



Cold site DR – On-premise to Power
VS
with
FalconStor StorSafe VTL

Cold site DR Procedure and options:

On-Prem: Getting started procedure & on-prem recovery:

1. Start with sizing the on-prem and PVS VTL
 - use Sizing Calculator ([link](#))
2. Decide on the on-prem VTL platform
 - VM on Vmware, VM on Hyper-V, VM on Power, x86 hardware
3. Create PVS infrastructure account, workspace, network etc.
4. Decide deploying option for StorSight server
 - VM on prem
 - X86
 - VPC
5. Install StorSafe on-prem using Sizing output
 - Configure VTL,
 - Creating repository, cache folder/index etc.
 - Add IBM i clients
 - Backup data from IBM i to VTL
6. Install PVS VTL using sizing output
 - Complete configuration by
 - Creating Repository, Cache, Folder/index etc.
7. Configure replication from On-prem to PVS VTL
8. Take periodic delta backup consistent with your backup & recovery strategy into the on-prem StoreSafe and ensure replication gets completed.
9. Go through On-Prem Restore process when there is a need for recovery.

Note: These are recommended steps and not directly supported since site and system dynamics can vary.

Power VS: Offsite Backups with Cloud Recovery

Follow steps 1-8 of Offsite Backups process

Option 1: Quicker recovery

1. Ensure that the VTL replication is active and without lags.
2. Migrate IBM i and other On-Prem systems to PVS and put these systems in cold standby
3. On a regular basis (quarterly, semi-annually, annually or more regularly aligned to your recovery needs) test the DR site in Power VS by periodically updating & at the time of need, restoring the most recent backups from StorSafe VTL in Power VS.

Option 2: Regular recovery

1. Ensure that the VTL replication is active and without lags.
2. At the time of need, Build & Migrate IBM i (refer to slide with title “IBM i to IBM Cloud PowerVS”) and other on-Prem systems to PVS.

Note: Periodic full system backups may be necessary for this option to ensure quantum of delta restores during the time of recovery is minimal.

Note: Either option can be chosen based on your recovery requirements.

Use Cases:

1. Alternative solution to off-site physical tape vaulting– Optimized backups with VTL replication to Power VS, you have a second copy of backup in Power VS for recovery scenarios.
2. Affordable DR in Power VS – Provision minimal resources or tailor the environment to suit your recovery needs.
3. Native high-performance backup/restore solution for Power VS resident workloads (IBM i, AIX or Linux).

Scenarios For Recovery

| Sl. No | Failure Type | Recovery Action |
|--------|---|--|
| 1. | Ransomware Recovery | Restore from the last known good backup. |
| 2. | Recovery from a lost object in a protected LPAR | Restore from the last known good backup. |
| 3. | Recovery of a failed LPAR / failed Power system | RESTORE21 from tape on-prem after fixing HW issue in the Power System. |
| 4. | Recovery from a VTL failure | Fix the VTL, replicate the backup from PowerVS, and do the restore. |
| 5. | Recovery from a VTL storage failure | Fix the storage, replicate the backup from PowerVS, and do the restore. |
| 6. | Recovery from a total on-prem site failure requiring DR switch over | Switch workload to Power VS (Build / restore up to last known / replicated backup) Once the on-prem site issue is resolved and operational, replicate the backups from the Power VS VTL, and perform build/restore as applicable in preparation for switchback. |

Stepwise methodology for Offsite Backups & Recovery scenarios

Please note: FalconStor may provide scripts described here, on an as-needed and unsupported basis.

1. Sizing the On-Prem & PVS VTL

Start with sizing the on-prem and PVS VTL using our Sizing Calculator:

<https://www.falconstor.com/ibm-calculator/welcome/> password: IBM2024

Sample Outputs:

Default Dedupe Ratio for IBM i Workloads is 20:1

Digitize Physical Tapes

Import from Data Domain

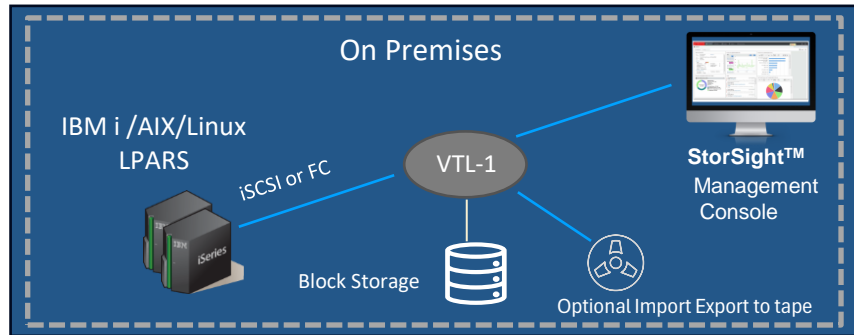
| Sizing Results | Primary | DR VTL |
|--|---------|--------|
| Repository Size (TB): | 5 | 5 |
| Total Storage Required (TB): | 8 | 7 |
| Total Memory (GB): | 33 | 33 |
| CPU (Cores): | 2 | 2 |
| VM Type: | | s1022 |
| NIC Ports 1 Gig (minimum requirement): | 2 | 3 |

Use IBM Cloud Object Storage for Immutable Data Storage and Archiving

Use Block Storage option for Performance

| Inputs for Power VS Price Estimator | LPAR Qty | DC | System | Proc | Cores | Mem-GB | OS | Tier 1-GB | Tier3-GB | VTL Rep-TB |
|---------------------------------------|----------|----|--------|------|-------|--------|-----------|-----------|----------|------------|
| VM to run VTL Backup - Primary Site | | | | S | | | BYO Linux | | | |
| VTL Repository License - Primary Site | | | | | | | | | | |
| VM to run VTL Backup - DR Site | 1 | | s1022 | S | 2 | 33 | BYO Linux | | 2250 | |
| VTL Repository License - DR Site | | | | | | | | | | 5 |

2. Decide on the On-Prem VTL Platform



On-Premise Deployment Options:

- ❖ VM on VMware
- ❖ VM on Hyper-V
- ❖ VM on Power
- ❖ X86 hardware
- ❖ Fibre Channel or iSCSI
- ❖ VTL clustering for backing up large environments
- ❖ Compatibility with IBM i, AIX, and Linux
- ❖ FC HBAs: QLogic 25xx 8 Gb, QLogic 26xx 16 Gb, and QLogic 2742/2772 32 Gb

An iSCSI virtual tape library (VTL) improves the performance of save and restore operations over Ethernet.

<https://www.ibm.com/support/pages/ibm-i-removable-media-support-iscsi-vtl>

Fibre Channel target mode and iSCSI target mode can be enabled on StorSafe so that clients can take advantage of extensive storage capabilities such as virtualization, mirroring, replication, NPIV, and security. Support is offered for all FC topologies, including point-to-point and fabric.

At the Certification Matrix, you can see all of the hardware and software that we have certified from all the vendors, such as backup software, hypervisors, tape libraries and drives, storage, servers, server OS, clouds, etc.

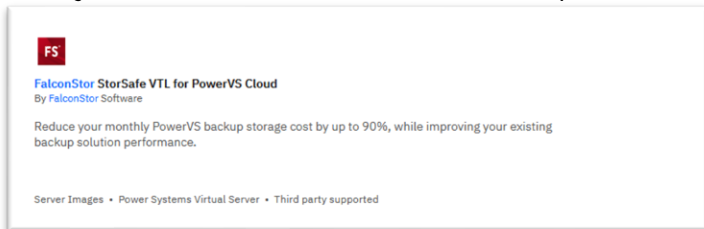
www.falconstor.com/support/certification-matrix/

3. Create PVS Infrastructure Workspace & deploy FalconStor

3a. Use the IBM Deployable Architecture from the catalog tile to build a Power Systems Virtual Server (PowerVS) workspace with a Virtual Private Cloud (VPC) landing zone.



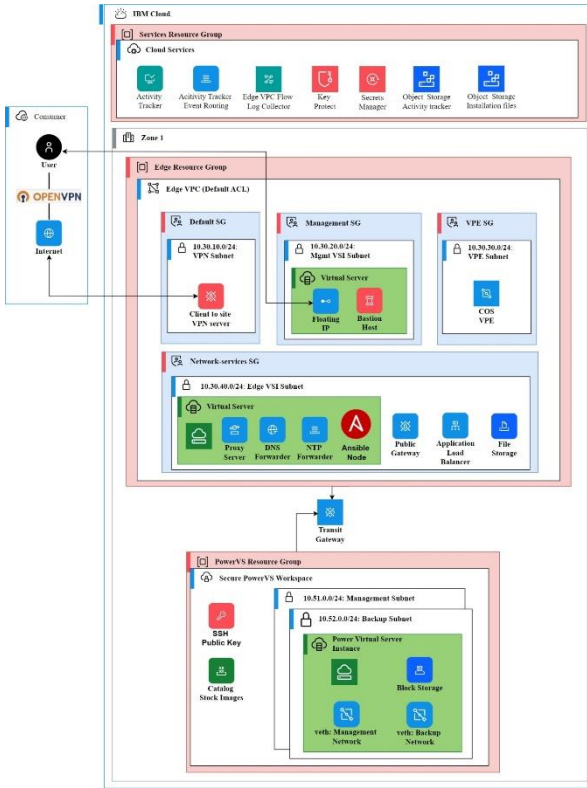
3b. Then, you can select the CRN of this workspace when you deploy a FalconStor StorSafe VTL cloud catalog tile.



To set up a deployable architecture workspace, you will need to:

1. Create your API key.
2. Generate your SSH private and public keys on your machine that will access resources in the workspace.
3. Add IBM Secrets Manager service that will hold your keys for a centralized management.
4. Create an IBM project to manage code-based deployments across accounts, collaborate with team members, and maintain compliance.

3a. Create PVS Infrastructure Workspace



Power Virtual Server with VPC landing zone 'Quickstart' variation

The Power Virtual Server with VPC landing zone as 'Quickstart' variation of 'Create a new architecture' option deploys VPC services and a Power Virtual Server workspace and interconnects them. It also creates one Power virtual server instance of chosen t-shirt size or custom configuration.

Required and optional management components are configured.

For more details on the Power Virtual Server with VPC landing zone architecture overview:

<https://cloud.ibm.com/catalog/architecture/deploy-arch-ibm-pvs-inf-2dd486c7-b317-4aaa-907b-42671485ad96-global>

3b. Deploy FalconStor via PowerVS Tile With Output from Sizing Calculator & Deployable Architecture

IBM Cloud Search resources and products... Catalog Manage 2353501 - FalconStor

Set the input variables

Required input variables
A value for each of the following parameters is required. A default value might be set for some parameters. You can choose to accept the default value or update it.

| Parameter | Description | Value |
|---------------------|---|----------------------------------|
| crn | Power Systems Virtual Server CRN | Power Systems Virtual Serve... ▾ |
| instance_name | The name to assign to the StorSafe VTL instance | JWG-test6 |
| memory | The amount of memory to assign to the StorSafe VTL instance in GB according to the following formula: $memory \geq 16 + (2 * license_repository_capacity)$ | 29 - + |
| network_1 | The first network ID or name to assign to the StorSafe VTL instance, as defined for the selected Power Systems Virtual Server CRN | Enter network_1 |
| repository_capacity | The StorSafe VTL licensed repository capacity in TB | 1 - + |
| ssh_key_name | The name of the public SSH RSA key to access the StorSafe VTL instance, as defined for the selected Power Systems Virtual Server CRN | Enter ssh_key_name |

4. Deploy StorSight Server

FalconStor StorSight is a web-based portal for centralized management and monitoring of multiple backup and deduplication servers. Deploying options for StorSight server:


- VM on-prem
- X86
- Virtual Private Cloud (VPC)

StorSight Dashboard Web GUI:



StorSight Management Console

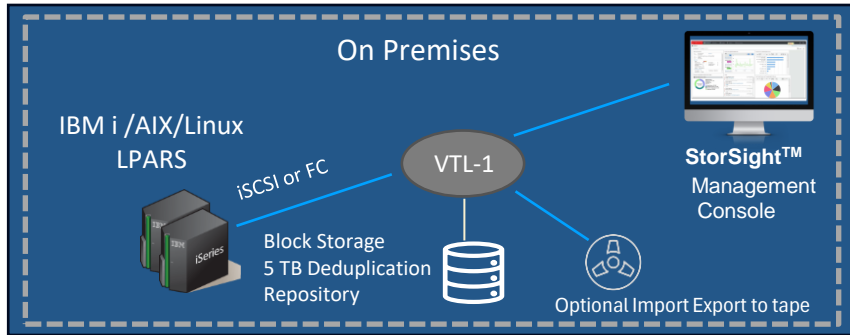
- Central orchestration layer for management of on-premises, hybrid cloud and multicloud environments
- Real-time visibility into status, health, and integrity
- Provides Smart rules, analytics, reports, and forecasts



StorSight virtual appliance minimum requirements:

| Hardware | VM Requirement |
|----------|---|
| CPU | 1 vCPU |
| Memory | 16 GB (recommended 32 GB) |
| Disk | Operating system: 1 disk of 80 GB Database: 1 disk of 100 GB |
| Network | 1 virtual network adapter |

5. Install & Configure StorSafe On-Prem VTL



1. Install the VTL on-prem based on sizing done in step 1 /slide 5.
2. Configure the VTL.
3. Create the deduplication repository, cache folder, index folder, and configuration repository.
4. Add IBM i clients.
5. Backup data from IBM i to VTL.

Once the VTL is created in PVS, an email is sent requesting confirmation of the order. The engineer will need to fill out the form so that we can then send them their license and the license will be sent to the email address that's used to fill out the form.

Redbook: IBM Power Virtual Server Guide for IBM AIX and Linux

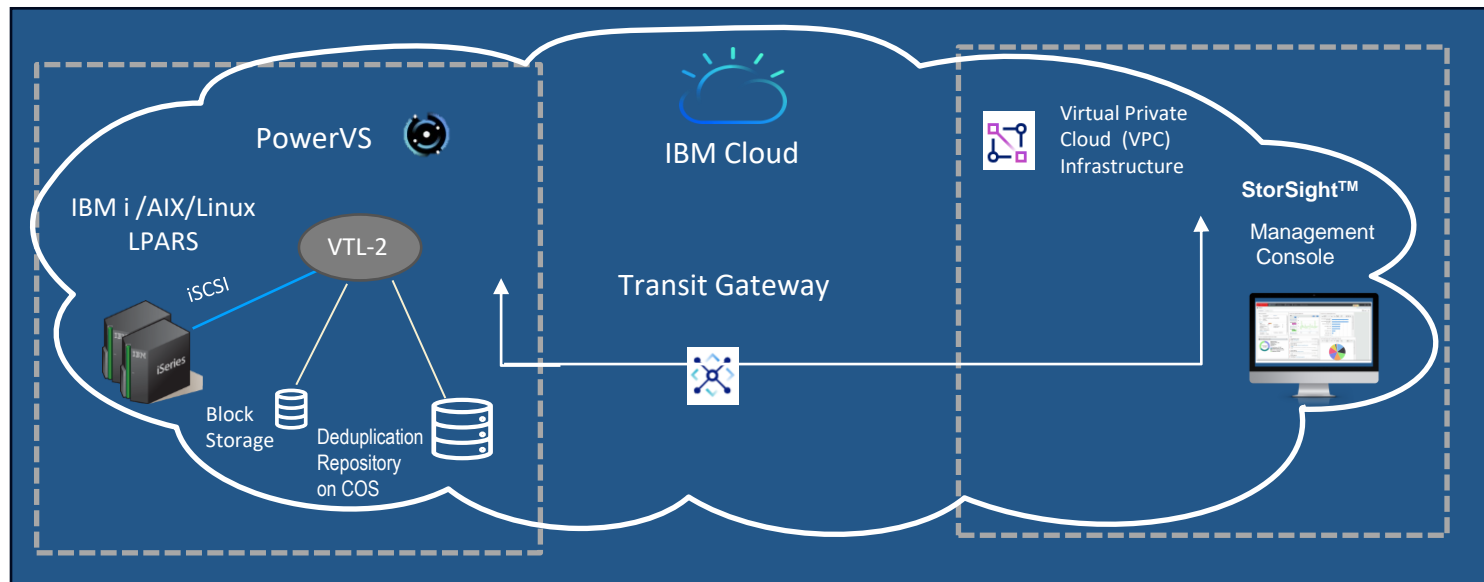
<https://www.redbooks.ibm.com/abstracts/sg248512.html?Open>

For more details on how to install the VTL, consult the FalconStor StorSafe for IBM Power Deployment Guide:

<https://falconstor-download.s3.us-east.cloud-object-storage.appdomain.cloud/FalconStor%20StorSafe%20for%20IBM%20Power%20Deployment%20Guide.pdf>

6. “Configure” PVS VTL Using the Sizing Output

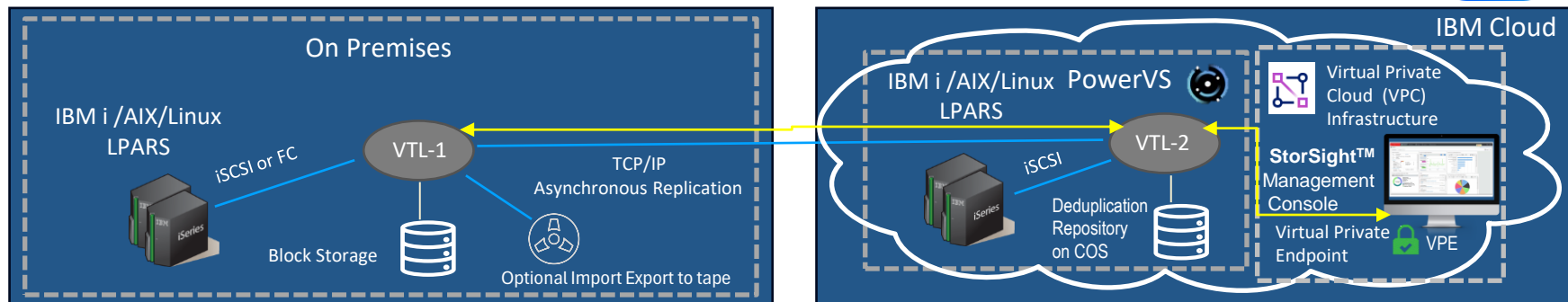
Complete configuration: Create the deduplication repository on COS, and the cache folder, index folder, and configuration repository on block storage.



For more details on how to install the VTL, consult the FalconStor StorSafe for IBM Power Deployment Guide:

<https://falconstor-download.s3.us-east.cloud-object-storage.appdomain.cloud/FalconStor%20StorSafe%20for%20IBM%20Power%20Deployment%20Guide.pdf>

7a. Configure Replication from on-prem to PVS VTL



Connectivity - The following connections are required:

- ❑ Network connection between the on-premises StorSafe and the PowerVS StorSafe in IBM Cloud
- ❑ Network connection between StorSight in VPC and the on-premises StorSafe
- ❑ Network connections between StorSight in the VPC infrastructure and the PowerVS StorSafe in IBM Cloud
- ❑ iSCSI or Fibre Channel connection between IBM i host clients and the on-premises StorSafe
- ❑ iSCSI connections between IBM i host clients and the PowerVS StorSafe in IBM Cloud

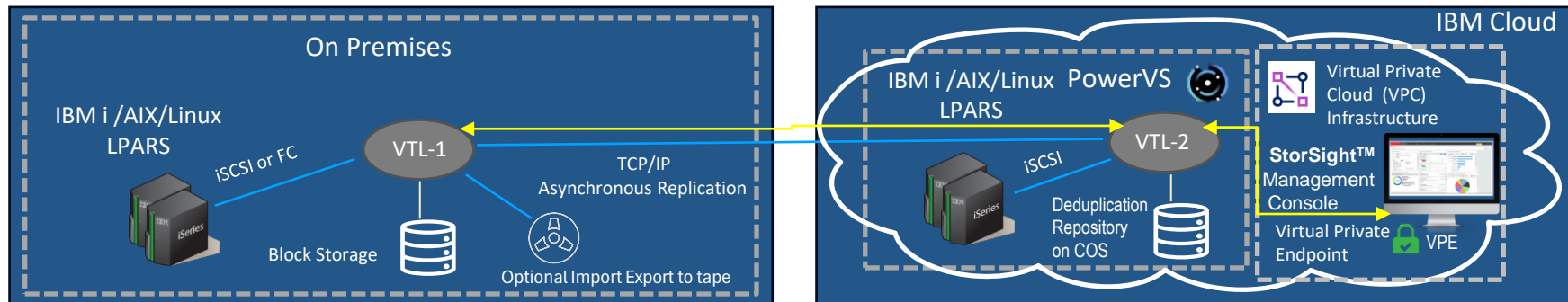
- ❑ If IBM COS is used for the deduplication repository, provide network connectivity between PowerVS StorSafe and IBM Cloud Object Storage.
- ❑ Internet connection with the FalconStor license server for online registration

Virtual Local Area Networks (VLANs)

You can set up VLANs to isolate the network traffic between:

- IBM i host clients and StorSafe for ingest data
- StorSafe and StorSight for management
- StorSafe and IBM COS for deduplicated data
- StorSafe source and replica servers for data replication

7b. Configure Replication from on-prem to PVS VTL



Data replication

| |
|--------------------------|
| Source Site Location |
| Target Site Location |
| WAN Link Type |
| WAN Length |
| WAN Bandwidth |
| Cross Replication or not |
| Dedicated or Shared |

Create network subnets

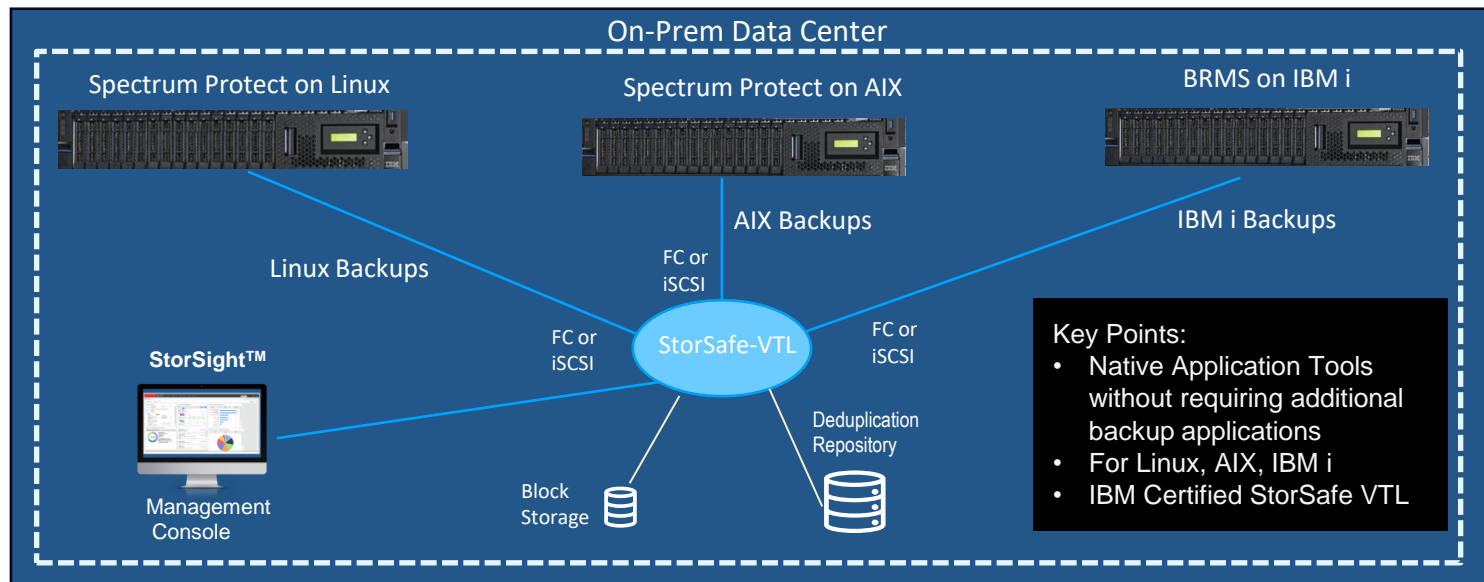
To isolate traffic via VLANs, create at least three subnets in your Power Systems Virtual Server service for different usage, such as **StorSight Portal** and **COS access**, **iSCSI clients** in different areas, and **Replication** traffic with a remote server. You can have as many subnets as you require in each Power Systems Virtual Server service. Once you specify the networks, IBM **cloud-init** configures the IP addresses.

For more details, consult the FalconStor StorSafe for IBM Power Deployment Guide, pages 20 and 22.

<https://falconstor-download.s3.us-east.cloud-object-storage.appdomain.cloud/FalconStor%20StorSafe%20for%20IBM%20Power%20Deployment%20Guide.pdf>

8. Delta backup into the on-prem StorSafe VTL

Use your existing backup software (e.g., BRMS for IBM i). Take periodic delta backup consistent with your backup & recovery strategy into the on-prem StorSafe. Ensure replication gets completed. If the delta becomes too large causing recovery to be slow, you may need to take a full backup more periodically.



Refer to these links for information: Presumes the user is familiar with IBM i save/restore operations

For a quick reference on IBM i OS commands for backup, <https://www.ibm.com/docs/en/i/7.5?topic=recovery-backing-up-your-system>

BRMS for IBM Cloud using VTL iSCSI Devices

<https://helpsystemswiki.atlassian.net/wiki/spaces/IWT/pages/1597636618/BRMS+for+IBM+Cloud+using+VTL+iSCSI+Devices>

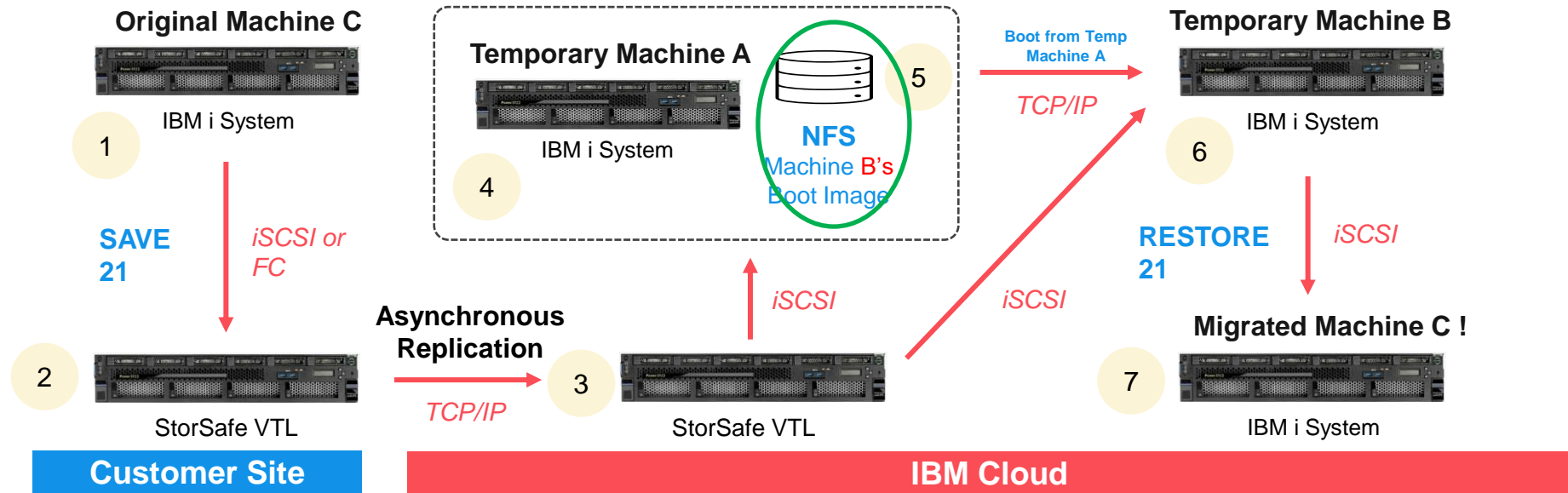
<https://helpsystemswiki.atlassian.net/wiki/spaces/IWT/pages/1597440018/BRMS+using+VTL+iSCSI+Device+Requirements+and+Considerations>

<https://helpsystemswiki.atlassian.net/wiki/spaces/IWT/pages/1597276174/BRMS+using+VTL+iSCSI+Device+Operations+How+to...>

<https://helpsystemswiki.atlassian.net/wiki/spaces/IWT/pages/1597636644/Verify+Image+Catalog+After+Backup>

Recovery from Offsite Backups (Cold DR)

1. IBM i to IBM Cloud PowerVS



1. Prep for migration on Machine C to make the first tape, which will contain SAVSYS and the base IBM i operating system.

2. Perform a **SAVE 21** on Machine C on-premises at the customer site. This makes a second tape.

3. **Replicate** both tapes from the customer's site to StorSafe in the IBM cloud.

4. Restore the Savesys from the StorSafe tape to Machine A in IBM Cloud.

5. On Machine A, Put the restored boot image onto an NFS share.

6. Boot Machine B from NFS on Machine A. Apply the required PTFs onto Machine B for iSCSI support & configure StorSafe VTL.

7. Perform a **RESTORE 21** on machine B and reboot to complete the migration of Machine C to the IBM cloud! + Perform delta restore (periodically as applicable to your recovery option – refer slide 2).

<https://www.ibm.com/support/pages/node/6413715>

<https://www.ibm.com/support/pages/system/files/inline-files/IBM%20i%20Support%20for%20iSCSI%20VTL%201.5.pdf> (Refer pg. 16 to 18)

Reference Material for Network Install Using Network File System (NFS)

<https://helpsystemswiki.atlassian.net/wiki/spaces/IWT/pages/1597603857/Reference+Material+for+Network+Install+Using+Network+File+System+NFS>

2. Periodically Test Cloud DR Readiness

On a regular basis (quarterly, semi-annually, annually or more regularly aligned to your recovery needs) test the DR site in PowerVS by restoring backups from StorSafe VTL in PowerVS. These tests will help in estimating the recovery time required and gain familiarity with the procedure.

For Option 1: Quicker recovery

1. Build the IBM i system in Power VS following the procedure depicted in the previous slide and have it in cold standby mode.
2. On a regular basis, perform delta restore of the most recent replicated backups from the StorSafe VTL in Power VS.
3. Activate the System and perform application/data validations in a controlled manner.

For Option 2: Regular recovery

1. Migrate the on-prem IBM i system to PVS following the procedure depicted in previous slide to practice and attain familiarity of build/restore procedure, when in need of a disaster recovery cold DR switchover.
2. Once the system is built and data restored from most recent backup that was replicated over to the Power VS StorSafe VTL.
3. Activate the system and perform application/data validations in a controlled manner.

In the event of a disaster recovery switchover need:

1. Perform above steps (as per option chosen) and ensure most recent backup is restored. Promote replicated tapes in StorSafe VTL in Power VS and perform necessary testing.
2. Perform application/data validations and start application services once verified and ready to commission/provide access to end users.
3. Perform other associated procedures towards switch over such as Network advertisements, routing, DNS/IP changes (if any) to ensure user traffic can flow through into Power VS.

Thank You!

Reference Documents

IBMi

1. *IBM i Backup and Recovery*: <https://www.ibm.com/docs/en/i/7.4?topic=recovery-backup>
2. *IBM i Disaster Recovery Strategies*: <https://www.ibm.com/docs/en/i/7.5?topic=recovery-planning-backup-strategy>
3. *IBM i Redbooks*: <https://www.redbooks.ibm.com/search?query=ibm+i>

StorSafe VTL

1. *StorSafe VTL for IBM Power Deployment Guide*:

<https://falconstor-download.s3.us-east.cloud-object-storage.appdomain.cloud/FalconStor%20StorSafe%20for%20IBM%20Power%20Deployment%20Guide.pdf>

2. *Best Practices Guide*: https://www.falconstor.com/wp-content/uploads/2020/06/FalconStor_VTL_White-Paper_Best_Practices_Guide.pdf

IBM Cloud

1. *IBM Cloud Object Storage Documentation*: <https://cloud.ibm.com/docs/cloud-object-storage>

2. *IBM Cloud High Availability and Disaster Recovery options IBM data center*:

<https://cloud.ibm.com/docs/power-iaas?topic=power-iaas-ha-dr-on-cloud>

3. *IBM Cloud Power Virtual Server Backup strategies for IBM i*: <https://cloud.ibm.com/docs/power-iaas?topic=power-iaas-backup-ibmi>