



Technical Report

NetApp Snap Creator Framework with IBM Lotus Domino Plug-In Deployment and Configuration Guide

John B. Spinks
January 2012 | TR-4009

BACKUP AND RESTORE SOLUTION FOR IBM LOTUS DOMINO

For mission-critical applications, it is very important that backups are performed after verifying application consistency. The application consistency feature confirms the data integrity and usability of the backup image. NetApp® Snap Creator™ Framework contains a plug-in for IBM Lotus Domino that uses Domino application programming interfaces (APIs) for application consistency. NetApp recommends this plug-in as the solution for customers running Lotus Domino on NetApp. This document describes the installation, setup, configuration, and operation of Snap Creator with the Domino plug-in.

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1 INTRODUCTION

Today, businesses have operations across the globe, and they are required to keep their mission-critical applications running 24x7. They also expect application performance to be maintained during routine maintenance operations, such as backups and recoveries, regardless of the data growth rate, which can sometimes be very high. It is difficult to find a time during which a backup can be made with minimal effect on system performance and availability.

The following factors make traditional backup and recovery methods challenging:

- **System performance impact.** Backup operations typically have a significant effect on the performance of a production system because they place a high load on the Domino or database server, the storage system, and the underlying network during the backup process.
- **Shrinking backup windows.** Enterprises expect maximum availability of their applications. Defining an appropriate window for creating backup images can be challenging when the database needs to be accessible 24x7.
- **Rapid data growth.** Enterprise data grows exponentially. That means longer windows are needed to back up data. Organizations that can no longer afford an extended window for backups and restores must invest heavily in their backup infrastructure to keep backup windows short. Growing databases also require more tape media or disk storage space for backup images. Incremental backups can address these issues, but longer restore times make them unacceptable.
- **Decreasing mean time to recover.** The mean time to recover (MTTR) is the time needed to recover from a database failure. The MTTR can be divided in two parts: the time required to restore the database from a backup image, and the time required to perform roll-forward recovery of the database. The roll-forward recovery time depends on the number of archive and active logs that need to be reapplied to the database after it has been restored. A NetApp Snapshot™ copy is a local image of data.

Preserving data integrity during the backup process is crucial to a successful restore. Data integrity (also known as application consistency) can be achieved by using the Domino APIs to put the Domino environment into a consistent state.

NetApp Snap Creator Framework leverages the power of Snapshot and NetApp SnapRestore® technologies, which offer unique features to address the challenges presented by traditional backup and recovery methods. When combined with the Lotus Domino plug-in, Snap Creator can be used to drive application-consistent Snapshot copies for the Domino environment without affecting availability. This document describes the deployment and configuration of Snap Creator with the Domino plug-in in a Domino environment.

2 PURPOSE AND SCOPE

This document describes the Snap Creator Framework with the Domino plug-in, including the following topics:

- Overview of Snap Creator Framework
- Overview of Lotus Domino
- Snap Creator plug-in for Lotus Domino
- Preinstallation and installation information specific to the Domino plug-in
- Installation of Snap Creator
- Setting up a Snap Creator configuration file for the Domino plug-in
- Backup with the Domino plug-in
- Restore with the Domino plug-in
- Snap Creator Framework troubleshooting

- References for additional information

3 SNAP CREATOR FRAMEWORK OVERVIEW

Snap Creator Framework, or Snap Creator, is a central backup framework used to integrate Snapshot technology with any application that is not supported by NetApp SnapManager® products. Normally, this requires a customized script that interfaces with the application and the NetApp storage system. Customized scripts are written repetitively every day and are not often reused. Snap Creator makes backup, recovery, and disaster recovery operations faster and more productive.

Because the integration for most applications is unique and challenging, backup products support only a few applications. By contrast, Snap Creator provides application integration through plug-ins that enable Snap Creator to support any application anywhere. Integrate application consistency using the built-in Snap Creator plug-ins, or create custom backup scripts.

Snap Creator supports and provides application plug-ins for Lotus Domino, Oracle®, VMware®, DB2, MySQL, Sybase ASE, MaxDB, SnapManager for SQL Server® (SMSQL), and SnapManager for Exchange® (SME). In addition, other application plug-ins are available through the [Snap Creator Community](#). Snap Creator manages communication with NetApp storage systems and performs various tasks that include policy-based Snapshot management (using API or NetApp SnapDrive®), an optional LUN or volume clone, seamless integration with NetApp SnapMirror® or NetApp SnapVault®, and integration with Operations Manager or Protection Manager. Snap Creator is not a replacement for NetApp SnapManager and SnapDrive products; rather, it integrates with both products to provide a complete solution.

Snap Creator Framework benefits include:

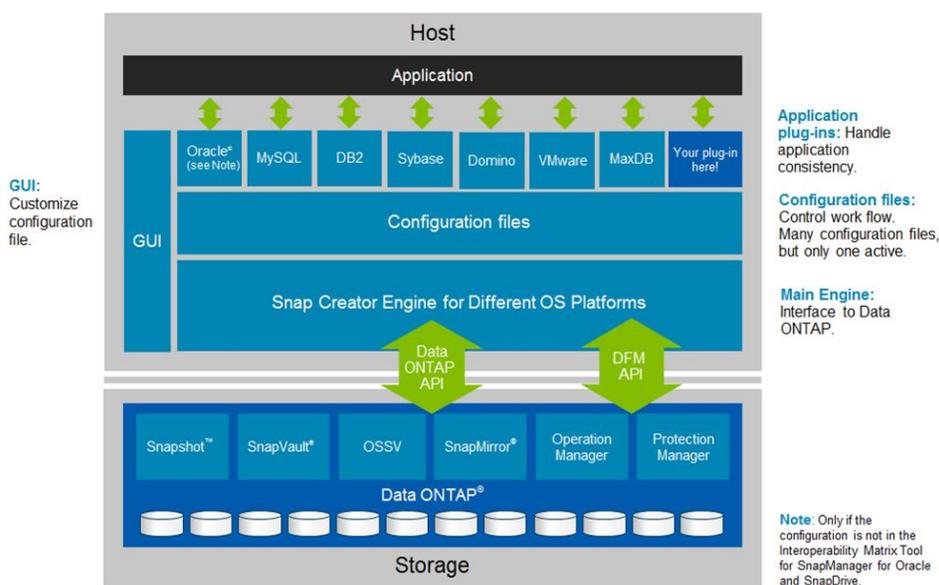
- Support for multiple operating systems (including Microsoft® Windows®, Linux®, Solaris, AIX, and HP-UX)
- Server and agent architecture for centralized management
- Application plug-ins for Lotus Domino, DB2, Oracle, Sybase, VMware, MySQL, MaxDB, SME, and SMSQL
- An intuitive GUI
- Integration with NetApp technologies such as Snapshot copies, SnapDrive, SnapVault, SnapMirror, logical unit number (LUN) or volume cloning, Operations Manager, and Protection Manager
- GUI-based scheduler

3.1 SNAP CREATOR ARCHITECTURE

Snap Creator consists of a server and an agent layer. The server is where the GUI, configuration, and command line interface (CLI) reside. The agent is a lightweight daemon that runs remotely or locally and allows the Snap Creator server to send quiesce or unquiesce operations to a given database. The communication layer from agent to server is Simple Object Access Protocol (SOAP) over HTTP.

Figure 1 shows the Snap Creator architecture.

Figure 1) Snap Creator architecture.



For additional information about Snap Creator, refer to the [NetApp Snap Creator Framework 3.5.0 Installation and Administration Guide](#) on the NetApp Support site. For more information about how to obtain the NetApp Snap Creator Framework Installation and Administration Guide, refer to section 6.1.

4 IBM LOTUS DOMINO OVERVIEW

IBM Lotus Domino enables organizations to use a single platform to provide a variety of messaging and collaboration services. In many ways, Lotus Domino is an independent application framework running on top of an independent operating system.

Lotus is ranked number two in the e-mail and collaboration space, with a consistent 37% market share. According to IBM, Lotus Domino has a global customer base of over 50,000 organizations, including more than half of the global 100 corporations.

Lotus Domino is often compared to other messaging platforms, such as Microsoft Exchange, but Domino also provides messaging services (such as e-mail, calendar, scheduling, and so on), collaboration services (such as group databases and discussion databases), HTTP services (such as hosting Web pages or blogs), application services that are either purchased from vendors or custom built in-house, LDAP services, and database services.

Lotus Domino started out as the Lotus Notes Server, which can cause some confusion when referring to Lotus products. It is common for people to refer to Lotus Notes when they are speaking about Lotus Domino. In general, Lotus Domino is server software, and Lotus Notes is client software. To make a Microsoft comparison: Lotus Domino (server software) is like Microsoft Exchange, and Lotus Notes (client software) is like Microsoft Outlook.

5 SNAP CREATOR PLUG-IN FOR LOTUS DOMINO

The Lotus Domino application consistency feature offers application consistency by using the Domino plug-in to interface with Domino APIs. The plug-in is supported on Windows, Linux, Solaris, and AIX. The Snap Creator Framework and the Lotus Domino plug-in are fully supported by NetApp Global Services (NGS) and, using the IBM provided Domino APIs, meets the support requirements for IBM.

The Snap Creator for Domino plug-in is part of the Snap Creator Framework with benefits including:

- Application-consistent Snapshot copies:
 - Plug-in uses the IBM provided Domino APIs for consistency
 - No downtime or interruption to users
- Multiplatform support:
 - Microsoft Windows
 - Linux
 - Solaris
 - AIX
- Multiple restore options:
 - Volume restore
 - Single-file restore
 - Up-to-the-minute single-file restore
 - Selectable point-in-time restore

Note: Single-file restore functions are only supported with Network File System (NFS) protocol.

The plug-in for Lotus Domino is supported in all IBM-supported versions of Domino (currently, Domino 8.0.x and 8.5.x). For more information on supported products, refer to the [NetApp Interoperability Matrix Tool \(IMT\)](#).

As the plug-in for Lotus Domino matured, additional features were added. Table 1 identifies the Domino plug-in features that are available in specific versions of the Domino plug-in.

Table 1) Snap Creator Domino plug-in feature matrix

Domino Plug-In Feature	Snap Creator 3.5	Snap Creator 3.4 P1/P2	Snap Creator 3.4	Snap Creator 3.3 and Older
NGS support	Yes	Yes	Yes	No
Domino application consistency (using Domino APIs)	Yes	Yes	Yes	No
Compatible with Microsoft Windows	Yes	Yes	Yes	No
Compatible with Linux (32-bit)	Yes	Yes	Yes	No
Compatible with Solaris	Yes	Yes	Yes	No
Compatible with AIX	Yes	No	No	No
Continue on database error	Yes	Yes	No	No
Volume restore: point in time	Yes	Yes	Yes	No

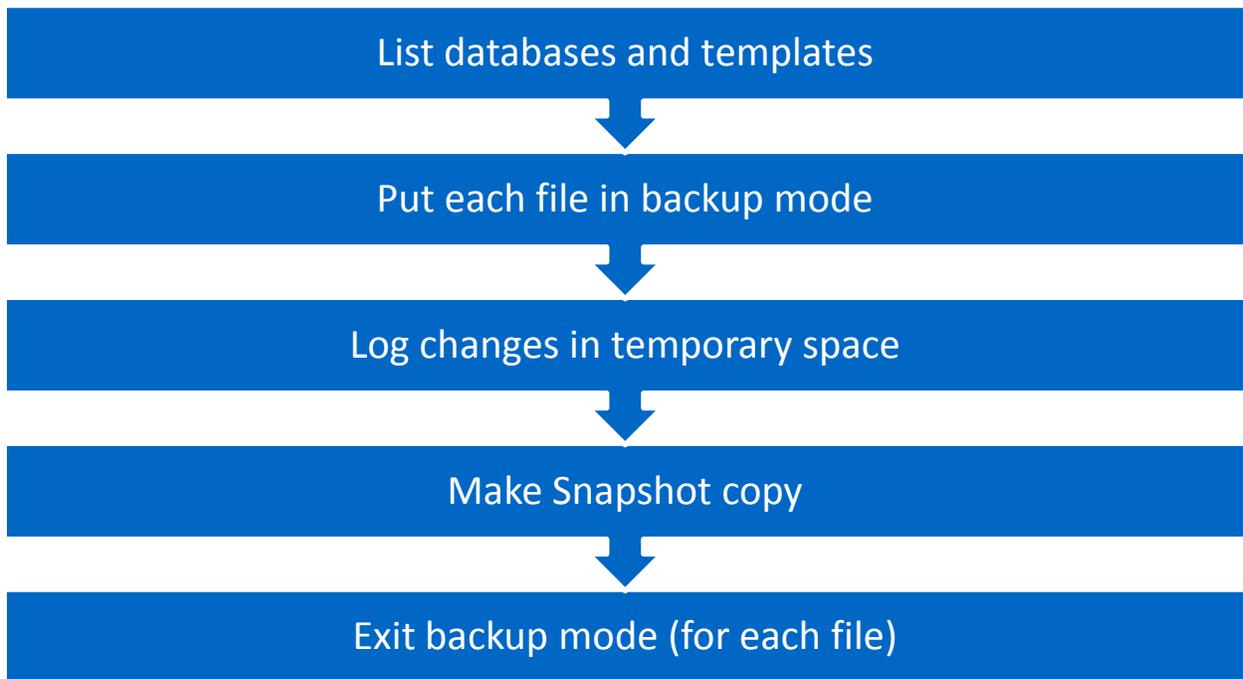
Domino Plug-In Feature	Snap Creator 3.5	Snap Creator 3.4 P1/P2	Snap Creator 3.4	Snap Creator 3.3 and Older
Single-file restore: point in time (NFS)	Yes	Yes	Yes	No
Single-file restore: up to the minute (NFS)	Yes	No	No	No
Single-file restore: selectable point in time (NFS)	Yes	No	No	No
Option to disable replication after restore (NFS)	Yes	No	No	No
Reset database instance identifier after restore (NFS)	Yes	No	No	No
Independent unquiesce action	Yes	No	No	No
Automated cleanup of logs and .info file (use Snap Creator archive settings)	Yes	No	No	No

Note: The Domino plug-in included with Snap Creator 3.3 and earlier was a script-based plug-in that did not include any advanced features or consistency options.

BACKUP OPERATIONS

The backup mode of the Domino plug-in works by gathering a list of all databases, templates, and mailboxes in the Domino environment. Each file is then placed in a quiesced state. While the databases are quiesced, all changes to the databases are stored in a temporary area known as changeinfo. During this time, there is no effect on the end user. If archive-style Domino transaction logging is used, the Domino plug-in for Snap Creator also manages the archiving of transaction logs after the backup mode ends.

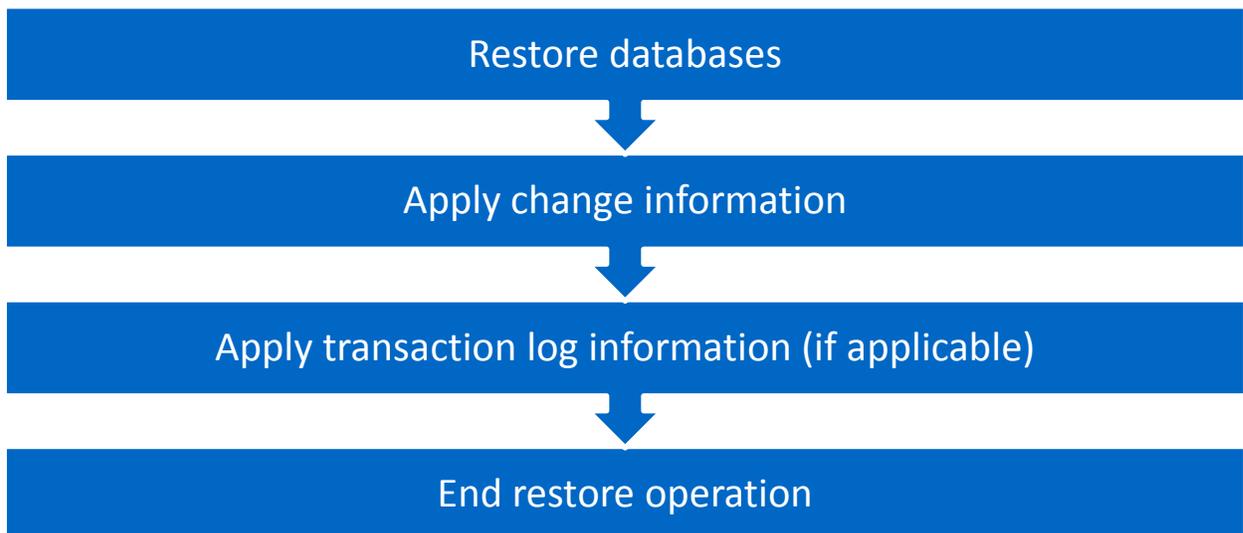
Figure 2) Snap Creator Domino plug-in backup steps.



RESTORE OPERATIONS

Restore operations work similarly to backup operations. There are several options for restore, and the process differs slightly depending on which option is selected, but generally, the database is restored, and then the backup information is applied to the database.

Figure 3) Snap Creator Domino plug-in restore steps.



Snap Creator Domino plug-in has multiple restore options, including:

- **Volume restore (point in time only).** Restores the entire volume to the point in time of the Snapshot copy. Use this option when the entire volume needs to be restored, such as in the event of a complete system failure.

- **Single-file restore (point in time).** Restores a single file to the point in time of the Snapshot copy.
- **Single-file restore (up to the minute).** Restores a single file and then plays forward the Domino transaction logs to the most recent copy.

Note: This option requires Domino transaction logging to be enabled.

- **Single-file restore (selectable point in time).** Restores a single file and then plays forward the Domino transaction logs to a specified point in time. For example, a Snapshot copy created on December 15, 2011 at 10 a.m. can be restored to December 16, 2011 at 9:45 a.m.

Note: This option requires Domino transaction logging to be enabled. Transaction logs can only be played forward. Selecting a time before the Snapshot copy was created causes an error.

Note: Single-file restore operations only work in NFS.

With all of the restore options, the changeinfo is written back to the databases after the restore is complete. The `DOMINO_RESTORE_DATA_PATH` parameter in the configuration file must be set to the path in which the Domino data is restored. It is likely that the path could change depending on the type of restore that is performed. For example, a volume restore must be set to the same path as the Domino data, but a single-file restore must be set to an alternative path on the same volume as the Domino data.

If the `DOMINO_RESTORE_DATA_PATH` is not set properly, the changeinfo cannot be applied to the database, which causes a postrestore error. The file is restored, but the necessary changeinfo is not applied.

With single-file restore, the subdirectory paths must match. For example, assume that the following parameters are set in the configuration file:

- `DOMINO_DATA_PATH` is set to `F:\domino\data`
- `DOMINO_RESTORE_DATA_PATH` is set to `F:\domino\data\restore`

To restore the database, `F:\domino\data\mail\user1.nsf`, the file must be restored to `F:\domino\data\restore\mail\user1.nsf`. Programmatically, the variables are defined in the configuration file. During the restore operation, the paths are stripped of the relative path information, which leaves `\mail\user1.nsf` as both the source and the destination path. Because the paths match the changeinfo, the transaction log information is applied without issue. If it is not set correctly, a postrestore error can occur.

Note: Currently, Snap Creator does not create a directory if it does not exist. Confirm that the paths are valid, or create a new directory, if necessary.

To avoid unintentionally overwriting changeinfo data, NetApp recommends that changeinfo be stored on a volume that is not a part of the Snapshot copy. The changeinfo files must be available after the restore operation. If the changeinfo folder is included in the Snapshot copy during restore, the data is overwritten and causes the restore to fail.

SNAP CREATOR ARCHIVE LOG SETTINGS

The Domino plug-in stores changeinfo files and copies of required transaction log files in the changeinfo directory for use during the restore operation. Enabling Snap Creator archive log settings cleans up files that are no longer required.

6 SNAP CREATOR PREINSTALLATION STEPS

There are a few questions that must be answered before Snap Creator installation begins, including:

- What operating system is the server using?
- What bit level is the server using?

Note: With the Domino plug-in, it is important that the bit level of Snap Creator matches the Domino server. In order to use the GUI, the bit level of Java[®] needs to match Snap Creator as well.

- Is the installation going to be an agent install or a server install?
- If this is a server install, is the GUI going to be used?
- What port does the Snap Creator agent use to communicate?

Note: The default port is 9090.

- Where will Snap Creator be installed?
- Will Snap Creator use a certain user to communicate with the storage system? If so, does the user exist and have the required access credentials?

6.1 DOWNLOAD THE SNAP CREATOR FRAMEWORK

Download the Snap Creator Framework from the NetApp Support site. Snap Creator is located in the software download section. Follow these instructions to download the Snap Create Framework software:

1. Click View & Download to select the appropriate version of Snap Creator.
2. Click Continue.
3. Read the end user license agreement and click Accept.
4. Select the operating system and appropriate bit level of the software packages.
5. Click OK.

Note: A link to the NetApp Snap Creator Framework Installation and Administration Guide for the version of software selected is also available on this page.

6.2 CREATE A DATA ONTAP USER FOR SNAP CREATOR

Snap Creator uses NetApp Data ONTAP[®] APIs to communicate with storage systems. Although a NetApp root user account can be used, it is not recommended. To make sure the user account is only granted rights to access Snap Creator, NetApp recommends creating a new role, group, and user to control access and limit the scope of the Snap Creator account.

This section provides details about the roles required for Snap Creator. An account with the proper access must exist on all NetApp storage systems involved in the configuration. Certain roles are required only for certain functions. New versions of Snap Creator might require additional roles. Review release notes and installation and administration guides for information about new versions of Snap Creator before upgrading to see if additional roles are required.

As of NetApp Snap Creator Framework 3.5, roles that Snap Creator can use include:

- login-* (for all login access) or login-http-admin (for API login only)
- api-snapshot-* (required)
- api-system-* (required)
- api-ems-* (required)
- api-snapvault-* (required only for SnapVault management)
- api-snapmirror-* (required only for SnapMirror management)
- api-volume-* (required for volume clones)
- api-lun-* (required for volume and LUN clones)
- api-cg-* (required for consistency group Snapshot copies)
- api-nfs-* (required for exporting cloned volumes using NFS)
- api-file-* (required to list the files during single-file restore)

- `api-license-*` (required to retrieve license information)

STORAGE SYSTEM CONFIGURATION

NetApp recommends that you create a new role, group, and user to use with the Snap Creator Framework. Structurally, the role is assigned to the group, and the group contains the user. To complete the process, log in to the Data ONTAP CLI by SSH, console connection, or telnet, and follow these steps to create a new role, group, and user.

Note: Copying and pasting commands from this document might result in errors, such as incorrectly transferred characters caused by line breaks and hard returns. Such errors cause the commands to fail. NetApp recommends copying and pasting the commands into a text editor first so that the characters can be verified and corrected before they are entered into the CLI console.

1. Create a role defining the rights required by Snap Creator on the storage system by entering the following command.

```
useradmin role add <rolename> -a login-*,api-snapshot-*,api-system-*,api-ems-*,api-snapvault-*,api-snapmirror-*,api-volume-*,api-lun-*,api-cg-*,api-nfs-*,api-filer-*,api-file-*,api-license-*
```

Note: The commands shown in this step include all of the API roles used by Snap Creator. However, you can restrict user access by excluding certain roles. For example, if a user does not use SnapMirror, then `api-snapmirror-*` is not required.

Where `<rolename>` is the name of the new role.

In this example, `sc_role` is the `<rolename>`.

```
NetApp>useradmin role add sc_role -a login-*,api-snapshot-*,api-system-*,api-ems-*,api-snapvault-*,api-snapmirror-*,api-volume-*,api-lun-*,api-cg-*,api-nfs-*,api-file-*,api-license-*
Role <sc_role> added.
NetApp>
```

2. Create a new group on the storage system and assign the role created in step 1 to the group. Enter the following command on each storage controller:

```
useradmin group add <groupname> -r <rolename>
```

Where:

- `<groupname>` is the name of the new group. In the output example, `sc_group` is the `<groupname>`.
- `<rolename>` is the name of the role assigned to the new group. In the output example, `sc_role` is the `<rolename>`.

```
NetApp>useradmin group add sc_group -r sc_role
Group <sc_group> added.
NetApp>
```

3. Create a Snap Creator user account in the group created in step 2. Enter the following command on each storage controller:

```
useradmin user add <username> -g <groupname>
```

Where:

- `<username>` is the name of the new user. In the output example, `sc_user` is the `<username>`.
- `<groupname>` is the name of the group to which the user is assigned. In the output example, a `<groupname>` of `sc_group` is used.

Note: After the `user add` command is entered, the system prompts for a password for the account.

```
NetApp>useradmin user add sc_user -g sc_group
New password:
Retype new password:
User <sc_user> added.
NetApp>
```

Use this account to create configuration files for Snap Creator.

4. Repeat these steps for each controller that requires Snap Creator.

6.3 INSTALL OR VERIFY JAVA INSTALLATION ON SNAP CREATOR SERVER

The Snap Creator GUI is Java based and uses NetApp Web framework (NWF). For the Snap Creator GUI to function, Java Runtime Environment (JRE) 1.6 or higher must be installed on the Snap Creator server. Agents do not require Java. Download Java from www.java.com/en/download/manual.jsp.

Note: The bit level (32-bit or 64-bit) of the version of Java installed needs to match the bit level of Snap Creator that is installed.

To verify the Java version, enter the following command:

```
java -version
```

The output displays the installed version of Java. If the Java installation is 64-bit, the bit level is displayed. If no bit level is displayed, then the installation is 32-bit. For example, entering the `java -version` command on a 32-bit Windows 2003 operating system yields the following output:

```
C:\Documents and Settings\Administrator>java -version
java version "1.7.0_04-ea"
Java(TM) SE Runtime Environment (build 1.7.0_04-ea-b01)
Java HotSpot(TM) Client VM (build 23.0-b03, mixed mode, sharing)
```

6.4 DOMINO PLUG-IN PREINSTALLATION

The Domino plug-in is part of the Snap Creator installation package. No additional packages are required. However, depending on the operating system, there are some preinstallation steps that must be performed.

LINUX, SOLARIS, AND AIX INFORMATION AND PREINSTALLATION STEPS

Lotus Domino for Linux is available only as a 32-bit application, so regardless of the server bit level, the 32-bit version of Snap Creator must be used to support Lotus Domino.

Domino on AIX, Linux, and Solaris can't be run as the root user. Therefore, Snap Creator can't be run as the root user. This is true for the Snap Creator server, agent, and GUI. NetApp recommends that Snap Creator use the same account that was used to install Domino.

For the Domino plug-in to work properly, create three symbolic links (symlinks) to Domino's shared object files. Assuming that Domino was installed in the default location, copy and paste the following commands into the environment:

```
ln -s /opt/ibm/lotus/notes/latest/linux/libxmlproc.so /usr/lib/libxmlproc.so
ln -s /opt/ibm/lotus/notes/latest/linux/libndgts.so /usr/lib/libndgts.so
ln -s /opt/ibm/lotus/notes/latest/linux/libnotes.so /usr/lib/libnotes.so
```

WINDOWS INFORMATION AND PREINSTALLATION STEPS

The Snap Creator Framework version that is installed must match the bit level of the Lotus Domino server. For example, if a customer uses Windows 64-bit and Domino 32-bit, then Snap Creator 32-bit

must be installed. Domino APIs are different for 32- and 64-bit installations, and if the bit levels of Snap Creator Framework and Domino don't match, a failure occurs.

The path to the Domino binary files must be added to the environmental variables for Windows. The path should be the same path as the `Notes_ExecDirectory` listed in the Domino Plug-In Parameters section.

Follow these instructions to add the path to the environmental variables:

1. For Windows 2003, right-click My Computer and select Properties. For Windows 2008, right-click Computer and select Properties.

Note: My Computer and Computer are located in the Start menu or on the desktop.

2. For Windows 2003, click the Advanced tab. For Windows 2008, click Advanced system settings.
3. Click Environmental Variables.

In environmental variables, there are two sections: User variables and System variables. NetApp recommends selecting System variables. If User variables is selected, Snap Creator must be run as the selected user.

4. Locate and select `Path`.
5. Click Edit.
6. Append a semicolon (;) after the last value, and then add the Domino path.
7. Click Ok to return to the desktop.

Note: If you perform these steps after Snap Creator is installed, you must restart the Snap Creator services.

7 INSTALL SNAP CREATOR

There are two primary installation methods: one for Windows and one for operating systems based on UNIX®. Each method is discussed in this section.

7.1 INSTALL WINDOWS

This section describes the installation process for Snap Creator Framework with Windows.

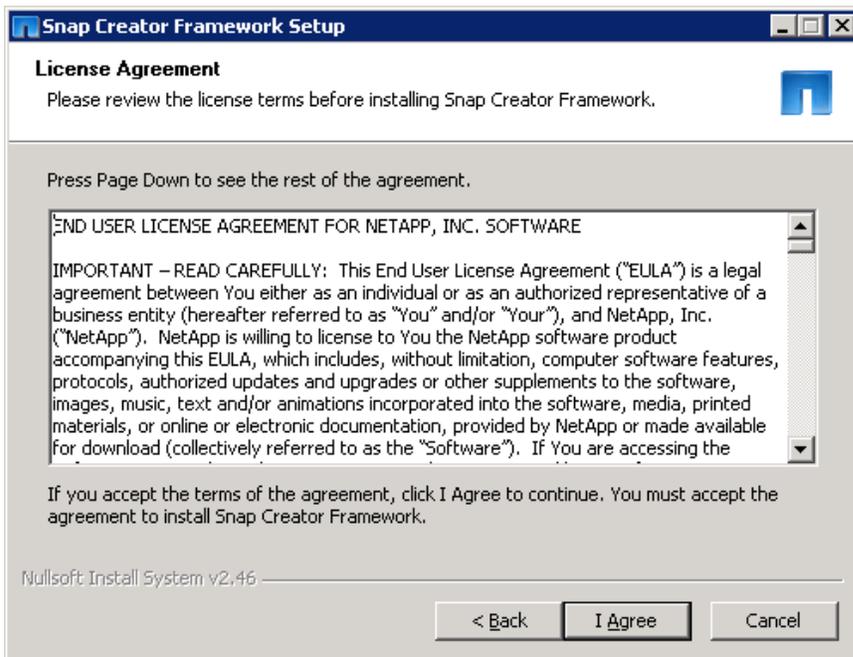
The following instructions assume this is a first-time Snap Creator installation. However, if there is an old version of Snap Creator already installed, uninstall the old version first.

Note: Before uninstalling the old version of Snap Creator, back up all of the log files and configuration files.

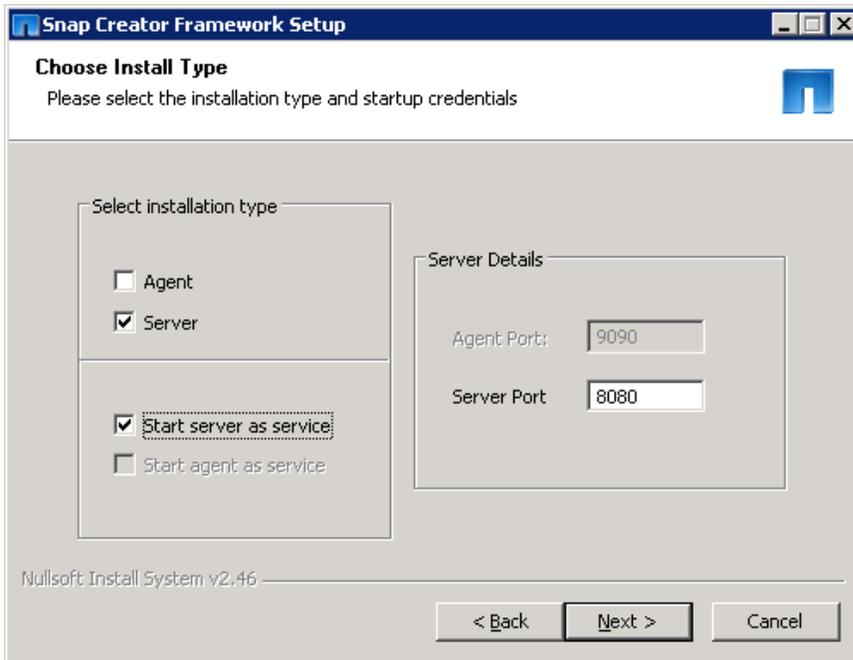
1. Download Snap Creator Framework from the software download section of the NetApp Support site.
Note: Download the bit level that is compatible with the operating system.
2. Click the `.exe` file to launch the Snap Creator Installer. The Welcome screen appears.



3. Click Next to start the installation. The license agreement appears.



4. Read the license agreement and click I Agree to agree to and accept the license terms.
5. Select an installation type. This screen also provides the option to start the selected Snap Creator type as a Windows service.



In the example, the installation type selected is Server, and Start server as a service option is also selected. The default server port is 8080. These settings can be changed to fit installation needs.

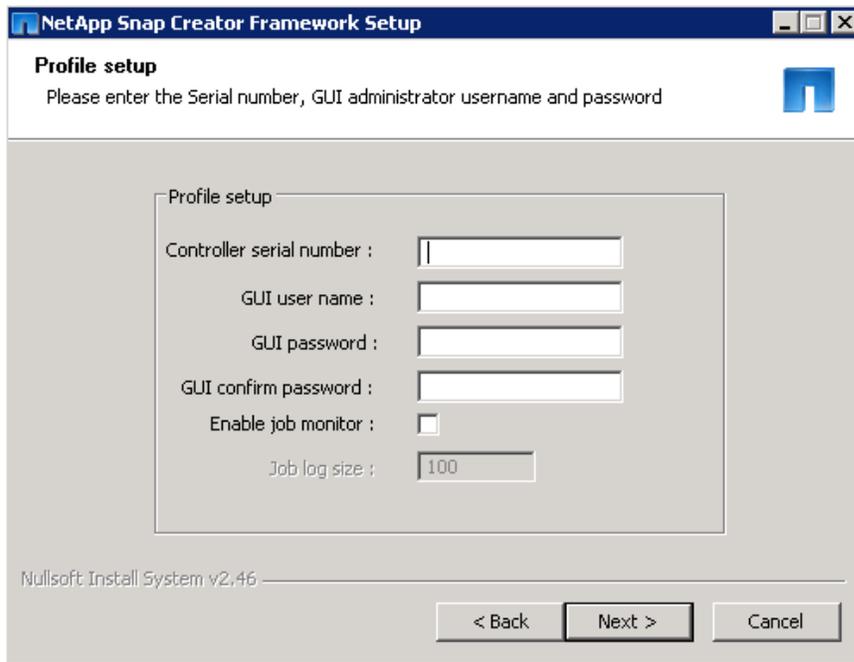
If the selected installation type is Server, continue with step 6. If the selected installation type is Agent, continue with step 7.

6. Set up a profile for the Snap Creator GUI.

Note: The Profile setup screen appears only if the installation type selected was Server.

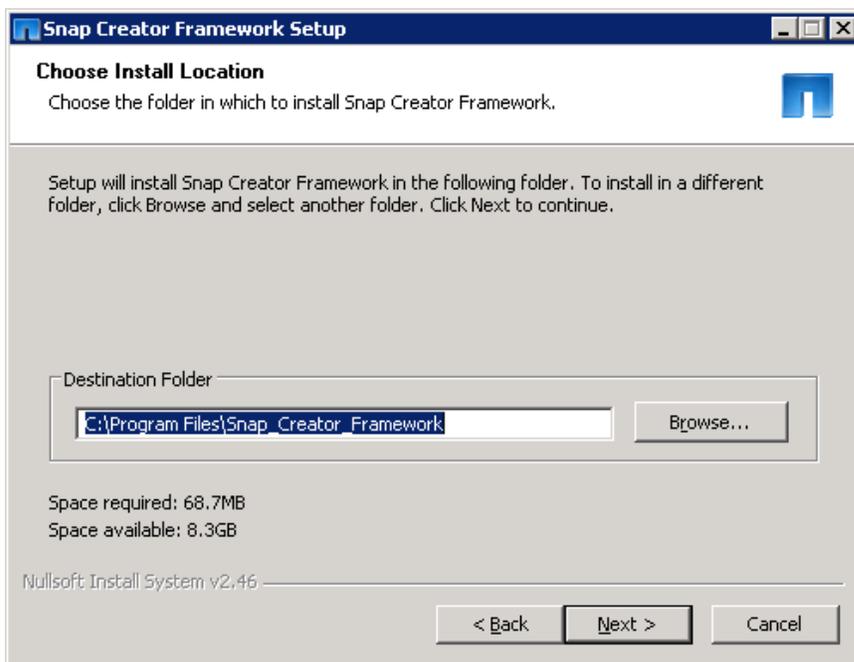
Enter data in the following fields:

- **Controller serial number.** This optional parameter requests the storage system serial number. The controller serial number is included in logs and can be useful during troubleshooting.
- **GUI user name.** The name of the GUI user.
- **GUI password.** The password for the GUI user.
- **GUI confirm password.** Confirm the GUI password here.
- **Enable job monitoring.** Select this checkbox to enable the job monitor. The job monitor is a separate section of the GUI that monitors all of the jobs run by Snap Creator, as well as the status of the jobs.
- **Job log size.** The number of jobs to keep in the job log history. The default is 100 jobs.



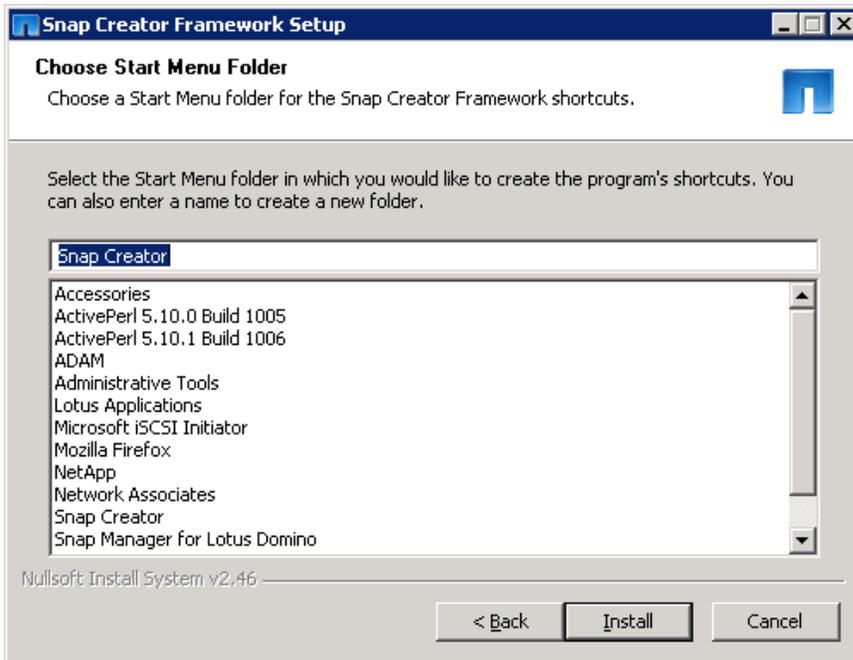
Click Next when the profile setup is complete.

7. Select an installation location from the Destination Folder field. The default destination folder is C:\Program Files\Snap_Creator_Framework.

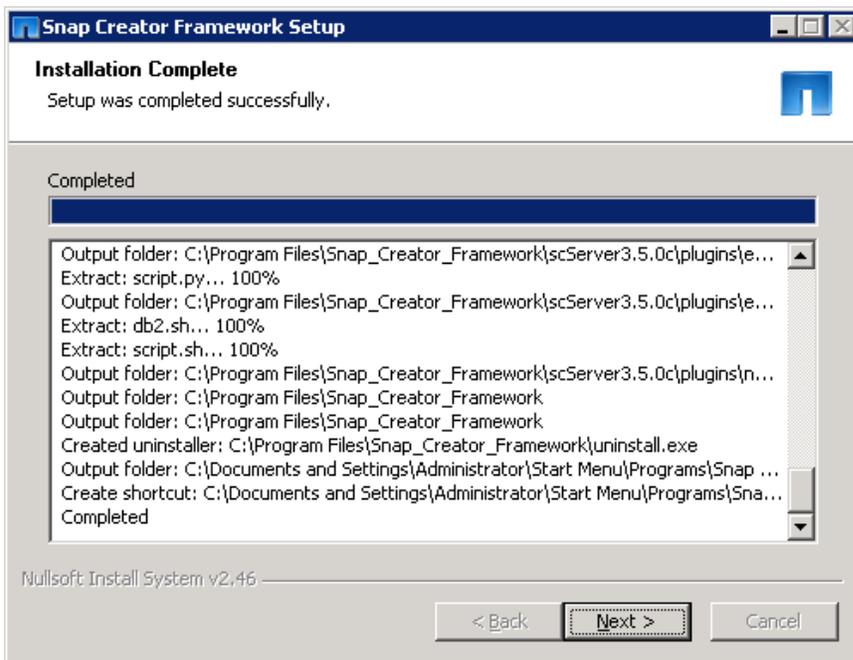


Click Next.

8. Select a Start menu folder for Snap Creator to appear in on the Windows Start menu. By default, Snap Creator appears in the Snap Creator folder.



- Click Install to continue. The Installation Complete screen appears and displays the status of the Snap Creator installation.

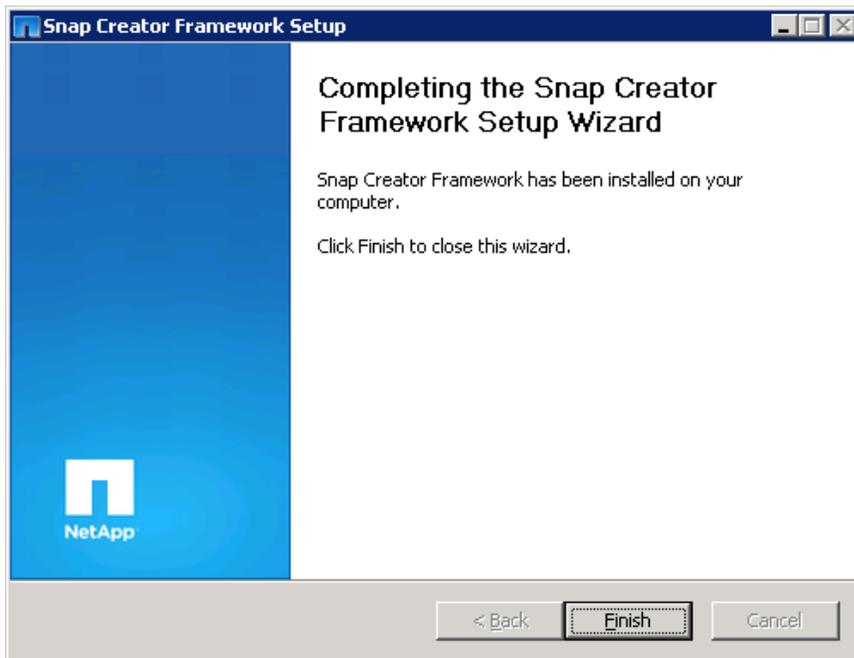


- Click Next to continue.
- If Start server as a service was selected in step 5, a command prompt appears, and a process begins. The process attempts to start services that already exist; it is common to see failure messages during this process.

```
C:\WINDOWS\system32\cmd.exe
[SC] OpenService FAILED 1060:
The specified service does not exist as an installed service.
[SC] OpenService FAILED 1060:
The specified service does not exist as an installed service.
[SC] CreateService SUCCESS
[SC] ChangeServiceConfig2 SUCCESS
[SC] StartService FAILED 2:
```

After the installation is complete, a new screen appears.

12. Click Finish to close the Windows Installer.



7.2 INSTALL UNIX

This section describes the installation process for Snap Creator for open systems platforms such as AIX, Linux, and Solaris. Snap Creator installation for operating systems based on UNIX differs from the installation for Windows, because the software package is an executable file that, when extracted, contains both the Snap Creator server software and the Snap Creator agent software.

1. Download Snap Creator Framework from the software download section of the NetApp Support site.

Note: Download the bit level that is compatible with the operating system.

2. Copy the Snap Creator `tar.gz` file to the Snap Creator extraction location.
 - a. If necessary, enter the `mkdir` command to create a new directory. For example, to create a directory called `SC_3.5` enter this command:

```
mkdir SC_3.5
```

- b. Enter the `cp` command to copy the Snap Creator `tar.gz` file to the new directory. For example, from the directory where Snap Creator file was downloaded, enter the following command to copy the file to the newly created `SC_3.5` directory:

```
cp Snap_Creator_Community_Release_3.5.0-Linux32.tar /SC_3.5
```

3. Enter the `chown` command to change file and folder ownership, because with the Domino plug-in, a user other than `root` must be used to run Snap Creator.

Note: The Domino user who runs Snap Creator must be the directory owner.

If a new directory is created, set the Domino user as the directory owner. It is easier to set the Domino user as the directory owner before extracting the Snap Creator executable file, but it can be done at any time.

When `chown` is used with the `-R` switch, ownership of files and folders under the directory is also changed. For example, enter the following command to change ownership of all files and folders in the new directory for the Domino user, `domadmin`:

```
chown -R domadmin /SC_3.5
```

4. Enter `cd` to change directories to the location where `tar.gz` will be unzipped. For example, to change to the `/SC_3.5` directory, enter the following command:

```
cd /SC_3.5
```

5. Enter the `gunzip` command to unzip the `tar.gz` file.

Note: The `tar.gz` file must be unzipped before it can be extracted.

```
gunzip Snap_Creator_Community_Release_3.5.0-Linux32.tar.gz
```

6. Enter the `-xvf` command to extract the `.tar` file. Tar files are typically extracted using the `-xvf` switches, which extract the file in verbose mode.

```
tar -xvf Snap_Creator_Community_Release_3.5.0-Linux32.tar
```

7. Enter the `ls` command to perform a directory listing. The directories `scAgent<version#>` and `scServer<version#>` are displayed along with the `.tar` file extracted in step 6.

This completes the Snap Creator installation.

To use the Snap Creator server or agent, the Snap Creator server and agent must be configured individually. For information about configuring the Snap Creator server, refer to section 8. For information about configuring the Snap Creator agent, refer to section 9.

8 CONFIGURE THE SNAP CREATOR SERVER

This section describes configuring and starting the Snap Creator server and the Snap Creator Framework GUI.

8.1 SNAP CREATOR SERVER SETUP ON WINDOWS

When installing Snap Creator on Windows, an option is available to install the Snap Creator server and start it as a service. If the appropriate option was selected during the installation, then the Snap Creator service will already be started. The port that the Snap Creator server uses to access the GUI was selected during installation. If the Snap Creator agent service must be managed through the Windows Services plug-in, the installed name is `SnapCreatorServerService`.

8.2 SET UP THE SNAP CREATOR SERVER ON UNIX

Use the following steps to configure the Snap Creator server in either a UNIX environment or a Windows environment. In a Windows environment, enter the commands through the CLI.

1. Change the directory to the `scServer<version#>` subdirectory and then enter the following command to start the Snap Creator setup:

```
./snapcreator --profile setup
```

Note: The Snap Creator executable file should, upon extraction, already be configured with the proper permissions to be executed. If the `-profile setup` command does not work, enter the following command to add the permissions:

```
chmod 755 snapcreator
```

The end user license agreement (EULA) appears, including a prompt to accept the EULA.

```
Do you accept the End User License Agreement (y|n):
```

2. Enter Y to accept the EULA and press Enter to continue. A confirmation appears.

```
Setup NetApp Snap Creator Framework 3.5.0 Server (y|n):
```

3. Enter Y to continue with the setup and press Enter to continue. A prompt appears that requests the serial number of the Snap Creator storage system. This is an optional field, but it is useful for sending support requests or looking at log files.

```
Enter serial number:
```

4. Enter the storage serial number, if desired, and press Enter to continue. A prompt appears that asks if the GUI job monitor should be enabled. The GUI job monitor is a new feature in Snap Creator 3.5.0. The job monitor lists all of the jobs that have been run on the Snap Creator server and provides an easy way to determine whether jobs are completing properly.

```
Enable GUI job monitor (Y|N):
```

5. Enter Y to enable the job monitor or N to disable the job monitor, and then press Enter to continue. If the job monitor is enabled, a prompt appears that requests the number of jobs allowed in the job monitor list. For reference, the Windows default is 100 jobs.

```
Enter job monitor size, how many jobs to allow:
```

6. Enter the number of jobs to allow and press Enter to continue. A prompt appears that requests the GUI administrator username.

```
Please Enter GUI Administrator Username:
```

7. Enter the username and press Enter to continue. A prompt appears that requests the password for the GUI administrative user.

```
Please Enter password for admin:
```

8. Enter the password for the GUI administrative user and press Enter to continue.

Note: By design, no characters appear onscreen when entering the password.

A prompt appears to confirm the password entered in the previous step.

```
Please Confirm password for admin:
```

Enter the password again for the GUI administrative user and press Enter to continue. Instructions for starting the Snap Creator GUI appear.

```
INFO: Updated NetApp Snap Creator Framework 3.5.0 GUI
```

```
INFO: To start GUI please do the following:
```

```
cd /SC_3.5_1122_Test/scServer3.5.0/gui
java -jar snapcreator.jar
or
java -jar snapcreator.jar -gui_port <gui_port>
```

INFO: To access NetApp Snap Creator Framework 3.5.0 GUI goto
"http://fuji20linux.netapp.com:8080" or "http://fuji20linux.netapp.com:<gui_port>"

9. Follow the instructions to start the Snap Creator GUI. The next section provides detailed instructions to start the Snap Creator GUI.

8.3 START THE SNAP CREATOR GUI ON UNIX

Start the Snap Creator GUI by following the information provided onscreen after completing the Snap Creator server setup. The steps are provided in detail in this section.

Use the following steps to start the Snap Creator GUI server in either a UNIX environment or a Windows environment. In a Windows environment, enter the commands through the CLI.

1. Change the directory to the `gui` subdirectory. For example, if Snap Creator is installed at `/SC_3.5/scServer3.5`, use the `cd` command to change directories to `/SC_3.5/scServer3.5/gui`.

2. Enter the following command to start the GUI:

```
java -jar snapcreator.jar
```

Alternatively, the port number of the GUI can be configured by appending the desired port number to the end of the command with the `--gui_port` switch. For example, to set the GUI to port 8888, run the following command:

```
java -jar snapcreator.jar --gui_port 8888
```

3. Launch the GUI. Open a Web browser and point the browser to `http://<HostName>:<port>`

Where:

- `HostName` is the host name or IP address of the Snap Creator server
- `Port` is the port number where the Snap Creator server is running. By default, this is port 8080.

4. Log in to the Snap Creator GUI using the credentials supplied during the setup process in section 8.2.

9 START AND CONFIGURE THE SNAP CREATOR AGENT

This section discusses configuring and starting the Snap Creator agent.

9.1 CONFIGURE THE SNAP CREATOR AGENT

The Snap Creator Framework agent uses a file named `agent.conf` to secure the functionality of the agent. The `agent.conf` file allows or restricts two things: hosts and commands.

The `agent.conf` file is located where the agent is installed in the `config` subdirectory:
`/path/to/scAgent_v<#>/config/agent.conf.`

HOSTS

By default, the Snap Creator Framework agent allows communications with any Snap Creator Framework server, but communications to a particular server can be limited. This is done by changing the host line in the `agent.conf` file. The default host entry in the `agent.conf` file is:

```
host: scServer@*
```

The wildcard entry (*) tells Snap Creator to allow anything. The wildcard can be replaced with a host name or IP address to restrict communications to a particular Snap Creator server.

COMMANDS

By default, the Snap Creator Framework agent prevents any commands that are not part of the Snap Creator Framework, or one of the Snap Creator plug-ins, from being run on remote agents. There are situations in which a configuration file might be set up in such a way that additional commands must be run on a remote agent. This includes any entries that might be added to `PRE`, `POST`, `APP`, or other commands.

A common example is using a SnapDrive call to create a Snapshot copy. The SnapDrive for Windows (SDW) command line executable is `sdcli.exe`. Because this command is not part of the Snap Creator Framework, it must be given explicit permission to run. To do this, add the command to the `agent.conf` file. Because the Snap Creator agent denies additional commands by default, the default command entry in the `agent.conf` file is:

```
command:
```

Any commands or scripts that require permission to run in the `agent.conf` file must be listed on a separate line. For example, if `sdcli.exe` and the `echo` command need to be added to the `agent.conf` file, enter the command lines like this:

```
command:sdcli.exe
command: echo
```

In addition to the examples provided, regular expressions can also be used to be more restrictive.

Note: Although a wildcard entry (*) can be used to allow all commands, for security reasons, NetApp does not recommend this practice.

9.2 START THE SNAP CREATOR AGENT ON WINDOWS

For Snap Creator installed on Windows, options are provided to install the Snap Creator agent and start it as a service. If the appropriate option was selected during installation, then the Snap Creator service was already started. The port that the Snap Creator agent uses to communicate with the Snap Creator server was selected during installation. If the Snap Creator agent service needs to be managed through the Windows Services plug-in, the installed name is `SnapCreatorAgentService`.

9.3 START THE SNAP CREATOR AGENT ON UNIX

To configure the Snap Creator agent on open systems, such as AIX, Linux, or Solaris, run the following commands for the initial setup:

1. Change the directory to the `/<path>/<to>/scAgent_v<#>` subdirectory and then enter the following command to start the Snap Creator setup:

```
./snapcreator --profile setup
```

Note: The Snap Creator executable should already be configured upon extraction with the proper permissions to be executed. If for some reason the `--profile setup` command does not work, the permissions might need to be added. Enter the following command to add the permissions:

```
chmod 755 snapcreator
```

The end user license agreement (EULA) appears, including a prompt to accept the EULA.

```
Do you accept the End User License Agreement (y|n):
```

Enter Y to accept the EULA and press Enter to continue. A prompt appears to set up the Snap Creator Framework server. However, it is the agent, not the server, that must be configured in this procedure.

```
Setup NetApp Snap Creator Framework 3.5.0 Server (y|n):
```

2. Enter N and press Enter to continue. A prompt appears to set up the Snap Creator Framework agent.

```
Setup NetApp Snap Creator Framework 3.5.0 Agent (y|n):
```

3. Enter Y and press Enter to continue. The environmental variables are updated so that the Snap Creator agent scripts work properly. The usage information for the agent appears.

```
INFO: Updated NetApp Snap Creator Framework 3.5.0 Agent
INFO: To start the NetApp Snap Creator Framework 3.5.0 Agent run
"/SC_3.5/scAgent3.5.0/bin/scAgent start"
INFO: To stop the NetApp Snap Creator Framework 3.5.0 Agent run
"/SC_3.5/scAgent3.5.0/bin/scAgent stop"
```

4. Follow the instructions on the screen to start the Snap Creator agent. Some common commands include:

- **Starting the Snap Creator agent.** `/path/to/scAgent_v<#>/bin/scAgent start`
- **Stopping the Snap Creator agent.** `/path/to/scAgent_v<#>/bin/scAgent stop`
- **Checking the status of the Snap Creator agent.** `/path/to/scAgent_v<#>/bin/scAgent status`

Port 9090 is the default port through which the Snap Creator Framework agent communicates with the Snap Creator server. Use the `SC_AGENT_PORT` environmental variable to specify the port that Snap Creator uses for server-to-agent communication. Because it is a system environmental variable, the commands used to set this variable differ for each operating system. Refer to the operating system documentation for information on setting environmental variables.

NetApp recommends that the `start` command for the Snap Creator agent be run automatically at startup. This can be done by adding the `start` command to a script. The steps to create a script might vary by operating system and according to the preferences of the system administrators who manage the server.

In general, the `start` command for the Snap Creator agent can be added to any file in the `/path/to/rc2.d` subdirectory that begins with `S9`, such as `S99scagent`. The `rc2.d` subdirectory is typically located in `/etc/`, but the location might depend on the host operating system and the particular configuration of the server. Refer to the operating system documentation for more information.

10 SET UP SNAP CREATOR CONFIGURATION FILE WITH DOMINO PLUG-IN

A configuration file is the heart of Snap Creator. It configures Snap Creator, enables application plug-ins to run, sets necessary variables, and defines the volumes that are captured in Snapshot copies.

Each configuration file can be unique, and there are potentially hundreds of ways to configure Snap Creator. Therefore, this section discusses general configuration file settings. Configuration setup is discussed later in the document.

10.1 GENERAL CONFIGURATION FILE INFORMATION

Snap Creator is driven by configuration files. Multiple configuration files can be created, but upon running Snap Creator, a single configuration file must be selected. Essentially, the configuration file tells Snap Creator what to do.

There are two ways to set up configuration files: through the GUI or through the CLI using a text editor. Many customers use the GUI, but there might be situations in which a configuration file must be edited using a text editor.

The configuration file is located within the directory where Snap Creator was installed. In Windows, the default location is `C:\Program Files\Snap_Creator_Framework`. In Linux, Solaris, and AIX, the configuration file is installed in the location in which the installation file was extracted.

Using the Windows default as an example, the configuration files are located in a directory structure like this:

```
C:\Program Files\Snap_Creator_Framework\scServer_v<#>/configs
```

Where `<#>` is the version number of the installed version of Snap Creator.

Within the `configs` directory are profiles. From a file perspective, a profile is simply a folder. By default, there is one profile installed that is named `default`. Configuration files must exist within a profile. Profiles allow organization of configuration files by application, location, department, and so on. There can be multiple configuration files within a profile, if desired.

The configuration file is divided into four sections, including:

- Basic configuration
- NetApp options
- Other options
- Additional plug-ins

10.2 REQUIRED PARAMETERS FOR ANY CONFIGURATION FILE

Table 2 describes the required parameters for a configuration file.

Table 2) Snap Creator required parameters.

Parameter	Setting	Description
SNAME		Snapshot copy naming convention must be unique. Snapshot copies on NetApp are deleted according to the naming convention and retention policy used.
SNAP_TIMESTAMP_ONLY	Y/N	If set to Y, Snapshot copies end with YYYYMMDDHHMMSS. Otherwise, new Snapshot copies are renamed to end with <code>_recent</code> .
VOLUMES		The list of source appliances and volumes needed from which to create Snapshot copies, such as: <ul style="list-style-type: none">• filer1:vol1,vol2,vol3• filer2:vol1• filer3:vol2,vol3

Parameter	Setting	Description
NTAP_SNAPSHOT_RETENTIONS		Determines the number of NetApp Snapshot copies retained for a given policy, for example: <ul style="list-style-type: none"> Daily:7 Weekly:4 Monthly:1
NTAP_USERS		The list of appliances and their corresponding user names and passwords, such as: <ul style="list-style-type: none"> filer1:joe/password1 filer2:bob/password2 filer3:ken/password3 Note: To use protected passwords, first run <code>./snapcreator-cryptpasswd</code> , and then save the scrambled password in the configuration file.
NTAP_PWD_PROTECTION	Y/N	Enables password protection. You must encrypt all passwords (storage system, applications, and plug-ins) and save encrypted passwords in the configuration file when this option is set to Y.
TRANSPORT	HTTP/HTTPS	Permits the choice of the protocol for API communications. Note: HTTPS might require <code>openssl-devel</code> libraries.
PORT		The port used to communicate with the NetApp storage controllers. Normally, HTTP defaults to 80, and HTTPS defaults to 443.
LOG_NUM		The number of <code>.debug</code> and <code>.out</code> reports that Snap Creator must retain.
CONFIG_TYPE	PLUGIN STANDARD	There are two types of configuration in SC 3.x: plug-in and standard. Multiple plug-in configurations can be used to build up complex quiesce and unquiesce backup workflows.

10.3 DOMINO PLUG-IN PARAMETERS

The following parameters are required to be set in the configuration file when using the Domino plug-in.

Note: It is important that these variables are set correctly, or else the plug-in will not work.

Table 3) Snap Creator Domino plug-in parameters.

Parameter	Description
DOMINO_DATA_PATH	The path to Domino data directory. For example: <code>notes/notesdata</code>
DOMINO_INI_PATH	The path to <code>notes.ini</code> file (include <code>notes.ini</code> in the path). For example: <code>/notes/notesdata/notes.ini</code>
DOMINO_CHANGE_INFO_PATH	The path where <code>changeinfo</code> files are saved. NetApp recommends using a different volume than Domino data or log paths. For example: <code>/changeinfo</code>

Parameter	Description
DOMINO_DATABASE_TYPE	<p>Can be any of the following values:</p> <ul style="list-style-type: none"> 0 = back up everything (1+2+3) 1 = back up only for *.box files 2 = back up only for *.nsf, *.nsg, and *.nsh files. 3 = back up only for *.ntf files <p>Note: If option 3 is selected, the Snapshot copy contains all files on the volume, but only the .ntf files are quiesced.</p> <p>Because all files are captured as part of the Snapshot copy, NetApp recommends using 0.</p>
LOTUS	The path to the Lotus directory where Domino is installed. This is typically one directory back from the Notes_ExecDirectory in Windows. When using the default installation path in Linux, the value would be /opt/ibm/lotus.
Notes_ExecDirectory	The path that contains Domino shared object files (.so or .dll). For example: /opt/ibm/lotus/notes/latest/linux/
DOMINO_RESTORE_DATA_PATH	<p>The Domino plug-in applies change information to databases after a restore. To do it properly, this parameter must be set to the location where Domino data is being restored. Use the same path as DOMINO_DATA_PATH, if restoring to the same location. This would be typical in FC or iSCSI environments where a volume restore is the only option.</p> <p>In NFS environments, a single-file restore can be performed. This can be a different path than the DOMINO_DATA_PATH, but it must still be on the same volume. For example: /notes/notesdata</p>

There are several other sections within the configuration file that should be configured specifically for use with the Domino plug-in. These settings are separated by their parent section in the text version of the configuration file below.

GENERAL SETTINGS

General settings must be configured for the Domino plug-in to function properly. The GUI automatically sets this value when a configuration file for the Domino plug-in is created.

Table 4) Snap Creator Domino plug-in general settings.

Parameter	Setting	Description
SNAP_TIMESTAMP_ONLY	Y	Although this value is required for any configuration file, it must be set to Y for the Domino plug-in to function properly.

CLIENT/SERVER CONFIGURATION AGENT SETTINGS

NetApp recommends these Domino plug-in settings when using an agent configuration.

Table 5) Snap Creator Domino plug-in agent settings.

Parameter	Setting	Description
SC_AGENT_TIMEOUT	900	Time in seconds for server/agent communication to exist. The client/server architecture uses a timeout mechanism. If the client does not respond before the set value is reached, the server fails with a timeout method. The agent remains running. Note: The default value is 300 seconds. Depending on the number of databases in the Domino environment, the default value might not be sufficient. NetApp recommends setting this value to a minimum value of 900 seconds.
SC_AGENT_UNQUIESCE_TIMEOUT	900	Time in seconds to wait after a database quiesce operation to bring the database back into normal operation mode. Note: This is only available in combination with SC_AGENT_WATCHDOG_ENABLE=Y.
SC_AGENT_WATCHDOG_ENABLE	SC 3.4 set to N SC 3.5 set to Y	With Snap Creator 3.5+, Snap Creator starts a watchdog process while quiescing the database. After the period specified in SC_AGENT_UNQUIESCE_TIMEOUT, the database is brought into normal operation automatically. Note: This feature does not work with Snap Creator 3.4. The value must be set to N. Setting the value to Y in Snap Creator 3.4 can cause the Domino server to crash.
SC_AGENT_LOG_ENABLE	Y	Enables logging on the agent.

PLUG-IN MODULE OPTIONS

NetApp recommends these settings for use with the Domino plug-in.

Table 6) Snap Creator Domino plug-in module options.

Parameters	Setting	Description
APP_NAME	domino	Determines which plug-in is used. To use the Domino plug-in, set the value to domino.
APP_IGNORE_ERROR	Y	Tells Snap Creator not to exit when the plug-in encounters an error. If APP_IGNORE_ERROR=N, and the database can't be accessed by the APIs because of file corruption or other issues, then the plug-in exits and the Snapshot copy is not created. If the Domino environment has 1,000 databases, a problem with 1 database can result in none of the databases capturing a Snapshot copy. If APP_IGNORE_ERROR=Y, any problems with the database are logged, and the plug-in continues with the next database. The plug-in completes successfully, but with errors. The logs provide details at the end of the quiesce section regarding which databases, if any, encountered problems during the quiesce process. Note: APP_IGNORE_ERROR=Y only works with Snap Creator 3.4 P1 or greater. This parameter cannot be set from the GUI. The configuration file must be opened using a text editor and the value set manually.

ARCHIVE LOG SETTINGS

These parameters are recommended for use with the Domino plug-in. Enabling log archiving enables Snap Creator to clean up the `.info` and `.txn` files added to the changeinfo path by the Domino plug-in.

Table 7) Snap Creator Domino plug-in archive log settings.

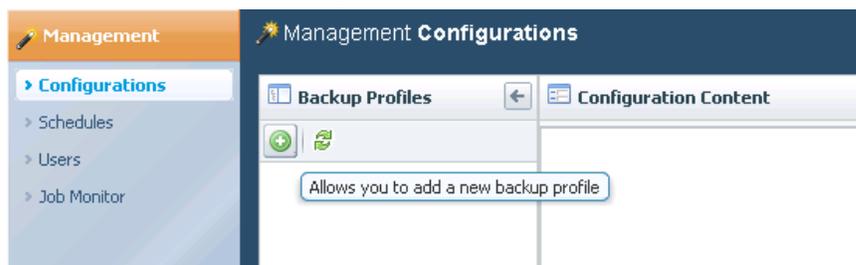
Parameters	Setting	Description
ARCHIVE_LOG_ENABLE	Y	Enables log archiving
ARCHIVE_LOG_RETENTION	Equal to or greater than: NTAP_SNAPSHOT_RETENTIONS	The number of days' worth of logs to keep
ARCHIVE_LOG_DIR	<DOMINO_CHANGE_INFO_PATH>/logs	The directory to clean up
ARCHIVE_LOG_EXT	TXN	The Domino plug-in takes care of the <code>.info</code> files. The archive log settings only need to be configured to archive <code>.txn</code> files.
ARCHIVE_LOG_RECURSIVE_SEARCH	N	The Domino plug-in puts <code>.txn</code> files in the log's subdirectory of the <DOMINO_CHANGE_INFO_PATH>, so recursive search is not required.

10.4 CREATE A CONFIGURATION FILE USING THE GUI

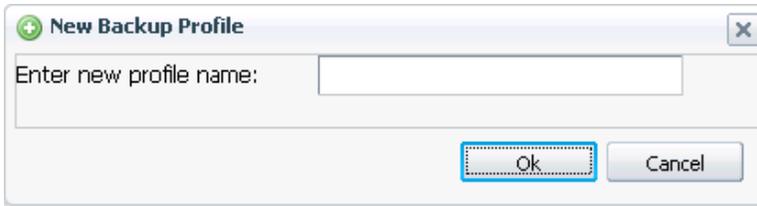
Snap Creator features an easy-to-use GUI. The GUI includes a wizard that simplifies creating a configuration file. Follow these instructions to create a configuration file:

Note: The completed variables in this section are for example only. When creating a configuration file, verify the settings and verify that they are correct for each environment.

1. Open a Web browser and point the browser to `http://<servername>:<port>`
Where:
 - `<servername>` is the name or IP address of the Snap Creator server.
 - `<port>` is the port where the GUI is running. By default this is port 8080.
2. Enter the credentials to log in to the Snap Creator server. The Snap Creator GUI appears. If this is the first time the GUI has been launched, a new profile must be created.
3. Click the  icon. The figure shows the  icon and a tool tip.



4. Click the  icon. A new window appears that requests the new profile name.

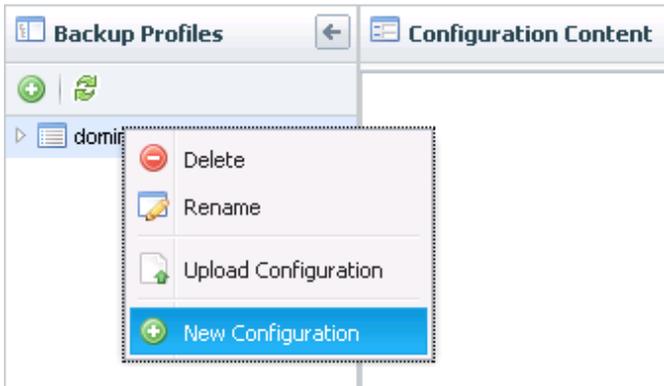


In this example, the profile name used is domino.

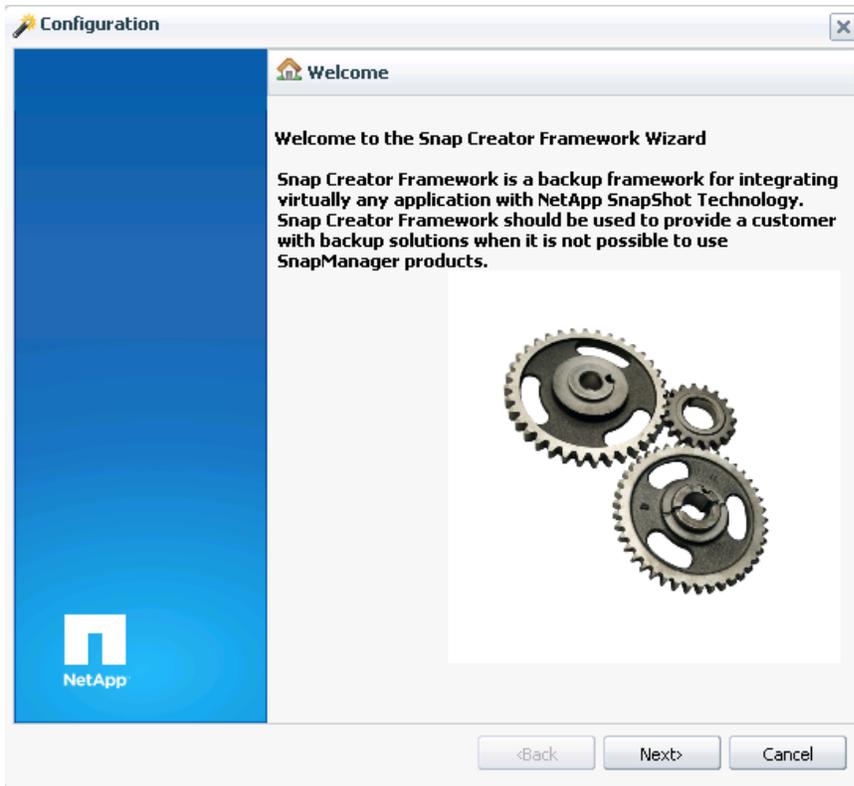
5. Enter the new profile name. The new profile is now listed in Backup Profiles.



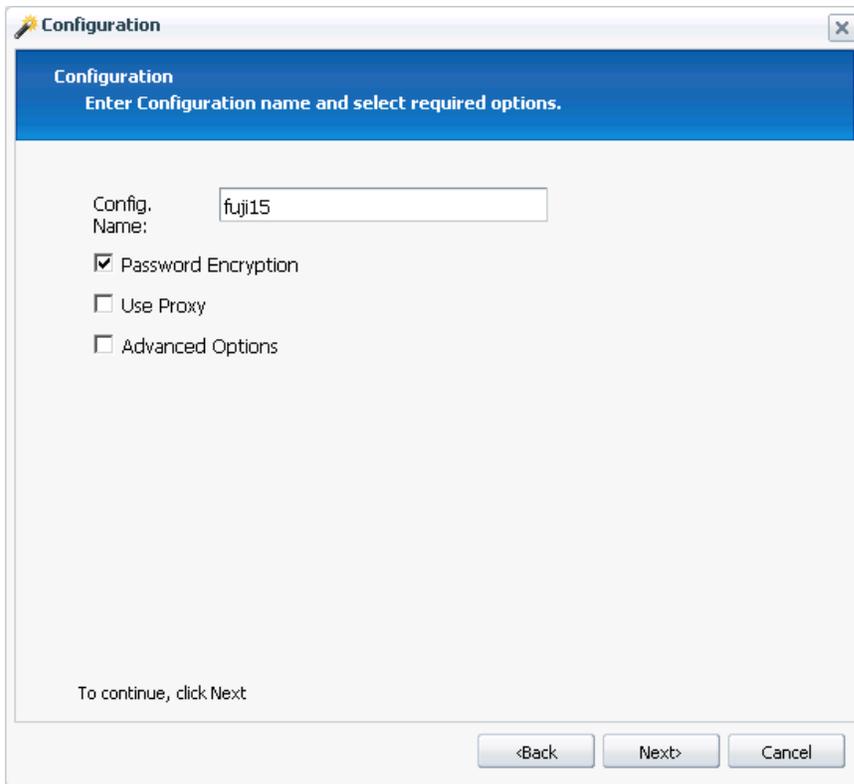
6. Right-click the profile and select New Configuration to create a new configuration file.



The Configuration Wizard appears.

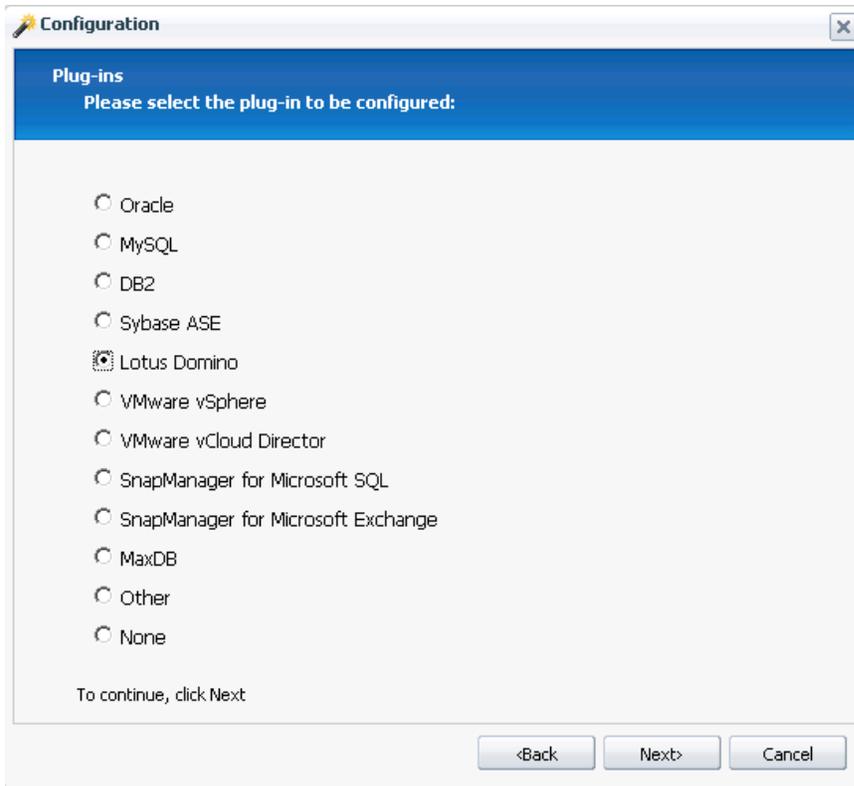


7. Click Next to continue.
8. Enter the config name. In this example, the config name is fuji15. Options for enabling password encryption, using a proxy, and selecting advanced options are available on this screen. By default, password encryption is enabled, because password encryption prevents passwords from being displayed in clear text in the configuration.

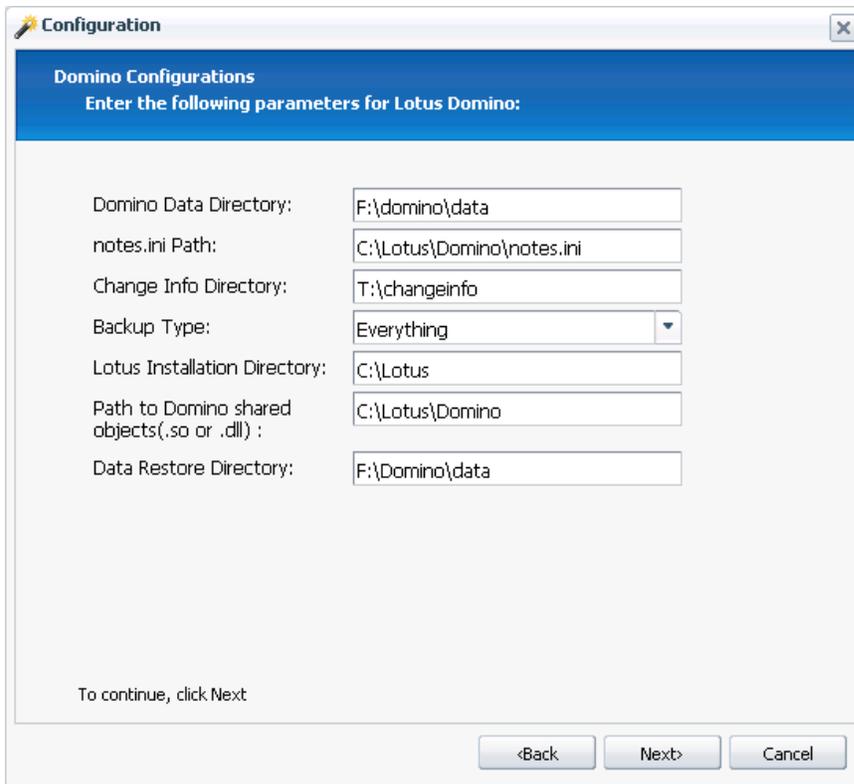


Note: Hover the cursor over an option to display a tool tip. Tool tips are available on all options and can help set variables properly.

9. Click Next to continue. The plug-ins configuration window appears.
10. Select the plug-in to be configured. The settings on this page default to Other, but in this example, the Lotus Domino plug-in is selected.



11. Click Next to continue.
12. Enter data for all of the fields on the parameter plug-in page. In this example, parameters for the Lotus Domino plug-in have been configured.

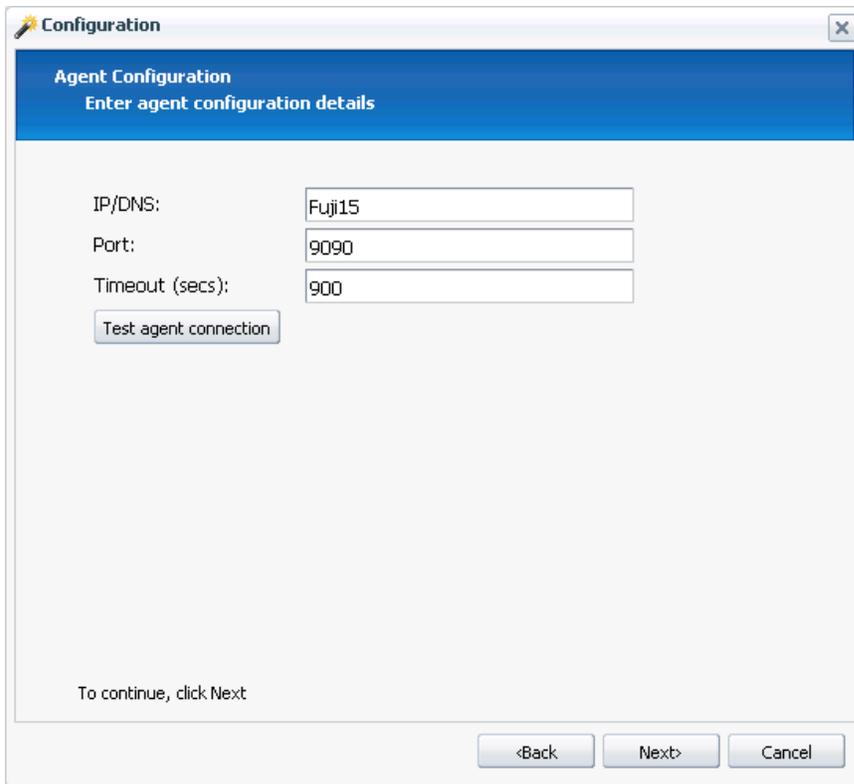


13. Click Next to continue. The Agent Configuration window appears.

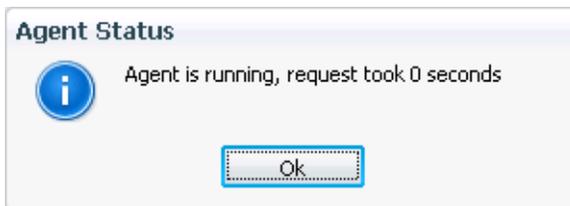
Note: If the environment created uses Snap Creator server only, leave the fields blank and click Next.

14. Enter data in all of the fields in the Agent Configuration window. In this example, the Snap Creator agent runs on Fuji15 with the default port, 9090.

Note: NetApp recommends a timeout of 900 seconds for the Domino plug-in.



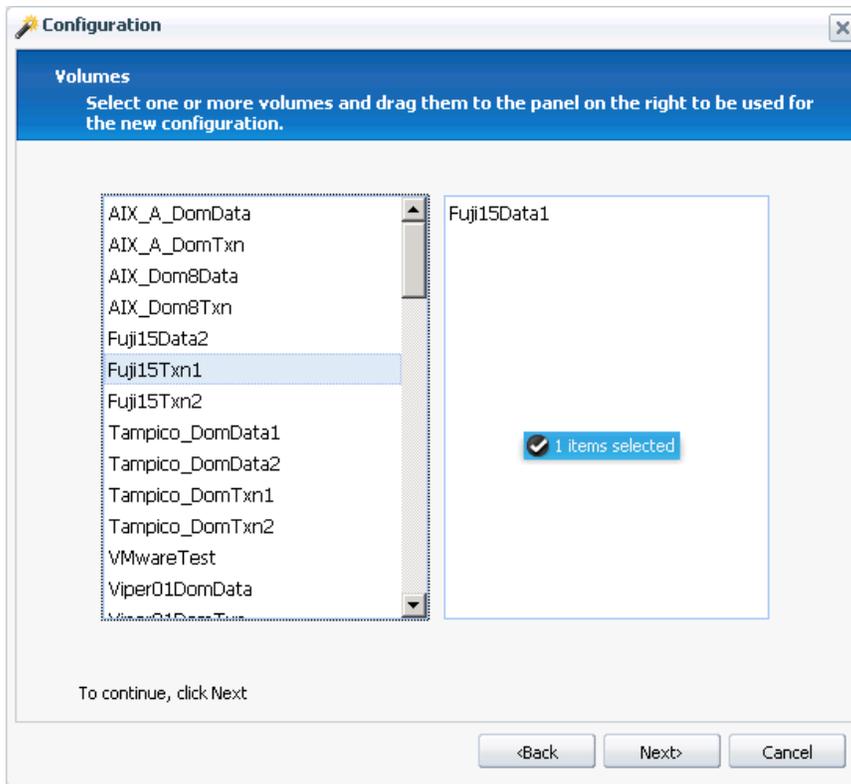
15. Click Test agent connection to test communication with the agent. This action verifies that the agent is running and the settings are correct. A confirmation box appears.



16. Click Ok to close the Agent Status confirmation box.
17. Click Next on the Agent Configuration window to continue. The Controller Login Credentials window appears.
18. Enter the storage system controller name or IP address, the controller user name, password, and transport method (either HTTP or HTTPS).

The screenshot shows a 'Configuration' window with a blue header bar containing the text 'Controller Login Credentials' and 'Enter Controller Login, Password and other details.' Below the header, there are five input fields: 'Controller (Name/IP):' with the value 'Iceman', 'Controller User:' with 'sc_user', 'Controller Password:' with masked characters, 'Transport:' with a dropdown menu showing 'HTTP', and 'Controller Port:' with '80'. At the bottom left, it says 'To continue, click Next'. At the bottom right, there are three buttons: '<Back', 'Next>', and 'Cancel'.

19. Click Next to continue. The Volumes window appears.
20. Drag and drop the volumes to capture as part of the Snapshot copy from the left pane of the window to the right pane. If you accidentally select a volume, simply drag it back to the left pane. In the example, one volume (Fuji15Data1) is already in the right pane, and a second volume (Fuji15Txn1) is selected and ready to be dragged and dropped.



21. Click Next to continue. The Snapshot Action window appears.
22. Enter data for all applicable fields on the Snapshot Action window. This step defines the Snapshot copy. The example shows a Snapshot copy named fuji15, with a daily policy being kept for 31 days and a retention age of 31 days.

Configuration

Snapshot Action
Provide Snapshot information.

Snapshot Name:

Policy Name:

Policy Retention:

Policy Retention Age:

Naming Convention: Recent Timestamp

Consistency Group:

Consistency Timeout:

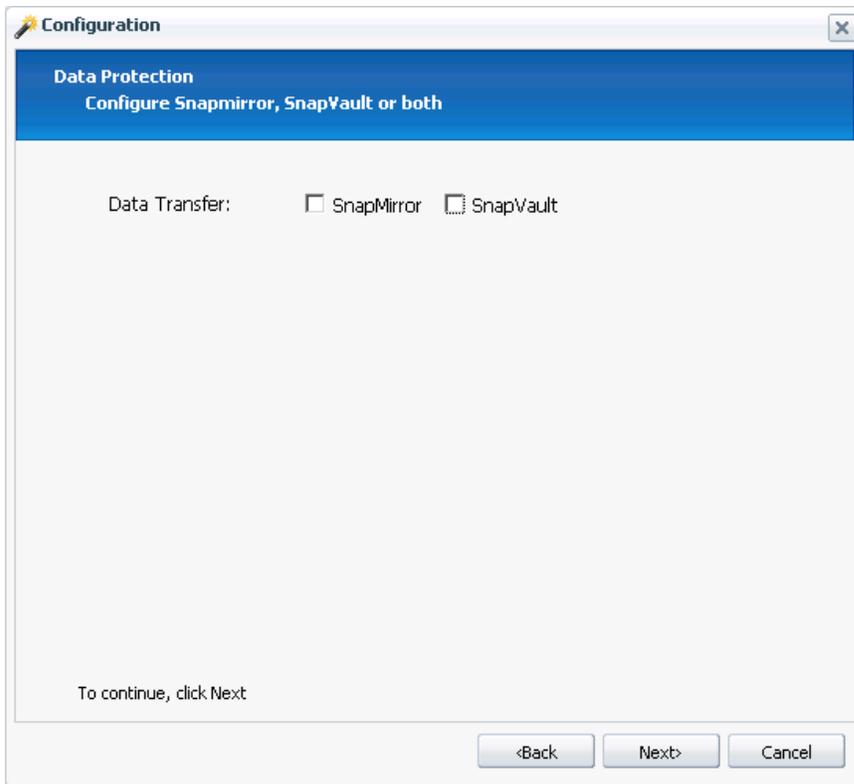
To continue, click Next

<Back Next> Cancel

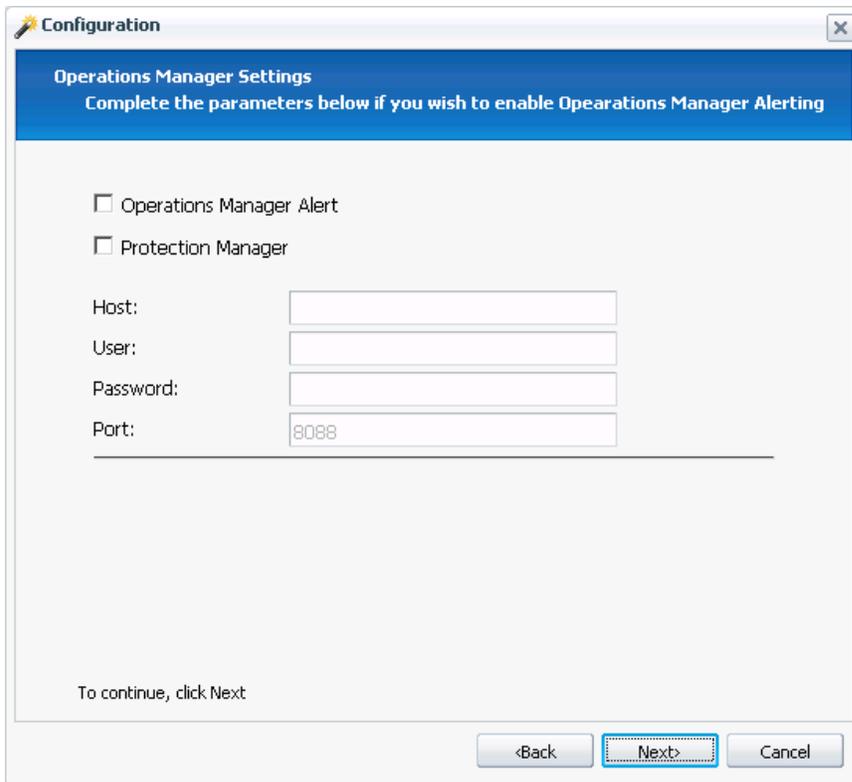
23. Click Next to continue. The Data Protection window appears.

24. Select SnapMirror, SnapVault, or both. Data Protection enables Snap Creator to integrate with SnapMirror and SnapVault.

Note: Snap Creator does not create the SnapMirror or SnapVault relationship. These must exist before configuring in Snap Creator.

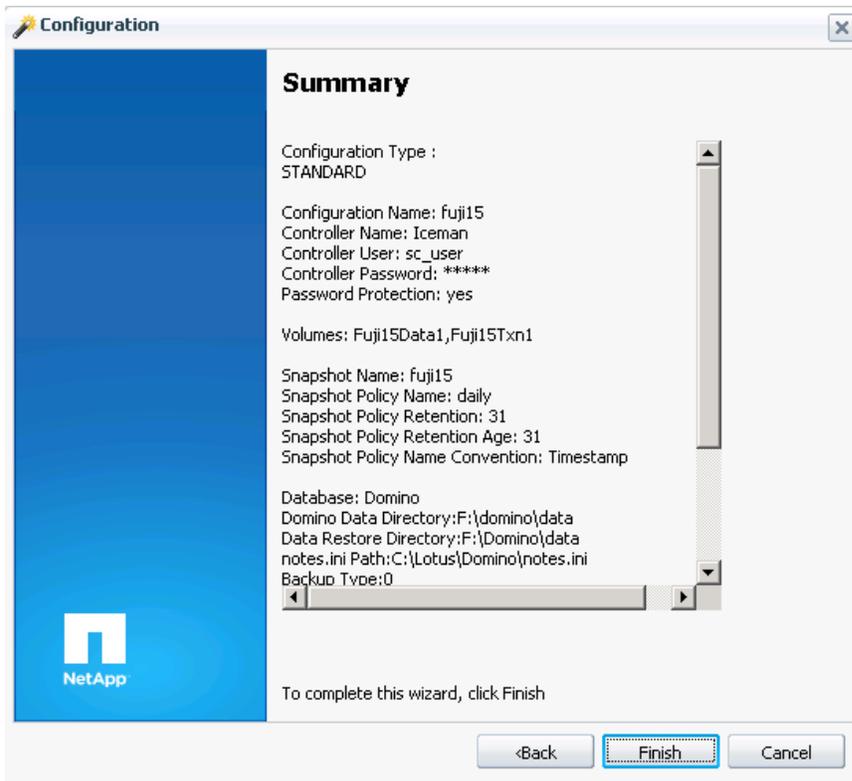


25. Click Next to continue. The Operations Manager Settings window appears.
26. Complete the parameters to enable Operations Manager Alerting. If Operations Manager Alerting is selected, Snap Creator logs events so that they are visible in Operations Manager. If Protection Manager is enabled, Snap Creator registers Snapshot copies with Protection Manager to provide data protection of Snapshot copies created with Snap Creator.



27. Click Next to continue. The Summary window appears.

28. Review the configured settings. Click Back to change any settings.



29. Click Finish to complete the configuration.

CHANGE OR UPDATE A CONFIGURATION FILE USING THE GUI

Configure additional settings through the GUI after the configuration file is created. Not all options are available through the wizard; some options must be updated after creating configuration file.

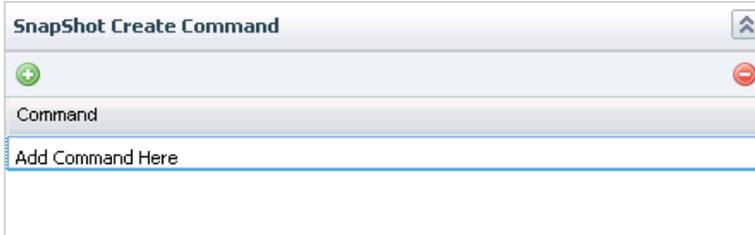
An example of an option that must be configured after creating the configuration file is SnapDrive. SnapDrive should be set up in the configuration file when using iSCSI or FC protocols. This makes sure that Snapshot copies are not only application-consistent, but also consistent with the file system.

To set up the configuration file for SnapDrive using the GUI, perform the following steps:

1. Expand the profile in the Backup Profiles window.



2. Click to select the configuration file. The configuration file opens in the Configuration Content pane.
3. Scroll to the appropriate location in the configuration file to add the new option. To enable SnapDrive, add a command in the SnapShot Create Command window. The appropriate location for the SnapDrive command is the bottom of the configuration file.
4. Click the  icon to add an entry to SnapShot Create Command window. A new line that contains the words "Add Command Here" is added to the command box.



5. Remove the words "Add Command Here" from the command box and enter the following command to create a Snapshot copy using SnapDrive: "`<path>\<to>\<SnapDrive>\SDCLI.exe`" `snap create -s %SNAME-%SNAP_TYPE_%SNAP_TIME -D <mountpoint>`

Where:

- "`<path>\<to>\<SnapDrive>\SDCLI.exe`" is the path to the SnapDrive CLI. In Windows, this is `SDCLI.exe`. The default path is `C:\Program Files\Netapp\SnapDrive\SDCLI.exe`. Because this is being passed through the command line, the command itself is encapsulated in quotation marks to prevent the space from causing an issue.
- `%SNAME-%SNAP_TYPE_%SNAP_TIME` makes sure that the Snapshot copy name is provided based on NetApp recommended settings. This causes Snap Creator parameters to properly name the Snapshot copy with the configuration file name, the type of Snapshot policy (hourly, daily, or monthly), and the time and date the Snapshot copy was created.
- `<mountpoint>` is the drive letter or letters separated by a space.

Note: In this example, SnapDrive is being used in a Windows environment and is installed to the default path.

```
"C:\Program Files\Netapp\SnapDrive\SDCLI.exe" snap create -s %SNAME-  
%SNAP_TYPE_%SNAP_TIME -D F G
```

6. Press Enter.

7. Scroll to the top of the configuration file and click  to save the changes.

Note: Any commands outside of Snap Creator need to be allowed through the `agent.conf` file located on the agent. Refer to the Configure the Snap Creator Agent section for additional information.

11 CREATE A SNAPSHOT BACKUP COPY WITH SNAP CREATOR

Backing up a Domino database with Snap Creator is simple. You can create a Snapshot backup copy through the GUI or the CLI or schedule Snapshot copies using any scheduling tool, including the Snap Creator GUI scheduler. This section addresses creating a Snapshot backup with both the GUI and the CLI.

11.1 CREATE A SNAPSHOT BACKUP USING THE GUI

This section provides instructions for creating a Snapshot backup using the GUI.

1. Open a Web browser and point the browser to `http://<servername>:<port>`

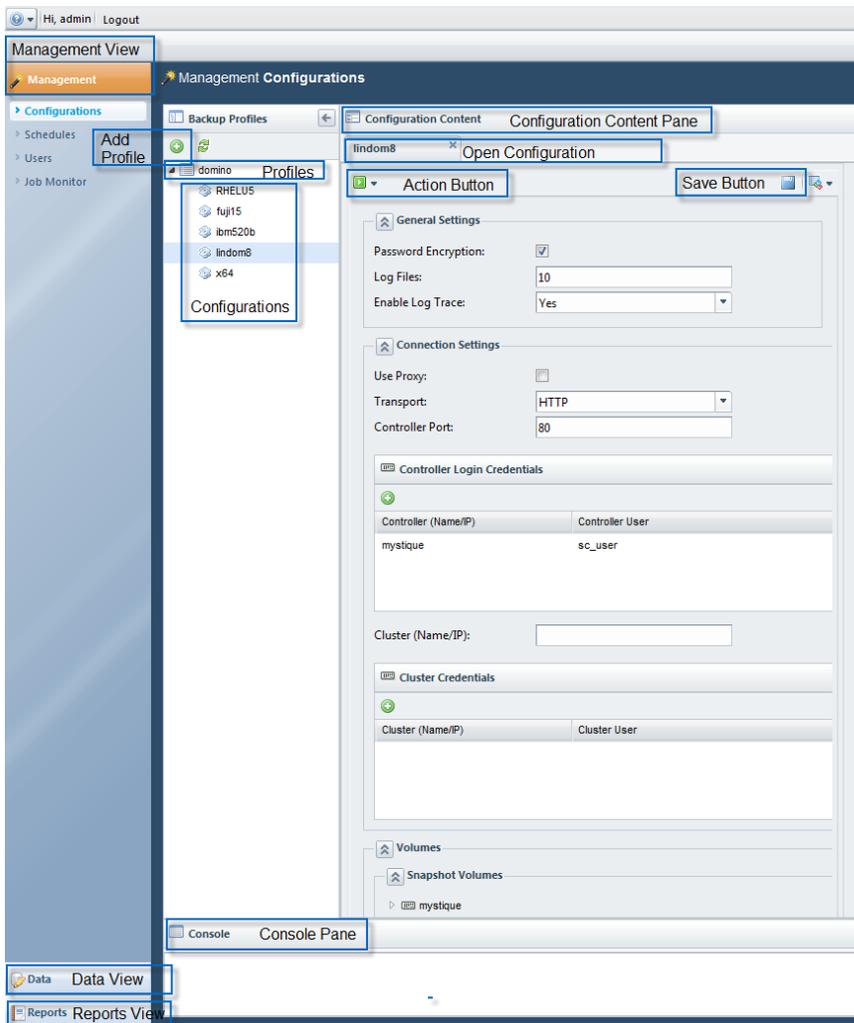
Where:

- `<servername>` is the name or IP address of the Snap Creator server.
- `<port>` is the port where the GUI is running.

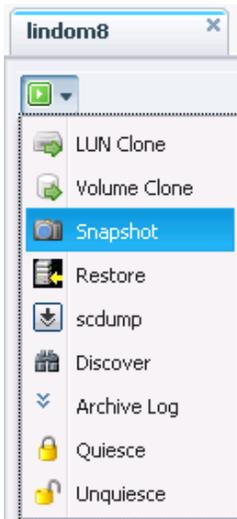
Note: By default, the port is 8080.

2. Enter the credentials to log in to the Snap Creator GUI.

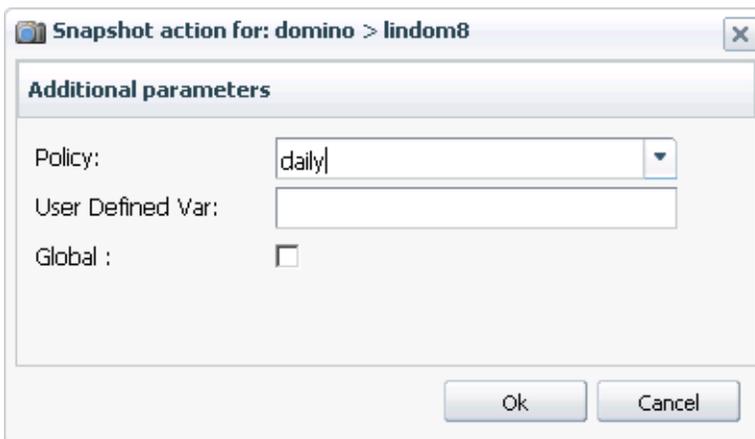
3. After logging in, the Snap Creator GUI appears. The example shows the Snap Creator GUI with some specific elements called out.



4. Expand the Profiles pane and double-click a configuration to open it in the Configuration Content pane.
5. Click the green action button  and select Snapshot from the drop-down menu. A Snapshot copy is initiated for the selected configuration. The example shows the options seen on the action menu.



The Additional parameters window appears.



6. Select the policy and click Ok.

Note: The policy must already be defined in the configuration file for it to appear in the drop-down menu.

Optionally, enter a user-defined variable and select a global configuration file.

Information about the Snapshot job is displayed in the Console window. Make the Console pane easier to read by enlarging it. Click to select the line above Console and drag it up to enlarge the pane.

The example shows the bottom of the Console window. The bottom line of the output indicates that Snap Creator finished successfully.

```

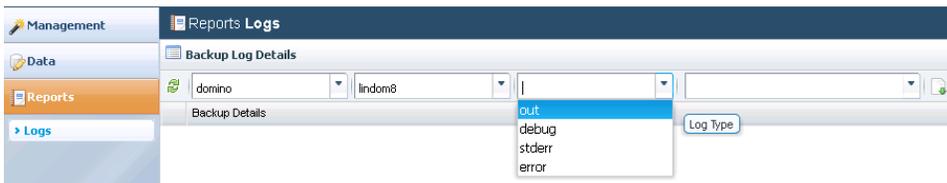
Console
-----
domino > lndom8
-----
Backup Details
74 ***** Removing NetApp Snapshot Delete on Primary myrsiqe *****
75 [Wed Nov 16 09:31:25 2011] WARN: More than 4 NetApp snapshots exist, older snapshots of myrsiqe: fuj120_linux_DomData will be automatically deleted!
76 [Wed Nov 16 09:31:25 2011] WARN: Deleting NetApp Snapshot lndom8-daily_2011110101117 on myrsiqe: fuj120_linux_DomData
77 [Wed Nov 16 09:31:26 2011] INFO: NetApp Snapshot Delete of lndom8-daily_2011110101117 on myrsiqe: fuj120_linux_DomData completed Successfully
78 [Wed Nov 16 09:31:26 2011] WARN: More than 4 NetApp snapshots exist, older snapshots of myrsiqe: fuj120_linux_DomTem will be automatically deleted!
79 [Wed Nov 16 09:31:26 2011] WARN: Deleting NetApp Snapshot lndom8-daily_2011110101117 on myrsiqe: fuj120_linux_DomTem
80 [Wed Nov 16 09:31:27 2011] INFO: NetApp Snapshot Delete of lndom8-daily_2011110101117 on myrsiqe: fuj120_linux_DomTem completed Successfully
81
82 ***** POST NETAPP COMMANDS *****
83 [Wed Nov 16 09:31:27 2011] INFO: (domino > lndom8) _ntimed
84
85 ***** POST NETAPP COMMANDS FINISHED SUCCESSFULLY *****
86
87 ***** ARCHIVE COMMANDS *****
88 [Wed Nov 16 09:31:27 2011] INFO: No commands defined
89
90 ***** ARCHIVE COMMANDS FINISHED SUCCESSFULLY *****
91
92 ***** Snap Creator Community Release 3.5.0c finished successfully *****
93 [Wed Nov 16 09:31:28 2011] INFO: INFO: Snap Creator finished successfully ( Action: snap )
94

```

The Console pane only displays the most pertinent information; this is the verbose mode. The Reports view provides more detailed information.

7. Click Reports, and then select a profile and a configuration file. There are several different logging options, including:
 - **Out.** The log contains only verbose logging information.
 - **Debug.** The debug log contains verbose and debug logging information. If trace messages are enabled in the configuration file (default setting), the trace information appears in this log.
 - **Stderr.** The stderr of standard error streams log is usually empty, but it will contain information if issues with the Snap Creator code are encountered.
 - **Error.** The error log contains a history of error events for a selected configuration.

The example shows logging options.



8. Select a logging option and choose a log file. The log file appears.

Note: With Log Trace enabled in the configuration file (default setting), the debug log displays all of the actions from the Domino APIs. This means that the log lists each individual Domino database, template, and box file, as well as the API actions called against these files.

11.2 CREATE A SNAPSHOT BACKUP USING THE CLI

Snap Creator works equally well on the CLI of operating systems based on both UNIX and Windows. The commands for Snap Creator are the same regardless of the operating system. The examples described in this document are from Snap Creator running on a Windows server, but the commands are the same for Linux, AIX, Solaris, and other operating systems.

The following example represents the typical command structure for Snap Creator:

```

snapcreator --profile <Config> --action <Action> --policy <Policy> <Optional Arguments>

```

Table 8 describes Snap Creator command options commonly used with the Domino plug-in.

Table 8) Snap Creator command options commonly used with Domino plug-in.

Parameter	Description
<code>--profile <Profile></code>	The name of the profile should be the name given to the directory/file without the <code>.conf</code> suffix. To create alternative configuration files under the same profile, use the <code>--config</code> option. The available profiles can be listed using <code>--profile list</code> . Snap Creator setup is run by using <code>--profile setup</code> .
<code>--action <Action></code> (<code>snap unquiesce restore</code>)	There are several possible actions, but the most common actions used with the Domino plug-in are create a Snapshot copy (<code>snap</code>), unquiesce an application (<code>unquiesce</code>), or perform an interactive restore (<code>restore</code>).
<code>--policy <Policy></code>	The name of the Snapshot policy defined in <code>NTAP_SNAPSHOT_RETENTIONS</code> and possibly <code>NTAP_SNAPVAULT_RETENTIONS</code> . When you name the Snapshot policy, it is important to remember that the name passed to Snap Creator as <code>--policy</code> is exactly the same as defined in <code>NTAP_SNAPSHOT_RETENTIONS</code> , as well as in <code>NTAP_SNAPVAULT_RETENTIONS</code> , if you are using SnapVault. You can also have as many of these as you want, all with different retentions. Note: If you use SnapDrive to create the Snapshot copies, use lowercase letters. SnapDrive (at least in Windows) cannot differentiate between uppercase and lowercase letters.
<code>--config</code>	Permits specification of an alternative configuration file located under the <code>/path/to/scServer_v<#>/<Config></code> directory. For example: <code>./snapcreator --profile <Profile> --action <Action> --policy <Policy> --config <Alternate Config></code> Note: This option is required when the profile <code>/path/to/scServer_v<#>/configs/<profile></code> and the configuration does not match <code>/path/to/scServer_v<#>/configs/<profile>/<config>.conf</code>
<code>--verbose</code>	Displays all logging information to <code>STDOUT</code> . This is an optional setting and is used mostly for testing and running Snap Creator manually. For example: <code>./snapcreator --profile <Profile> --action <Action> --policy <Policy> --config <Alternate Config> --verbose</code>
<code>--debug</code>	Displays all logging information to <code>STDOUT</code> and the log file. This is an optional setting used for debugging problems. For example: <code>./snapcreator --profile <Profile> --action <Action> --policy <Policy> --config <Alternate Config> --verbose--debug</code>
<code>--cryptpasswd</code>	Encrypts a password for storing it in a configuration file. For example: <code>./snapcreator --cryptpasswd</code>

For a full list of the available Snap Creator command list options, refer to the [NetApp Snap Creator Framework 3.5.0 Installation and Administration Guide](#).

The following is an example of running a command line action:

```
./snapcreator --action snap --profile domino --policy daily --config lindom8
```

Where:

- `--action snap`: indicates the action to be taken; in this case, `snap` indicates a Snapshot copy will be created.

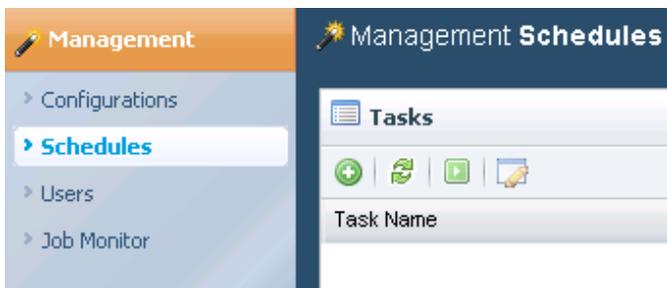
- `--profile domino`: indicates the name of the profile to be used, in this case, `domino`.
- `--policy daily`: indicates the policy to be used, in this case, `daily`.
- `--config lindom8`: indicates that the `lindom8` is the configuration file. This parameter is needed when multiple configuration files are present within the profile or when the profile name is different from the configuration name.

11.3 SCHEDULE SNAPSHOT COPIES USING THE SNAP CREATOR GUI

To simplify manageability and daily operations, the Snap Creator GUI offers a scheduling tool called scheduler. The scheduler can be used for creating not only Snapshot backups, but also LUN clones or volume clones.

To access the scheduler from the Snap Creator GUI, click Schedules, which is located under the Management pane. Figure 4 shows the location of the Snap Creator scheduler.

Figure 4) Snap Creator schedule view.



To create a schedule, click the  icon to launch the New Task window. The New Task window assists with setting up the schedule. Figure 5 shows a sample of a completed schedule.

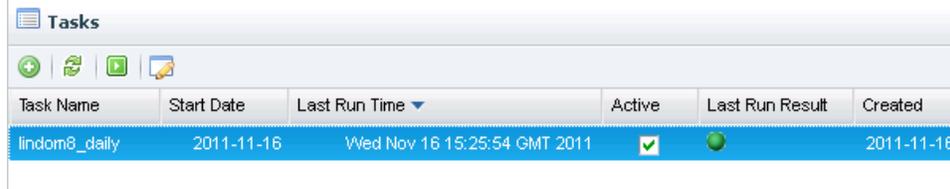
Figure 5) Snap Creator schedule new task.

The schedule in Figure 5 is set to run a Snapshot backup of the `lindom8` configuration file in the `domino` profile daily at 10 p.m. All options, except the task name, were selected from drop-down menus that make the scheduler easy to use.

To run additional actions from the scheduler, select a schedule. Once a scheduled job is selected, the action bar allows the schedule to be run, edited, or deleted using buttons at the top of the screen.

As actions are completed on the scheduler, the last run result is displayed with either a green dot (indicating success) or a red dot (indicating failure). This functionality makes it simple to check the status of the last scheduled tasks.

Figure 6) Snap Creator schedule tasks.



Task Name	Start Date	Last Run Time	Active	Last Run Result	Created
<code>lindom8_daily</code>	2011-11-16	Wed Nov 16 15:25:54 GMT 2011	<input checked="" type="checkbox"/>	●	2011-11-16

Additional information about scheduled operations can be found in the job monitor or in the reports view of the Snap Creator GUI.

12 PERFORM DOMINO DATABASE RESTORE WITH THE DOMINO PLUG-IN

The Snap Creator plug-in for Domino has multiple restore options available. All of these restore options are available in both the GUI and the CLI. The different restore options include:

- Volume restore (point in time only)
- Single-file restore (point in time)
- Single-file restore (up to the minute)
- Single-file restore (selectable point in time)

Note: Single-file restore operations only work with NFS. Up-to-the-minute and selectable point-in-time single-file restores require that Domino transaction logging be enabled.

In all of the restore options, `changeinfo` is written back to databases after a restore. The `DOMINO_RESTORE_DATA_PATH` parameter in the configuration file needs to be set to the path where the Domino data is restored. It is likely that this path could change depending on the type of restore being performed. Typical use cases for setting the `DOMINO_RESTORE_DATA_PATH` variable include:

- For a volume restore: `DOMINO_RESTORE_DATA_PATH = DOMINO_DATA`.
- For a single-database restore: `DOMINO_RESTORE_DATA_PATH =` a subdirectory on the same volume on which the Domino Data volume exists.

If the `DOMINO_RESTORE_DATA_PATH` is not set properly, the `changeinfo` cannot be applied to the database, which causes a postrestore error. The file is restored, but the necessary `changeinfo` is not applied.

12.1 VOLUME RESTORE USING THE GUI

If the entire volume must be restored, it can be restored through the Snap Creator GUI. This is a point-in-time operation where the Domino server is restored to the point in time of the selected Snapshot backup image.

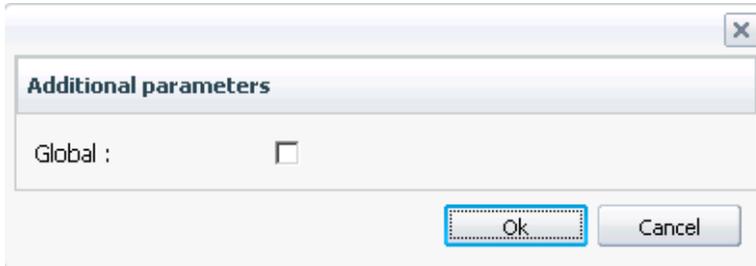
In the event of a volume restore, `DOMINO_RESTORE_DATA_PATH` should be set to the same value as `DOMINO_DATA_PATH` in the configuration file. The value must be set properly to be sure that the change information is correctly applied to the restored databases.

Note: Before initiating a volume restore on a Domino server, verify that Domino server is not running.

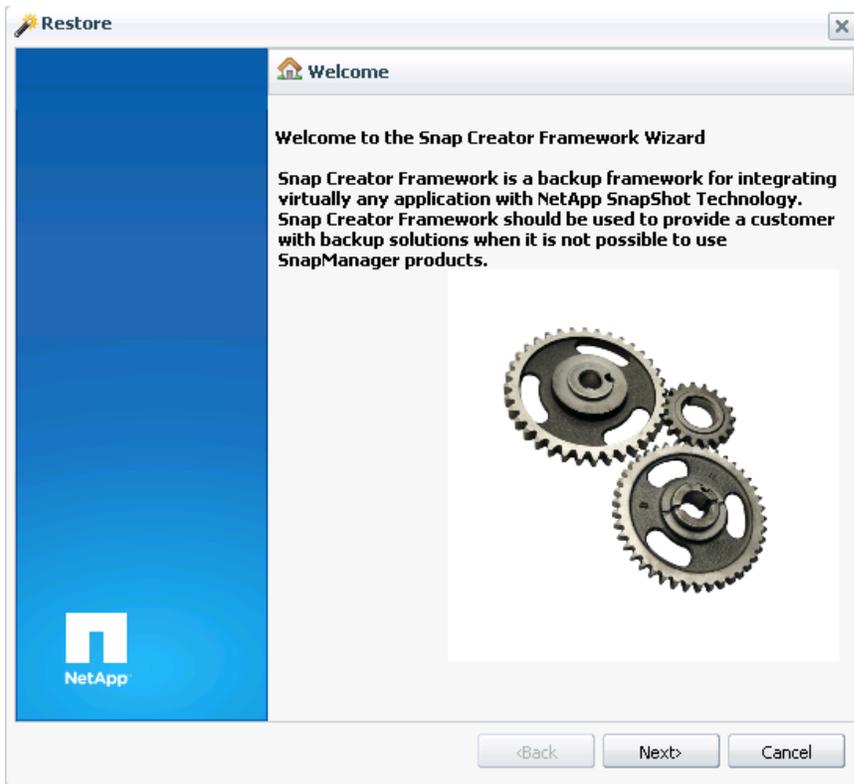
1. To start the restore from the GUI, select the action button  and then select Restore. The example shows the options available on the action menu.



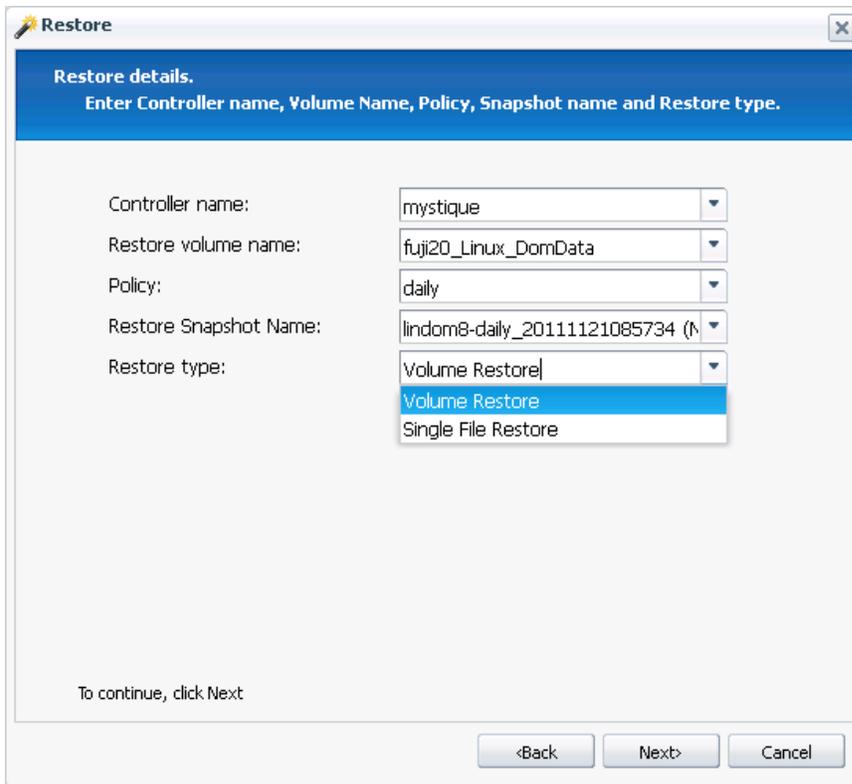
2. Select the checkbox to use a global configuration file. Otherwise, leave the checkbox unselected.



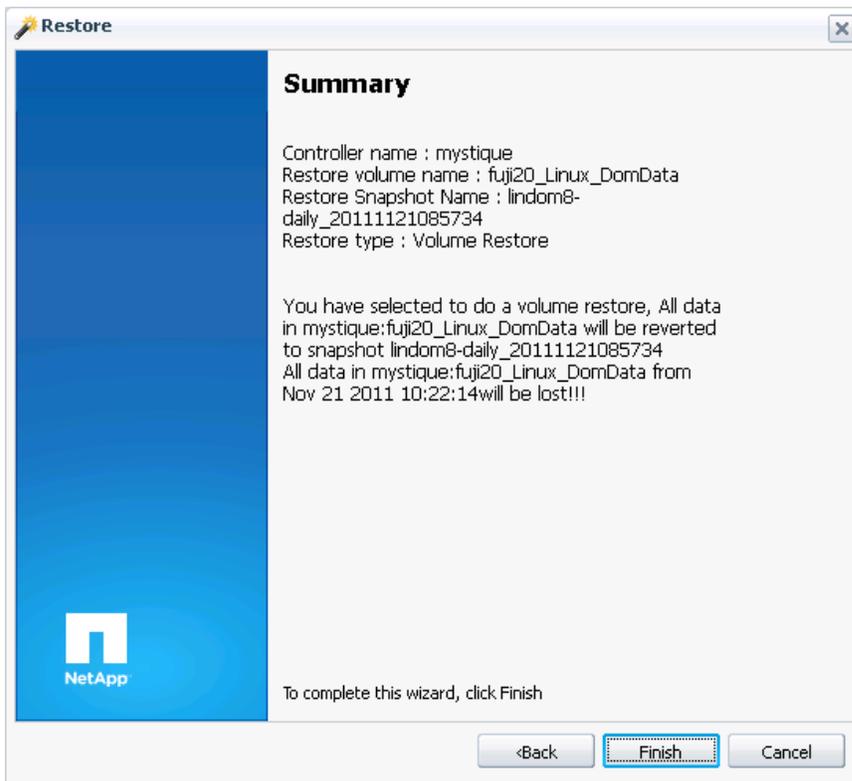
3. Click Ok. The Welcome screen appears.



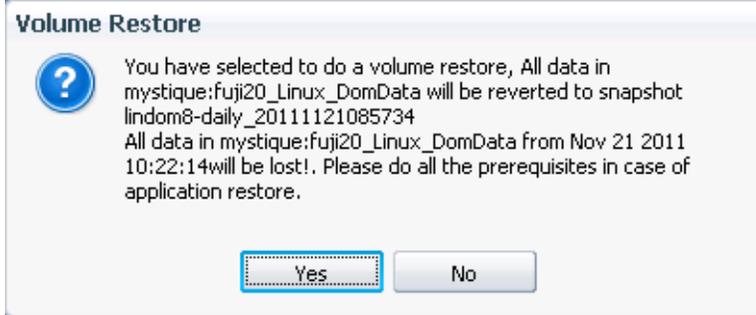
4. Click Next to continue. The Restore details window appears.
5. Select the controller, restore volume name, policy, restore Snapshot name, and restore type from the drop-down menus. The example shows the Restore details window with Volume Restore selected.



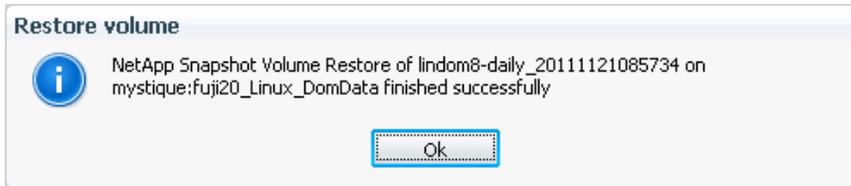
6. Click Next to continue. The Summary window appears.
7. Review the summary information to verify that it is correct.



- Click Finish to initiate the restore operation, or click Back to make changes. The Volume Restore confirmation box appears and shows the volume settings.



- Click Yes to continue with the restore operation. After the restore is complete, a success message appears.



- Click Ok to complete the restore operation.

Note: Start the Domino server after the restore is complete.

12.2 SINGLE-FILE RESTORE USING THE GUI

There are three different options for single-file restore. The types of single-database restore that are available include:

- Single-file restore (point in time).** Restores a single file to the point in time of the selected Snapshot copy.
- Single-file restore (up to the minute).** Restores a single file then plays forward the Domino transaction logs to the most recent copy.

Note: This option requires Domino transaction logging to be enabled.

- Single-file restore (selectable point in time).** Restores a single file and then plays forward the Domino transaction logs to a specified point in time. For example, a Snapshot copy created on December 15, 2011 at 10 a.m. can be restored to December 16, 2011 at 9:45 a.m.

Note: This option requires Domino transaction logging to be enabled. Transaction logs can only be played forward. Selecting a time before the Snapshot copy was created causes an error.

Note: Single-file restore operations only work with the NFS protocol. The NFS protocol is defined as the NFS file system mounted on a physical host or virtual machine.

A single database can be restored to the point in time of the selected Snapshot copy.

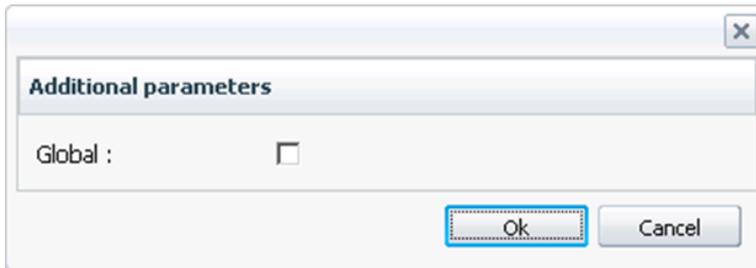
Follow these instructions to start the restore operation from the GUI:

Note: The steps for a single-database restore operation are identical until it's time to select one of the three restore options. The steps for each restore option are unique. The unique steps for each restore option are described separately following this procedure.

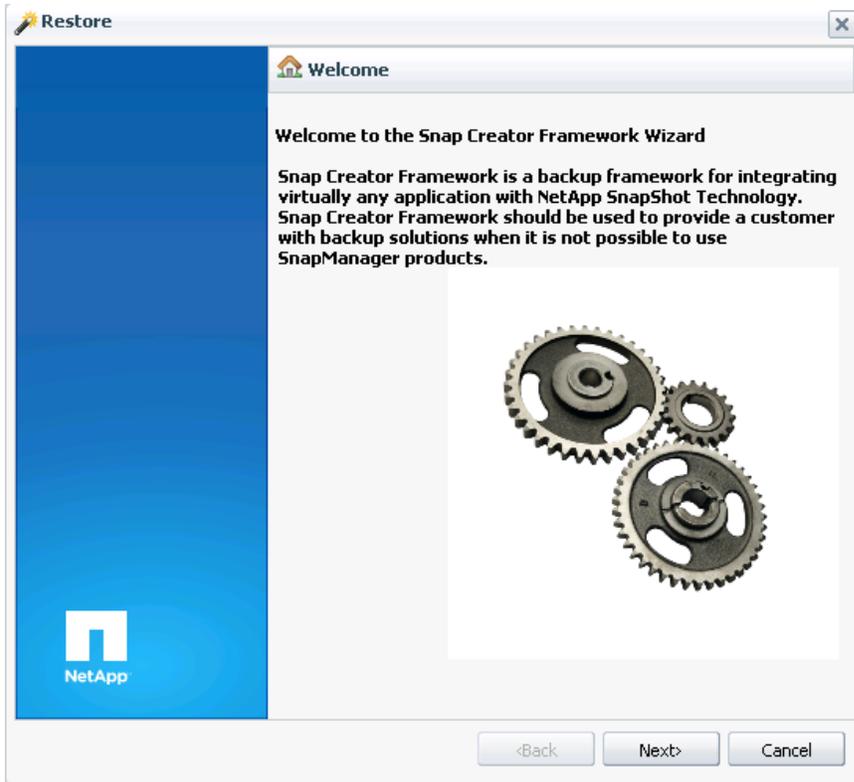
- Select the action button  and then select Restore.



2. Select the checkbox to use a global configuration file. Otherwise, leave the checkbox unselected.



3. Click Ok. The Welcome screen appears.



4. Click Next to continue. The Restore details window appears.
5. Select the controller, restore volume name, policy, restore Snapshot name, and restore type from the drop-down menus. The shows the Restore details window with Single-file Restore selected.

Restore

Restore details.
Enter Controller name, Volume Name, Policy, Snapshot name and Restore type.

Controller name: mystique

Restore volume name: fuji20_Linux_DomData

Policy: daily

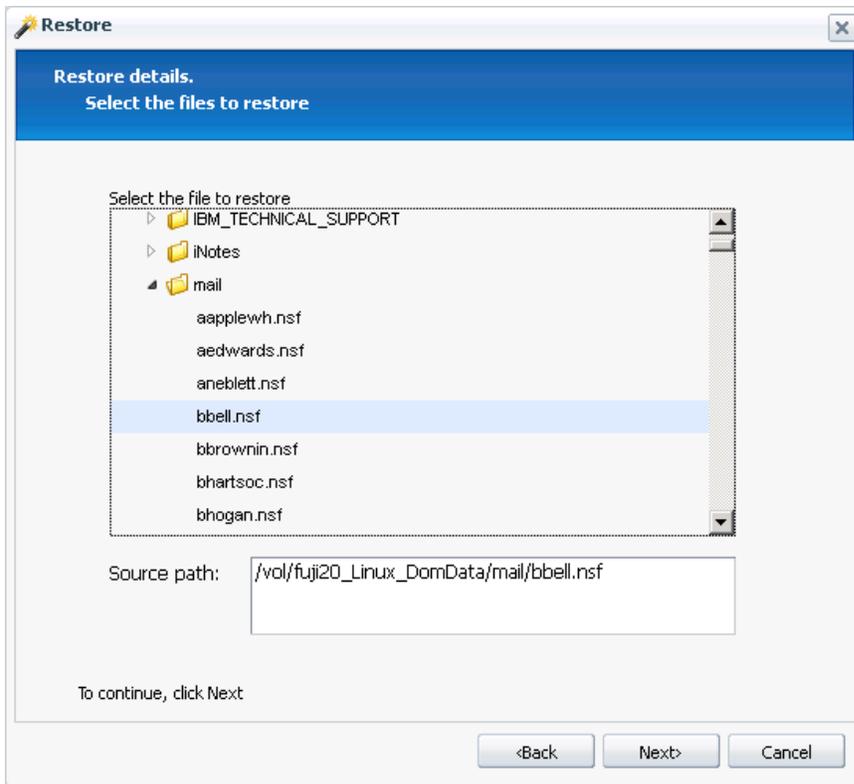
Restore Snapshot Name: lindom8-daily_20111121122729 (N)

Restore type: Single File Restore

To continue, click Next

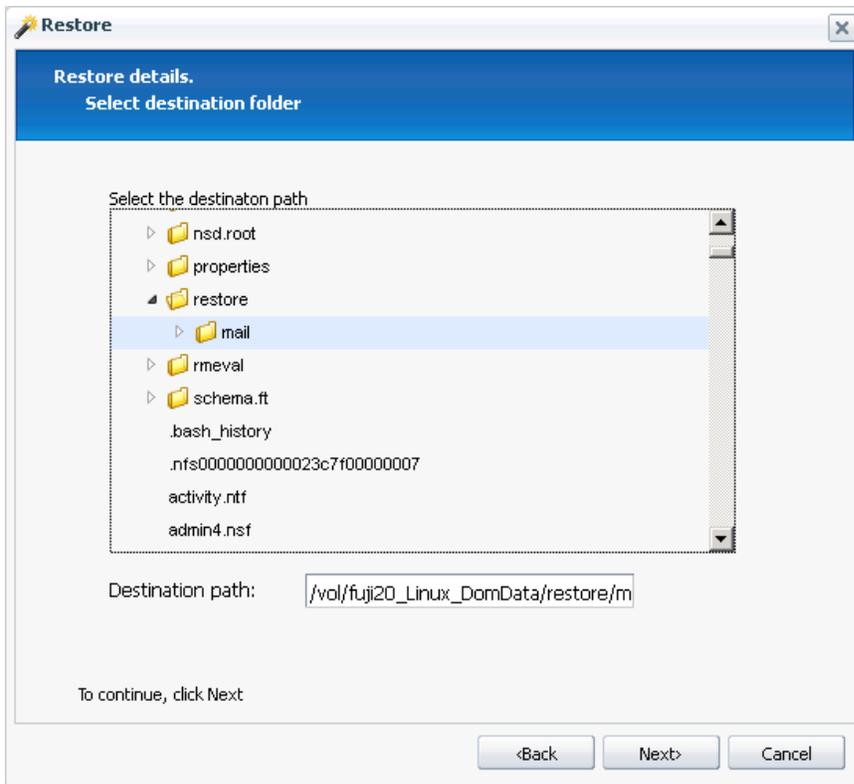
<Back Next> Cancel

6. Click Next to continue. The Select files to restore window appears.
 7. Browse through the directory structure and select the file to restore.
- Note:** With Domino, only a single file can be restored at a time.



Note: Notice that the path in the example is from the perspective of the storage system, not the server file system, because the file is restored at the storage system level.

8. Click Next. The Select destination folder window appears.
9. Browse the directory to select a location in which to restore the file. For the postrestore operation (in which changeinfo is applied) to be successful, the subdirectory structure must match. For example, in step 7 the selected file is `/mail/bbell.nsf`. Snap Creator does not create subdirectories. Therefore, if the subdirectory `/mail` doesn't already exist, it must be created in the restore path. The example shows the proper directory structure for restoring the file to `/restore/mail/bbell.nsf`.



Note: Notice that the path is shown from the perspective of the storage system, not the server file system, because the file is restored at the storage system level.

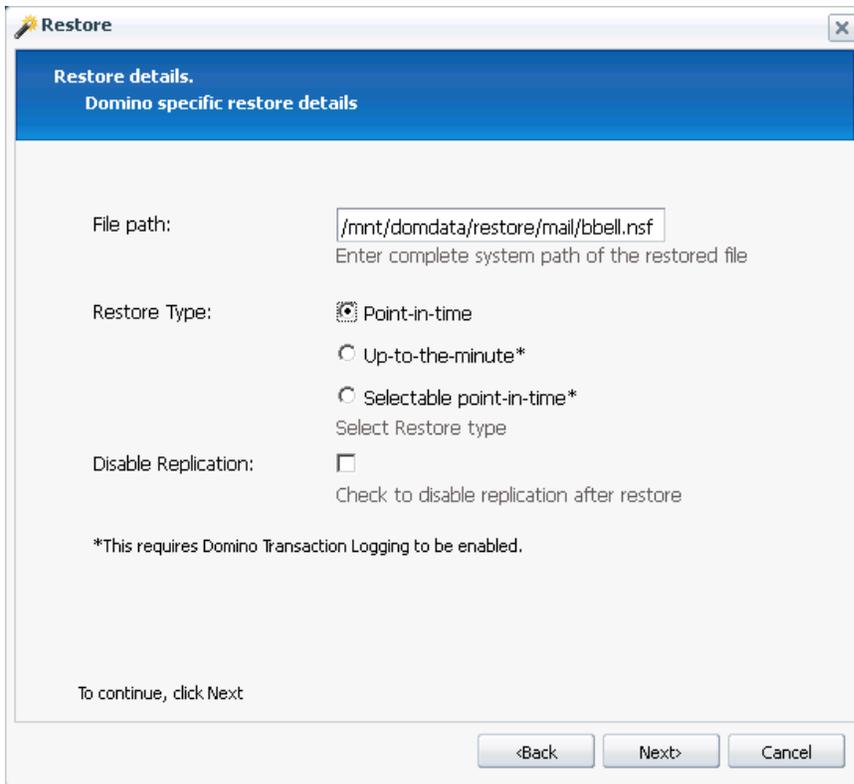
10. Click Next to continue.

Note: At this stage in the restore operation, one of the three restore options must be selected: point-in-time restore, up-to-the-minute restore, or selectable point-in-time restore. The steps for each restore option are described individually in the following sections.

POINT-IN-TIME SINGLE-DATABASE RESTORE USING THE GUI

The point-in-time option restores a single database to the point in time of the Snapshot copy. Follow these instructions to perform a point-in-time single-database restore from the GUI:

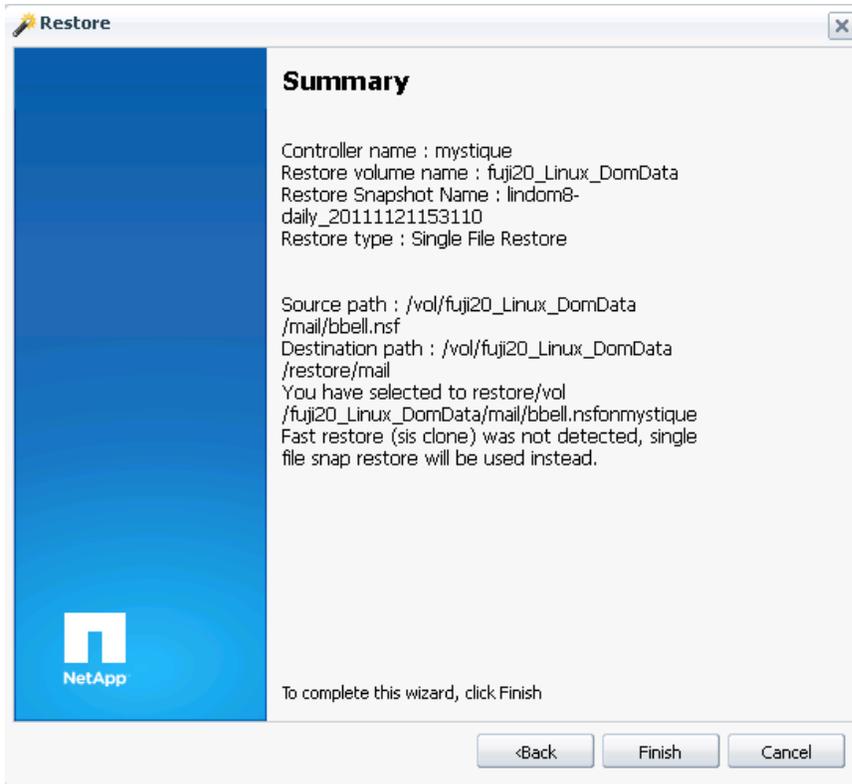
1. Select the point-in-time option to continue with the restore.



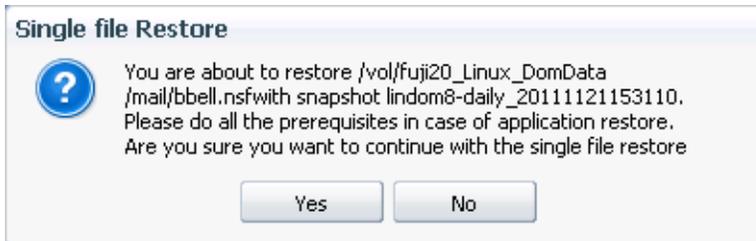
Note: Although Snap Creator Framework 3.5 and later versions attempt to complete the file path based on the input supplied, carefully verify the file path to make sure that it is correct.

Optionally, choose to disable Domino replication upon restore. This option generates the replica ID to keep changes to the database from replicating back to the database after a restore. Select the Disable Replication checkbox to set this option.

2. Click Next to continue. The Summary window appears.



3. Confirm the settings, and then click Finish to continue. A confirmation box appears.



4. Click Yes to continue. After the single-file restore is complete, a message that indicates success appears.



5. Click Ok to complete the restore operation.

UP-TO-THE-MINUTE SINGLE-DATABASE RESTORE USING THE GUI

The up-to-the-minute option restores a single database to the point in time of the Snapshot copy, after which Domino transaction logs can be applied to the most recent information available. This action

essentially restores the database up to the current time. The up-to-the-minute single-database restore option requires that the Domino transaction logs are enabled both on the Domino server and on the specific database and that all required transaction logs are available. Follow these instructions to perform an up-to-the-minute single-database restore from the GUI:

1. Select the up-to-the-minute option to continue with the restore.

Restore

Restore details.
Domino specific restore details

File path:
Enter complete system path of the restored file

Restore Type:

Point-in-time

Up-to-the-minute*

Selectable point-in-time*

Select Restore type

Disable Replication:
Check to disable replication after restore

*This requires Domino Transaction Logging to be enabled.

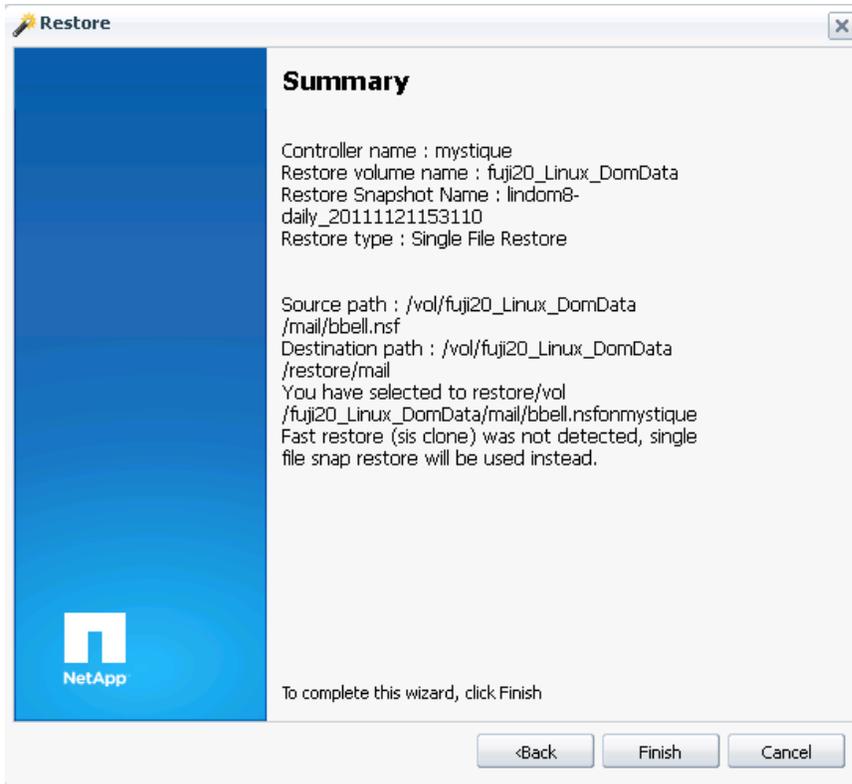
To continue, click Next

<Back Next> Cancel

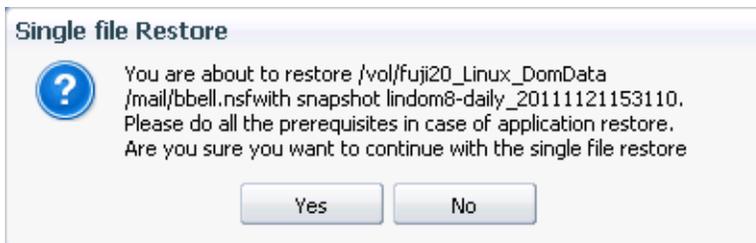
Note: Although Snap Creator Framework 3.5 and later versions attempt to complete the file path based on the input supplied, carefully verify the file path to make sure that it is correct.

Optionally, choose to disable Domino replication upon restore. This option generates the replica ID to keep changes to the database from replicating back to the database after a restore. Select the Disable Replication checkbox to set this option.

2. Click Next to continue. The Summary window appears.



3. Confirm the settings, and then click Finish to continue. A confirmation box appears.



4. Click Yes to continue. After the single-file restore is complete, a message that indicates success appears.



5. Click Ok to complete the restore operation.

SELECTABLE POINT-IN-TIME SINGLE-DATABASE RESTORE USING THE GUI

The selectable point-in-time option restores a single database to the point in time of a selected Snapshot copy, after which Domino transaction logs can be applied to a selectable point in time. In other words, if a Snapshot copy was created at 12 p.m. on November 21, 2011, the transaction logs can be applied to

restore information from 1:15 p.m. on November 21, 2011. The selectable point-in-time single-database restore option requires that the Domino transaction logs are enabled both on the Domino server and on the specific database and that all required transaction logs are available.

Note: Be aware that with selectable point-in-time single-database restore, there could be multiple time stamps, such as the time stamp of the Snapshot copy and the time stamp of the server. The database is restored to the point in time of the Snapshot copy, but when transaction logs are applied, Snap Creator tries to restore to the time stamp on the Domino server (which might have a different time stamp than the Snapshot copy).

1. Select the selectable point-in-time option to continue with the restore. The selectable point-in-time option restores a file to the point in time of the Snapshot copy and then plays forward the transaction logs to a specific point in time.

Restore

Restore details.
Domino specific restore details

File path:
Enter complete system path of the restored file

Restore Type:
 Point-in-time
 Up-to-the-minute*
 Selectable point-in-time*
Select Restore type

Date:
Time: : :

Ignore Validation:
Check if controller and server time don't match

Disable Replication:

*This requires Domino Transaction Logging to be enabled.

To continue, click Next

<Back Next> Cancel

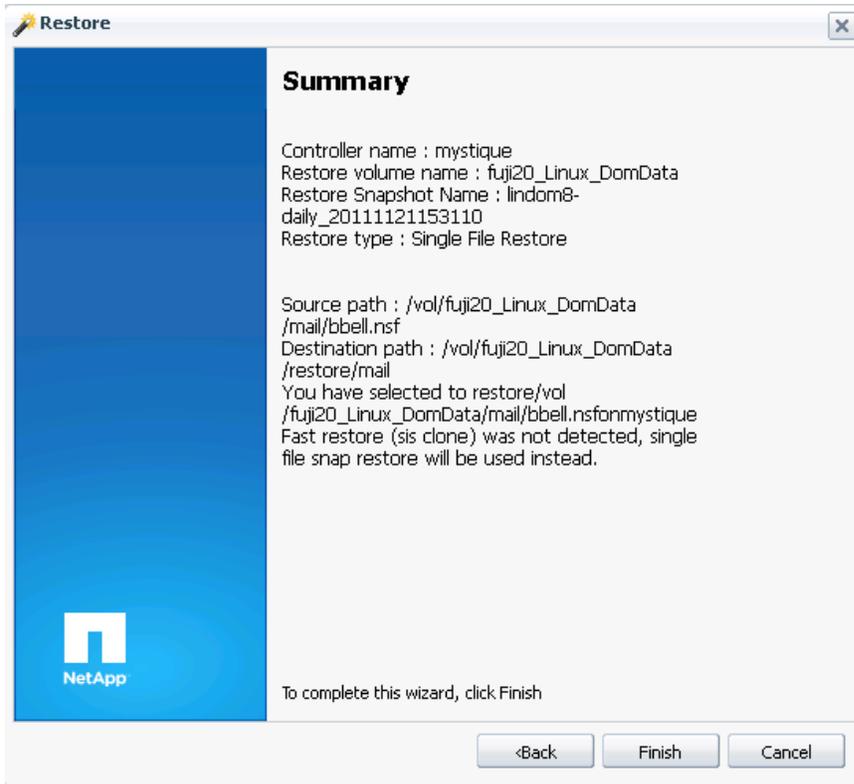
Note: Although Snap Creator Framework 3.5 and later versions attempt to complete the file path based on the input supplied, carefully verify the file path to make sure that it is correct.

Optionally, choose to disable Domino replication upon restore. This option generates the replica ID to keep changes to the database from replicating back to the database after a restore. Select the Disable Replication checkbox to set this option.

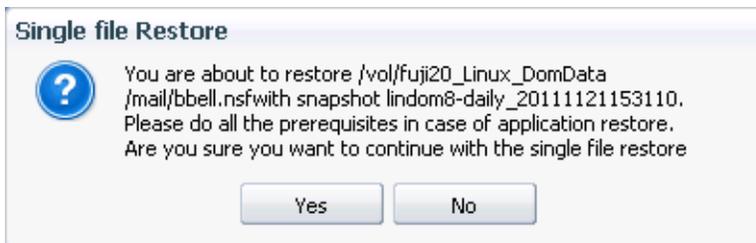
2. Select the restore time and date from the calendar widget.

Note: Choose a time and date after the time and date that the Snapshot copy was created. Transaction logs can only play forward, not backward. The selected time and date are from the perspective of the Domino server.

3. Click Next to continue. The Summary window appears.



4. Confirm the settings, and then click Finish to continue. A confirmation box appears.



5. Click Yes to continue. After the single-file restore is complete, a message that indicates success appears.



6. Click Ok to complete the restore operation.

12.3 VOLUME RESTORE USING THE CLI

A full volume restore can be completed using the Snap Creator CLI. The CLI restore operation is an interactive process. This operation is a point-in-time restore in which the Domino server is restored to the point in time of the selected Snapshot copy.

In the event of a volume restore, set `DOMINO_RESTORE_DATA_PATH` to the same value as the `DOMINO_DATA_PATH` in the configuration file. The path must be set properly to make sure that the change information is applied correctly to the restored databases.

Note: Before initiating a volume restore on a Domino server, make sure that Domino server is not running.

1. Enter the following command to initiate the restore:

```
snapcreator.exe --action restore --profile domino --policy daily --config lindom8
```

Where:

- `--action restore` indicates the action; in this case, restore indicates a restore will be performed.
- `--profile domino` indicates the name of the profile, in this case, domino.
- `--policy daily` indicates the policy used, in this case, daily.
- `--config lindom8` indicates that the `lindom8` is the configuration file. This parameter is needed when multiple configuration files are present within the profile, or when the profile name is different from the configuration name.

The following message appears:

```
### You have chosen to do a snap restore on one or more volumes for the Config:
lindom8 Policy: daily ###
Are you sure you want to continue (y|n)?
```

2. Enter Y and press Enter to continue. A prompt appears to select the volume to restore.

```
### Volume Menu for mystique ###
01. fuji20_Linux_DomData
02. fuji20_Linux_DomTxn
Select a volume for snapshot restore (enter a number, "n" for next filer, "c" to
continue, or "q" to quit):
```

3. Enter the number of the volume to restore, and then press Enter to continue. In this example, volume 01 was selected, and the Snapshot copies that are available in the selected volume appear.

```
### Snapshot Menu for mystique:fuji20_Linux_DomData ###
01. lindom8-daily_20111121144636 (Nov 21 2011 16:11:12)
02. lindom8-daily_20111121144003 (Nov 21 2011 16:04:41)
03. lindom8-daily_20111121123010 (Nov 21 2011 13:54:52)
04. lindom8-daily_20111121122729 (Nov 21 2011 13:52:21)
05. lindom8-daily_20111121104347 (Nov 21 2011 12:08:49)
06. lindom8-daily_20111121085734 (Nov 21 2011 10:22:14)
07. lindom8-daily_20111121084512 (Nov 21 2011 10:09:54)
Select a snapshot for restore (enter a number or "q" to quit):
```

4. Enter the number of the Snapshot copy to restore, and then press Enter to continue. In this example, Snapshot copy 02 was selected. A prompt appears to ask which type of restore operation to perform.

```
### Restore Menu for mystique:fuji20_Linux_DomData snapshot lindom8-
daily_20111121144003 ###
01. Volume Restore
02. Single File Restore
Select a restore type (enter a number, or "q" to quit):
```

5. Enter the number of the type of restore to perform. In this example, 01 was selected to perform for a volume restore. A confirmation message appears.

```
WARN: You have selected to do a volume restore, All data in
mystique:fuji20_Linux_DomData will be reverted to snapshot 1
indom8-daily_20111121144003
WARN: All data in mystique:fuji20_Linux_DomData from Nov 21 2011 16:04:41 to Nov 21
2011 15:20:57 will be lost!!!
Are you sure you want to continue with the restore (y|n)?
```

6. Enter Y and press Enter to continue with the volume restore. A message appears to confirm that the volume restore finished successfully, and the screen returns to the volume menu.

```
INFO: NetApp Snapshot Volume Restore of lindom8-daily_20111121144003 on
mystique:fuji20_Linux_DomData finished successfu
lly

### Volume Menu for mystique ###
01. fuji20_Linux_DomData
02. fuji20_Linux_DomTxn
Select a volume for snapshot restore (enter a number, "n" for next filer, "c" to
continue, or "q" to quit):
```

7. Select another volume to restore, if necessary. If multiple storage systems are being used, enter N to view the volume from the next one. Otherwise, enter C and press Enter to continue.

Note: NetApp does not recommend using option Q unless an error has occurred. Using the Q or quit option causes Snap Creator to exit without performing any postrestore activities.

In this example, C was selected. The following message appears:

```
INFO: Completing restore and running an post-restore commands that may be defined
```

After the postrestore operation is complete, the command prompt returns.

12.4 SINGLE-DATABASE RESTORE USING THE CLI

A single-file restore can be completed using the Snap Creator CLI.

Note: Single-file restore operations only work with the NFS protocol. The NFS protocol is defined as the NFS file system mounted on the physical host or virtual machine.

The CLI restore operation is an interactive process. There are three types of single-file restore options available from the CLI, including:

- **Single-file restore (point in time).** Restores a single file to the point in time of the selected Snapshot copy.
- **Single-file restore (up to the minute).** Restores a single file, then plays forward the Domino transaction logs to the most recent copy.

Note: This option requires Domino transaction logging to be enabled.

- **Single-file restore (selectable point in time).** Restores a single file and then plays forward the Domino transaction logs to a specified point in time. For example, a Snapshot copy created on December 15, 2011 at 10 a.m. can be restored to December 16, 2011 at 9:45 a.m.

Note: This option requires Domino transaction logging to be enabled. Transaction logs can only be played forward. Selecting a time before the Snapshot copy was created causes an error.

In the event of a single-file restore, the `DOMINO_RESTORE_DATA_PATH` should be set to a different value than the `DOMINO_DATA_PATH` in the configuration file. The `DOMINO_RESTORE_DATA_PATH` needs to be on the same volume as the `DOMINO_DATA_PATH`. Typically, this is just a different subdirectory. The path

must be set properly to make sure that the change information is correctly applied to the restored databases.

Note: A single-file restore can be performed while the Domino server is running.

1. Enter the following command to initiate the restore:

```
snapcreator.exe --action restore --profile domino --policy daily --config lindom8
```

Where:

- `--action restore` indicates the action; in this case, restore indicates a restore will be performed.
- `--profile domino` indicates the name of the profile, in this case, domino.
- `--policy daily` indicates the policy used, in this case, daily.
- `--config lindom8` indicates that the `lindom8` is the configuration file. This parameter is needed when multiple configuration files are present within the profile, or when the profile name is different from the configuration name.

The following message appears:

```
### You have chosen to do a snap restore on one or more volumes for the Config:
lindom8 Policy: daily ###
Are you sure you want to continue (y|n)?
```

2. Enter Y and press Enter to continue. A prompt appears to select the volume to restore.

```
### Volume Menu for mystique ###
01. fuji20_Linux_DomData
02. fuji20_Linux_DomTxn
Select a volume for snapshot restore (enter a number, "n" for next filer, "c" to
continue, or "q" to quit):
```

3. Enter the number of the volume to restore, and then press Enter to continue. In this example, volume 01 was selected, and the Snapshot copies that are available in the selected volume appear.

```
### Snapshot Menu for mystique:fuji20_Linux_DomData ###
01. lindom8-daily_20111121144636 (Nov 21 2011 16:11:12)
02. lindom8-daily_20111121144003 (Nov 21 2011 16:04:41)
03. lindom8-daily_20111121123010 (Nov 21 2011 13:54:52)
04. lindom8-daily_20111121122729 (Nov 21 2011 13:52:21)
05. lindom8-daily_20111121104347 (Nov 21 2011 12:08:49)
06. lindom8-daily_20111121085734 (Nov 21 2011 10:22:14)
07. lindom8-daily_20111121084512 (Nov 21 2011 10:09:54)
Select a snapshot for restore (enter a number or "q" to quit):
```

4. Enter the number of the Snapshot copy to restore, and then press Enter to continue. In this example, Snapshot copy 02 was selected. A prompt appears that asks which type of restore operation to perform.

```
### Restore Menu for mystique:fuji20_Linux_DomData snapshot lindom8-
daily_20111121144003 ###
01. Volume Restore
02. Single File Restore
Select a restore type (enter a number, or "q" to quit):
```

5. Enter the number of the type of restore to perform. In this example, 02 was selected to perform a single-file restore. A message appears.

```
Would you like to bypass file selection and manually enter a file for restore (y|n)?
```

For applications or file systems with a small number of files, an automated menu can be displayed to allow file selection. With Domino, however, there might be hundreds or thousands of files. NetApp recommends manually entering the name of the file to restore.

6. Enter Y to manually enter a file name for restore, and then press Enter to continue. A prompt appears that asks for the path to the file to restore.

```
Enter the path to the file you would like to restore under /vol/fuji20_Linux_DomData
(relative path, or "q" to quit):
```

Note: The prompt asks for a path relative to the selected volume, so pay close attention to what already exists. Though it is not displayed, the path ends with a forward slash (/).

7. In this example, enter `mail/zwilliam.nsf` to restore the file `/vol/fuji20_Linux_DomData/mail/zwilliam.nsf`, and press Enter to continue.

Note: During this step, the Snap Creator interactive process is looking at the file from the perspective of the storage system.

A prompt appears that asks for the local path of the restored file on the storage system. The directory structure must match.

```
Enter complete system path of the restored file(eg:
/mnt/domino/data/RESTORE/activity.ntf):
```

8. In this example, enter `/mnt/domdata/restore/mail/zwilliam.nsf`, and then press Enter to continue.

Note: At this stage in the restore operation, choose one of the three restore options: point-in-time restore, up-to-the-minute restore, or selectable point-in-time restore. The steps for each restore option are described individually in the following sections.

POINT-IN-TIME SINGLE-DATABASE RESTORE USING THE CLI

The point-in-time option restores a file to the point in time of the Snapshot copy. Follow these instructions to perform a point-in-time restore from the CLI:

1. Enter 01 to continue with the point-in-time restore, and then press Enter.

```
### Restore Menu for Domino ###
01. Point-in-time
02. Up-to-the-minute
03. Selectable point-in-time
Select domino restore type (enter a number):
```

A prompt appears that asks to disable Domino replication upon restore.

```
Disable replication (y|n)?
```

Note: Sometimes a database is restored to recover a document or message that was accidentally deleted or corrupted. Disabling replication makes sure that other copies of the database in the environment cannot replicate undesirable changes to the database.

2. Enter either Y or N to select the replication option for the database, and then press Enter to continue. A prompt appears that summarizes the single-file restore selection and requests confirmation to continue with the operation.

```
You have selected to restore /vol/fuji20_Linux_DomData/mail/zwilliam.nsf on mystique.
Fast restore (sis clone) was not detected, single file snap restore will be used
instead. You will be prompted to select a restore location
Are you sure you want to continue with the single file restore (y|n)?
```

Enter Y, and then press Enter to continue. A prompt appears that asks if the restore operation should be performed to the original location of the file. Typically with Domino, the single-file restore does not restore back to the original location, but this is an option. This is a duplicate prompt: Enter information that is consistent with what has already been provided.

```
Do you want to Restore to original location
[/vol/fuji20_Linux_DomData/mail/zwilliam.nsf] (y|n):
```

3. For this example, select N, and then press Enter to continue. If N was selected, a prompt appears that asks for an alternative path for file restore.

```
Enter alternate path to file for restore:
```

Note: Notice the location listed in the example in step 0. The file is listed from the perspective of the storage system, not the local file system. The input in step 4 must be formatted in the same manner.

4. For this example, enter /vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf, and then press Enter to continue.

Note: Compare the path entered in this step to the path in the example in step 0. Notice that the subdirectory structure matches: zwilliam.nsf is in the mail subdirectory in the original location as well as the restore location. The subdirectory structures must match for the Domino transaction log information to be applied properly (if applicable).

A prompt appears to warn that a restore operation is about to occur.

```
WARN: You are about to restore /vol/fuji20_Linux_DomData/mail/zwilliam.nsf to
/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf with snapshot lindom8-
daily_20111122112020
Are you sure you want to continue (y|n)?
```

Carefully examine the paths and syntax to make sure both are correct.

Note: Look for extra forward slashes (/) in the paths. Extra forward slashes are common mistakes when manually entering a path in the CLI.

5. Enter Y, and then press Enter to continue. At this stage, the restore operation is complete. The file is restored to the file system, but none of the postrestore activities have occurred, such as applying change info.

A prompt appears that provides the opportunity to restore files on other volumes.

```
INFO: INFO: NetApp Single File Restore (SFSR) of lindom8-daily_20111122112020 on
mystique:/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf started successfully

### Volume Menu for mystique ###
01. fuji20_Linux_DomData
02. fuji20_Linux_DomTxn
Select a volume for snapshot restore (enter a number, "n" for next filer, "c" to
continue, or "q" to quit):
```

Note: The Domino plug-in currently only supports one file restored at a time. NetApp recommends entering C to continue.

6. Enter C, and then press Enter to continue.

Note: NetApp does not recommend using option Q unless an error has occurred. Using the Q or quit option causes Snap Creator to exit without performing any postrestore activities.

Postrestore operations occur in the background. Typically, these do not appear onscreen except, for example, with the `-debug` option. However, the postrestore output can be viewed in the logs folder.

A message similar to the following appears:

```
INFO: Completing restore and running an post-restore commands that may be defined
```

Once this process is complete, the command prompt returns, and the restore operation is complete.

UP-TO-THE-MINUTE SINGLE-DATABASE RESTORE USING THE CLI

The up-to-the-minute option restores a single database to the point in time of the Snapshot copy, after which Domino transaction logs can be applied to the most recent information available. This action essentially restores the database up to the current time. The up-to-the-minute single-database restore

option requires that the Domino transaction logs are enabled both on the Domino server and on the specific database and that all required transaction logs are available. Follow these instructions to perform an up-to-the-minute restore single-database restore from the CLI:

1. Enter 02 to continue with the up-to-the-minute restore, and then press Enter.

```
### Restore Menu for Domino ###
01. Point-in-time
02. Up-to-the-minute
03. Selectable point-in-time
Select domino restore type (enter a number):
```

A prompt appears that asks to disable Domino replication upon restore.

```
Disable replication (y|n)?
```

Note: Sometimes a database is restored to recover a document or message that was accidentally deleted or corrupted. Disabling replication makes sure that other copies of the database in the environment cannot replicate undesirable changes to the database.

Enter either Y or N to select the replication option for the database, and then press Enter to continue. A prompt appears that summarizes the single-file restore selection and asks to confirm whether to continue with the operation.

```
You have selected to restore /vol/fuji20_Linux_DomData/mail/zwilliam.nsf on mystique.
Fast restore (sis clone) was not detected, single file snap restore will be used
instead. You will be prompted to select a restore location
Are you sure you want to continue with the single file restore (y|n)?
```

2. Enter Y, and then press Enter to continue. A prompt appears that asks if the restore operation should be performed to the original location of the file. Typically with Domino, the single-file restore does not restore back to the original location, but this is an option. This is a duplicate prompt: Make sure the information entered is consistent with what has already been provided.

```
Do you want to Restore to original location
[/vol/fuji20_Linux_DomData/mail/zwilliam.nsf] (y|n):
```

3. For this example, select N, and then press Enter to continue. If N was selected, a prompt appears that asks for an alternative path for file restore.

```
Enter alternate path to file for restore:
```

Note: Notice the location listed in the example in step 2. The file is listed from the perspective of the storage system, not the local file system. The input in step 4 must be formatted in the same manner.

4. For this example, enter `/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf`, and then press Enter to continue.

Note: Compare the path entered in this step to the path in the example in step 0. Notice that the subdirectory structure matches: `zwilliam.nsf` is in the `mail` subdirectory in the original location as well as the restore location. The subdirectory structures must match for the Domino transaction log information to be applied properly (if applicable).

A prompt appears warning that a restore operation is about to occur.

```
WARN: You are about to restore /vol/fuji20_Linux_DomData/mail/zwilliam.nsf to
/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf with snapshot lindom8-
daily_20111122112020
Are you sure you want to continue (y|n)?
```

Carefully examine the paths and syntax to make sure both are correct.

Note: Look for extra forward slashes (`/`) in the paths. Extra forward slashes are common mistakes when manually entering a path in the CLI.

5. Enter Y, and then press Enter to continue. At this stage, the restore operation is complete. The file is restored to the file system, but none of the postrestore activities have occurred, such as applying change info.

A prompt appears that provides the opportunity to restore files on other volumes.

```
INFO: INFO: NetApp Single File Restore (SFSR) of lindom8-daily_20111122112020 on
mystique:/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf started successfully

### Volume Menu for mystique ###
01. fuji20_Linux_DomData
02. fuji20_Linux_DomTxn
Select a volume for snapshot restore (enter a number, "n" for next filer, "c" to
continue, or "q" to quit):
```

Note: The Domino plug-in currently only supports one file restored at a time. NetApp recommends entering C to continue.

6. Enter C, and then press Enter to continue.

Note: NetApp does not recommend using option Q unless an error has occurred. Using the Q or quit option causes Snap Creator to exit without performing any postrestore activities.

Postrestore operations occur in the background. Typically, these do not appear onscreen except, for example, with the `-debug` option. However, the postrestore output can be viewed in the logs folder.

A message similar to the following appears:

```
INFO: Completing restore and running an post-restore commands that may be defined
```

Once this process is complete, the command prompt returns, and the restore operation is complete.

SELECTABLE POINT-IN-TIME SINGLE-DATABASE RESTORE USING THE CLI

The selectable point-in-time option restores a single database to the point in time of a selected Snapshot copy, after which the Domino transaction logs can be applied to a selectable point in time. In other words, if a Snapshot copy was created at 12 p.m. on November 21, 2011, the transaction logs can be applied to restore information from 1:15 p.m. on November 21, 2011. The selectable point-in-time single-database restore option requires that the Domino transaction logs are enabled both on the Domino server and on the specific database and that all required transaction logs are available.

Note: Be aware that with selectable point-in-time single-database restore, there could be multiple time stamps, such as the time stamp of the Snapshot copy and the time stamp of the server. The database is restored to the point in time of the Snapshot copy (the time stamp of the storage system), but when transaction logs are applied, Snap Creator tries to restore to the time stamp on the Domino server (which might have a different time stamp than the Snapshot copy).

1. Enter 03 to continue with the selectable point-in-time restore, and then press Enter.

```
### Restore Menu for Domino ###
01. Point-in-time
02. Up-to-the-minute
03. Selectable point-in-time
Select domino restore type (enter a number):
```

A prompt appears that asks for the time and date to which the Domino transaction logs will be played forward.

```
Enter time in the following format 'MM/dd/yyyy HH:mm:ss' (eg: 09/15/2011 17:13:00):
```

2. For this example, enter the following time and date, and then press Enter.

```
11/22/2011 13:15:00
```

A prompt appears that asks to disable Domino replication upon restore.

```
Disable replication (y|n)?
```

Note: Sometimes a database is restored to recover a document or message that was accidentally deleted or corrupted. Disabling replication makes sure that other copies of the database in the environment cannot replicate undesirable changes to the database.

3. Enter either Y or N to select the replication option for the database, and then press Enter to continue. A prompt appears that summarizes the single-file restore selection and requests confirmation to continue with the operation.

```
You have selected to restore /vol/fuji20_Linux_DomData/mail/zwilliam.nsf on mystique.
Fast restore (sis clone) was not detected, single file snap restore will be used
instead. You will be prompted to select a restore location
Are you sure you want to continue with the single file restore (y|n)?
```

Enter Y, and then press Enter to continue. A prompt appears that asks if the restore operation should be performed to the original location of the file. Typically with Domino, the single-file restore does not restore back to the original location, but this is an option. This is a duplicate prompt: Make sure the information entered is consistent with what has already been provided.

```
Do you want to Restore to original location
[/vol/fuji20_Linux_DomData/mail/zwilliam.nsf] (y|n):
```

4. For this example, select N, and then press Enter to continue. If N was selected, a prompt appears that asks for an alternative path for file restore.

```
Enter alternate path to file for restore:
```

Note: Notice the location listed in the example in step 0. The file is listed from the perspective of the storage system, not the local file system. The input in step 5 must be formatted in the same manner.

5. For this example, enter `/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf`, and then press Enter to continue.

Note: Compare the path entered in this step to the path in the example in step 0. Notice that the subdirectory structure matches: `zwilliam.nsf` is in the `mail` subdirectory in the original location as well as the restore location. The subdirectory structures must match for the Domino transaction log information to be applied properly (if applicable).

A prompt appears warning that a restore operation is about to occur.

```
WARN: You are about to restore /vol/fuji20_Linux_DomData/mail/zwilliam.nsf to
/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf with snapshot lindom8-
daily_20111122112020
Are you sure you want to continue (y|n)?
```

Carefully examine the paths and syntax to make sure both are correct.

Note: Look for extra forward slashes (`/`) in the paths. Extra forward slashes are common mistakes when manually entering a path in the CLI.

6. Enter Y, and then press Enter to continue. At this stage, the restore operation is complete. The file is restored to the file system, but none of the postrestore activities have occurred, such as applying change info.

A prompt appears that provides the opportunity to restore files on other volumes.

```
INFO: INFO: NetApp Single File Restore (SFSR) of lindom8-daily_20111122112020 on
mystique:/vol/fuji20_Linux_DomData/restore/mail/zwilliam.nsf started successfully

### Volume Menu for mystique ###
01. fuji20_Linux_DomData
02. fuji20_Linux_DomTxn
```

```
Select a volume for snapshot restore (enter a number, "n" for next filer, "c" to
continue, or "q" to quit):
```

Note: The Domino plug-in currently only supports one file restored at a time. NetApp recommends entering C to continue.

7. Enter C, and then press Enter to continue.

Note: NetApp does not recommend using option Q unless an error has occurred. Using the Q or quit option causes Snap Creator to exit without performing any postrestore activities.

Postrestore operations occur in the background. Typically, these do not appear onscreen except, for example, with the `-debug` option. However, the postrestore output can be viewed in the logs folder.

A message similar to the following appears:

```
INFO: Completing restore and running an post-restore commands that may be defined
```

Once this process is complete, the command prompt returns, and the restore operation is complete.

12.5 SINGLE-FILE RESTORE WITH SNAPDRIVE

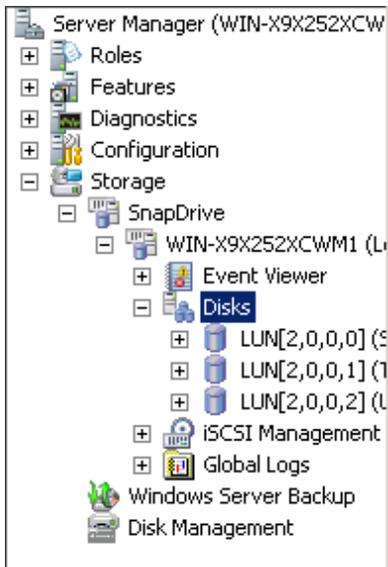
The single-file restore options included with the Snap Creator Framework only work with the NFS protocol, because Snap Creator cannot perform the block-to-file conversion that is necessary when using block-based protocols, such as iSCSI or Fibre Channel (FC). With block-based protocols, the file information is typically encapsulated in LUNs. If a single-file restore is initiated through Snap Creator, Snap Creator can only see the underlying LUN. The same is true when using virtual machine disk (VMDK) datastores: all that can be seen is the `.vmdk` file.

For customers in this situation, NetApp recommends using SnapDrive. SnapDrive can mount a point-in-time Snapshot copy to a mountpoint on the local host where Snap Drive is installed. This allows Snapshot copies to be easily mounted and unmounted for quick access to files, databases, templates, and so on. Customers using block-based protocols can also use SnapDrive to perform point-in-time single-file restore operations.

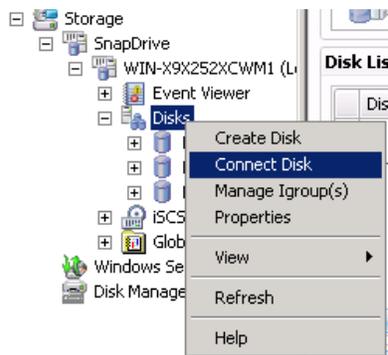
In a Windows 2008 environment, SnapDrive is installed as a computer management snap-in and is accessible from the Server Manager. Follow these instructions to mount a Snapshot copy for single-file restore using SnapDrive:

Note: It is assumed that SnapDrive is already installed and working in the environment.

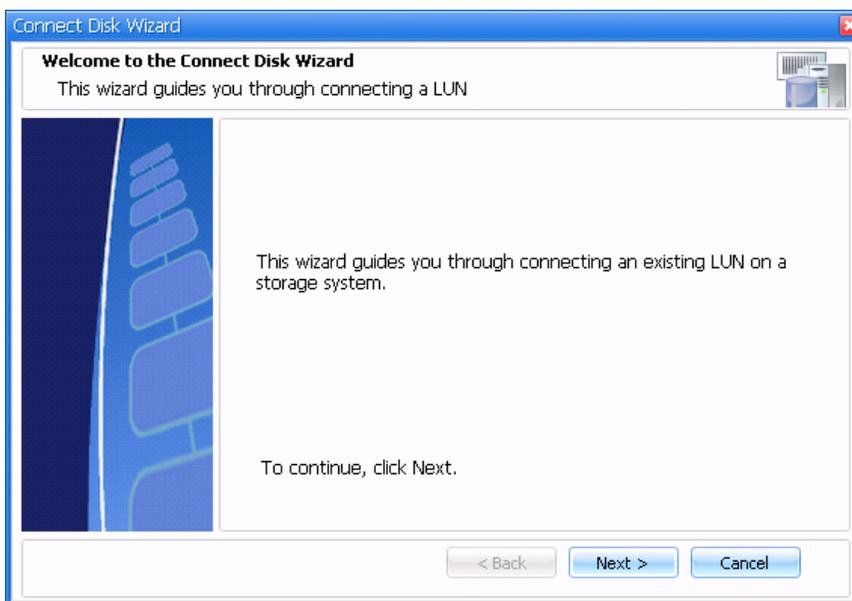
1. Open Server Manager, and then click to expand Storage > SnapDrive.
2. From the SnapDrive menu, click to expand the physical server name folder and select Disks.



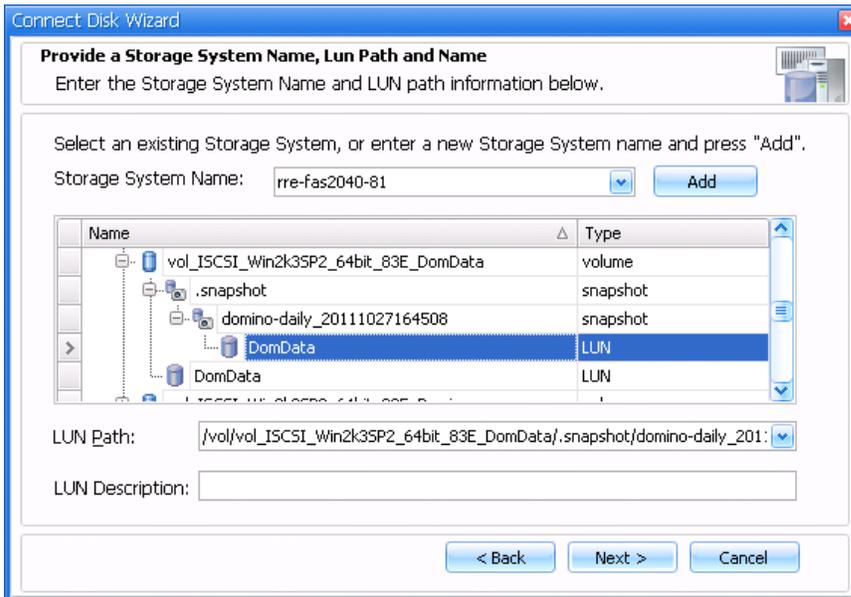
3. Right-click Disks and select Connect Disk to connect a Snapshot copy.



The Connect Disk Wizard appears.



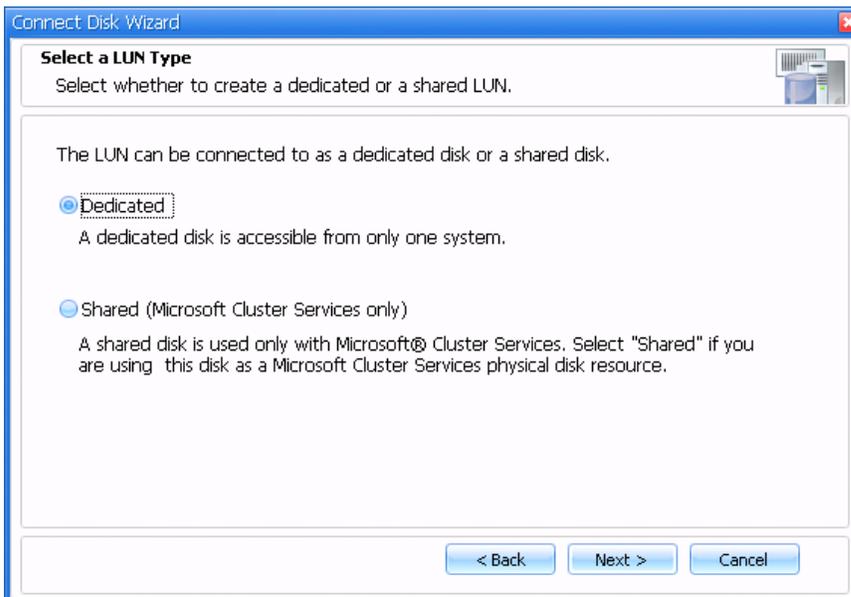
4. Click Next to continue.
5. Select the storage system, volume, and Snapshot copy to connect.



Notice under the selected volume, there is a directory named `.snapshot`. This directory contains all of the Snapshot copies available on the volume. Expanding the Snapshot copy displays a list of the underlying LUNs. For example, the figure displays the `DomData` LUN selected on the Snapshot copy.

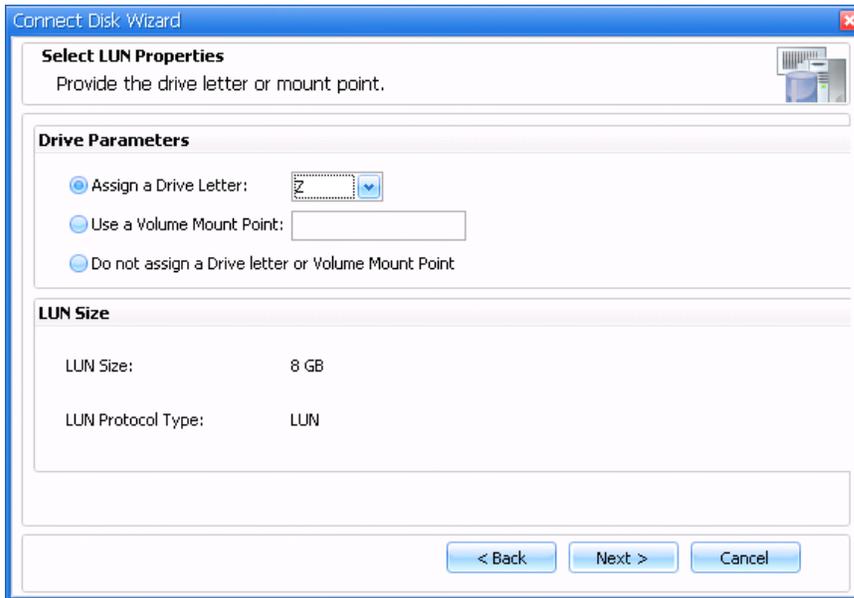
6. Click Next to continue.
7. Select the LUN type, either dedicated or shared.

Note: Typically, the default setting of dedicated is accepted.



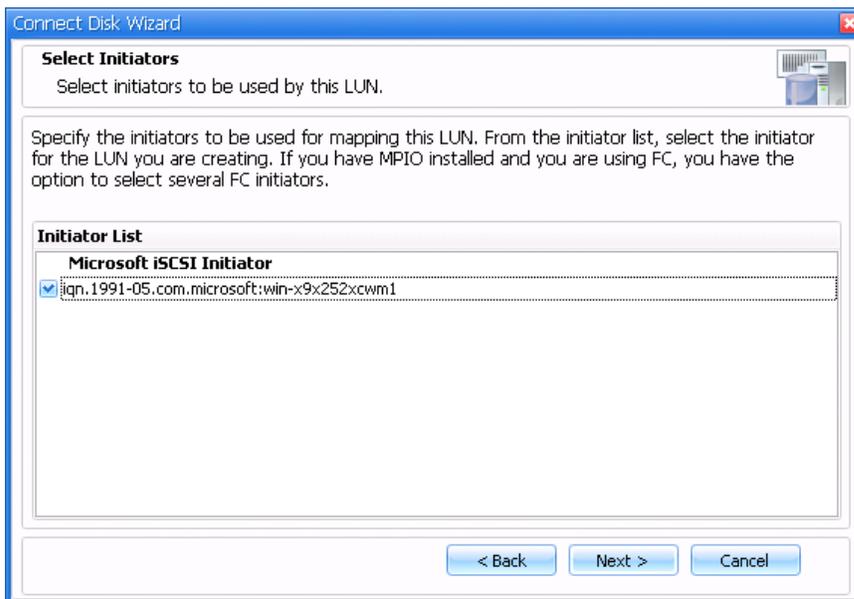
8. Click Next to continue.
9. Set the LUN properties for the Snapshot copy to be mounted.

Note: Typically, the drive letter is the only setting that is configured at this stage.



10. Click Next to continue.

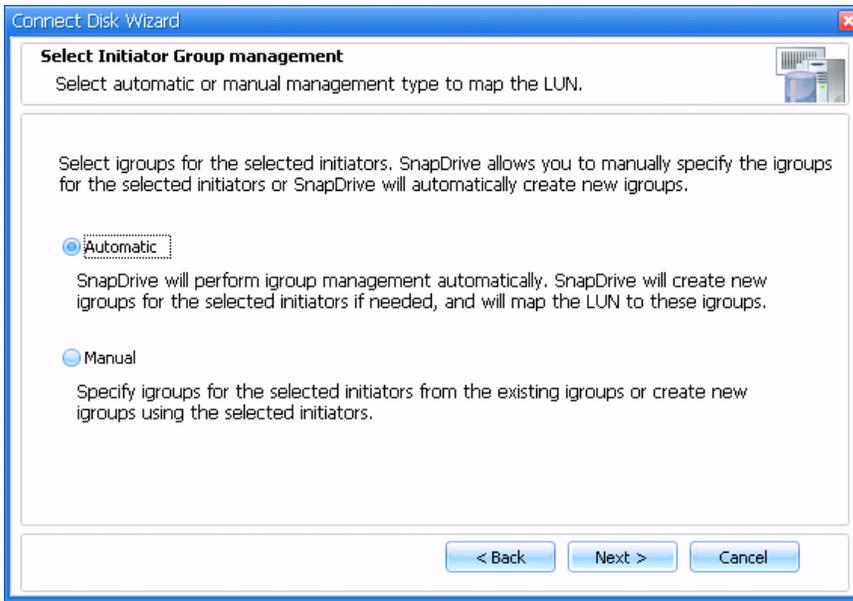
11. Select an iSCSI initiator or HBA. In this example, the system uses iSCSI, so an iSCSI initiator is requested.



12. Click Next to continue.

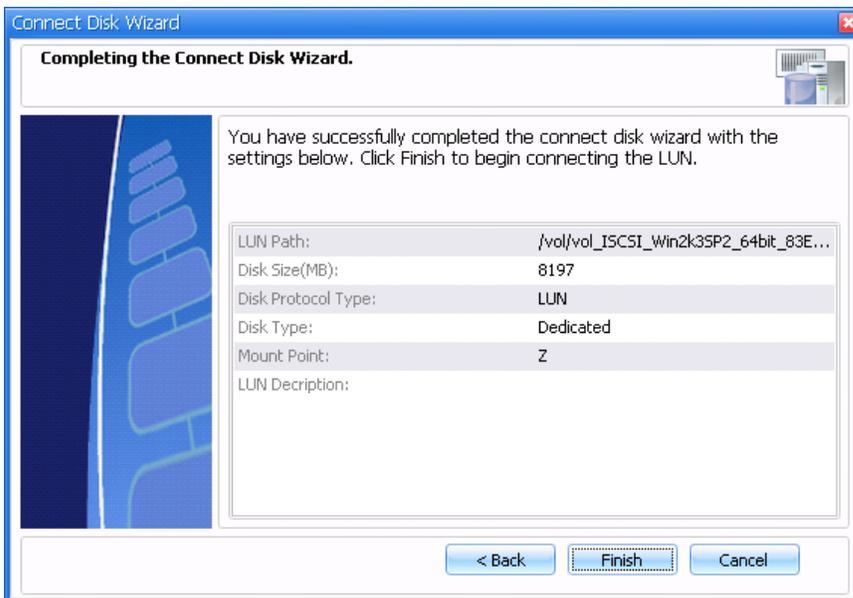
13. Select initiator group management.

Note: For temporarily mounting a Snapshot copy, select automatic, which is the default setting. This differs slightly if FC is being used.

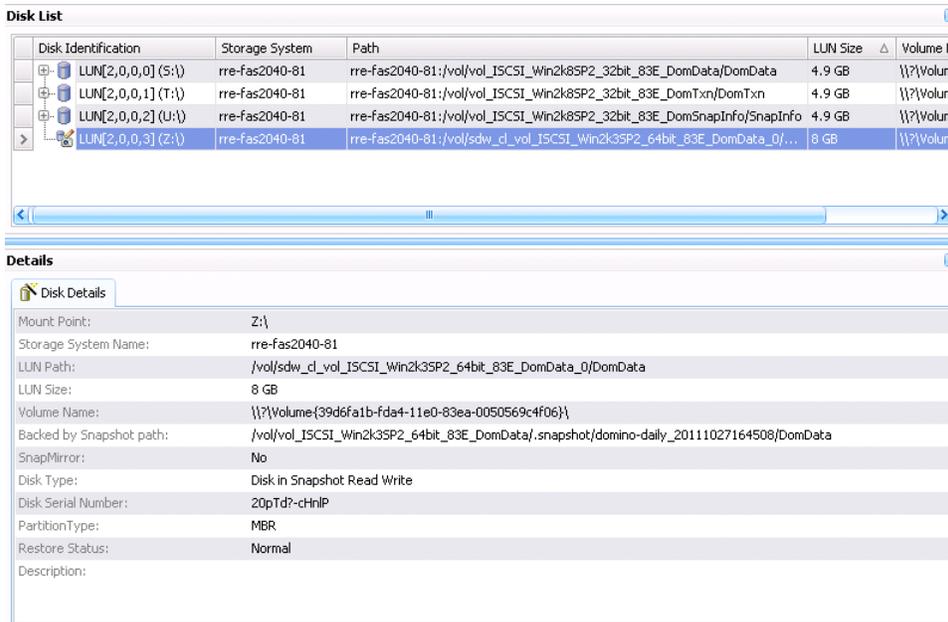


14. Click Next to continue. A summary window appears.

15. Confirm the settings.



16. Click Finish to accept the settings. The selected Snapshot copy is mounted to the chosen mountpoint. The example shows the disk list and details from Snap Creator after the Snapshot copy is mounted.



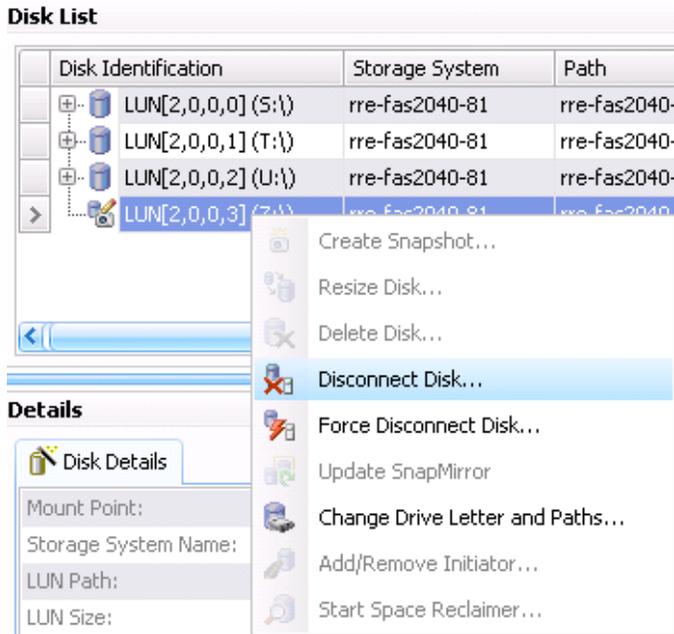
In the figure, the drive to which the Snapshot copy was mounted is selected. The LUN path (located under Disk Details) indicates the name of the mounted LUN.

Notice in the example that the LUN path begins with /vol/sdw_cl_vol.... Cl_vol indicates that NetApp FlexClone[®] is enabled on the storage system, and a clone was automatically made of the Snapshot copy. This means that the mounted Z drive is a read/write file system. If FlexClone is not enabled on the storage system, the Snapshot copy is read only.

Now the Z drive can be browsed, just like the production Domino file system. Open a database from the Domino administrator client, or copy and paste the file into a new location. At this point, several different operations are possible, depending on the desired workflow.

After the needed databases or information is recovered, remove the mounted Snapshot copy using SnapDrive.

17. To remove the mounted Snapshot copy, right-click the mounted disk and select Disconnect Disk. The figure illustrates the contextual menu on a mounted LUN.



13 TROUBLESHOOT COMMON PROBLEMS

Troubleshoot Snap Creator issues using information found in Snap Creator logs and error messages. This section discusses some common problems, as well as methods for troubleshooting Snap Creator Framework error messages.

13.1 LOGS

Use Snap Creator logs to troubleshoot problems. Logs contain information about everything Snap Creator does.

Logs contain the output from any external commands or scripts run by Snap Creator. If other scripts are run through Snap Creator, it is important to properly set up exit codes and output for those scripts. Do not exit with status 0 if a problem occurs.

The out, debug, stderr, and agent logs are retained, as defined by the LOG_NUM value in the configuration file, whereas the error log is appended. All logs are written to the `/path/to/scServer_v<#>/logs/<profile>` directory.

There are four logs for every profile and configuration, including:

- Out
- Debug
- Error
- Stderr

OUT LOG

The out log contains only verbose logging information.

DEBUG LOG

The debug log contains verbose and debug logging information. Trace messages are an extra level of debug logs that can be used by the plug-in to show trace messages. The `LOG_TRACE_ENABLE` - (Y|N) setting enables/disables trace messages, for example.

ERROR LOG

The error log contains a history of all the error events for a given configuration. The error log provides information about past errors. Use this information to correlate errors and gain a historical perspective of errors that occurred. Also, monitor this log file and use it to integrate Snap Creator with the monitoring application.

STDERR LOG

This is usually empty, but it contains stderr if there are any issues, such as bugs in code.

13.2 SCDUMP

Snap Creator collects all support information using `scdump` and places it into a `.zip` file located in the root Snap Creator directory. This information is useful for troubleshooting. The `.zip` file consists of the following items:

- Snap Creator version (build info, date, and so on)
- Host operating system and architecture
- Database and version
- SnapDrive version
- Other environmental variables

The syntax for `scdump` is:

```
./snapcreator.pl --profile <profile> [--config <config>] --action scdump verbose
```

`Scdump` can also be executed by clicking the action button in the Snap Creator GUI.

13.3 TROUBLESHOOT SNAP CREATOR GUI ERRORS

This section provides tips for troubleshooting common Snap Creator GUI errors.

ERROR STARTING THE GUI

This error message occurs when there is insufficient space for the temp file.

```
HTTP ERROR 503
Problem accessing /. Reason: SERVICE_UNAVAILABLE
```

Verify that there is sufficient space in the temp folder in the relevant operating system folders. With Linux, for example, check the `/tmp` folder.

HTTPS ERRORS USING SNAP CREATOR ON LINUX

HTTPS might not work on Linux until additional libraries are added. The problem occurs mainly with SUSE, but any operating systems based on UNIX could be affected. Snap Creator does not include SSL libraries.

To run HTTPS on Linux or other operating systems based on UNIX, the system must include an OpenSSL package and SSL symlinks. If OpenSSL is not installed, install OpenSSL.

Verify that the symlinks were created correctly. Verify that the symlinks, `libssl.so.6` and `libcrypto.so.6`, are located either in `/usr/lib64` (for 64-bit operating systems) or in `/usr/lib`.

If the symlinks do not exist in those locations, launch the CLI, change directories to either `/usr/lib` or `/usr/lib64`, and run the following commands to link the symlinks:

```
ln -sf libssl.so.0.9.8 libssl.so.6
ln -sf libcrypto.so.0.9.8 libcrypto.so.6
```

13.4 ERROR MESSAGES

The Snap Creator Framework has a variety of error messages that are associated with different Snap Creator operations. Each error message is composed of an area code and a five-digit unique identifier. The error message format is `ERROR: [<area code>.<unique area error identifier>]` `<error message>`.

Area codes identify where an error occurred. Table 9 lists common area codes.

Table 9) Common area codes.

Area Code	Location of Error
scf	Snap Creator Framework
agt	Snap Creator agent
ora	Oracle plug-in
mys	MySQL plug-in
db2	DB2 plug-in
syb	Sybase plug-in
ltd	Lotus Domino plug-in
psg	PostgreSQL plug-in
vmw	VMware
max	MaxDB plug-in
sme	SnapManager Exchange plug-in
sms	SnapManager SQL Server plug-in
gui	Snap Creator GUI

Table 10 provides details about Lotus Domino plug-in error messages. For a full list of Snap Creator Framework error messages, refer to the [NetApp Snap Creator Framework 3.5.0 Installation and Administration Guide](#).

Table 10) Lotus Domino plug-in error messages.

Error Code	Error Message	Description/Resolution
ltd-0001	Domino plug-in cannot work with <code>SNAP_TIMESTAMP_ONLY = N</code> . <code>SNAP_TIMESTAMP_ONLY</code> should be set to Y.	This error is displayed if <code>SNAP_TIMESTAMP_ONLY</code> is set to N. For the Domino plug-in to work, <code>SNAP_TIMESTAMP_ONLY</code> must be set to Y in the configuration file.
ltd-0002	Quiescing databases finished with errors.	The Domino plug-in was unable to quiesce all the databases successfully. Check the logs to find the reason for the error, or run Snap Creator in debug mode to find the error.

Error Code	Error Message	Description/Resolution
ltd-0003	Unquiescing databases finished with errors.	The Domino plug-in was unable to unquiesce all the databases successfully. Check the logs to find the reason for the error, or run Snap Creator in debug mode to find the error.
ltd-0004	Discovering databases failed.	Application discovery failed due to an application error. Check configuration and application settings. Disable autodiscovery by setting APP_AUTO_DISCOVERY=N and commenting out VALIDATE_VOLUMES.
ltd-0005	Collection of OS information failed.	The scdump action failed due to an error collecting OS information. Check the logs and try running the command manually.
ltd-0006	Collection of SnapDrive information failed.	The scdump action failed due to an error collecting SnapDrive information. Check the logs and try running the command manually.
ltd-0007	Unused.	Unused.
ltd-0008	Restoring databases finished with errors.	The Domino plug-in was unable to restore all the databases successfully. Check the logs to find the reason for the error, or run Snap Creator in debug mode to find the error.
ltd-0009	Domino plug-in couldn't be loaded.	The causes of this error could be either that the Domino plug-in is not supported on this platform or that the prerequisites for the Domino plug-in to run are not satisfied.

13.5 SNAP CREATOR AGENT LOGS

The Snap Creator agent creates logs, enabled by default with the following option:

```
SC_AGENT_LOG_ENABLE=Y
```

The following three logs exist for every profile and configuration created on the Snap Creator agent:

- Out
- Debug
- Stderr

Additionally, agent console debug can be enabled by specifying the `--debug` option, for example:

```
/path/to/scAgent_v<#>/bin/scAgent -debug
```

Each log contains several different message types. Message types include INFO, CMD, OUTPUT, DEBUG, WARN, or ERROR. Each message type indicates a different condition, for example:

- INFO indicates a standard, normally occurring operation.
- CMD is an external command or script that Snap Creator runs (according to configuration); the return code from the command or script is logged.

Note: These are usually PRE, POST, or APP quiesce and unquiesce commands.

- OUTPUT indicates a NetApp Data ONTAP API call.
- DEBUG is debug information.
- WARN is used to call attention to an activity, but the activity is considered to be normal and, in general, requires no action. For example, when Snapshot copies are deleted, a WARN appears.

- ERROR indicates a problem that most likely requires a manual action to fix. Snap Creator exits when it encounters an ERROR, so it is important to fix the problem before Snap Creator runs again.

14 SUMMARY

NetApp recommends that the NetApp Snap Creator Framework be used with the Domino plug-in as the method for managing Lotus Domino environments that use NetApp products. The Snap Creator Framework with Domino plug-in enables Snapshot copies to be application-consistent using IBM-provided Domino API calls that meet IBM support requirements.

REFERENCES

- NetApp Interoperability Matrix Tool
<http://now.netapp.com/matrix/>
- NetApp Snap Creator Community
www.snapcreator.com
- NetApp Snap Creator Framework 3.5.0 Installation and Administration Guide
<https://now.netapp.com/knowledge/docs/snapcreator/rel350/pdfs/iag.pdf>
- NetApp Support site
<http://now.netapp.com/>

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