OPENNTF WEBINARS

January, 2022 OpenNTF Webinar

Backup your Domino Server - New Options in V12

AGENDA

- Welcome – Howard Greenberg and Graham Acres
- Presentation – Daniel Nashed, Nash!Com
- Q and A - All

THANKS TO THE OPENNTF SPONSORS

- HCL made a contribution to help our organization
  - Funds these webinars!
  - Contests like Hackathons
  - Running the organization
- Prominic donates all IT related services
  - Cloud Hosting for OpenNTF
  - Infrastructure management for HCL Domino and Atlassian Servers
  - System Administration for day-to-day operation

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- Join us and get involved!
- We are all volunteers
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- If your idea is bigger than you can do on your own, we can connect you to a team to work on it
- Test or help or modify an existing project
- Write guides or documentation
- Add reviews on projects / stars on Snippets

UPCOMING EVENTS

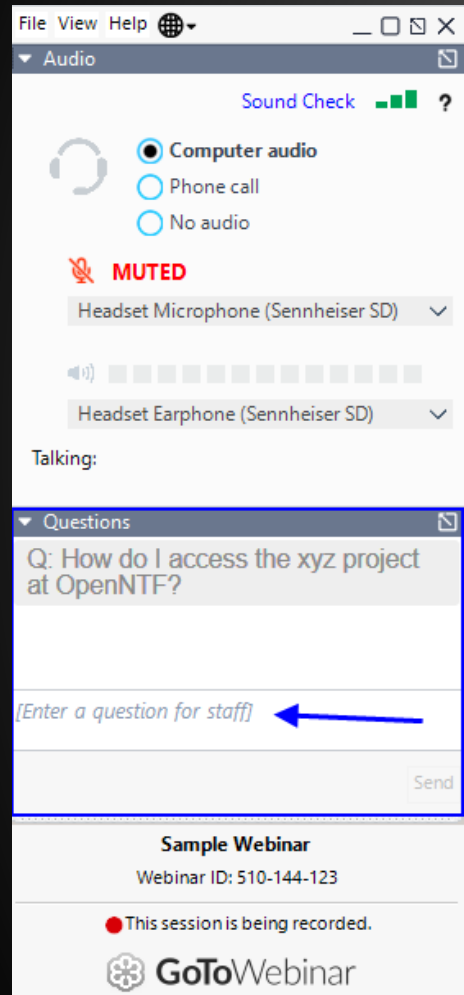- Engage 2022 – Bruges, Belgium – March 22-23, 2022
  - https://engage.ug/

NEXT WEBINAR - TBD

- February 17, 2022

ASKING QUESTIONS

- First Question – Will this be recorded?
  - Yes, view on YouTube!!!
  - https://www.youtube.com/user/OpenNTF
- Use the Questions Pane in GoToWebinar
- We will get to your questions at the end of the webinar
- The speakers will respond to your questions <u>verbally</u>
  - (not in the Questions pane)
- Please keep all questions related to the topics that our speakers are discussing!!!
- Unrelated Question => post at:
  - http://openntf.slack.com/

Introduction & Functionality

# Domino Backup Requirements
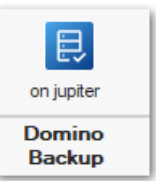
- Domino NSF files need to be backup-ed <u>on-line</u>

    – Open file backup is **<u>not</u>** an option and leads to **inconsistent databases**!

    – You either need a Domino aware backup software

    – Or shutdown your Domino server for backup!

- VSS (Volume Shadow Copy) or file-system snapshots on Linux **alone** are <u>not supported</u>

    – Domino Backup integration needed to support Snapshot backup

- Customers ask for archive style transaction logging to allow point in time restores

- New requirements like backup Docker containers and also new backup vendors

    – For example Veeam leveraging snapshot backup

Domino V12 Design Goal
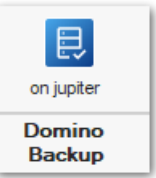
- Full featured Domino Backup integration to <u>bridge</u> between Domino and backup solutions

- Allow <u>integration</u> with any type of backup vendor via custom scripts

- Allow Domino to integrate with customer's favorite backup solution

- Support **snapshot backup** applications

- Allows **broad** functionality on the Domino backup/restore side

- **Notes/Domino style UI** in combination with favorite backup solution

Main Functionality

- Flexible restore options

  – Bring database online, point in time recovery,

  – Disable replication, change replica ID, change title, disable all agents, etc.

- Command-Line/REST API, etc. integration for backup tools with file and snapshot backup

- Support for **Win64** and **Linux64** only

  – AIX and OS400 have strong IBM vendor support already

- Recover **documents** <u>and</u> **folders** into original database

- Integrated DAOS restore missing NLOs leveraging an existing file-backup

  – Focus is NSF & Translog backup. DAOS is a single file backup handled by any backup application

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Technical Background

- **Problem**
  - Domino is constantly accessing files on disk; thus, file copy operations are causing inconsistent backups.

- **Solution**
  - **Domino Backup API** brings database into consistent state
  - Now NSF/NTFs can be backed up on file-level
  - Write access is still available to end users.

- Changes (aka deltas) are captured and **<u>must</u>** be applied to the backup to bring the database into consistent state!
  - Delta files are merged during backup in case of file backup operations
  - Or on restore in case of other operations
  - The Domino backup & restore takes care of tracking delta files

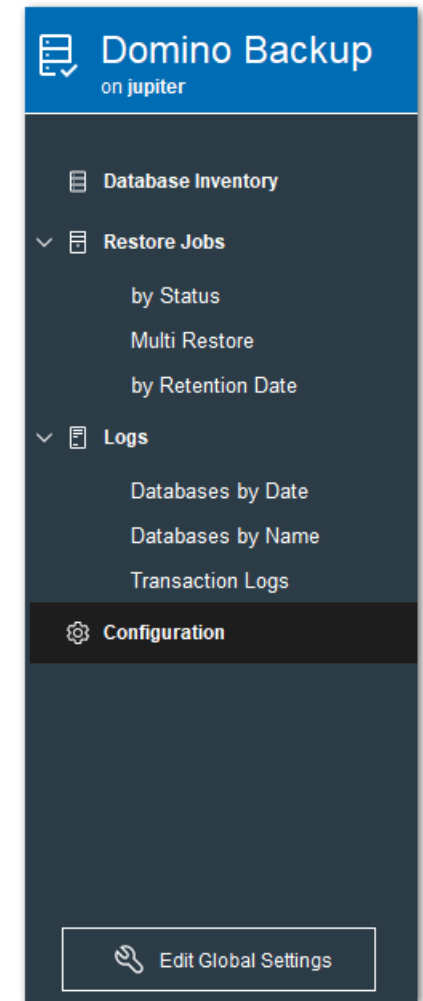HCL Software Academy for Digital Solutions

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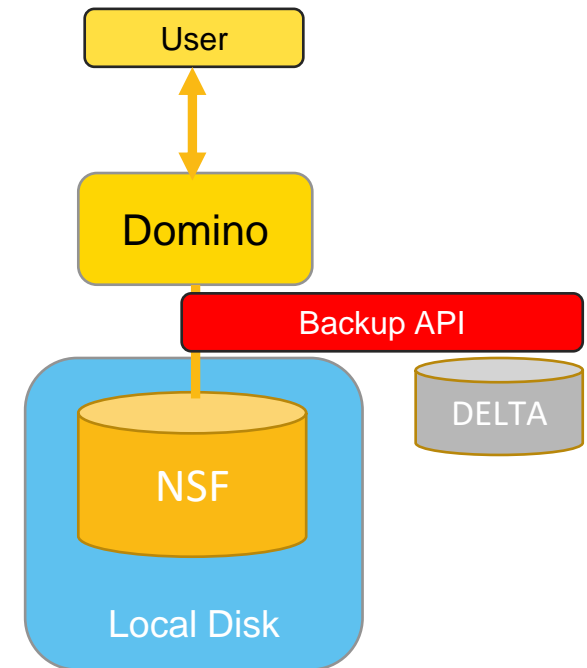
Backup and Restore Application Components

- **backup** – Backup servertask invoked via program document

- **restore** – Restore servertask either

  - a.) invoked on command line or

  - b.) running permanently monitoring the restore job database via -g option

- **dominobackup.nsf**

  - Configuration

  - Database Inventory and Backup Logs

  - Restore interface and restore jobs

dominobackup.nsf

- Configuration
  - Per server or global configuration per platform
  - Global settings

- Per Database Backup log repository
  - Showing all backups per database and base for restore operations

- Per Backup log for NSF files and Translog

- Restore requests
  - Derived from per database backup, when you select a restore

Domino Backup
on jupiter

- Database Inventory
- Restore Jobs
  - by Status
  - Multi Restore
  - by Retention Date
- Logs
  - Databases by Date
  - Databases by Name
  - Transaction Logs
- Configuration

Edit Global Settings

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Backup Concept : Full Backup

- Full backup only

  – Allows to recover data at the point in time when the backup was taken

- With circular Transaction logging is enabled in Domino

  – Limited point in time recovery if transaction logs are still on disk

- Typical setup:

  – Daily Full backup

  – Backup job running outside of business hours

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Backup Scenario: Disk / File Share

- **Configured out of the box**

  – Just needs a "disk" with sufficient space to backup databases

  – Very simple to setup

- Changes during backup in the databases are automatically merged into the database backup!

  – Consistent backup without the need to use the restore

  – Databases can be just copied back – Don't overwrite existing databases on OS level when the server is up!!

- Any type of **file-share**

  – **Recommended**: Storage supporting compression and de-duplication

    ▫ **Cohesity** → Backup share into backup repository (called "View")

    ▫ e.g **TrueNAS** → https://www.truenas.com/ - leverages ZFS storage like many others on the market

    ▫ Other deduplicating storage like **NetApp** etc..

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Quick Start Backup

- **1. load backup** → creates new dominobackup.nsf

- Review configuration
  - One pre-defined file copy configuration per platform
  - Already enabled
  - Check if the target location works in your environment
  - Server needs write permissions to create the directory!

- **2. load backup** → to start your first backup

Demo: Backup Jumpstart

Run Domino backup with File Integration

Restore Operations

- 1. Find the database to restore

- 2. Create a "restore job" using the action button

- 3. Specify the restore time and restore options
  - Most important options are set by default

- 4. Submit the restore using action button

- **5. load restore**

  - Tip Load restore -g

  - Allows to keep the restore application loaded

  - If you have remote console permissions:
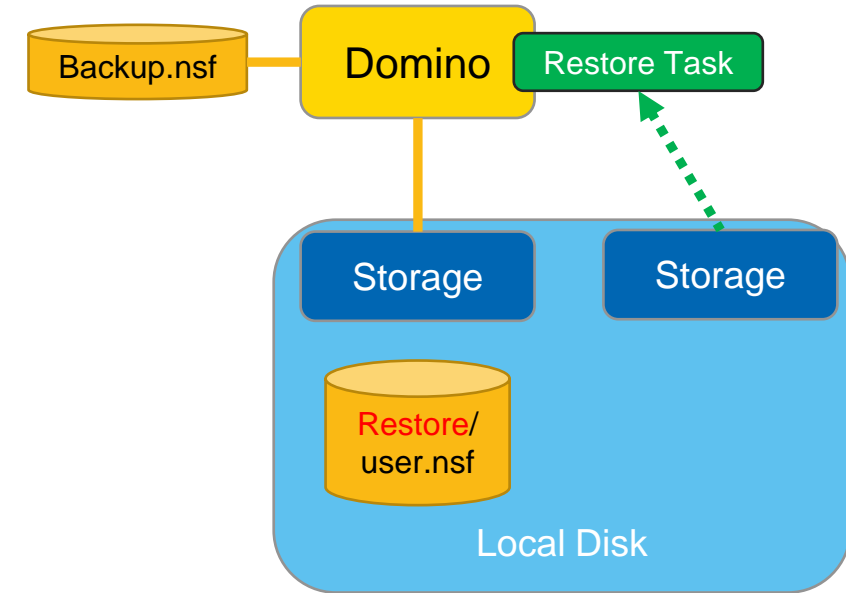   → Action button to start restore

File Types involved

- ***.nsf, *.ntf, *.box**

  – Original databases to be backed up

- ***.txn**

  – Transaction log files to be backed up

- ***.DELTA**

  – Delta files created during backup – if database changes during backup (e.g. names.nsf.DELTA)

- ***.DAD**

  – Restored database before "activation" (e.g names.nsf.DAD)

  – Restored with a temporary name to avoid server will find the database before it it recovered

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Restore operation in detail

- Servertask copies back database to restore location

- File name will have a **.DAD** extension to ensure the server does not access it meanwhile

- Disables replication and sets other settings

- Applies **.DELTA** file if available and recovers the database

- Renames the database to remove the **.DAD** extension

- Recovery documents and folders into original database if requested

Backup.nsf — Domino — Restore Task

Storage — Storage

Restore/ user.nsf

Local Disk

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Restore documents & folders to original database

- **Restore documents and folders**

  - **Restore** deleted documents & folders into original database!

  - Finds deletion stubs and updates it to replace the deletion stub

  - Folder notes are updated and replicated back to the original database overwriting the deletion stub
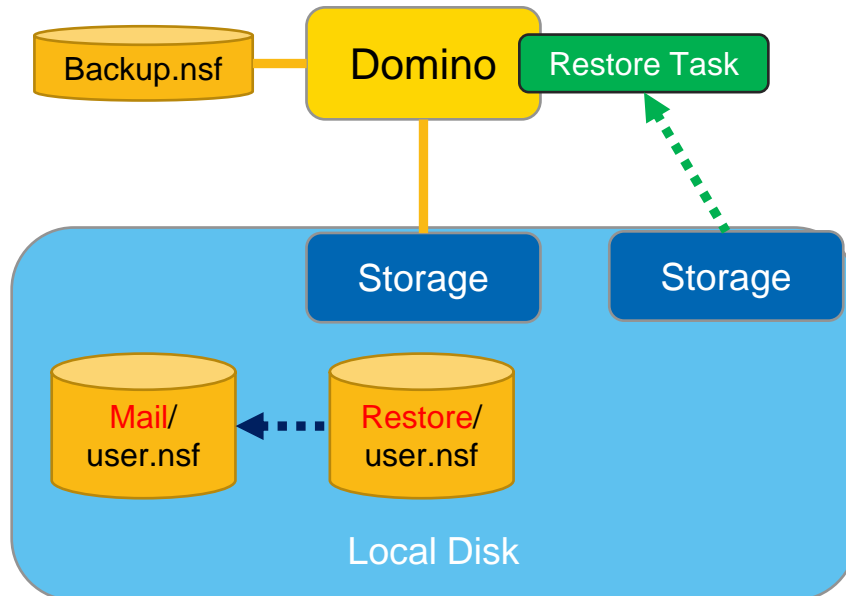
Recover point in time:	☐ Enable
Recovery time:	⌐ ▭
Recover no activation:	☐ Enable
Restore retention time:	⌐ ▭
Disable replication:	☑ Enable
Change replica ID:	☐ Enable
Disable agents:	☐ Enable
Change DB title (default):	☐ Enable
Current title	『Daniel Nashed』
New DB title:	『 』
Restore folders/docs:	『Folders&Docs』 ▾
Doc restore folder:	『RestoredDocuments-05-10-2021』 ▭
Time range from:	📅 🕐 0
Time range until:	📅 🕐 0
Restore DAOS:	☑ Enable

Backup.nsf — Domino — Restore Task

Storage   Storage

Mail/user.nsf ◄···· Restore/user.nsf

Local Disk

Backup Concept : Transaction Log in Archived mode

- **Full backup** + Translog Backup allows to recover data at any point time

- Archive Style transaction logging is enabled in Domino
  - TXN files must be backed up in time to recover disk space

- Typical setup:
  - Full backup (e.g. twice a week)
  - Transaction Log Backup every 2 hours
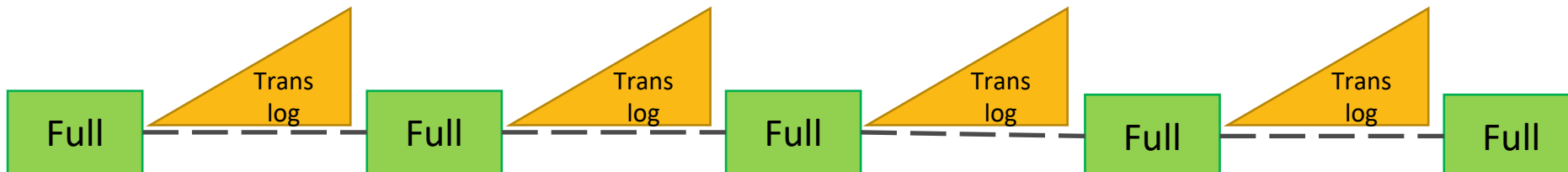
Archive Transaction Log Backup
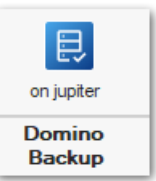
- **More complex backup setup**

- Schedule a full NSF backup at least twice a week
  - Better <u>every night</u> to reduce the time needed for restore and for consistent backups

- Incremental backup for databases with changed **DBIID** (fixup -j, compact -B/-C, DBMT)

- Ensure number of compacts is reduced and always scheduled before a full backup
  - Switch to **DBMT** for a better control and more modern and efficient maintenance operations!

Restore "Point in time"

on jupiter

Domino Backup

- Point in time restores based on the full backup of database

- Changes applied from transactions recorded in translog until point in time

- **All** translog extends between the database backup and point in time selected have to be inspected for databases to recover

- This means temporary restoring all translogs one after another from the backup if not on disk!

Restore path:	⌈restore⌋ ☐ KeepSubDirs		
Restore time select:	05/10/2021 📅	06:27:36 PM 🕐	Local time ℹ
	05/10/2021 06:27:36 PM CEDT		
Selected backup:	⌈05/07/2021_03:55:38_PM_GMT⌋ ▾		
Recover point in time:	☑ Enable		
Recovery time:	⌈05/10/2021 06:27:36 PM CEDT⌋		

- Restore task takes care of the restore

  – But it can take hours depending on the number of translogs affected!

  – Ensure shorter backup cycles – One week can cause very long restores on a Friday afternoon!

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Backup Operations

- Load backup **-b**

  – Full backup (default)

- Load backup **-t**

  – Translog archive backup

- Load backup **-i**

  – Incremental backup

  – Backup all databases with new **DBIID** since last full backup

  – All new databases or databases with changed **DBIID** (fixup -j, compact -B or -C, DBMT, ..)

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Backup Integrations

Integration Points
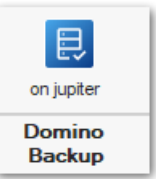
- **File backup commands** – build-in, leveraging OS commands

  – Most easy to setup backup/restore

  – Customizable via @formulas

  – Can be also leveraged for commercial software like Cohesity with their backup repository

  – Used for backup, restore and backup prune operations (delete)

- **Command-Line interface**

  – Very flexible, standardized interface for Windows (batch) and Linux (shell script)

  – Customizable via @formulas

  – Return strings can be passed to the backup software for backup reference and status

- **Agent interface**

  – Can be for example used for REST requests leveraging HTTP Request class

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Backup Scenario: Integration on Script level

- **Command Line backup with a backup application**
  - For example: Linux Borg Backup → https://borgbackup.readthedocs.io/en/stable/
  - Or command line integration with a client like AWS S3 CLI or any other custom script

- **Flow**
  - Domino backup servertask takes one database after another into backup mode
  - OS level command is called to backup the database
  - Bring database into normal operations mode
  - Check if changes occurred during backup and create a <u>delta</u> file with changes

- **Challenges**
  - Restore operation is required to bring a restored database online
  - Deltas need to be applied back on restore

HCL GitHub Project for Backup Integrations

- https://github.com/HCL-TECH-SOFTWARE/domino-backup

- https://opensource.hcltechsw.com/domino-backup/

HCL GitHub Project for Backup Integration Solutions

- Open Source repository for 3rd party backup integrations based on the **framework** Domino provides

- Integration point/operations documentation

- Additional information
  - Technologies like snapshot
  - Best practices around backup and storage optimization
  - File system back-end operations

- Main entry point for supporting backup integrations
  - It is not intended that HCL support should help to integrate applications

- Collaboration in the community via GitHub repository
  - **Backup vendors, customers, partners and HCL**

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Command-Line Interface Parameters

- Example scripts for Windows & Linux

- Standardized parameter list for all backup/restore/prune operations

  - PhysicalFileName   – physical file name

  - FileName   – logical Notes file name

  - BackupDbRef   – backup reference passed to the backup application

  - BackupNode   – backup node name used for backup/restore – usually short server-name

  - BackupName   – backup name can be specified during backup

  - BackupMode   – FULL, INCREMENTAL, SELECTIVE, ...

  - BackupStartDT   – Start of backup job – useful for backup identification

  - BackupTargetDir   – Target directory (or location) for backup – specified in the configuration

  - RetentionDays   – Backup Retention days

"Delta Files" created during backup

- The Domino Backup API brings databases into a consistent state for backup

- Databases can be backed up on file-level once backup is started

- **Important:** Changes in database are recorded and **need to be applied** to the backup database to bring the database into **consistent** state!

- Delta files can be

  - a.) merged during backup in case of file backup operations

  - b.) on restore in case of other operations

- **Delta Files have to be merged in any case!**

  - But don't worry - The Domino backup & restore takes care about tracking delta files

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Implementation reference: S3 Storage Minio

- Command line integration

- Simple integration based on **formulas** not a "Cmd file"
  - Good example to show how @Formula integration works
  - Results are captured by the backup/restore task
    - OK and Error strings can be used to check operation status
  - Needs helper binary and config from S3 vendor (e.g. **mc** from Minio)

Configuration

Main | Backup | Snapshot | Restore | Prune | Notification | Advanced

Status:	Enabled
Config type:	Default
Platform:	Linux
Excluded databases (pattern):	
Backup target dir databases:	s3-backup/domino-backup/nsf
Backup target dir translog:	s3-backup/domino-backup/translog
Backup retention (days):	7
Backup log dir:	/local/backup/log
Script directory:	/local/notesdata/scripts
Log OS command output:	All output
Backup target delta files:	
Description:	S3 Minio Linux
Comments:	

Configuration

Main | Backup | Snapshot | Restore | Prune | Notification | Advanced

Backup DB command:	Cmd Formula	x:= "/"; q:={"}; ScriptDir + x + "mc -q cp " + q + PhysicalFileName + q + " " + q + BackupTargetDir + x + BackupNode + x + BackupMode + x + BackupDateTime + x + FileName + q +" 2>&1"
Backup translog command:	Cmd Formula	x:= "/"; q:={"}; ScriptDir + x + "mc -q cp " + q + PhysicalFileName + q + " " + q+ BackupTargetDir + x + BackupNode + x + BackupReference + x + FileName + q +" 2>&1"
Pre-backup command:		
Post-backup command:		
Backup disable direct apply:	☐ Enabled	
Backup log file:	Disk&Attachment	
Backup OK string:	Transferred:	
Backup error string:	<ERROR>	

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Implementation reference: S3 Storage AWS CLI S3

- Same type of integration

- Just a different command line used
  - In this case AWS CLI with S3 command

- Needs target specific configuration
  - AWS credentials and target information for the bucket used

Configuration

Main | Backup | Snapshot | Restore | Prune | Notification | Advanced

Status:	Disabled
Config type:	Default
Platform:	Windows
Excluded databases (pattern):	⌈ ⌋
Backup target dir databases:	⌈s3://aws-s3/backup/nsf⌋
Backup target dir translog:	⌈s3://aws-s3/backup/translog⌋
Backup retention (days):	⌈7⌋
Backup log dir:	⌈c:/backup/log⌋
Script directory:	⌈ ⌋
Log OS command output:	Errors only
Backup target delta files:	⌈ ⌋
Description:	⌈S3 AWS Windows⌋
Comments:	⌈ ⌋

Configuration

Main | Backup | Snapshot | Restore | Prune | Notification | Advanced

Backup DB command:	Cmd Formula	⌈x:= "/"; q:={'}; "aws s3 cp " + q + PhysicalFileName + q + " " + q + BackupTargetDir + x + BackupNode + x + BackupMode + x + BackupDateTime + x + FileName + q +" 2>&1"⌋
Backup translog command:	Cmd Formula	⌈ x:= "/"; q:={'}; "aws s3 cp " + q + PhysicalFileName + q + " " + q+ BackupTargetDir + x + BackupNode + x + BackupReference + x + FileName + q +" 2>&1"⌋
Pre-backup command:		⌈ ⌋
Post-backup command:		⌈ ⌋
Backup disable direct apply:	☐ Enabled	
Backup log file:	Disk&Attachment	
Backup OK string:	⌈upload:⌋	
Backup error string:	⌈<ERROR>⌋	

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Demo: Backup CMD Integration

Example: Backup to S3

Domino 12.0.1
New Features & Improvements

Domino V12.0.1 Backup & Restore

- Domino V12 already had all integration points needed for building flexible integration for many types of backup back-ends

- Domino V12.0.1 Backup & Restore offers additional functionality for closer integration

    - Fit & Finish for existing integration options

    - Support for 3rd party restore operations

    - Better support for snapshot backup vendors like Veeam

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Domino 12.0.1 3rd Party Restore

- Backup vendors with full Domino support leveraging the standard C-API interface can now leverage the Domino restore interface for <u>restore</u> operations

- **Restore 3rd party restore mode**

  – Allows to integrate with your favorite Domino aware backup solution

  – Leverages same type of integration used for the existing backup integrations

- Flow:

  – Specify database to restore & run restore operation

  – "**restore**" task executes integration script to trigger 3rd party restore operation

  – 3rd party restores database and brings it online

  – Domino **restore** performs additional restore operations (changing replica-ID, restoring documents & folders!)

  – Existing DAOS restore operations can be combined

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Configure Domino 3ʳᵈ Party Restore

- Same type of integration you know from full integration operations

- Restore operation triggers the external backup vendor for a full restore including bringing the database online

- Domino restore operations will be executed immediately after restore completes

- Tip:
  - Restore time cannot be passed via **Cmd** operation
  - Best choice is probably "**Cmd Formula**"
  - Allows to pass any field in restore document

Configure Domino 3ʳᵈ Party Restore

- Tip, if you only want to change the date, there is a 3ʳᵈ party date formula

```
- X:=@If (RestoreDateTime=""; @Now;RestoreDateTime);
  Y:=@Text(@Year(X));M:=@Text(@Month(X));D:=@Text(@Day(X));H:=@Text(@Hour(X));N:=@Text(@Min
  ute(X));S:=@Text(@Second(X));
  @Repeat("0";4-@Length(Y))+Y + @Repeat("0";2-@Length(M))+M + @Repeat("0";2-@Length(D))+D +
  @Repeat("0";2-@Length(H))+H + @Repeat("0";2-@Length(N))+N + @Repeat("0";2-@Length(S))+S;
```

Configuration

| Main | Backup | Snapshot | Restore | Prune | Notification | Advanced |

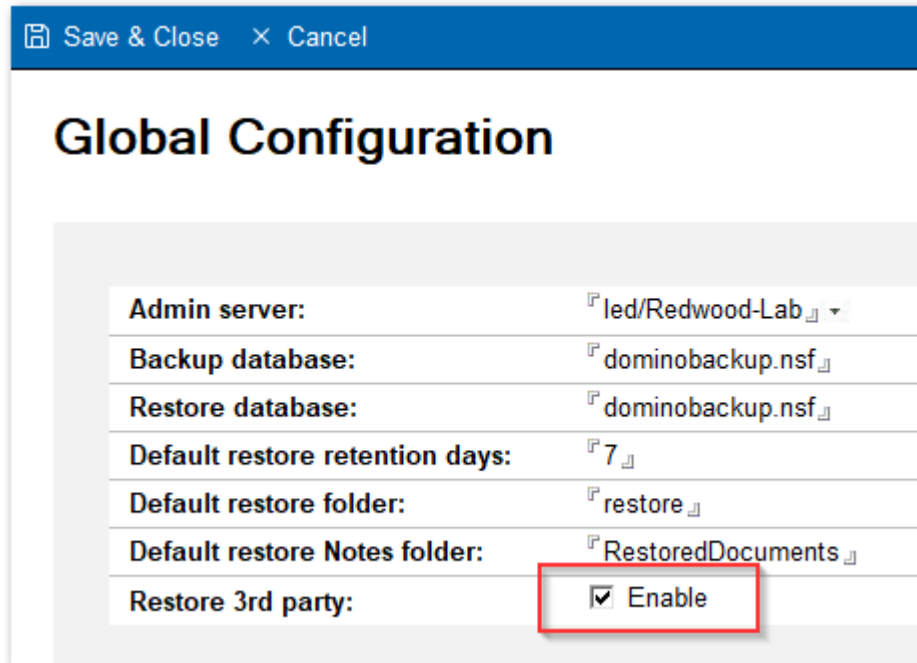|	
Backup result string:	
Backup ref string:	
Notification form:	
Notification form translog:	
Restore DB title formula:	{Restored - } + Title
Backup keep empty delta files:	☐ Enabled
3rd party date formula:	X:=@If (RestoreDateTime=""; @Now;RestoreDateTime); Y:=@Text(@Year(X));M:=@Text(@Month(X));D:=@Text(@Day(X));H:=@Text(@Hour(X));N:=@Text(@Minute(X));S:=@Text(@Second(X)); @Repeat("0";4-@Length(Y))+Y + @Repeat("0";2-@Length(M))+M + @Repeat("0";2-@Length(D))+D + @Repeat("0";2-@Length(H))+H + @Repeat("0";2-@Length(N))+N + @Repeat("0";2-@Length(S))+S;

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Enable 3rd Party Restore Operations

- Open global configuration

- Enable "**Restore 3rd party**"

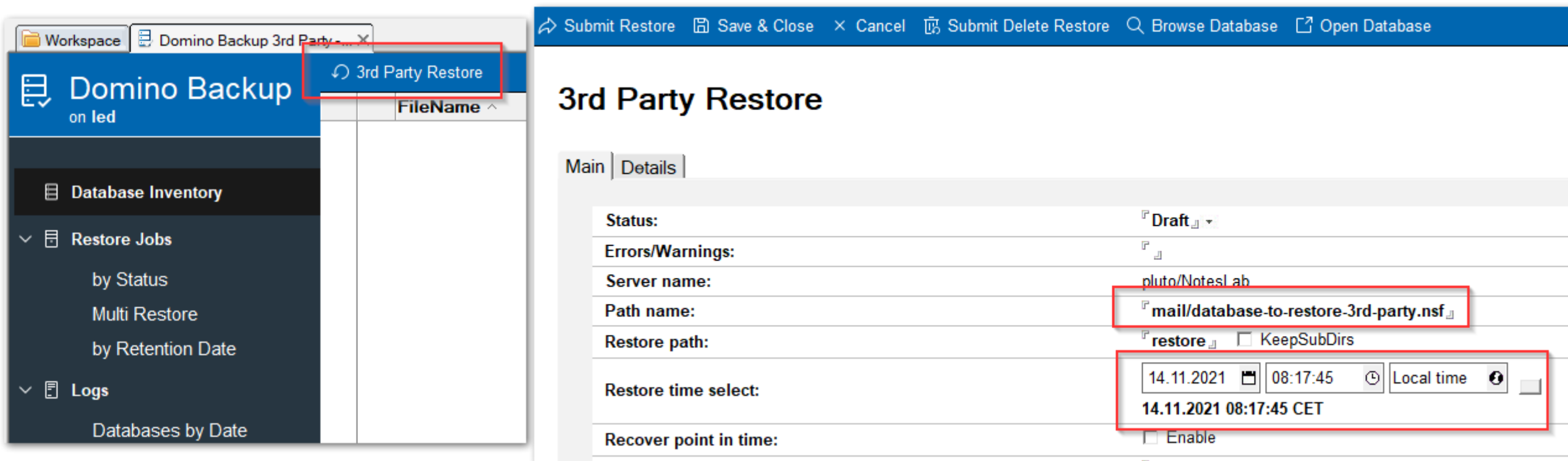- Brings **dominobackup.nsf** into 3rd party operations mode

Perform 3rd Party Restore

- 3rd party restore can obviously not use the database inventory

- Restore operations are triggered by entering the database name manually

Tip: 3rd Party Restore → Select Databases via SmartIcon

- SmartIcons are globally available in any database

- **Idea:** Run SmartIcon on **person/mail-in** or **catalog.nsf** document to create a restore document

```
Server := @Subset(@DbName; 1);

BackupDB := "dominobackup.nsf";

@If (Server = ""; @Prompt([Ok];"Error"; "Cannot run on local database!"); "");

@If (Server = ""; @Return (""); "");

Database := @If (Mailfile != "";
@If (@Ends(@LowerCase(MailFile);".nsf");MailFile;MailFile+".nsf"); PathName !="";PathName;"");

@Command([Compose]; Server : BackupDB; "RestoreJob");

@UpdateFormulaContext;

@SetField ("ServerName"; Server);

@SetField ("PathnameRestore"; Database);

@Command([EditGotoField]; "RestorePath");
```

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Domino V12.0.1 End to End Logging

- In Domino 12.0 logs for command-line/script integrations are only parsed for errors
  - For debugging you had to write the logs into files and manage them on your own

- Domino 12.0.1 backup automatically collects all standard output from invoked scripts/ commands
  - When backup/restore scripts/commands fail, the output is stored in a temporary file
  - Once the backup or restore operations completes, the full logfile is appended to the backup/restore note
  - On by default and cannot be disabled
  - You can change the configuration to log all output for debugging purposes (Main configuration tab)

  - Tip: Redirect error output for scripts by adding **2>&1** direct to the command configuration

Script directory:	┌ ┐
Log OS command output:	Errors only ▼
	All output
	Errors only
Backup target delta files:	┌ ┐
Description:	┌Windows Default Configuration┘

domino-win-01#default#SNAP#20211113131326.log   backup_error_domino-win-01_2021_11_13@14_13_26.log

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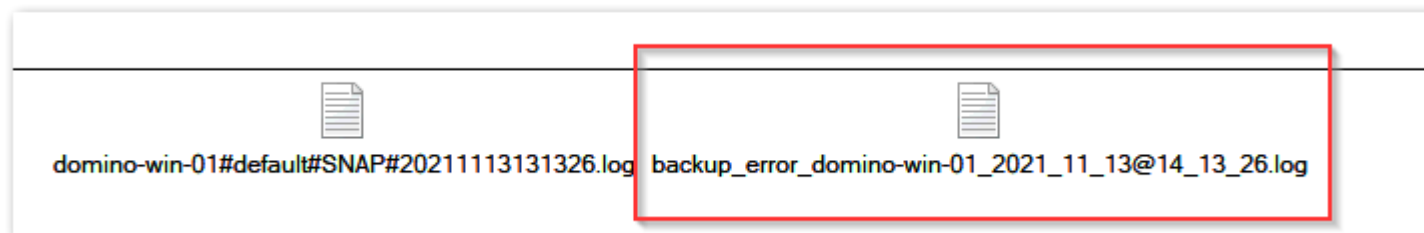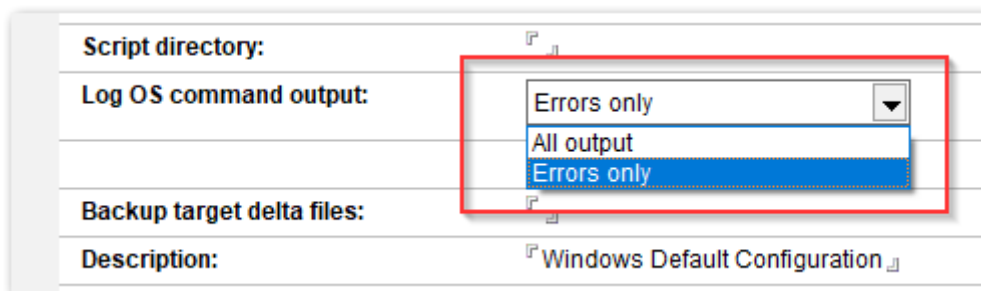
Domino V12.0.1 Selective Backup Prune

- In Domino 12.0 backups are only pruned by retention time

- Domino 12.0.1 introduces a selected prune operation directly from the Log views

  – Just select one or more backups to be pruned and run "**load backup -p**" (or **Run Prune Server Cmd**)
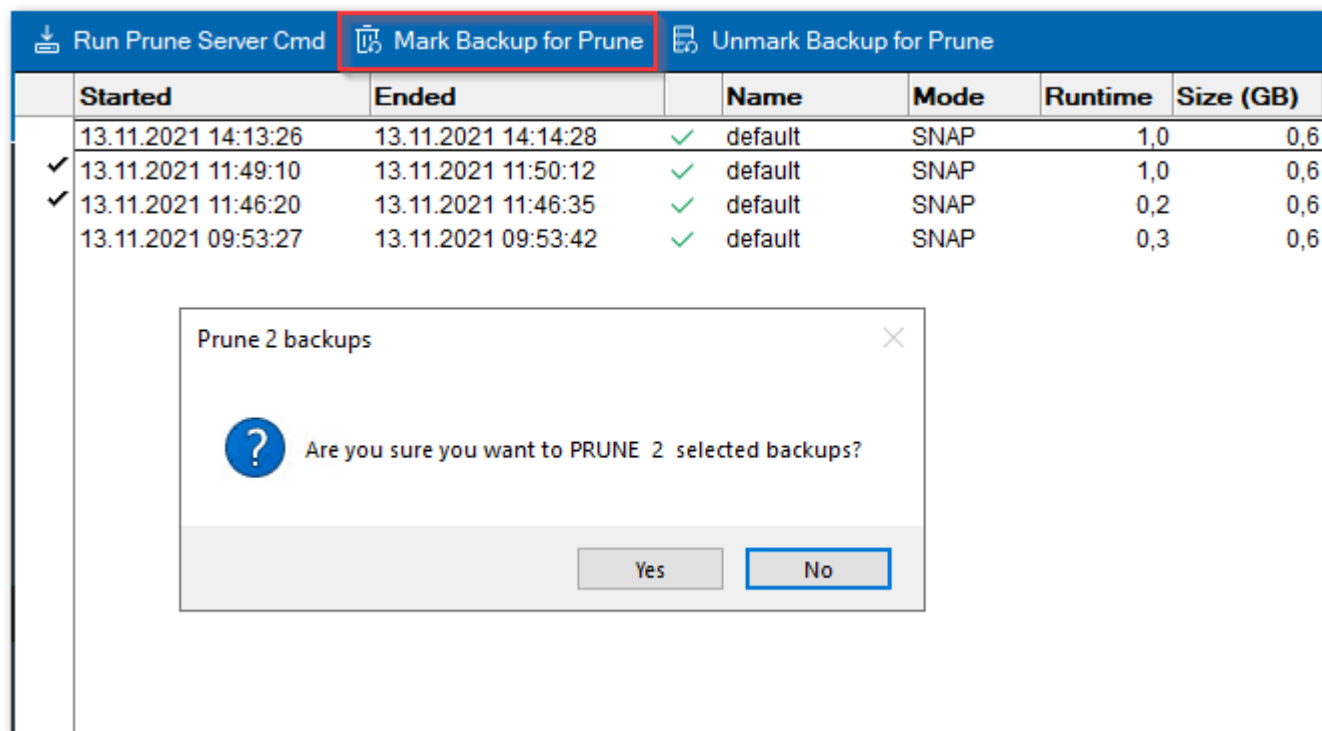
Domino V12.0.1 Multi Restore Improvements

- In Domino V12.0 the multi restore operation was limited
  - All databases had to come from the same backup
  - There have been some UI issues not showing the right error messages

- **Domino 12.0.1 now fully supports multi database restore**
  - Always the latest backups for a database matching the restore time, are used
  - Databases don't need to be in the same backup (e.g. incremental backups)

- How does it work?
  - Admin selects the restore time
  - Submit logic checks each selected database for matching backup and writes the time into each doc
  - Restore operation will restore each database from the specified backup date

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Domino V12.0.1 Multi Restore Optimization

- **Challenge**
  - Restoring multiple database from a snapshot would potentially involve many mount/unmount operations
  - For many backup vendors mounting a snapshot is a quite time consuming operation

- **Solution**
  - New pre-restore and post-restore scripts to allow restore operation optimization

- Example logic:
  - **Restore DB operation script** → Checks if the right snapshot is mounted
  - → If yes, just copy the database from snapshot
  - → If not mount the snapshot and copy the file
  - Next file might hit the already mounted snapshot – or mounts another snapshot
  - **Post Restore Script** → Unmounts all mounted snapshots

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Veeam Backup & Replication

Reference implementation published on GitHub

Backup Scenario: Snapshot

- Works similar like previous scenario but brings <u>all</u> databases into backup mode <u>at once</u>

- **Flow**

  - Bring all databases into backup mode

  - Call an OS level command to take snapshot

  - Bring all databases into normal operations mode

  - Create a **delta** file with changes for each database with changes

  - Operations on Domino side finished, snapshot and delta files are static and any file backup can be used

- **Backup using snapshot**

  - Many different options depending on the solution used

  - Most simple approach on Windows – without a backup application supporting snapshots itself

    - Call a VSS snapshot command and to get a temporary snapshot

    - Use any file backup solution to backup the snapshot along with delta files

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Backup Concept : Snapshot

- **Flow:**

  1. Backup application brings all databases into backup mode

  2. Snapshot is initiated – should not take more than a couple of sections

  3. Delta files from backup are stored

  4. Snapshot and delta files are backed up

- On restore usually the snapshot is mounted to "copy" databases back

- Delta files are usually saved to different backend or separate snapshot of another disk

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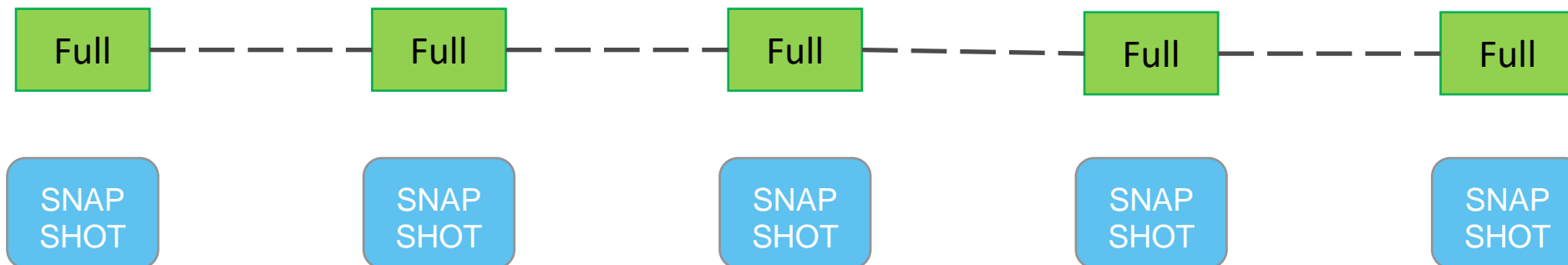
Snapshot backup on Windows

- **VSS Snapshot** (Volume shadow copy) is build into Windows

    – Usually leveraged by backup applications to create a consistent state of an application

    – Domino Backup is <u>not a VSS writer</u> but brings databases into consistent state before initiating snapshot

    – Only works well if the application gives back control after the snapshot is created

- **Scenarios**

    – Snapshot enabled backup application is used

    – Snapshot aware storage/infrastructure is used

    – Domino can use native Windows tool "**diskshadow.exe**" to create snapshot and invokes backup operation

- **Different ways to use snapshot result**

    – Only use snapshot to bring databases into consistent state for backup and use classical backup

    – Use native snapshot backup in the storage backend to keep the backup as snapshot

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Snapshot backup on Linux

- Most file systems used don't have snapshot capabilities on their own

- **OpenZFS** and **btrfs** support natively support snapshots

- Some applications like Veeam use own storage drivers to ensure block level delta backup

- Storage providers like NetApp support snapshots

- Depending on the technology used different type of integrations possible

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Veeam Backup and Replication 11

Veeam
Backup & Replication

- **Enterprise solution widely used**

- Veeam named a Leader for the 4th time in a row

  – Category: "Data Center Backup and Recovery Solutions"

- **Current situation**

  – Simple "**pre-freeze**" script "drop databases" to <u>try</u> to bring databases into sync

  – Only **crash consistent** backup

  – Not supported by Domino

  – Does not support Backup API integration via agent

  – Restore requires **Veeam admin** to <u>manually</u> search and mount the <u>right</u> backup

  – No automation or additional functionality like disabling replication, safely bring database on-line etc.

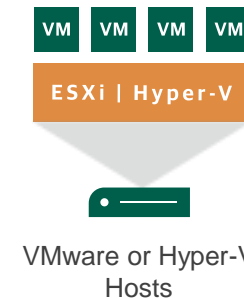Figure 1. Magic Quadrant for Data Center Backup and Recovery Solutions
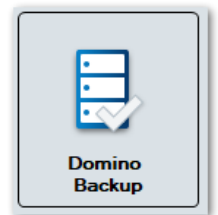
Source: Gartner (July 2020)

Design Goal

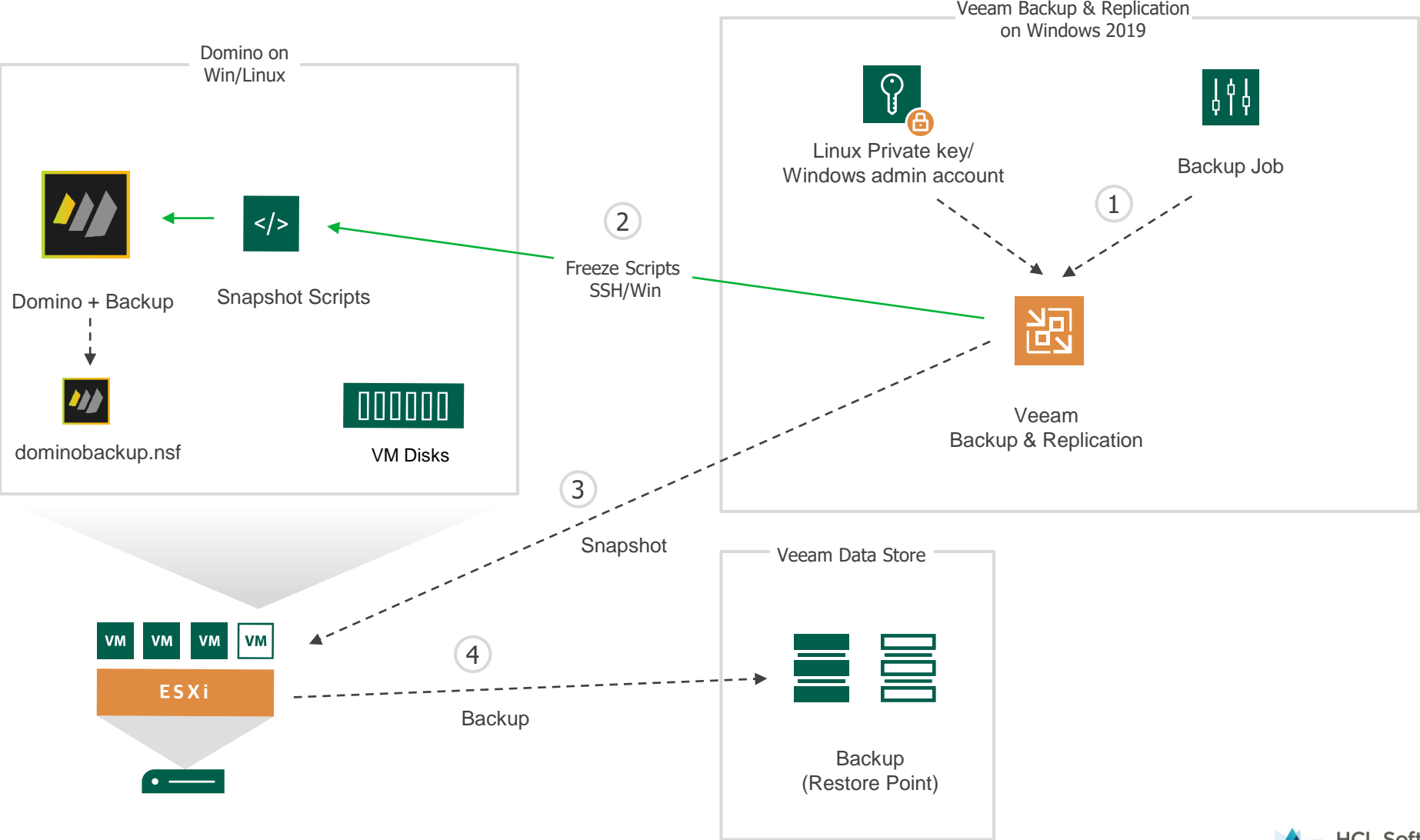- Full featured Domino Backup **end to end integration** with Veeam Backup and Replication

- **Veeam Admin: Expects simple Domino integration with "freeze" scripts configured in Veeam**

- **Domino Admin: Expects seamless restore databases operations triggered from Domino**

  - No manual mount or recovery operations in a Veeam client UI

- Secure, optimized and reliable backup solution for Domino which takes benefit of both worlds

- Support Windows and Linux back ends with

  - **VMware**, **Hyper-V agent less backup** on guest OS

  - Currently not in focus:
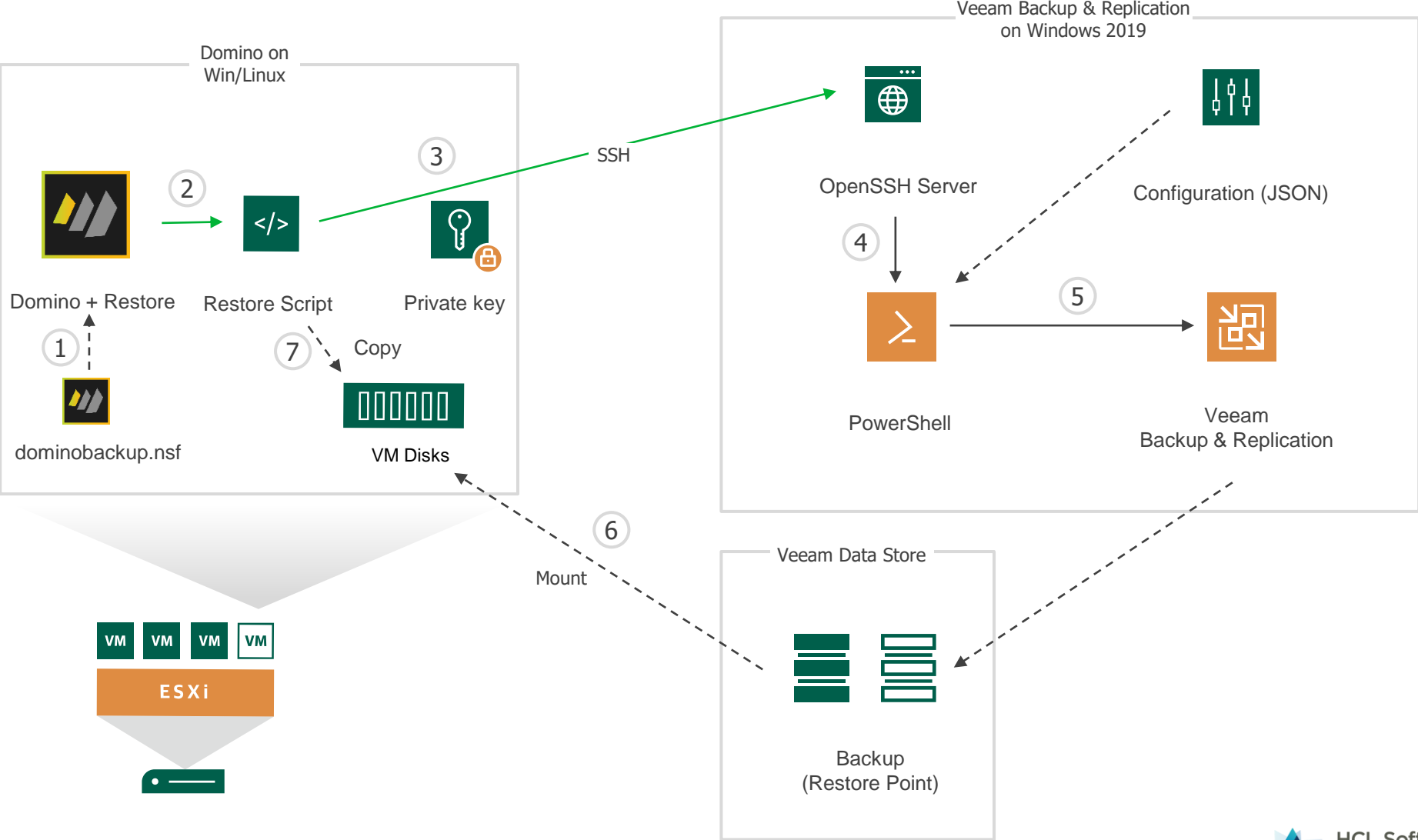   Servers using **Veeam agent** installed on OS level

| VM | VM | VM | VM |

ESXi | Hyper-V

VMware or Hyper-V
Hosts

Veeam Agents
for Windows & Linux

Domino
Backup

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Domino Backup

Domino on Win/Linux

Domino + Backup

dominobackup.nsf

Snapshot Scripts

VM Disks

Veeam Backup & Replication on Windows 2019

Linux Private key/ Windows admin account

Backup Job

①

② Freeze Scripts SSH/Win

Veeam Backup & Replication

③ Snapshot

④ Backup

VM VM VM VM

ESXi

Veeam Data Store

Backup (Restore Point)

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Domino Restore

Domino Configuration for Veeam Backup

- Admin deploys script on each server and imports DXL configuration

- Customized settings in "main" tab

Veeam Job Configuration

- Standard Veeam job configuration

- Includes application processing via snapshot scripts

- Requires an admin user defined in Veeam Credential store

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Veeam Backup & Replication Configuration

- Veeam admin configures backup jobs with simple "**pre-freeze**" and "**post-thaw**" scripts

  - Veeam copies scripts for each backup operation to the target guest OS

  - Call defined **freeze** scripts on Domino server to start Domino backup to bring <u>all</u> databases into backup mode

- **Windows**:

  - Admin account for **freeze-script** and **mount** operations in Veeam credential store

- **Linux**:

  - SSH key in Veeam credential store used for freeze-script operations for "**notes**" user

  - No elevation of user required for freeze operations with **notes** user

  - Elevated access for **root** permissions using a "**veeam-mount**" user for restore mount operations

    - Requires **sudo** permissions for "**veeam-mount**" user for all Domino Linux servers

    - By design a the separate "**veeam-mount**" user is defined for elevated operations needed for restore mount

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Credentials Configuration for Linux
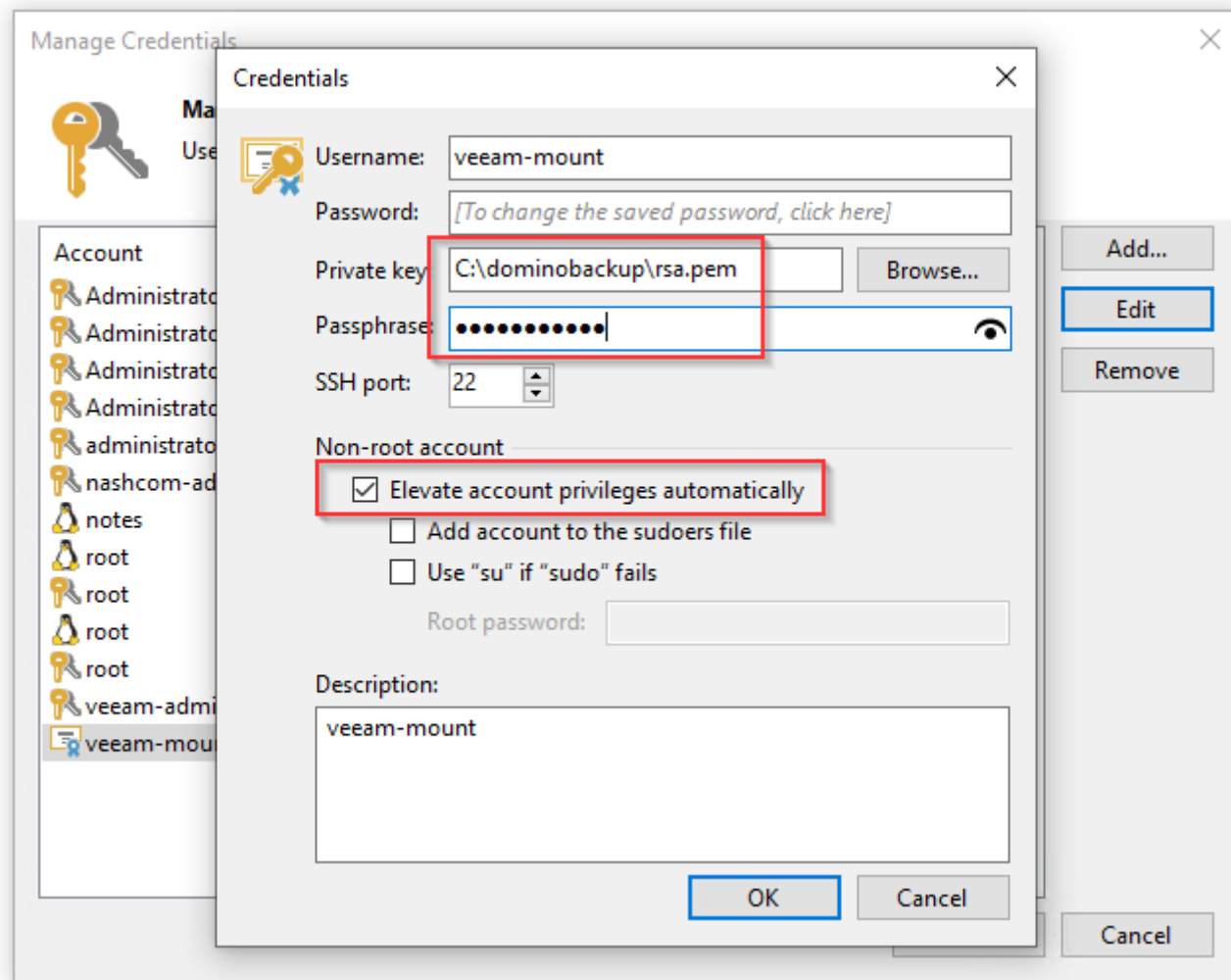
- Veeam supports SSH private/public key authentication for Linux

- Ensure the key is in RSA key format for importing

- Enable account privilege elevation

- Ensure the description matches your configuration

  - Credentials are search by "Description"

- SSH public key for **veeam-mount** user on each Domino Linux server

  - Account needs **sudo** permissions

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Per Server Configuration

- Backup operations are configured and scheduled using standard jobs with freeze scripts

- Restore operations require separate configuration per Domino server

- Configuration file in JSON format contains one entry per Domino server
  - Defines access and mapping to virtual machine (VM backup) or host (agent backup)

```
dominobackup.cfg ☒    DominoRestore.ps1 ☒
 1    [
 2      {
 3        "VmHost"       : VM-Domino-Linux",
 4        "IpAddress"   : "192.168.1.12",
 5        "AccountName" : "veeam-mount",
 6        "OS"          : "Linux"
 7      },
 8
 9      {
10        "VmHost"       : "VM-Domino-Win",
11        "IpAddress"   : "192.168.1.19",
12        "AccountName" : "DominoWin2019Admin",
13        "OS"          : "Windows"
14      }
15    ]
16
```

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Domino Restore Operations with Veeam Integration

Restore Job

Main | Details

Status:	Restored
Errors/Warnings:	
Server name:	mercury/NotesLab
Path name:	homepage.nsf
Restore path:	restore ☐ KeepSubDirs
Restore time select:	09.07.2021 📅 08:55:48 🕐 Local time 🌐 ☐ 09.07.2021 08:55:48 CEDT
Selected backup:	20210708202941 ☐
Recover point in time:	☐ Enable
Recovery time:	☐
Recover no activation:	☐ Enable
Restore retention time:	☐
Disable replication:	☑ Enable

- **Seamless restore for Domino Administrator**

  - Domino admin uses Domino Backup Inventory to select database to restore

  - Creates a restore job

  - Domino Restore server task takes care of

    - Finding the right backup

    - Mounting the backup

    - Copying the database to the requested location

    - Unmounts the backup

    - Applies requested operations

    - Brings database on-line

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Restore Integration via PowerShell and OpenSSH Server

- Veeam Backup and Replication leverages the Windows platform

- REST Interfaces for Backup & Replication and Veeam Enterprise Manger do not provide the capabilities Domino needed for integrated restore operations

- **Veeam PowerShell interface** is the best supported and most flexible automation interface
  - Runs locally on Veeam server for all servers in backup

- Remote PowerShell is <u>not</u> an option because of security requirements and Linux platform support
  - Note: Linux meanwhile supports PowerShell but it would not be likely Linux admins would install it

- Integration is leveraging an **OpenSSH server** included and supported on Windows 2019+ / Win 10+
  - Including **Public/Private key authentication** with up to date standards (ECDSA and ed25519)

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OpenSSH Server Installation on Veeam Server

- OpenSSH server is an optional component available starting with Win2019 / Win10

- Configuration example for **sshd_config** for SSH key only configuration is included our repository

- Straightforward to install and configure

  - Ref: https://docs.microsoft.com/en-us/windows-server/administration/openssh/openssh_install_firstuse

Security Configuration

- Integration leverages **SSH** to establish secured communication channel
  with **private/public key authentication**

- User with **Veeam Restore Operator** role and an **authorized_keys** configuration

- The **authorized_keys** configuration restricts the permission to a single PowerShell script building
  the bridge between Domino and the Veeam server

- **SSH key per server** (or for multiple servers) to secure access
  to the Veeam server for restore mount requests

- **PowerShell script + JSON configuration** further restricts access to restore mount operations

  - Each server is added the configuration and checked by IP address

  - Controls access to restores <u>per</u> server

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Demo: Veeam Backup

In case we still have time..

Slides have most of the details

Build your own Lab Environment

- Free Backup for up to 10 Workloads!

  - Provides even free agents for notebooks

  - Can be used in production!

  - Some other limitations like only one backup repository

- Full featured functionality for virtual environments

  - VMware vSphere

  - Microsoft Hyper-V

  - https://www.veeam.com/backup-replication-system-requirements.html

- Community edition: https://www.veeam.com/virtual-machine-backup-solution-free.html

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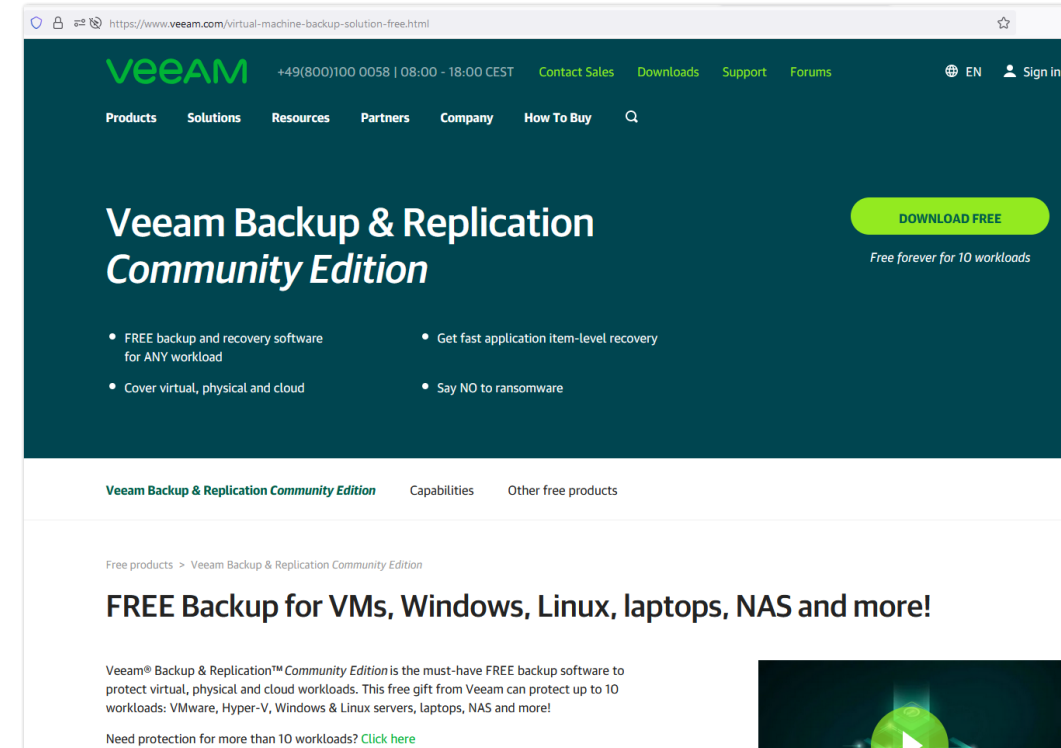
Supported Virtualization Platforms

- Only VMware **<u>vSphere</u>** is supported!!

  – <u>No support</u> for the free ESXi platform!

  – Integration requires VMware storage APIs not included in the free offerings

  – You could start with a time limited trial

  – Or you are lucky and can use a corporate vSphere environment ..

- There are some license changes in the Hyper-V platform

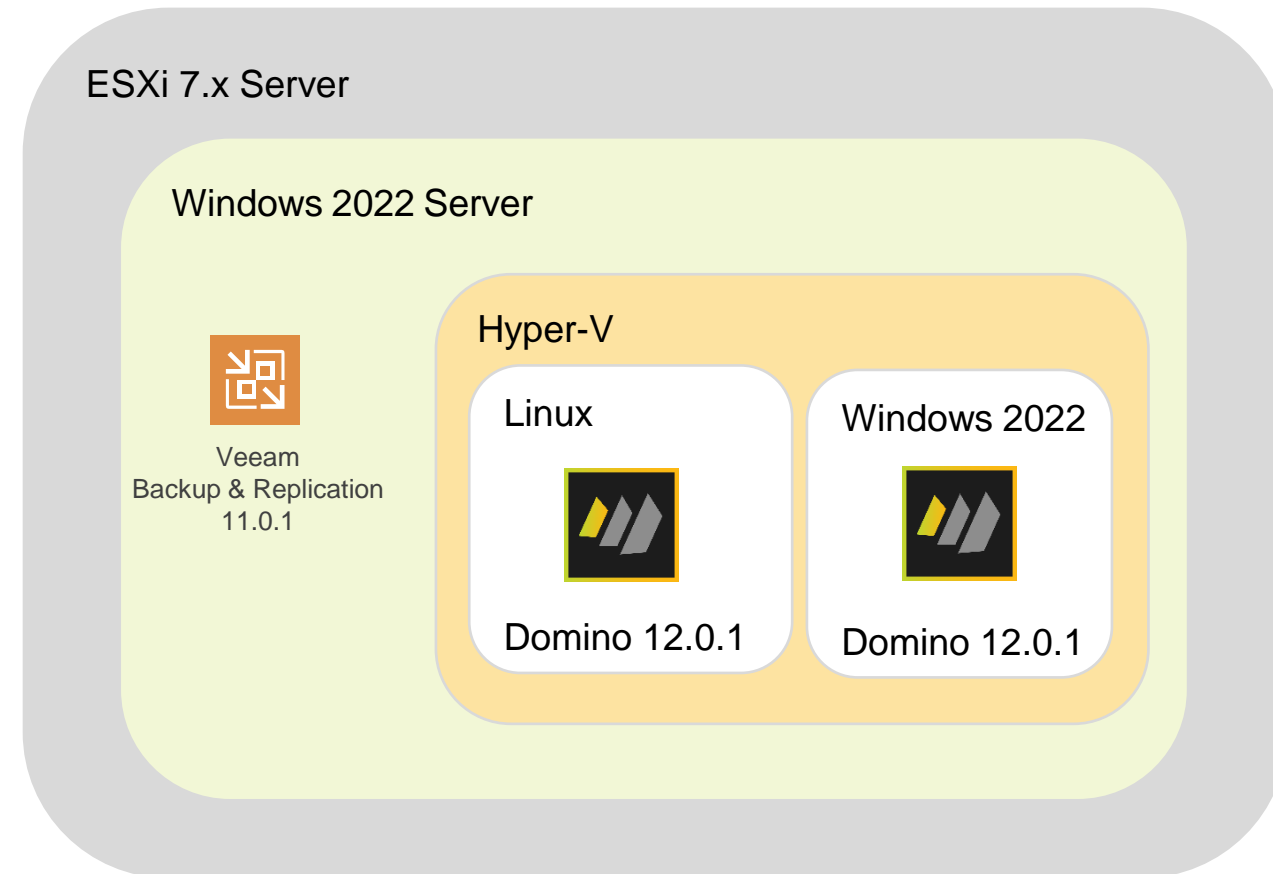 – But for Windows evaluation copies and MSDN licenses Hyper-V is still included

Virtualized infrastructure

vmware

VMware platforms
- vSphere 7.0
- vSphere 6.x
- vSphere 5.5

Virtual machines
- All operating systems supported by VMware
- Any application
- Any file system

Microsoft **Hyper-V**

Microsoft platforms
- Windows Server 2022
- Windows Server version 20H2
- Windows Server 2019
- Windows Server 2016
- Windows Server 2012 R2
- Windows Server 2012
- Windows Server 2008 R2 SP1

Virtual machines
- All operating systems supported by Microsoft Hyper-V
- Any application
- Any file system

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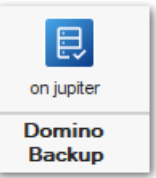HCL SOFTWARE

Building your own Lab Environment

- My starting point was VMware vSphere evaluation version setup with a new ESXi server
  - You cannot extend the trial, so I built a

- All in one VM for testing lab environment:

  - Intel NUC running ESXi 7.x *)

  - Windows 2022 VM with <u>embedded virtualization</u>

  - Veeam Backup & Replication 11.0.1

  - Hyper-V with two guest VMs

    - Windows 2022 with Domino 12.0.1

    - SUSE Leap 15.3 with Domino 12.0.1

**ESXi 7.x Server**

Windows 2022 Server

Veeam
Backup & Replication
11.0.1

Hyper-V

Linux

Domino 12.0.1

Windows 2022

Domino 12.0.1

*) Could be any virtualization platform with embedded virtualization support.

Additional Information

Backup Retention

on jupiter
Domino Backup

- Domino Backup contains information about backup repository and ensures backup retention

- Retention interval is written into backup logs and repository data to be used for backup retention

- There is a separate prune operation load backup –p <days> to prune backups earlier

- Backup retention time is also passed to back-ends during backup to support retention for other backup solutions

- Backup retention integration to prune backups in backup back-ends

  – Scripts to purge single databases and whole backups depending on back-end requirement

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Backup & Restore Logging
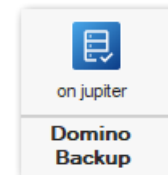
- Verbose Logging
  - load backup **-v**

- Debug Logging
  - Load backup **–V**

- Logs are written to console log

Domino Database Best Practices for Backup

- Leverage DAOS!

  – Will reduce NSF files up to 70%

  – DAOS is a simple file-backup of static files!

  – Recommended threshold: **~256 KB**

- Use database design and document compression

  – Will save a lot of disk space – round 50% of the document data

- Enable **NIFNSF** to store index outside the NSF

  – Around 10% of the original database

- Use **DBMT** to maintain your databases

  – Configure 10 days and run it once per week before backup

Q&A

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Relationship™

BEYOND THE CONTRACT

$8.4 BILLION ENTERPRISE | **132,000** IDEAPRENEURS | **44** COUNTRIES

▶ WATCH THE FILM

QUESTIONS?

Use the GoToWebinar Questions Pane

Please keep all questions related to the topics that our speakers are discussing!!!

Unrelated Question => post at:

http://openntf.slack.com/