IBM zSystems Client Engineering Workshop

IBM Z Cyber Vault Overview Session

IBM **Client Engineering for Systems**

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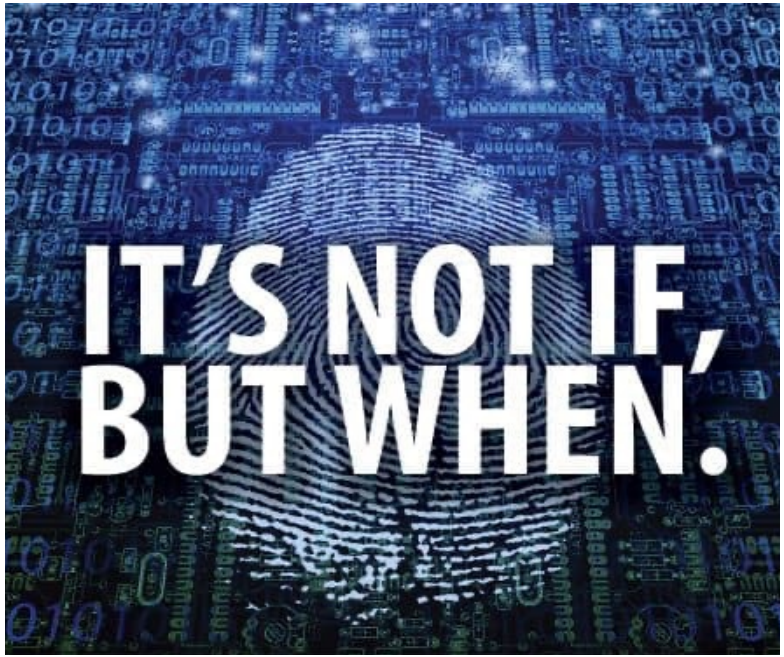
Agenda

- ❑ Cyber Resiliency Introduction
- ❑ IBM Z Cyber Vault Overview
- ❑ Protecting Your Data
- ❑ Validating and Recovering Your Data
- ❑ Next Steps

Cyber Resiliency

Absolute resiliency or security is impossible



Systems need to be built for Cyber Resiliency

- ✓ The ability to continuously deliver the intended outcome despite any adverse event or attacks
- ✓ Do everything you can to prevent downtime and attacks, plus minimize the impact and potential loss when an event does happen

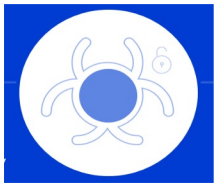
Sixty percent of businesses victimized by a cyber attack go out of business within six months.[1]

$4.54M

Average cost of a ransomware attack, not including the cost of the ransom itself.[2]

29 Days

Savings in response time for those with extended detection and response (XDR) technologies.[2]

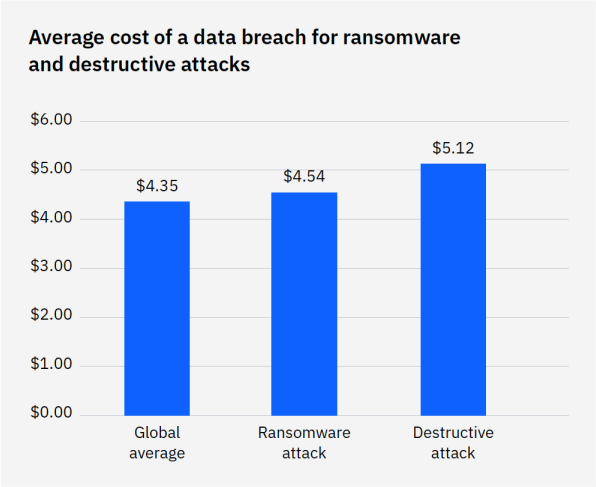


$1M

Average difference in cost where remote work was a factor in causing the breach versus when it wasn't.[2]

83%

Of organizations studied have had more than one data breach.[2]



[1]CNBC (https://www.cnbc.com/2019/10/13/cyberattacks-cost-small-companies-200k-putting-many-out-of-business.html
[2]Cost of a Data Breach Report 2022 (https://www.ibm.com/reports/data-breach)

Cyber resiliency solutions should handle a wide range of possible scenarios to reduce the risk of financial losses.

Cyber threats to enterprise data are increasing from a range of different sources including:

External Malware Infection
External Hacking
Insider Threats

Depending on the platform different risks are seen as more or less likely. For core systems running on IBM Z, many organizations believe the greatest risk is a threat from a:

Privileged Insider

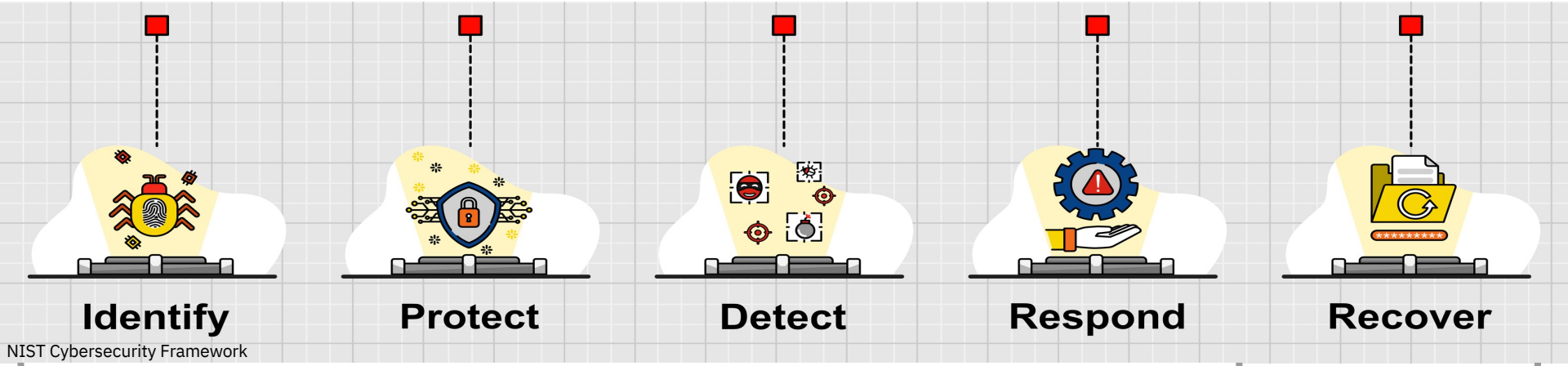
Similar loss or corruption of data is still also possible from other causes such as:

Application error
Operational error

Furthermore, the pandemic and massive increase in remote working changes some of the risk vectors as access to mainframe systems is more likely from outside the organization controlled networks.

Cyber Resiliency

The ability to *anticipate, withstand, adapt to, and recover* from adverse conditions, events, stresses, attacks, or compromises on systems that use or are enabled by cyber resources



NIST Cybersecurity Framework

Cyber Security – *Minimize Risk through prevention*

Cyber Resiliency – *Minimize Impact with IBM Cyber Vault*

IBM Z Cyber Vault Overview

Robust Cyber Resiliency requires Cyber Security, traditional Business Continuity, and Corruption Protection.

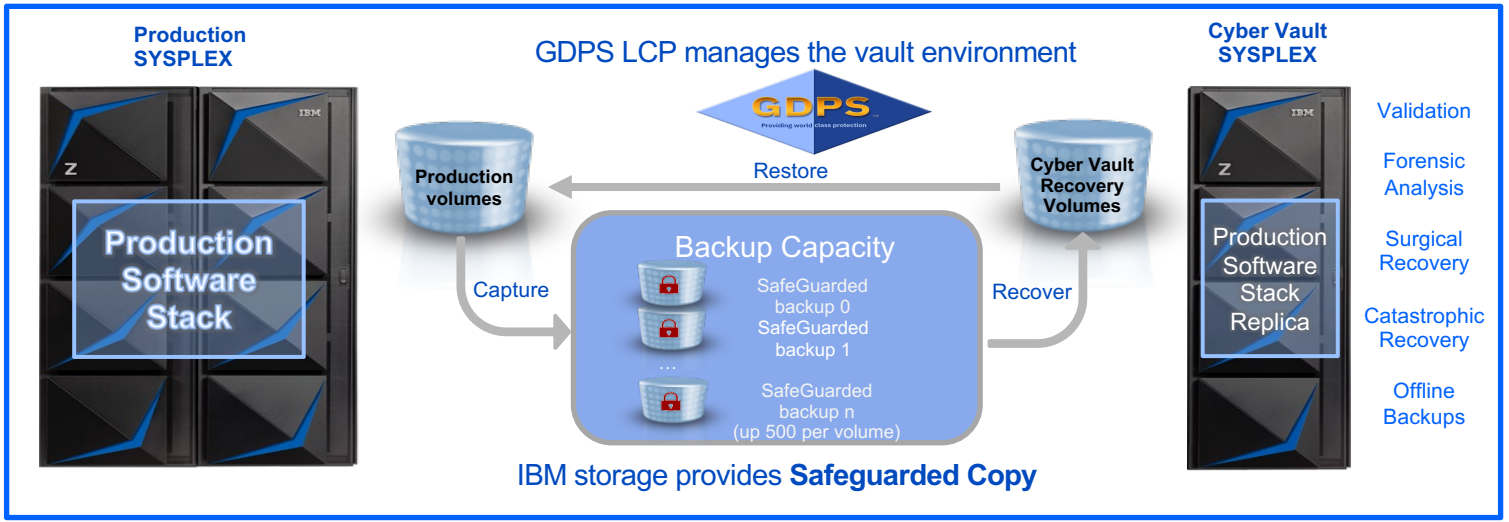
Cyber Resiliency

The ability to *anticipate, withstand, adapt to, and recover* from adverse conditions, events, stresses, attacks, or compromises on systems that use or are enabled by cyber resources

Cyber Security	*Continuous Operations*	*Disaster Recovery*	*Cyber Vault*
Encryption zSecure Guardium Qradar	Parallel Sysplex System Recovery Boost Datasharing Hyperswap	GDPS Automation System Recovery Boost Disk Replication	IBM Z Cyber Vault DS8K Safeguarded copy GDPS LCP TS7700
Minimize the risk by preventing access, ensuring immediate detection, and providing rapid response.	Minimize the risk and recover from outages caused by unplanned system failures and planned maintenance.	Minimize the impact of disaster level events by providing fast failover.	Minimize the impact of corruption events by protecting data, detecting corruption, responding quickly, and providing fast recovery.

IBM Z Cyber Vault

Reduce the time to recover from days to minutes.



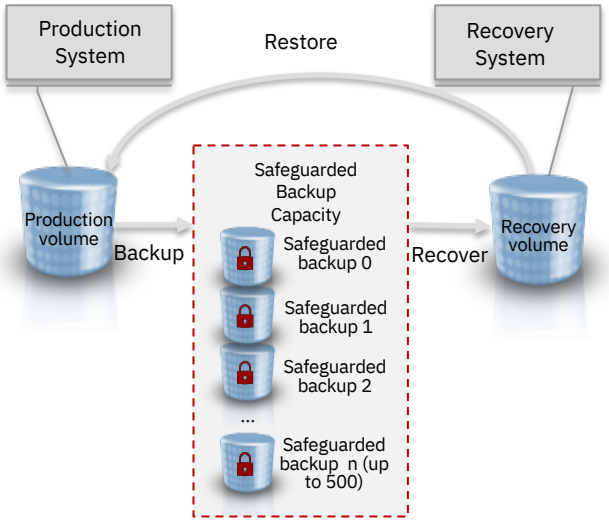
IBM DS8K with Safeguarded Copy provides immutable, consistent point-in-time copies of data.

GDPS LCP manages the creation, recovery, and restoration of the copies and provides automation to manage those processes.

IBM z Systems hardware and software provides a secure, isolated environment to perform data validation, forensic analysis, and create offline backups.

Traditional resiliency solutions don’t protect you from logical data corruption…. more is needed.

Protect your data with immutable point in time copies



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Detect, Respond, and Recover faster with these critical capabilities

Data validation
Regular analytics on the data copy to provide early detection of a problem, or reassurance that everything is OK

Forensic analysis
Start a copy of the production systems from the copy and use it to investigate the problem and determine the recovery action

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

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

Offline backup
Copy the copy of the environment to offline media to provide a second layer of protection

Protecting Your Data

Logical corruption protection copies (Safeguarded Copy)

Safeguarded Copies are secure, point-in-time copies of production data that can later be used for identification, repair, or replacement of production data that has been compromised by either cyber or internal attack or corrupted by system failures or human error.

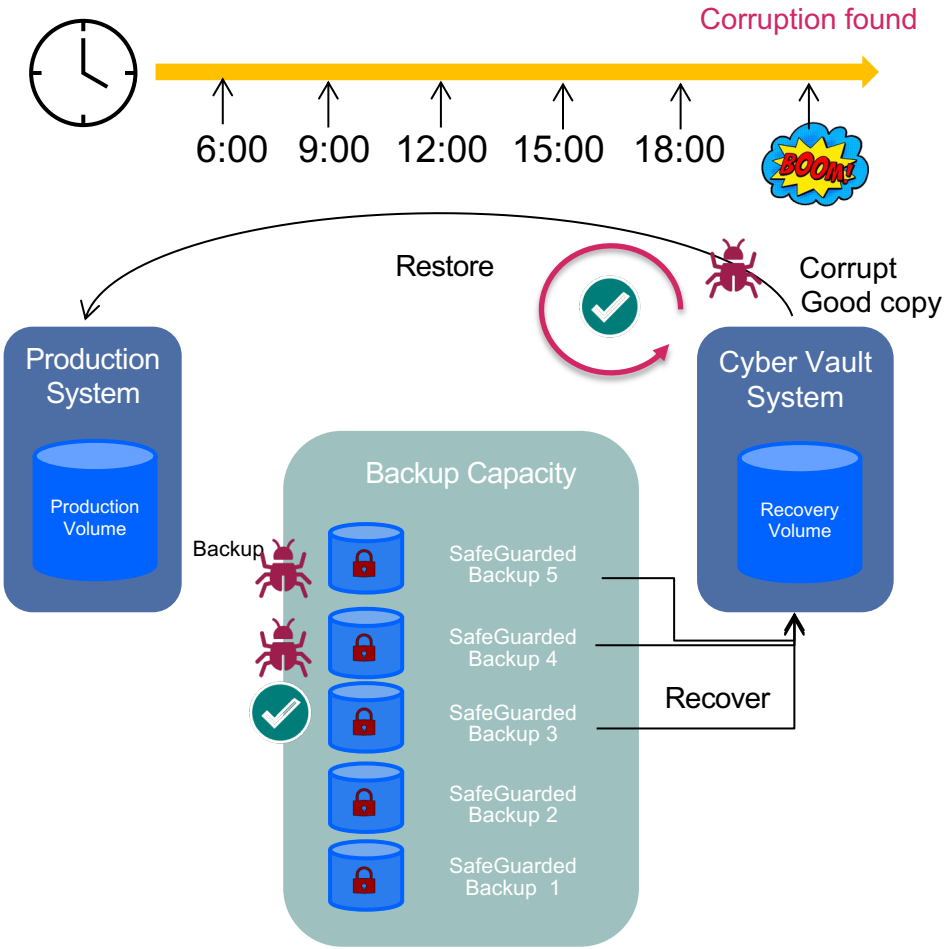
Recovery devices are used to logically restore back data to the production environment or to investigate a problem and determine what the recovery action should be

Source devices are where the protection copies are taken from. These could be production devices or taken from a HA/DR copy using data replication

Protection devices provide one or more logical protection copies and are not accessible by any system. Additional security measures aim to protect these from being modified or deleted due to user errors, malicious destruction or ransomware attacks

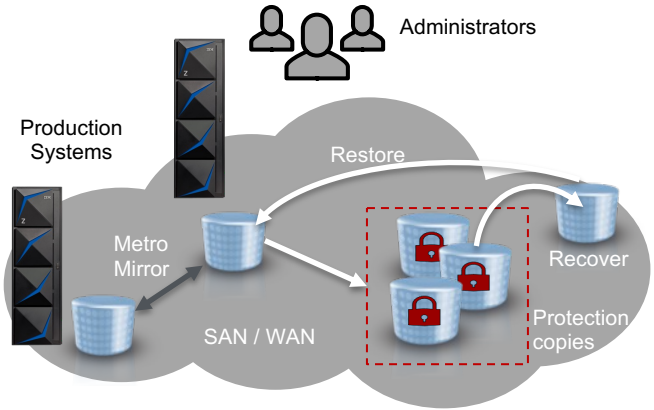
IBM Storage provides SafeGuarded Copy

- Prevent sensitive point in time copies of data from being modified or deleted due to errors, malicious destruction or ransomware attacks.
- Create up to **500** SafeGuarded Backups for a production volume stored in SafeGuarded Backup Capacity, which is not accessible to any server.
- The data is accessible only after a SafeGuarded Backup is recovered to a separate recovery volume.
- Recovery volumes are used with a data recovery system for:
  - Data validation
  - Forensic analysis
  - Restore production data



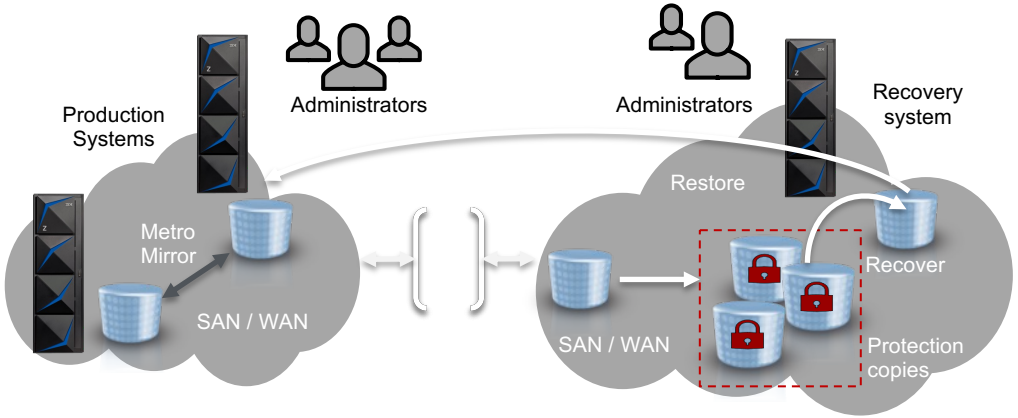
Air gap: Virtual and physical isolation of protection copies

Virtual isolation



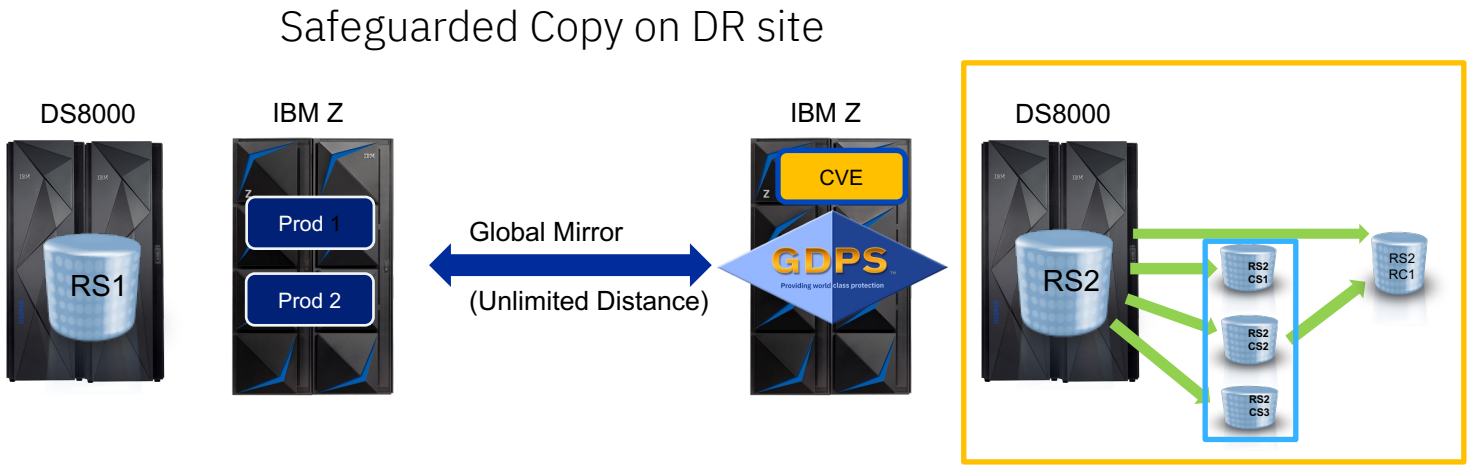
- The protection copies are created in one or more storage systems in the existing high availability and disaster recovery topology
- The storage systems are typically in the same SAN or IP network as the production environment

Physical isolation



- Additional storage systems are used for the protection copies
- The storage systems are typically not on the same SAN or IP network as the production environment
- The storage systems have restricted access and even different administrators to provide separation of duties

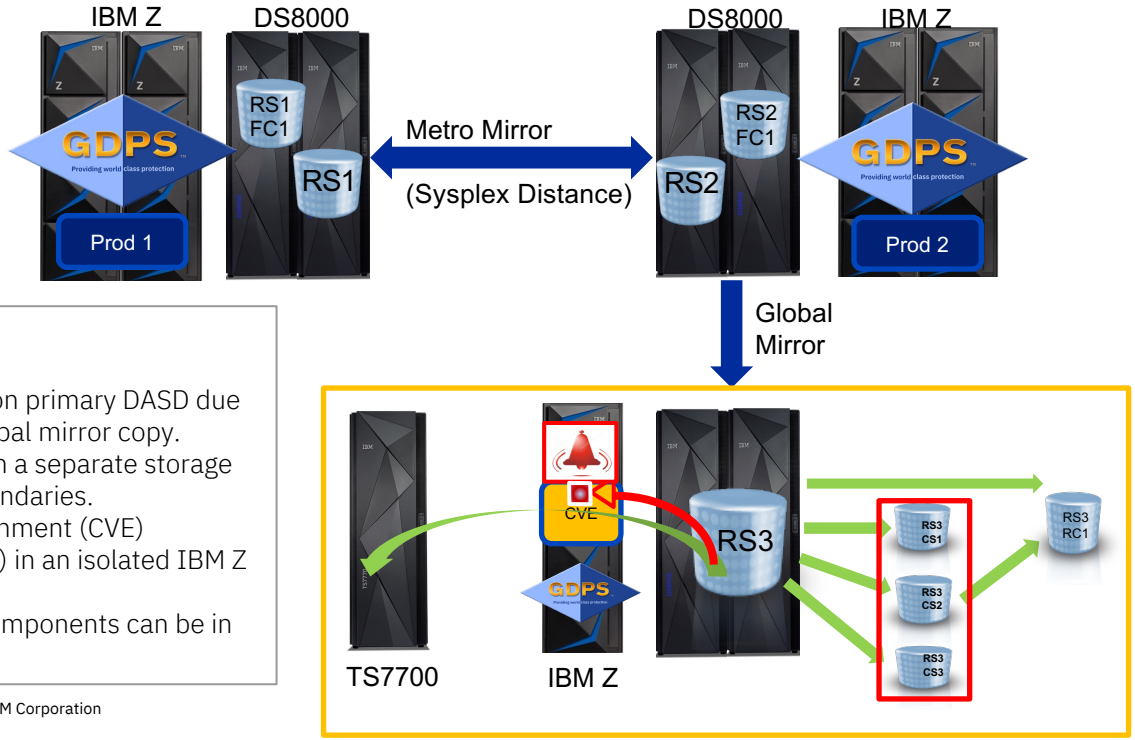
Safeguarded Copy Deployment example: Logical Airgap (virtual isolation) with Global Mirror



Description:

- Unlimited Distance
- No performance impact on primary DASD due to asynchronous copy mechanism.
- Safeguarded copies are in the same storage box as GM secondaries.
- IBM Z Cyber Vault Environment (CVE) leverages active capacity (MIPS) in DR site.

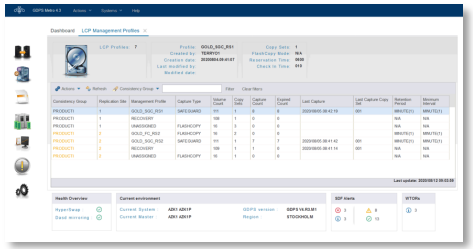
Safeguarded Copy Deployment example: Physical Airgap (and Isolation) using Global Mirror



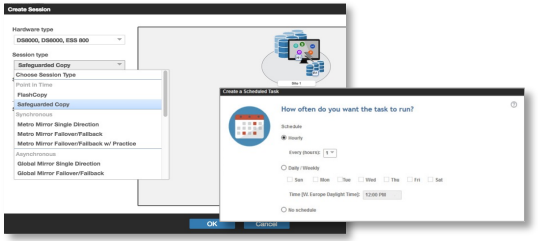
Description:

- Synchronous Distance
- No performance impact on primary DASD due to asynchronous new global mirror copy.
- Safeguarded copies are in a separate storage device with new GM secondaries.
- IBM Z Cyber Vault Environment (CVE) leverages capacity (MIPS) in an isolated IBM Z environment.
- The IBM Z Cyber Vault components can be in any datacenter.

Management Solutions for Cyber Vault and Safeguarded Copy



GDPS LCP Manager



Copy Services Manager (CSM)

GDPS LCP is a feature of GDPS that provides continuous data protection by managing Safeguarded Copies and automating validation and recovery.

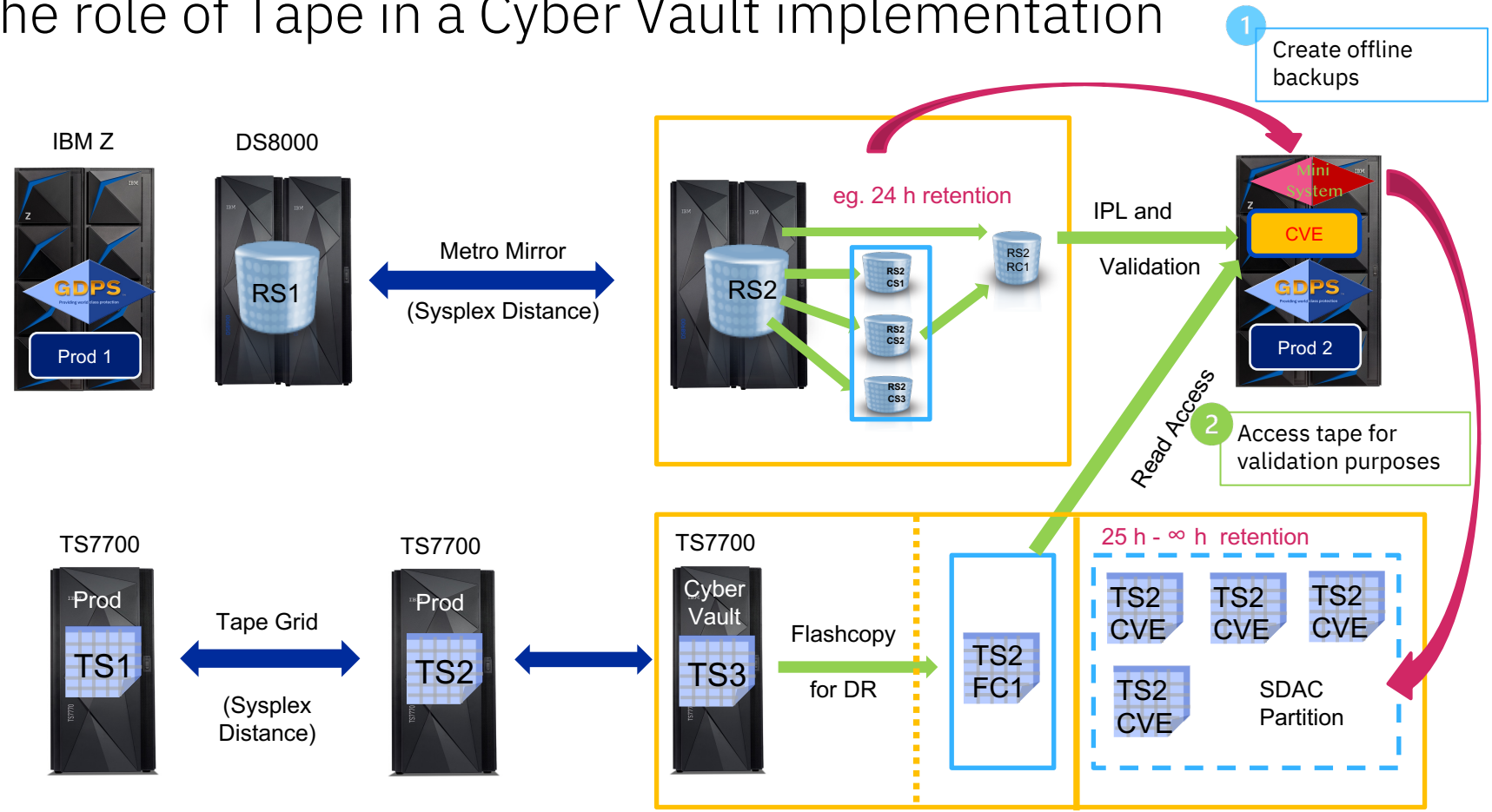
- Manage and monitor Safeguarded Copies
  - *Supports Safeguarded Copy in DS8K*
  - *Captures multiple, secure point-in-time copies of critical production data (referred to as protection copies)*
  - *Expire Safeguarded Copy Backup*
  - *Recover Safeguarded Copy Backup*
  - *Display Volumes of a Safeguarded Copy Backup*
- Provides enhanced security features to protect Safeguarded Copies
- Automates data validation and recovery processes

IBM Copy Services Manager provides highly secure and efficient capabilities to manage Safeguarded Copy

- Manage and monitor Safeguarded Copy sessions
  - *Create Safeguarded Copy Backups*
  - *Expire Safeguarded Copy Backups*
  - *Recover a Safeguarded Copy Backup*
  - *Display Volumes of a Safeguarded Copy Backup*
  - *Terminate a Safeguarded Copy session*
- Provides dual authentication control capability

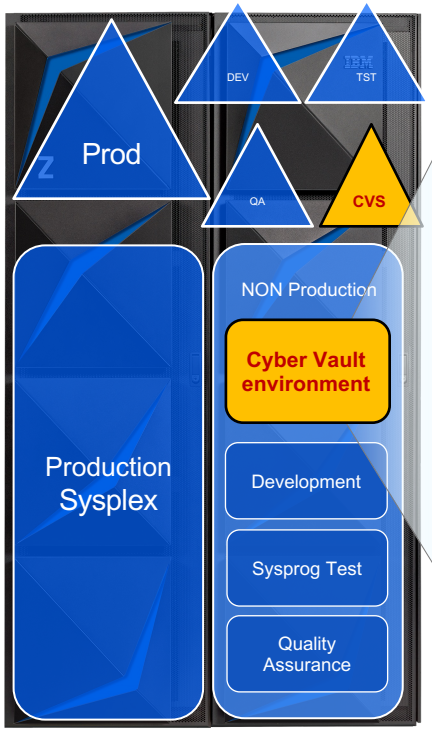
GDPS and GDPS LCP is the more comprehensive resiliency and cyber resiliency solution

The role of Tape in a Cyber Vault implementation



Validating and Recovering your data

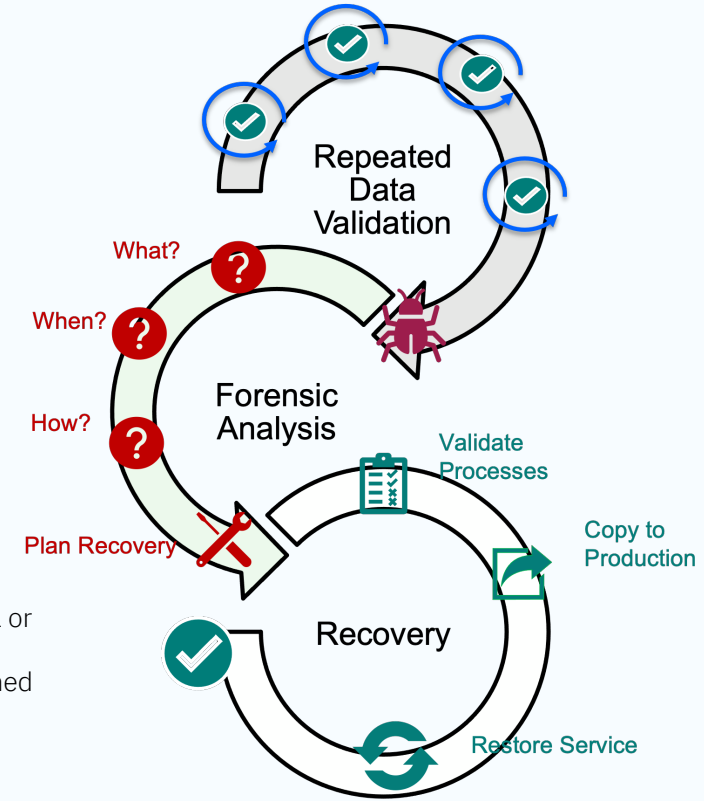
The sooner you identify a problem, the smaller the impact will be.



- Repeatable and Automated
- Time Consistent Copy is clean
- System is operational

- What, when and how data was corrupted?
- Can't be automated
- Tools may help, application knowledge is required

- Execute Recovery Actions - Surgical or Catastrophic.
- Use existing templates and predefined procedures



Stay one step ahead with continuous data validation

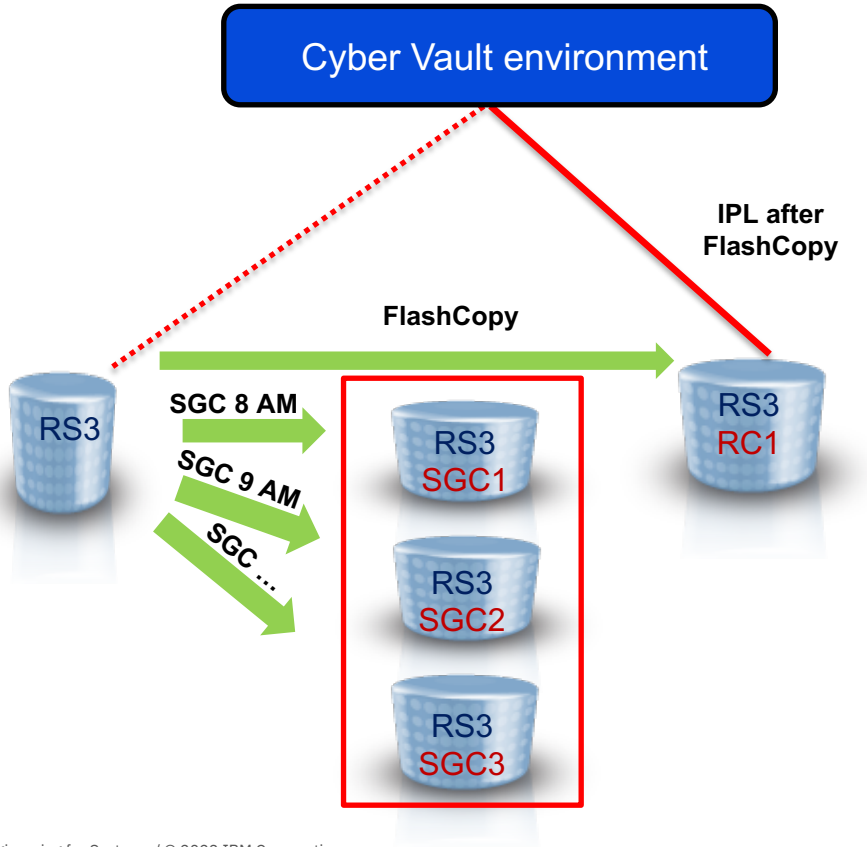
Continuous data validation allows the early detection of a problem or reassurance that a given protection copy is uncorrupted.

Data validation is the process of executing regular analytics to identify a data corruption situation and determine the most convenient recovery action.

Performing corruption detection and validation processes against a copy of data is more practical than doing this in the live production environment.

Valid data can be sent to offline media to have a reliable and isolated point-in-time copy.

IBM Z Cyber Vault – Data validation concept



As often as possible .....

Type 1: IPL with production images

- System Recovery Boost Upgrade record can be used to speed IPL
- Check Sysplex infrastructure
- Database and middleware restart and recovery

Type 2: Data Structure Validation

- Db2 Utilities, Log analysis, index checking
- IMS Utilities
- Catalog tools (Tivoli, IDCAMS, ISV products)
- VSAM Indexcheck, Datacheck
- DFSMShsm, DFSMSrmm tools
- RACF (IRRUT200), zSecure-Audit
- ISV software (CA1, CA7, ...)

Type 3: Data Content Validation

- Customer Application Program

Back trace a cyber attack by forensic analysis

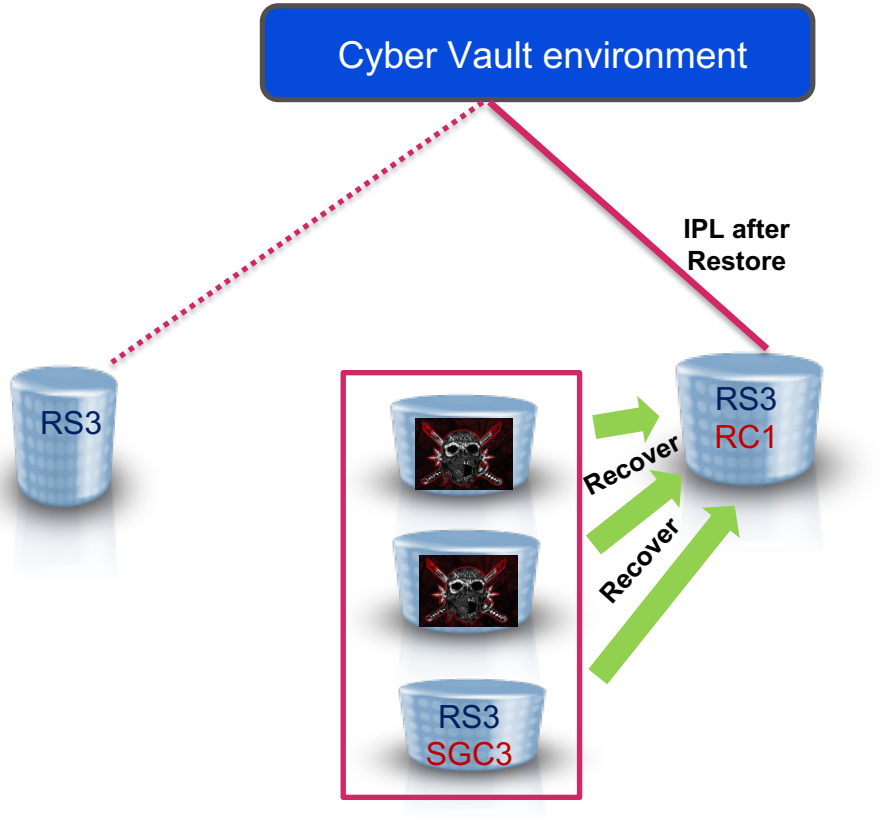
A forensic analysis identifies the cause and scope of a problem before deciding on a recovery action.

The forensic analysis determines what data is corrupted, when the corruption occurred, and which of the available protection copies is the last good one.

Based on this analysis, it can be determined how to proceed:

- Fix the corruption from within the production environment
- Extract and recover certain parts of the data from a valid backup copy (surgical recovery)
- Restore the entire environment to a point in time that is known to be unaffected by the corruption (catastrophic recovery)

Forensic Analysis



Determine start of data corruption …

- **IPL and validate** one Safeguarded Copy after the other to find the last clean copy.
- **Understand** the problem
  - Run specific data structure and data content analysis on all stored Safeguarded Copies until a “clean” copy is found.
  - Use database tools to analyze databases and logs to fully embrace the scope of the problem
- **Identify** steps forward
  - Create strategy for recovery dependent on availability of database image copy files.

Surgical data recovery

Surgical recovery consists of the extraction of specific data from a valid copy and logically restore it back to the production environment.

Surgical Recovery may be a faster method if only a small portion of the production data is corrupted and if consistency between current production data and the restored parts can
be re-established.

Another case for this kind of recovery may occur if the last known good backup copy is too old to restore the complete environment. It may then be desirable to leave most of the production volumes in its present state, and just copy replacement data to correct actually corrupted data.

Surgical Recovery - Scenarios

Surgical Recovery can be complex and it is dependent on which data is available where for restore and recovery. In case Surgical Recovery needs to be done, the first step is to identify the actual scenario.

1. Backups are available in Production

- Image Copy of database exist in the production environment

Test in Cyber Vault, recover in production (business as usual)

2. Backups are available in the Cyber Vault only

- Image Copy of database does not exist in the production environment
- Image Copies exist on DASD in the Cyber Vault environment

Recover and test in Cyber Vault, send to production

3. No Backups are available neither in Production nor in the Cyber Vault environment

- Image Copy of database does not exist in the production environment
- Image Copies do not exist on DASD in the Cyber Vault environment

Recover and test in Cyber Vault, send to production, ensure database integrity

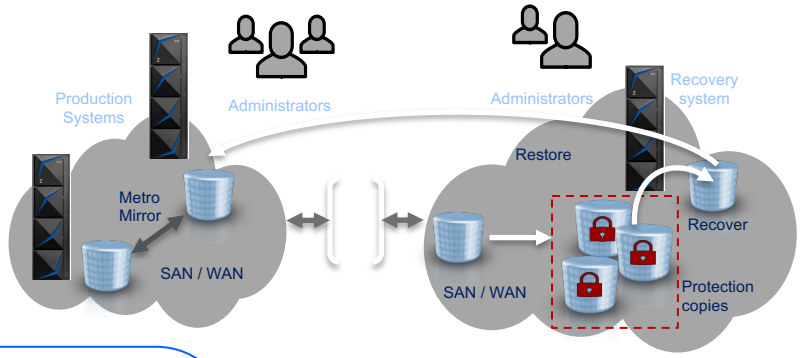
Catastrophic recovery

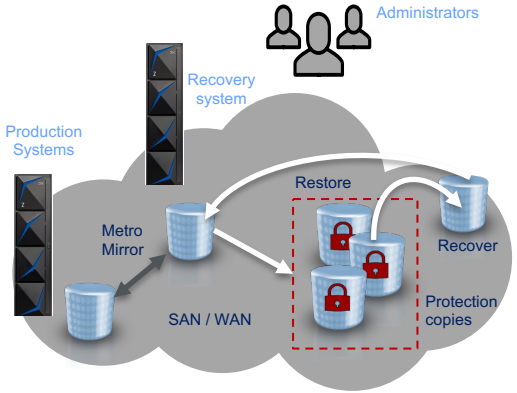
Catastrophic recovery is needed, when forward fixing or surgical recovery is not an option due to the extensive spread of the corruption.

In the case of massive corruption to all or most of the data in the environment, a castastrophic recovery needs to take place.

This means a full restore of a “clean” copy from Safeguarded Copy into the production environment needs to be done.

Catastrophic recovery concept





Catastrophic Recovery solutions will vary from client to client. The unifying concept involves full restore to a defined point in time for the whole environment.

But it is up to the client if, in this case they start production from the DR site, Metro Mirror Site 1 or Metro Mirror Site 2, to name some options

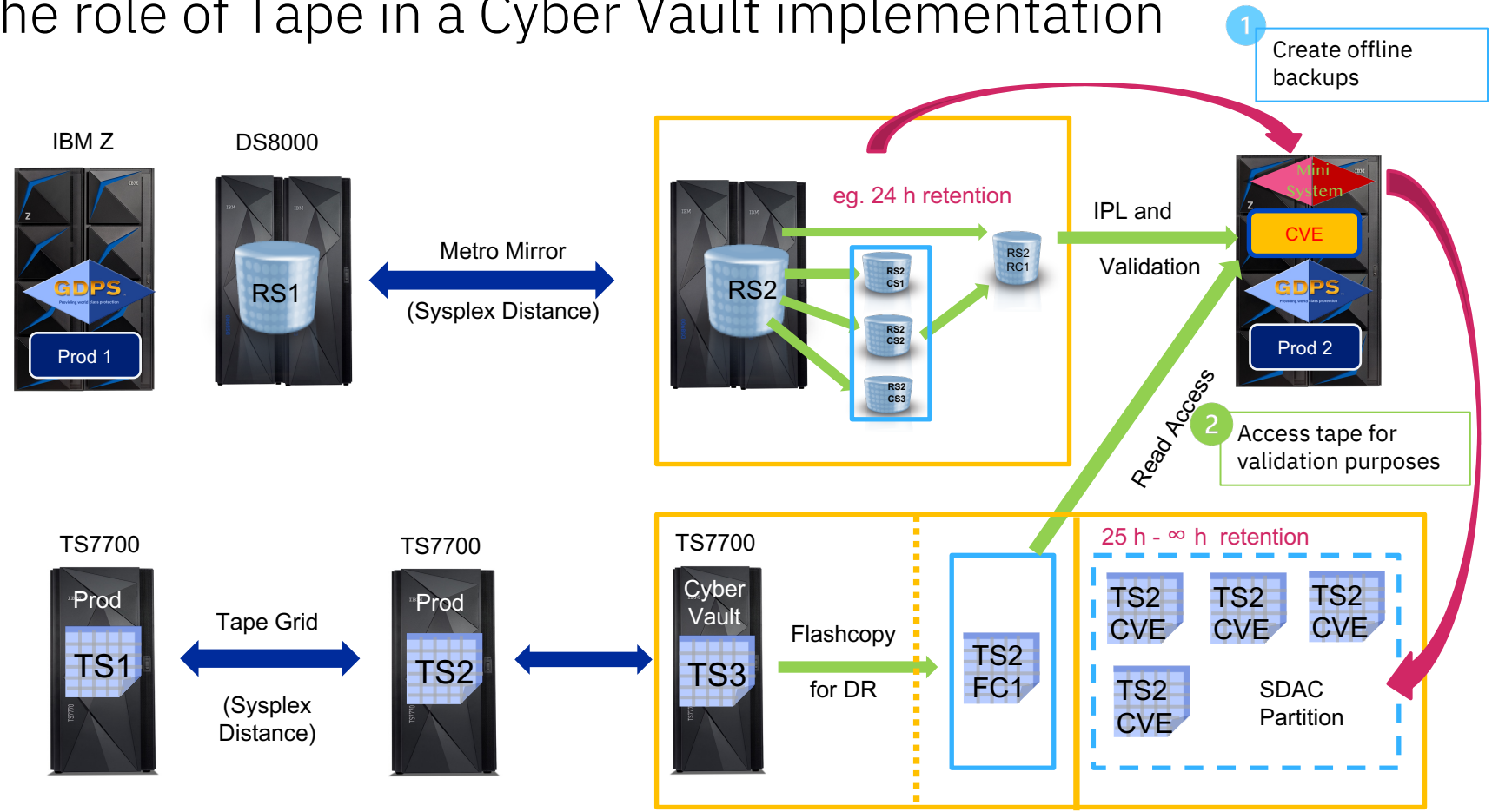
Offline Backups

Creating offline backups from your IBM Z Cyber Vault extends your ability to restore services from older point in copies.

In the context of Cyber Resiliency and Cyber Vault, additional offline copies provide additional protection. Safeguarded copy gives you the ability to capture and retain upto 500 copies for recovery and restoration from disk. However, you may need to retain some copies for longer.

Storing validated point in time copies on media like virtual tape or cloud object storage gives you a lower cost solution for longer term retention.

The role of Tape in a Cyber Vault implementation



Next Steps

IBM Z Cyber Vault
Discovery and Architecture Workshop

IBM Client Engineering will conduct two 2-hour sessions.

Identify high-level current state and gain insights into the Cyber Resiliency risks and challenges. Define the desired state and next steps for achieving it.

- Define cyber resiliency objectives including data retention and recovery time.
- Understand the current state and gain insights into cyber resiliency gaps and risks.
- Define success criteria.
- Design a future state Cyber Vault architecture.
- Develop and document an approach and roadmap to achieve the future state.