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## Veritas NetBackup – IBM Lotus Domino protection

Veritas NetBackup provides a stream based backup approach through the NetBackup IBM Lotus Notes Agent for over a decade. In recent years, deduplication technology has seen a vast adoption, allowing data reduction in required transmission of data, leading to faster backup and less backup storage space requirements. However, the stream based backup approach does not benefit from deduplication to the built-in NetBackup Media Server Deduplication (MSDP) capabilities due to the nature of how the data is received.

In this document you will learn about how Veritas NetBackup is able to provide consistent **IBM Lotus Domino backups** with high dedupe rates. The document will provide an overview on the workflow and then dives into the backup configuration and job settings for **Lotus Domino server** as well as recovering individual items from a Domino backup. For the rest of the document we will call IBM Lotus Domino in short by its new name "IBM Domino" (see also https://en.wikipedia.org/wiki/IBM\_Notes). This whitepaper provides information about:

- IBM Domino which is a non-VSS-aware application and the protection needs
- NetBackup policy configuration for physical IBM Domino servers and virtualized IBM Domino servers
- NetBackup Instant VM Recovery for a IBM Domino server

### **About IBM Domino**

IBM Domino is a server platform for collaboration and is hosting social business applications for everyday business needs. IBM Notes is the Client component providing business collaboration functions such as e-mail, calendars, contacts management, file sharing, a user directory and other functions.

IBM Domino uses a NoSQL document-database format as a standard storage mechanism for both the application design and its associated data. The storage format is called "Notes Storage Facility" (.nsf) and it's organized in a filesystem structure, however since the Domino database is accessed continuously the backup approach outlined in this document is required to establish data consistency.

IBM **Domino** is a non-VSS integrated and non-VSS aware application. This means there are no hooks available that automatically integrate with the Microsoft VSS Framework through the provider/requestor model which allow the application (IBM Domino) to be called externally with the VSS methods. The VSS method usually is used to requests database consistency and provides a communication path for the application to be aware of a backup that has happened so it can be internally recorded as recovery point. First and foremost, the VSS provides some automatic orchestration of steps in a logical sequence.

For more information about the Microsoft Operating System Framework to create application consistency see <a href="https://en.wikipedia.org/wiki/Shadow\_Copy">https://en.wikipedia.org/wiki/Shadow\_Copy</a>.

IBM Domino as a non-VSS integrated application can still benefit from VSS that takes care of additional items outside the IBM Domino application but in the Operating System. In order to achieve the same end-result the automatic orchestration aspect will now be substituted by a manual script driven approach. The IBM Domino documentation outlines the use of the nserver commands "drop" and "dbcache flush" to close active connection and sync the memory content down to the disk file.

Basically, a Domino Server is a collection of databases and files. Each user has a unique database for e-mail and may share application databases. This structure can result in hundreds or even thousands of smaller, unique database files in the IBM Notes /data directory.

In summary:

- Domino databases are accessed using IBM Notes clients
- Domino databases have a file extension of ".nsf"
- Within the database file there can be data, design elements and programming code
- Each database file also has its own security in the form of an Access Control list (ACL).
- The DOAS directory contains attachments associated to emails
- Everything is stored in filesystem structure
- Consistency can be achieved by using drop and dbcache flush

A complete backup of a IBM Domino server contains following elements:

- The note.ini file
- All databases
- IBM Domino server data files
- DOAS data directory
- ID files
- Template files

Other open Domino files which must be protected using Microsoft Operating System VSS:

- Log(s).nsf
- Names.nsf
- Mail.box
- Server ID file

#### PreBackup Script Elements

nserver -c "drop all" # Closes all open Server Sessions nserver -c "dbcache flush" # Looks for currently open Databases which have active Cache elements, writes the Cache content down to disk (sync) and closes them

This document provides the insights into the backup configuration and setup steps for a physical and a virtualized environment. Recovery of virtualized environments benefits from NetBackup's Instant Virtual Machine recovery as an additional tool in your recovery tool chest.

### **Operational Notes**

### Lotus Domino Transaction Logging

Like other databases, IBM Domino Server has a transaction logging facility which speeds up the operations of Lotus transactions. Transaction logging records the data saved by Lotus users in "Transaction Archive files". The data is saved in the order in which it is sent by the user's system. IBM Domino reads the transaction files, and then writes the data to the databases in a background process.

IBM Domino supports two types of transaction logs: Archive Logging and Circular Logging

Archive Logging creates new log files as they are needed and only overwrites them when the containing data has been archived.

Circular Logging reuses the disk space occupied by the log files once the size limit set in Domino has been reached.

Be aware that only Archive Logging is supported.

More information can be found at these links:

- http://www-01.ibm.com/support/docview.wss?uid=swg21087828
- <u>http://www.ibm.com/support/knowledgecenter/en/SSTG2D\_6.3.0/com.ibm.itsm.mail.dom.win.doc/concept\_domcb\_up1.html</u>

#### NetBackup Deduplication Ratio comparison for physical machine deployment

Media Server	Client Name	Policy Name	Policy Type	Job Protected Size(GB)	Job Size(GB)	Deduplication Rate
SvrMed-251.example.com	Svr-IBM-LD-201.example.com	NBU_IBM-LD_2	Lotus-Notes	1,969.57	1,278.85	35.07
SvrMed-251.example.com	Svr-IBM-LD-201.example.com	NBU IBM-LD 2	MS-Windows	0	0	93.4
SvrMed-251.example.com	Svr-IBM-LD-201.example.com	NBU_W2K3_2	MS-Windows	3,522.08	278.73	92.09

#### Figure 1- NBU Dedupe Ration Comparison

The job marked red is a regular Policy-Type Lotus-Notes which is processed as a streaming backup. The average dedupe result is about 35%.

The job marked green is following the process outlined in this document and performed as Policy-Type MS-Windows which takes advantage of deduplication optimizations for file based backups and results in a much higher deduplication ratio.

The above deduplication ratios apply to the physical machine deployment scenario. It is important to understand that when Lotus Notes is deployed as virtual machine the backups take advantage of NetBackup's build in feature set for VMware/Hyper-V like change block tracking and deduplication optimization specially for virtual environments. For deployments in virtual environments constant high dedupe are automatically received as crash consistent backups. In this document the process for getting to application consistent backups is explained exemplary with VMware, the principles also apply to Hyper-V.





Figure 2- NBU IBM Domino Functional Block Diagram – Policy Type: Windows

NetBackup IBM Domino Functional Block Diagram Policy Type: VMware



Figure 3- NBU Domino Functional Block Diagram – Policy Type: VMware

### **IBM** Domino in a physical machine deployment

This section covers the backup configuration for a IBM Domino deployment on a physical server.

Within NetBackup, the Policy Type to use for this backup is "MS-Windows". When the "Use Accelerator" box is checked, the backup will take advantage of the NetBackup Track Log capability which allows to identify changes in the filesystem faster and reduce the overall backup volume and time.

The name of the policy used here is "IBM\_Domino", This policy name will be reflected in the name used for the pre-execution script. Thus, if you use any other policy name in your environment, make sure you use your policy name in the pre-execution script name.

Attributes 🔁 Schedules 🖷 Clients	Backup Selections
Policy type: MS-Windows  Destination:  Data classific <no checkpoints="" checkpoints<="" classifica="" data="" msdp_stu="" netbackup="" policy="" storage:="" take="" td="" yolume=""><td>Ø Go into gffect at:       Apr 4, 2017 10:16:41 AM         Backup network drives         Cgoss mount points         Compress         Encrypt         Collect disaster recovery information for:         Bare Metal Restore         Collect true image restore information         with move detection         (Required for synthetic backups and Bare Metal Restore)         Allow multiple data streams         Disable client-side deduplication         Enable granular recovery         Vise Accelerator         Enable optimized backup of Windows deduplicated volumes         Keyword phrase (optional):         Microsoft Exchange Server Attributes         Exchange DAG or Exchange 2007 replication (LCR/CCR)         Database backup source:         Preferred server list         (Exchange DAG only)</td></no>	Ø Go into gffect at:       Apr 4, 2017 10:16:41 AM         Backup network drives         Cgoss mount points         Compress         Encrypt         Collect disaster recovery information for:         Bare Metal Restore         Collect true image restore information         with move detection         (Required for synthetic backups and Bare Metal Restore)         Allow multiple data streams         Disable client-side deduplication         Enable granular recovery         Vise Accelerator         Enable optimized backup of Windows deduplicated volumes         Keyword phrase (optional):         Microsoft Exchange Server Attributes         Exchange DAG or Exchange 2007 replication (LCR/CCR)         Database backup source:         Preferred server list         (Exchange DAG only)

Figure 4- NBU Policy Type Example – Physical Machine

Create a full backup schedule. Accelerator is performing the data optimization and will only perform backups of changed data while merging those into your existing backup data sets. The net result is that your backups will be represented as full backups in the restore console despite the time and data traffic optimization used.

5	Change Poli	cy - IBM_Dor	nino																		×
E	Server: w	vindows1																			
	Attributes	s 🚯 Sche	dules	<b>E</b>	Client	S		Backu	ıp Se	lectio	ns										
		2 4		6		8		10		12		14		16		18		20	2	2	24
Su	in	+ + +	+	÷	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ +	+	
Tu	e +	+ + +	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ +	+	-
W	ed	+ + +	+	Ť	+	+	+	+	+	+	+	+	+	+	+	+	+	1	* *	+	
Th	u	+ + +	+	Ļ	+	+	+	+	+	+	+	+	+	+	+	+	+	Ţ	+ +	+	
Fri	+	+ + +	+	÷	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ +	+	-
00						-														. '	
	Name	Туре	Synth	etic B	Dis	k-On	ly B	Reter	ntion	PR	etent	ion L	. Fr	equer	ncy	Media	Multi	. S	torage	Volu	me P
E	) full	Full Backup	No		No			2 wee	eks			1	l 1 da	ау			1	1			
																					Þ
											5	K Nev	M			K Del	ete		Ø.	hande	
												de Her					010			nany <u>e</u>	
													-	_	NK		C	ncol		Hole	
													_ L		<u>v</u> n			ncel		<u>u</u> elt	,

Figure 5- Scheduling Options – Full Backup

Under the "Clients" tab add the physical server name.

🕤 Change Policy - IBM_Domino			×
Server: windows1			
🔳 Attributes 🕲 Schedules 🖷 🖲	Clients Backup Selections		
	-		
Client Name	Hardware	Operating System	
📕 windows2	Windows-x64	Windows2008	
<u>× N</u> e	w X <u>D</u> elete	Change	re
		OK <u>C</u> ancel <u>H</u>	elp

Figure 6- Client Example – Physical Server name

Under the "Backup Selections" tab add your directories that need protection. As previously mentioned a complete backup of a IBM Domino server contains following elements based on the installation for this environment. Please change these variables to reflect your installation paths:

- The note.ini file located in C:\Program Files\IBM\Domino and C:\Program Files (x86)\IBM\Notes
- All databases located in E:\IBM\Domino\data
- IBM Domino server data files located in E:\IBM\Domino\data
- DOAS data directory which is not configured on this system
- ID files located in E:\IBM\Domino\data and in E:\IBM\Notes\Data
- Template files which are not configured on this system
- Log.nsf located in E:\IBM\Domino\data and in E:\IBM\Notes\Data
- Names.nsf located in E:\IBM\Domino\data
- Mail.box located in E:\IBM\Domino\data
- Server ID file located in E:\IBM\Domino\data

Change Policy - IBM_Domino	×
Server: windows1	
🖾 Attributes 🚯 Schedules 🖷 Clients 📾 Backup Selections	
Backup Selection List	
E:\IBM\Domino	
🔞 C:\Program Files\IBM\Domino\notes.ini	
E:\IBM\Notes	
C:\Program Files (x86)\IBM\Notes\notes.ini	
<u>₩ New</u> <u>New</u> <u>X D</u> elete <i>A</i> Chang <u>e</u>	
OK Cancel Help	1

#### **Figure 7- Policy Backup Selection List**

The IBM Domino database needs to be brought into a consistent state before the backup. NetBackup provides an integrated facility to execute pre- and post-commands. All that needs to be done is to place the script file into the Client's NetBackup bin directory as shown below.

The script monitors the success of the script execution on the IBM Domino Server and will create a location (if not already existing) to place the Log file.

The default folder structure created is "C:\SCRIPTS\DOMINO\DailyLog". If you would like to use a different path structure and names please modify the script accordingly.

🏭   🕞 🚯 = I		DailyLog			_ 🗆 X
File Home Share View					~ <b>(</b> )
📀 💿 🔻 ↑ 🌗 ► This PC ► Local Disk	(C:) • SCRIPTS • DOMINO • Daily	yLog	v (	Search DailyLog	Q
🕮 Recent places	^ Name	Date modified	Туре	Size	
<ul> <li>Image: This PC</li> <li>Desktop</li> <li>Documents</li> <li>Downloads</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> <li>Local Disk (C:)</li> <li>PerfLogs</li> <li>Program Files</li> <li>Program Files</li> <li>Program Files</li> </ul>	DominoFreeze.log	1/24/2017 2:19 AM 1/24/2017 2:19 AM	Text Document Text Document	1 KB 0 KB	
DOMINO					

Figure 8- Default location - DailyLog

On the IBM Domino Server browse to the Veritas NetBackup Client directory and create the "bpstart\_notitfy.IBM\_Domino.bat" file. The element "IBM\_Domino" is the policy name in our example above we used. If you used any other policy name, make sure you use your policy name instead.

Pre-Script Location on the IBM Domino Server

📓 I 💽 🔂 🖛 I		bin					-	x
File Home Sha	re View							v 🕐
⋲ 🕘 🗸 ↑ 🚺 🖸	\Program Files\Veritas\NetBackup\bin				✓ C S	Search bin		Q
- Envoritor	Name	Date modified	Туре	Size				^
	bporaimp.exe	1/11/2016 /:28 PM	Application	109 KB				
Desktop	bppfi.exe	1/11/2016 7:28 PM	Application	264 KB				
Uownloads	bpps.exe	1/11/2016 7:28 PM	Application	37 KB				
Recent places	bpresolver.exe	1/11/2016 7:28 PM	Application	265 KB				
<b>F</b> errise	bprestore.exe	1/11/2016 7:28 PM	Application	47 KB				
Im This PC	bpspsserver.exe	1/11/2016 7:28 PM	Application	204 KB	_			_
Desktop	bpstart_notify. IBM_Domino.bat	1/24/2017 2:06 AM	Windows Batch File	3 KB	]			=

Figure 9- Pre-Script Location – IBM Domino Server

Open the "bpstart\_notitfy.IBM\_Domino.bat" with Notepad, cut and paste the script from below into your Notepad, adjust the DOMINO\_PATH as needed and save.

REM ------REM - Create directory if not exit REM ------IF NOT EXIST "C:\SCRIPTS\DOMINO\DailyLog\" mkdir "C:\SCRIPTS\DOMINO\DailyLog\" REM REM ------REM - Define script variables, maybe you have to change this REM ------REM SET SCRIPTS PATH=C:\SCRIPTS\DOMINO\ SET DOMINO PATH="C:\Program Files\IBM\Domino\" SET DominoFreezeLOG=%SCRIPTS\_PATH%\DailyLog\DominoFreeze.log SET DominoFreezeErrLOG=%SCRIPTS\_PATH%\DailyLog\DominoFreezeError.log REM REM ------REM - Get the date and time without the slashes and colons FOR /F "tokens=2 delims==" %%a in ('wmic OS Get localdatetime /value') DO SET "dt=%%a" SET "YY=%dt:~2,2%" & set "YYYY=%dt:~0,4%" & set "MM=%dt:~4,2%" & set "DD=%dt:~6,2%" SET "HH=%dt:~8,2%" & set "Min=%dt:~10,2%" & set "Sec=%dt:~12,2%" SET FDATE=%YYYY%-%MM%-%DD% %HH%:%Min%:%Sec% REM ------REM REM ------**REM - Call Domino commands** REM ------%DOMINO PATH%nserver -c "drop all" timeout /T 5 /NOBREAK > NUL %DOMINO PATH%nserver -c "dbcache flush" timeout /T 5 /NOBREAK > NUL if %ERRORLEVEL% NEQ 0 GOTO :ERROR if %ERRORLEVEL% == 0 GOTO :SUCCESS :SUCCESS ECHO. >> %DominoFreezeLOG% ECHO Domino Freeze successfully called at %FDATE% >> %DominoFreezeLOG% EXIT /B 0 :ERROR ECHO. >> %DominoFreezeErrorLOG% ECHO Domino Freeze called failed at %FDATE% >> %DominoFreezeErrorLOG% EXIT /B 1

On the NetBackup Master Server (Host Properties > Master Server) configure the Microsoft Operating System VSS usage for the volumes of the IBM Domino Client. This ensures that after the IBM Domino database has been flushed by the script above a consistent snapshot of the volume is created and therefore the data contained in the backup will be static.



**Figure 10- Edit Host Properties Client Attributes** 

The backup Policy can now be run.

### Restores

The NetBackup Backup, Archive, and Restore Console allows you to select the file objects of your IBM Domino environment you would like to restore.



Figure 11- Backup, Archive and Restore UI – Performing Restores

### **IBM** Domino in a virtual machine deployment

This section covers the backup configuration for a IBM Domino deployment on a virtual server. The data protection happens on a virtual machine level (VM container level) while NetBackup's Granular Recovery Technology (GRT) allows you the flexibility to recover the full VM or a single file from the same one time backup. Instant Recovery capabilities complement the offering by allowing you to bring the VM online from the backup storage within minutes.

Within NetBackup the Policy Type to use for this backup is "VMware". The "Use Accelerator" box will take advantage of VMware Change Block Tracking (CBT) capability which allows VMware to identify changes on a block level and reduces the overall backup volume and time.

<b>S</b>	Change Poli	icy - VMware_Domino	X
📑 Server: nbmaster2			
🔲 Attributes 🛛 🔁 Schedules 🖉 🖳 Clients 🖉 🗃 Backup	Selections	UMware	
		<b></b>	
Policy type: VMware	-	Go into effect at:	Jan 26, 2015 11:39:37 AM
Destination:		Eollow NFS	
Data classification: <pre></pre>	-	Cross mount points	
Policy storage: dp_nbmaster2_disk-stu	-		
Policy volume pool: NetBackup	-		formation for
			iormauon ior:
Take checkpoints every: 0	ites	Collect true image resto	re information
Limit jobs per policy:		with move detection	
lob priority	priority)	(Required for synthetic t	ackups and Bare Metal Restore)
	phoney	Allow multiple data strea	ims
Media Ow <u>n</u> er: Any	-	Disable client-side dedu	plication
Snapshot Client and Replication Director		Enable granular recovery	y .
Perform block level incremental backups		Use Accelerator	of Windows dodustionted volumes
Use Replication Director			o or <u>windows deduplicated volumes</u>
Perform snapshot backups Options		Keyword phrase (optional):	
Retain snapshot for Instant Recovery or SLP manag	ement	Microsoft Exchange Server	Attributes
Hyper-V server:		Exchange DAG or Exchange	2007 replication (LCR/CCR)
✓ Perform off-host <u>b</u> ackup		Database backup	source:
<u>U</u> se:	-	Preferred serve	r list (Exchange DAG only)
Mach <u>i</u> ne:	-		(erenange erre enry)
			OK <u>C</u> ancel <u>H</u> elp

Figure 12- Policy Type - VMware

Create a full backup schedule. Accelerator is performing the data optimization and will leverage VMware's CBT transmission merging those changed blocks into your existing backup data sets. The net result is that your backups will be represented as full backups in the restore console despite the time and data traffic optimization used.

5				C	Chang	ge Polic	y - V	Mware	Dor	nino									X
🚦 Server: nbr	naster2																		
Attributes	Schedules	🖳 Clients	<u>iii</u> e	Backup	Selec	tions	📵 V	Mware	]										
	2 4	6		8		10		12		14		6	1	18		20	2	22	24
Sun +	+ + +	+ +	+	+	+	+ ·	+	+ +	-	+	+ -	- +	-	+	+	+ -		- +	
Tue	+ + +	+ +	+	+	+	+ ·	+	+ +	-	+	+ -	- +	-	+	+	+ +		- +	
Wed	+ + +	+ +	+	+	+	+ -	+	+ +	-	+	+ -	- +	-	+	+	+			
Fri Fri	* * *	+ +	+	+	+	+ ·	+	+ +	-	+	+ -	- +	-	+	+	+ -		- +	
Sat	+ + +		+	+	+	+ ·	+	+ +		+ 	+ -	- +		+ 	+	+ -		- +	
Name	Type Synth	etic B Disk-O	nly B	Retenti	on P	Retenti	on L	Freque	ncy	Media	Multi	Stora	ge	Volu	me Po	ol P	olicy	Media	Own
🕀 Full F	ull Backup			2 week	S		1	1 day			1					VMwa	are_D		
										_									
											<u> </u>	w		X	<u>D</u> elete		100	Chan <u>ge</u>	·
												_							
													<u>0</u> K	(		<u>C</u> ancel		<u>H</u> elp	

Figure 13- Schedule Type - Full

Under the "Clients" tab use the VIP query builder to include those IBM Domino machines you like to protect.

Change I	Policy - VMware_Domino		x
Server: nbmaster2			
🔳 Attributes 🕲 Schedules 🖳 Clients 📴 Backup Selection	ns 📑 VMware		
Virtual Machines for backup:			
Select <u>m</u> anually			
Select automatically through VMware Intelligent Policy guery			
Enable <u>v</u> Cloud Director integration			
NetBackup host to perform automatic virtual machine selection:	ckup Media Server	<b>•</b>	
Query Builder	5 Tost quony		n I
Join: Field: Operator:			
Select Select Select	VM selection status is as per current V any change in the VM environment.	M environment. Query result may vary with	
Query (Basic Mode)	Test query for policy: VMware_Domino		
	Query vmware:/?filter=Displayname Equal "D	)omino"	
Displayname Equal "Domino"	]		
	Test Query Results		
	VM Name Domino	Included	
	SLESVM1	Excluded	
		Excluded	
	Included: 1 Excluded: 9	Failed: 0	
		<u>C</u> lose <u>H</u> elp	
Advanced Mode		Edit Remove	
Test query to view results. VMs selected for backup may vary with	any change in the virtual environment.	<u>T</u> est Query	
Reuse VM selection query results for: 8 hours	v		
		<u>O</u> K <u>C</u> ancel <u>H</u> elp	

Figure 14- Client Selection – Using VMware Intelligent Policy (VIP)

It is recommended to use the VM display name as the Primary VM identifier as shown below:

Change	Policy - VMware_Domino	X
Server: nbmaster2		
🗉 Attributes 🏾 🤀 Schedules 🖉 🖳 Clients 🖉 📠 Backup Selection	ons 📑 VMware	
VMware backup host: Backup Media Server ✓ Optimizations  ✓ Enable file recovery from VM backup  ✓ Enable block-level incremental backup  ✓ Exclude deleted blocks  ✓ Exclude swap and paging files	Primary VM identifier: VM display name Existing snapshot handling: Remove NetBackup snapshot(s) and contin	Application Protection  Enable Exchange <u>Recovery</u> Truncate logs Enable SQL Server Recovery Truncate logs Enable SharePoint Recovery
Transport modes     NetBackup tries each selected transport in order from top to bottor     ✓ nbd: Do not encrypt the virtual disk data for over-the-network trans     nbdssl: Encrypt the virtual disk data for over-the-network transfer     san: Use san to move virtual disk data     hotadd: Use virtual disk files from NetBackup server	m. ifers Move Up Move Down	
		Advanc <u>e</u> d
	<u>O</u> K	<u>Cancel</u> <u>H</u> elp

#### Figure 15- Using the VM Display Name

The IBM Domino database needs to be brought into a consistent state before the backup.

VMware provides a pre-Snapshot freeze infrastructure for ESX 5.1/5.5 and higher that allows command execution before taking the VMware Snapshot. More details can be found here:

• <u>https://kb.vmware.com/selfservice/microsites/search.do?language=en\_US&cmd=displayKC&externalId=1006671</u>

All that needs to be done is to place the VMware pre-freeze-script.bat script file into the Virtual Machines C:\Windows directory and adjust the DOMINO\_PATH to reflect your installation as shown below.

👫   💭 🚺 = I	١	Windows			_ □ 3	x
File Home Share View					~	0
			v ن	Search Windows	م	>
📔 Desktop	^ Name	Date modified	Туре	Size		^
Documents	bootstat.dat	1/24/2017 2:43 AM	DAT File	66 KB		
Downloads	PFRO.log	1/24/2017 2:41 AM	Text Document	4 KB		
	pre-freeze-script.bat	1/24/2017 2:06 AM	Windows Batch File	3 KB		=
Pictures	WindowsUpdate.log	1/24/2017 1:20 AM	Text Document	0 KB		-
Videos	Dtclnstall.log	7/9/2015 6:04 PM	Text Document	3 KB		
Local Disk (C:)	setupact.log	7/9/2015 6:04 PM	Text Document	11 KB		
PerfLogs	ymgcoinstall.log	3/18/2014 3:29 AM	Text Document	6 KB		

#### Figure 16- Path Example for the Pre-Freeze Script File

Contents of the pre-freeze-script.bat script:

REM
REM - Create directory if not exit
REM
IF NOT EXIST "C:\SCRIPTS\DOMINO\DailyLog\" mkdir "C:\SCRIPTS\DOMINO\DailyLog\"
REM
REM
REM - Define script variables, maybe you have to change this
REM
REM
SET SCRIPTS_PATH=C:\SCRIPTS\DOMINO\
SET DOMINO_PATH="C:\Program Files\IBM\Domino\"
SET DominoFreezeLOG=%SCRIPTS_PATH%\DailyLog\DominoFreeze.log
SET DominoFreezeErrLOG=%SCRIPTS_PATH%\DailyLog\DominoFreezeError.log
REM
REM
REM - Get the date and time without the slashes and colons
FOR /F "tokens=2 delims==" %%a in ('wmic OS Get localdatetime /value') DO SET "dt=%%a"
SET "YY=%dt:~2,2%" & set "YYYY=%dt:~0,4%" & set "MM=%dt:~4,2%" & set "DD=%dt:~6,2%"
SET "HH=%dt:~8,2%" & set "Min=%dt:~10,2%" & set "Sec=%dt:~12,2%"
REIN
%DOMINO_PATH%nserver_c_dron_all"
timeout /T 5 /NOBREAK > NUI
%DOMINO_PATH%nserver_c "dbcache flush"
timeout /T 5 /NOBREAK > NUI
if %ERRORLEVEL% NEQ 0 GOTO :ERROR
if %ERRORLEVEL% == 0 GOTO :SUCCESS
:SUCCESS
ECHO. >> %DominoFreezeLOG%

ECHO Domino Freeze successfully called at %FDATE% >> %DominoFreezeLOG% EXIT /B 0 :ERROR ECHO. >> %DominoFreezeErrorLOG% ECHO Domino Freeze called failed at %FDATE% >> %DominoFreezeErrorLOG% EXIT /B 1

The script monitors the success of the script execution on the IBM Domino Server and will create a location (if not already existing) to place the Log file. The default folder structure created is "C:\SCRIPTS\DOMINO\DailyLog". If you would like to use a different path structure and names please modify the script accordingly.



Figure 17- Daily Log Path Example

The NetBackup job is calling the VMware VADP API for the backup. During the VMware Snapshot creation VMware is invoking the pre-freeze-script and creating the IBM Domino consistency.

5	Activity	Monitor -	nbmaster2 -	NetBackup	Administra	ation Console [admin	istrator log	ged into nb	master2]		_ □	x
(a) Veritas NetBackup™												
<u>File Edit View Actions Help</u>												
🗢 → 🗈 🖬 🕌 🎒 🍏 😭	] ← → 🖻 🗷 🚰 🚔 🗳 😤 🗎 🚔 🖓 🖈 😜 🧬 🖑 🕼 🐇 🦉 😤 📽 🖄 🖉 🖉 🖉 🖉 🖉 🖉 🖉 🖉											
nbmaster2 (Master Server)	3 Jobs (0 C	Queued 3 Acti	ive 0 Waiting f	or Retry 0 Sus	pended 0 Inc	complete 10 Done - 1 sel	ected)			Search	Y	
Backup Archive and Restore	Job Id	Туре	State	State Details	Status	Job Policy	Job Sched	Client	Media Server	Start Time	Elapsed Ti	End
- 🔜 Activity Monitor	22	Backup	Active			VMware_Domino	Full	Domino	nbmaster2	Jan 24, 2017 5:40:41	00:00:51	
🛉 🗒 NetBackup Management 🚽	21	Snapshot	Active			VMware_Domino	-	Domino	nbmaster2	Jan 24, 2017 5:40:02	00:00:41	
🔶 🖹 Reports	20	Backup	Active			VMware_Domino	-	nbmaster2	nbmaster2	Jan 24, 2017 5:39:40	00:01:31	

Figure 18- VMware Jobs – Monitoring in Activity Monitor

The regular VMware Snapshot then gets executed.

6	Activity Monitor - nbma	ster2 - NetBackup Ad	ministration Console	e [administrator logged	into nbmaster2]	-			
(e) Veritas NetBackup™									
0		vcenter - vS	phere Client			_ <b>D</b> X			
File Edit View Inventory Administration	File Edit View Inventory Administration Plug-ins Help								
🔄 💽 🏠 Home 🕨 🛃 Inventory 👂	Hosts and Clusters				Search Inventory	Q			
	2 🕞 📎 🦫								
Domino									
Datacenter Summar	Resource Allocation Perfor	mance Tasks & Events A	larms Console Permis	sions Maps					
2003DC 2003-SQL2005 General	al		Resources						
2003VM1 Guest i     2003VM1-SAN     WW Ver     2008-BASE CUU     2008-EXC2010 Memor     2008-SPT2010 Memor     SLESVM1 IP Add     B cex61     B Domino     DNS Na     EVC Ma     State:     Host:     Active     vSpher	OS: Microsoft Wini sion: 10 1 vCPU 4096 MB y Overhead: e Tools: Running (C resses: 192.168.2.215 ame: Domino ode: N/A Powered On esx61 Tasks: Create virtual i re HA Protection: ② N/A 도	dows Server 2012 (64-bit) urrent) nachine snapshot	Consumed Host CPU: Consumed Host Memory Active Guest Memory: Provisioned Storage: Not-shared Storage: Used Storage Storage ESKof_LS_128G < III Network & VM Network <	y: 2 1 Refresh St Status Drive Ty B Normal Non-SS Type Standard port group III	162 MHz 2017.00 MB 1187.00 MB bitage 64.18 GB 40.22 GB 44.40 GB pe 0 > Sta ©	8			
Comm	ands								
🛃 C	Open Console					~			
Recent Tasks				Name, Target or	Status contains: -	Clear ×			
Name Target	Status Details	Initiated by VCer	nter Server Reques	sted Start Ti 🖙 🛛 Start Time	Completed Time				
<ul> <li>Create virtual machine 骨 Domino</li> <li>学 Remove snapshot 骨 Domino</li> </ul>	0% Ø Completed	Administrator 🛃 Administrator	vcenter 1/24/2 vcenter 1/24/2	017 5:53:06 AM 1/24/2017 5: 017 5:47:10 AM 1/24/2017 5:	:53:06 AM :47:10 AM 1/24/2017 5:47:18 AM				
🔄 Tasks 💇 Alarms						Administrator //			

Figure 19- Execution of the VMware Snapshot

<u>\$</u>		Job Details: 21		_ <b>D</b> X					
Job ID:	21	Job State:	Active						
Job Overview	Detailed Status Job Hierarchy								
Affempt:	1		Attempt Started	Jan 24, 2017 5:40:02 AM					
Job PID:			Attempt Elapsed	: 00:05:15					
Storage Unit:	dp nbmaster2 disk-stu		Attempt Ended:						
Media Server:	nbmaster2		KB/Sec:						
Transport Type:	LAN								
Transport Type: LAN         Status:         Jan 24, 2017 5:40:03 AM - Info bpbrm (pid = 6672) reading file list for client         Jan 24, 2017 5:40:03 AM - Info bpbrm (pid = 8672) start bpfis on client         Jan 24, 2017 5:40:03 AM - Info bpbrm (pid = 8672) start bpfis on client         Jan 24, 2017 5:40:03 AM - Info bpbrm (pid = 8672) start bpfis on client         Jan 24, 2017 5:40:05 AM - Info bpbrm (pid = 8672) start up fis on client         Jan 24, 2017 5:40:05 AM - Info bpbrm (pid = 8672) start up fis on client         Jan 24, 2017 5:40:05 AM - Info bpbrs (pid = 856) Backup started         Jan 24, 2017 5:40:05 AM - Info bpfis (pid = 856) Backup started         Jan 24, 2017 5:40:05 AM - Info bpfis (pid = 856) done. status: 0         Jan 24, 2017 5:40:41 AM - Info bpfis (pid = 856) done. status: 0         Jan 24, 2017 5:40:41 AM - Info bpfis (pid = 856) done. status: 0: the requested operation was successfully completed         Jan 24, 2017 5:40:41 AM - end writing         Operation Status: 0         Jan 24, 2017 5:40:41 AM - end Parent Job; elapsed time 0:00:38         Jan 24, 2017 5:40:41 AM - Info nbjm (pid = 5332) snapshotid = Domino_1485254402         Jan 24, 2017 5:40:41 AM - Info nbjm (pid = 5332) snapshotid =Domino_1485254402         Jan 24, 2017 5:40:41 AM - begin Application Snapshot: Policy Execution Manager Preprocessed									
Current Kilobyte	s Written:	Estimated Kilobytes:							
Current Files Wr	itten:	Estimated Files:							
Current rile:			Trout	oleshooter					
Percent Comple	ete: 0%								
			\$ <b></b>	Refresh Close Help					



<u>چ</u>	Job Deta	ils: 22			x
<u>\$</u>	Job De	tails: 22		_ □	x
Job ID: 22	Jo	b State:	Active		
Job Overview         Detailed Status         Job           Attempt:	m (pid = 8660) There is no complete backup m (pid = 8660) starting bpbkar32 on client ig d; connect time: 0:00:00 ar32 (pid = 8616) Backup started ar32 (pid = 8616) accelerator enabled back n (pid = 8888) start n (pid = 8888) start n (pid = 8888) using 262144 data buffer sizs n (pid = 8888) start n (pid = 8888) using 30 data buffers n (pid = 8888) start backup ar32 (pid = 8616) INF – Backing up vCenter ting ar32 (pid = 8616) INF – Transport Type = in <b>1</b> <b>4200447</b>	o image match with track ] up, archive bit processing r to 1049600 bytes server vcenter, ESX host e ibd	Attempt Started: Attempt Elapsed: Attempt Ended: KB/Sec: journal, a regular f : <disabled> esx61, BLOS UUID 4</disabled>	Jan 24, 2017 5:40:41 AM 00:03:57 18303 ruii backup wiii be performed.	► b2
Current Files Written: Current File:	87359 Estin /\.775F4001-269F-11E5-80B	1ated Files: 5-806E6F6E6963}	0		
			Troul	bleshooter	
Percent Complete: 0%			<b>₽</b>	Refresh Close Hel	lp

Figure 21- Additional Job Details Information

## **Restores of VMware Backups**

Restores of VMware backups are similar to regular physical machine restores as shown below:

Ba	ackup, Archive, and Restore - nbmaster2	- NetBackup Administ	ration Console [administr	ator logged into nbmaster2]	_ 🗆 X
Ø Veritas NetBackup™					
<u>File Edit View Actions Help</u>					
	r 🗈 🖴				Login Activity 🔻
nbmaster2 (Master Server)	NetBackup server: So	Irce client:	Destination client	Policy type:	
nbmaster2 (Master Server)	nbmaster2 Doi	nino	Domino	VMware	
Backup, Archive, and Restore     Activity Monitor	Backup Files Restore Files Task Prog	ress			
P NetBackup Management	Restore type:				
← 🔄 Reports	Normal Backups 🔻				
Policies	Keyword phrase:			Start date: End	date:
- 🖺 Catalog	<none></none>			Jan 24, 2017 7:16:03 AM Jan	24, 2017 7:19:39 AM
← 🚮 Host Properties	Browse directory:	(			
P ■ Applications	/				<u>36</u> .8 20 m
<ul> <li>► Solution</li> <li>► Solution</li></ul>	Directory Structure	Contents of selected dire	ectory		Search 🍸
🕈 🖹 Media and Device Management	۹-🔼 🔤 /	Name	Backup Date	Size(Bytes) Modified	Schedule T Policy Im
- Device Monitor		names.nsf	Jan 24, 2017 7:19:39 AM	28743504 Apr 18, 2016 12:22:26 PM	Full Backup VMware_D Bac
- Media		names.nsf	Jan 24, 2017 7:16:03 AM	28743504 Apr 18, 2016 12:22:26 PM	Full Backup VMware_D Bac
- & Credentials	-Z Data	User1.nsf	Jan 24, 2017 7:19:39 AM	8294454 Apr 20, 2015 11:03:43 AM	Full Backup VMware_D Bac
🕈 🖵 Security Management	- 🔲 System Volume Information	User1.nsf	Jan 24, 2017 7:16:03 AM	8294454 Apr 20, 2015 11:03:43 AM	Full Backup VMware_D Bac
- 🥵 Security Events	- 🗌 Volume{775f4001-269f-11e5-8	User2.nst	Jan 24, 2017 7:19:39 AM	8294454 Apr 20, 2015 11:03:43 AM	Full Backup VMware_D Bac
🕈 💽 Certificate Management		User2 nef	Jan 24, 2017 7:10:03 AM	2294404 Apr 20, 2010 11:00.43 AM 2295612 Jon 24, 2017 7:11:00 AM	Full Backup VMware D. Bac
- Token Management		User3 nsf	Jan 24, 2017 7:16:03 AM	3395613 Jan 24, 2017 7:11:00 AM	Full Backup VMware D Bac
- Management		User4.nsf	Jan 24, 2017 7:19:39 AM	3233049 Jan 24, 2017 7:11:00 AM	Full Backup VMware D., Bac
- 🖗 Bare Metal Restore Management		User4.nsf	Jan 24, 2017 7:16:03 AM	3233049 Jan 24, 2017 7:11:00 AM	Full Backup VMware_D Bac
Logging Assistant					
		•			Þ
				<b>a</b> <u>E</u>	Preview Restore
				<b>A</b> .	last Natification
					iert noulication

Figure 22- Single File Restore from VMware Backups

Additionally, NetBackup offers Instant Virtual Machine recovery capabilities. With this a copy of your virtual machine is launched from the backup storage within minutes and can then be migrated back to your production storage online.

The screenshots below show the NetBackup vSphere Web-Plugin integration and the steps involved.



Within the vSphere Web Console click on Veritas NetBackup.

Figure 23- Instant Recovery via vSphere Web Client – Screen Shot 1

Click on the Instant Recovery Wizard.

mWare <sup>®</sup> vSphere Web Client A≡										
Navigator I	Veritas NetBackup									
History	<b>) Veritas</b> NetBackup™		⑦ (1)							
Image: Center Inventory Lists       Image: Center Inventory Lists         Image: Center Inventory Lists       Image: Center Inventory Center Inventory         Image: Center Inventory Center Inventory       Image: Center Inventory         Image: Center Inventory Center Inventory       Image: Center Inventory         Image: Center Inventory       Image: Center Inventory	Recovery Portal	Instant Recovery Cleanup Servers								
🔞 Veritas NetBackup	Recovery Portal Overview									
🖏 Administration 📏	Workflow	Workflow								
<ul> <li>デ Tasks</li> <li>i Log Browser</li> <li>i Events</li> </ul>	Recovery Wizard	3 Aun Instant Recovery								
🧭 Tags	Instant Recovery Cleanup	Run Instant Recovery wizard deanup to complete the workflow								
Q, New Search →	Register NetBackup Master Servers Settings	Image: Set preferred settings         Plugin configuration for the first time -one time activity	-							

Figure 24- Instant Recovery via vSphere Web Client – Screen Shot 2

Enter the name of your VM to recover and search for it. Once selected click Next.

Instant Recovery Wizard						H
1 Virtual Machine Selection						
2 Image Selection 3 Destination Selection 4 Virtual Machine Options	I Virtual Machi View Details	nes Added				
5 Review Selections	Search and add virtual machi	nes				Reset Search Parameters
	vCenter Server: vcenter		• NetBackup	Master Server: nbmaster2		• Search
	Search Results: Showing 1	results for "domino"				
	DisplayName	DNS Name	HostName	BIOSUUID	Instance UUID	ESX Server
	Domino	Domino	Domino	420309a1-373f-2506-6	5003d8cc-2c82-3604-9	esx61
						P Add Virtual Machines
					Back Next	Accelvate Managed

Figure 25- Instant Recovery via vSphere Web Client – Screen Shot 3

Select the latest or any backup image you like to recover from. Once selected click Next.

ge selection	Display Name	Date and Time of Backup (UTC)		Age	vCenter Server	Policy Name				
stination Selection	Domino	Tuesday, January 24, 2017 12:19:39 PM	Change	< 1 Hour	vcenter	VMware_Domino	~			
al Machine Options							*			
iew Selections										
	Storage Type	PureDisk	Master Ser	rver	nbmaster2					
	Backup ID	Domino_1485260379	Schedule	Туре	Full					
	Virtual Machine Attributes									
	Display Name	Domino	Host Name	е	Domino					
	DNS Name	Domino	vCenter Se	erver	vcenter					
	ESX Server	esx61	Data Cent	er	/Datacenter					
	Instance UUID	5003d8cc-2c82-3604-957b- bf08d811a4ba	BIOS UUIE	)	420309a1-37 9b2fb1c5ef87	73f-2506-696e- 7				
	Virtual Machine Version	vmx-10	vCloud En	abled	None					
	Resource Pool	/Datacenter/host/esx61/Resources	vApp		None					
	VMDKs									

Figure 26- Instant Recovery via vSphere Web Client – Screen Shot 4

### Select your recovery destination. Click Next.

0	Instant Recovery Wizard				**						
* *	1 Virtual Machine Selection     2 Image Selection     3 Destination Selection	Instant Recovery Destination: for all selected Virtual Machines									
	<ol> <li>Virtual Machine Options</li> <li>Review Selections</li> </ol>	vCenter Server:	vcenter 🗸								
		Data center/ESX Server:	/Datacenter/esx61	Change							
		Resource Pool or vApp:	Select Resource Pool or vApp	Select Optional							
		Temporary Datastore or Datastore Cluster:	ESX61_LS_128GB	Change							
		Reset to Preferred Destination		Save as Pre	ferred Destination						
		Change NetBackup Alternate Recovery Host			Optional						
				Back Next	Aietelvate Paneelloy						

Figure 27- Instant Recovery via vSphere Web Client – Screen Shot 5

Provide an alternate display name! This step is necessary as your original machine might be still up and running and you just want to recover an older version or perform some recovery tests. Click Next.

✓ 1 Virtual Machine Selection	
✓ 2 Image Selection	
Virtual Machine Options Retain networks Retain tag associations	
4 Virtual Machine Options 🕑 Power on 📰 Retain hardware version	
5 Review Selections	
Domino_Recover	
Add common suffix to all display names:	
Add Reset to Original Display Names	
Back Next Activate	Vancel dv

Figure 28- Instant Recovery via vSphere Web Client – Screen Shot 6

Review your selections. When satisfied click Finish to start the Instant Virtual Machine recovery process.

0	Instant Recovery Wizard									
>	1 Virtual Machine Selection	Review Selections:								
~	2 Image Selection     Virtual Machines and Images Selected									
~	3 Destination Selection	Virtual Machine Name	ESX Serv	/er	Date and Time of Backup (UTC)	Age				
1	4 Virtual Machine Options	Domino	esx61		Tuesday, January 24, 2017 12:19:	3 < 1 Ho	ur			
	5 Review Selections									
		Recovery Destination								
		vCenter Server	vcer	ter	ESX Server		esx61			
		Data center	/Dat	acenter	Virtual Machine Folder		/Datacenter/vm			
		Resource Pool or vApp	/Dat	acenter/host/esx61/Res es	Temporary Datastore or Datastore Cluster		er ESX61_LS_128GB			
		Run Pre-recovery Check	completed su	ccessfully.	ung me instant recovery process.					
						Back	Next	Finish	Cancel	

Figure 29- Instant Recovery via vSphere Web Client – Screen Shot 7

The recovered machine can now be seen in the vSphere environment. The machine can be launched and if needed moved back to production storage through Storage vMotion.

File Filt View Inventory Administration Plug-ins Help								
File Edit View Inventory Administration Plug-ins Help								
🖸 💽 🏠 Home 🕨 👸 Inventory 🕨 🛐 Hosts and Clusters	Q							
Opmino       Domino         Summary       Resource Allocation       Performance       Tasks & Events       Alarma       Console       Permissiona       Maps         Summary       2003-SQL2005       2003/SQL2005       Guest OS:       Microsoft Windows Server 2012 (64-bit)       Maps         Summary       2003-RAASE       Guest OS:       Microsoft Windows Server 2012 (64-bit)       Maps         Subscreen       2003-RAASE       Guest OS:       Microsoft Windows Server 2012 (64-bit)       Maps         Consumed Host CPU:       36 MHz       Consumed Host CPU:       36 MHz         2008-EXC2010       2008-EXC2010       Memory:       4096 MB         Memory:       4096 MB       Memory:       2017.00 HB         Memory:       4036 MB       Memory:       2017.00 HB         Memory:       4040 Verbead:       VMware Tools:       Refresh Storage:       64.18 GB         Not-shared Storage:       192.168.2.215       DNS Name:       Domino       EVC Mode:       NA         State:       Powered On       Host:       esx61       Ex61_LS_128GB       Normal Non-SSD       V         VSphere HA Protection:       N/A       VI       VI       VI Network       Standard port group       V         Shut Down								
Recent Tasks Name, Target or Status contains:  Clear	×							
Name       Larget       Details       Initiated by       venter server       Requested start I       Start Ime       Completed Time         V       Power On virtual machine       Image: Completed Time       Powering on       Venter server       1/24/2017 7:32:57 AM       1/24/2017 7:32:57 AM       1/24/2017 7:32:57 AM         V       Create virtual machine       Domino_Reco_       Image: Completed Administrator       Administrator       Venter       1/24/2017 7:32:53 AM       1/24/2017 7:32:53 AM	• • • • • • • • • • • • • • • • • • •							

Figure 30- Instant Recovery via vSphere Web Client – Screen Shot 8

While Instant Virtual Machine Recovery is active the job can be seen as running in the NetBackup Activity Monitor. Once finished with the recovery end the Instant Virtual Machine Recovery process in the vSphere Web-Plugin User Interface.

Activity Monitor - nbmaster2 - NetBackup Administration Console [administrator logged into nbmaster2]									_ 🗆 X	
S       S       Ceritas NetBackup™         Elle Edit View Actions Help         Impaster2 (Master Server)       Impaster2 (Master Server)         30 Jobs (0 Queued 1 Active 0 Waiting for Retry 0 Suspended 0 Incomplete 29 Done - 1 selected)       Search										
									Login Activity 🔻	
									Search	
Backup, Archive, and Restore	Job Id	Туре	State	State Details	Status	Job Policy	Job Sched	Client	Media Serve	Start Time
- 🔍 Activity Monitor	<b>X</b> 39	Activate Instant Recovery	Done			0		Domino	nbmaster2	Jan 24, 2017 7:32:32
🛉 🕂 🛄 NetBackup Management	38	VM Instant Recovery	Active					Domino	nbmaster2	Jan 24, 2017 7:32:30
🗠 🖹 Reports	<b>X</b> 37	Backup	Done			0 VMware_Domino	Full	Domino	nbmaster2	Jan 24, 2017 7:19:39
- 🖪 Policies	<b>X</b> <sup>™</sup> 36	Snapshot	Done			0 VMware_Domino	-	Domino	nbmaster2	Jan 24, 2017 7:19:03
🕶 📟 Storage	<b>X</b> <sup>™</sup> 35	Backup	Done			0 VMware_Domino	-	nbmaster2	nbmaster2	Jan 24, 2017 7:19:02
— 🌇 Catalog	<b>X</b> 34	Backup	Done			0 Domino_Data	Full	Domino	nbmaster2	Jan 24, 2017 7:18:03
<ul> <li>Most Properties</li> </ul>	🗙 33	Backup	Done			0 VMware_Domino	Full	Domino	nbmaster2	Jan 24, 2017 7:16:03
	<b>X</b> <sup>∎</sup> 32	Snapshot	Done			0 VMware_Domino	-	Domino	nbmaster2	Jan 24, 2017 7:15:24
► Cracle	🗙 🖁 31	Backup	Done			0 VMware_Domino	-	nbmaster2	nbmaster2	Jan 24, 2017 7:15:23

Figure 31- Instant Recovery via vSphere Web Client – Screen Shot 9

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