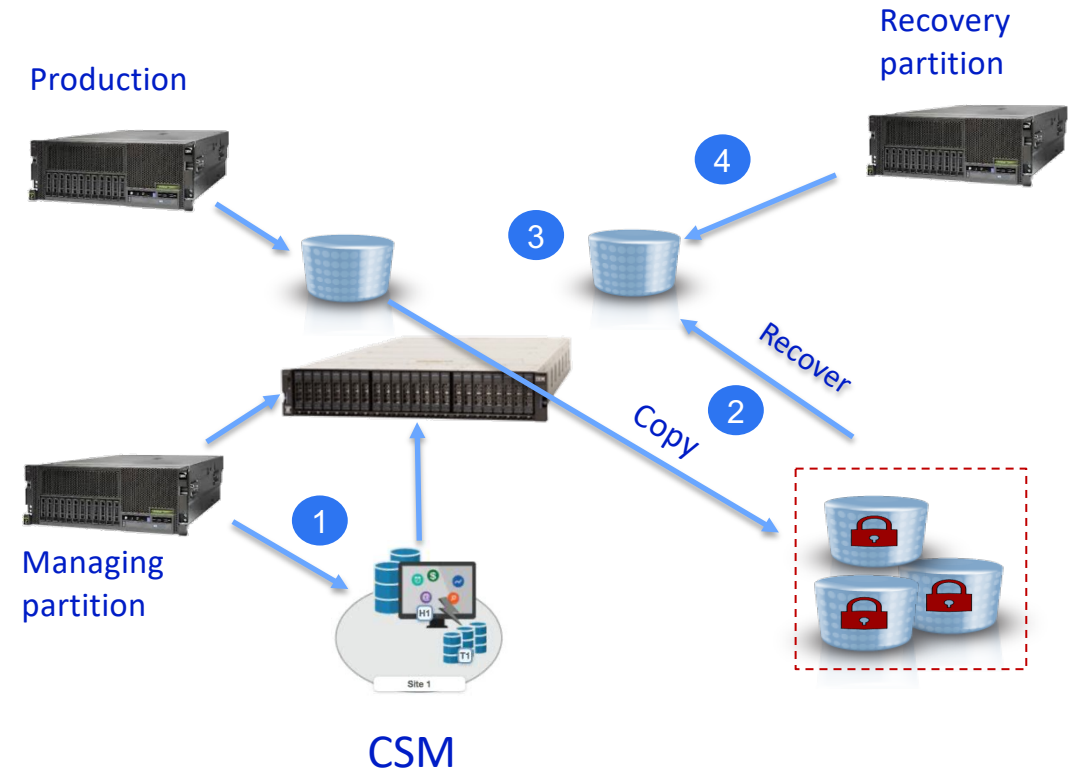
PowerHA Tools for IBM i – Safeguarded Copy Space Usage

```
                          Display % Volume(s) Capacity Used
_

Safeguarded                   Total percent        Total physical cap          Number
Disk Pool                         used              available (TB)           SG volumes
Backup_Location                    .00                   217.91                    50
```

DRP_Pool_S1   ✔ Online

     Backup_Location 🛡   ✔ Online

This information is also available through RTVSGCAP API, and a sample program to monitor the storage is provided in the PowerHA Tools library

Note: this information is at the child pool level, not just a particular SG copy.

IBM i specific implementation

Install PowerHA tools for IBM i Safeguarded copy

- Configure environment in IBM i to manage the safeguarded Copy

- Configure recovery system for validation/Forensic analysis

- Configure communication to CSM

- Write any custom management CL programs based on customer requirements

- Configure partition to auto set new IP etc on recovery to allow recovery system to come online if required

- Configure job scheduler/management process to automate safeguarded backups

- Configure scheduled checking for SG failures or capacity issues on the storage

- Write processes for recovery/restore after an event

IBM i specific implementation

IBM i Safeguarded copy automation

- STRSGCPY - performs a new Safeguarded Copy backup. Default for expiration interval may be overridden

- STRSGRCY - Performs a safe recovery action by ensuring no current recovery is active. Then it performs the recovery. For Spectrum Virtualize solution it will distribute the LUNS evenly across configured hosts.

- IPLLPAR - activate the IBM i partition

- WRKSTRPRSC/CFGSTRPRSC - Configure the target partitions TPC/IP, tape etc to allow the recovery partition to be used safely after IPL.

- ENDSGRCY - End the active Safeguarded copy recovery

- QZRDIARSGC - CL program to retrieve all current SafeGuarded copy states, information (backupids, expiration interval etc)

- RTVSGCCAP - CL program to retrieve current SG usage and storage remaining capacity

SafeGuarded Copy
on IBM i

DEMO

IBM. Let's Create

IBM

Thank you

IBM i

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