

Technical Paper

Disaster Recovery on the RaQ 4 with Third-Party Software

The RaQ 4 server supports the use of third-party backup solutions for performing disaster recovery. The supported backup solutions are:

- Knox Arkeia
- Legato NetWorker
- Veritas NetBackup

Each of these solutions requires customization to correctly recover the Cobalt configuration database in the RaQ 4 (the database in Postgres). This technical paper describes how disaster recovery works on the RaQ 4, the steps required to perform general disaster recovery, and detailed instructions on how to customize and use each of the specific backup solutions.

How disaster recovery works

For the RaQ 4 server, the term *disaster recovery* means restoring the server after performing an OS restore operation which wipes the hard drive clean and returns it to a factory-fresh state. This is also known as “bare-metal recovery”. The entire RaQ 4 must be restored in order for the configuration database and the machine configuration to be in synchronization.

For most files on the RaQ 4 server, disaster recovery is straightforward: the files are recovered from the backup service and written to the file system. However, the configuration database requires additional work and the three supported backup services must be tailored to handle the database.

The approach used to recover the configuration database using Knox Arkeia and Veritas NetBackup works as follows:

Before a backup operation begins, the pre-backup script `cobalt_prebackup` creates archives of the configuration database in the directory `/var/cobalt/backups`.

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The backup makes copies of the archive:

```
/var/cobalt/backups/cobalt.sql
```

When the backup is complete, the post-backup script `cobalt_postbackup` deletes the archive.

During the disaster-recovery process, the entire RaQ 4 server must be restored. This restores the archive to the directory `/var/cobalt/backups`. When the backup is complete, you must reboot the RaQ 4; the server does not reboot automatically. During the reboot process, the `cobalt_restore` startup script detects the archive and restores the configuration database. At this point, everything should be in a consistent state and disaster recovery is complete.

Legato NetWorker works in a different manner: it recovers the database during the file recovery phase since this service permits per-file scripting at both backup and recover time. The `postgresasm` script is used for this purpose.



Important: Changes to the machine configuration should not be made during the backup of the machine; otherwise, the configuration of the machine and the configuration databases may not be synchronized after the disaster-recovery process is complete.

This is also true for modifications to system configurations that do not use the Cobalt UI. After disaster recovery, the machine may be in an inconsistent state if the configuration databases and the system configuration files do not agree.

Cobalt recommends that you schedule backups for times when it is unlikely that system configuration changes are in progress. Partly for this reason, most backup systems automatically schedule backups for the early hours in the morning.

General steps to perform disaster recovery

The general procedure for performing disaster recovery is as follows:

1. Perform an OS restore to wipe the hard disk drive and return the RaQ 4 to a factory-fresh state.
2. Configure the RaQ 4 through the Setup Wizard and return it to the network. The RaQ 4 must be able to communicate with the backup server.
3. Through the Server Desktop UI on the RaQ 4, configure the backup service with which you backed up your RaQ 4. The tasks can include enabling the backup client or entering a backup server name. The specific configuration information is discussed later in this technical paper.
4. Use the backup solution to perform the recovery.
5. Reboot the RaQ 4 server.
6. Verify the restoration.

General notes regarding backup services

The following recommendations are stressed for configuring your backup service:

1. Backup systems are very sensitive to time. If possible, configure the RaQ 4 to use a network time protocol (NTP) server to set the clock on the server.

On the Server Desktop, select **Control Panel > Time** to configure the time settings or to specify an NTP server.
2. Backup systems are very sensitive to correct DNS configuration.

Ensure that your RaQ 4 server has both forward and reverse lookups available to the backup server so that the backup solution functions properly.
3. Always backup and recover the `/var` and `/etc` directories together.

These directories contain both the machine configuration and the Cobalt configuration database. Backing up and recovering these directories at different times can lead to inconsistencies between the configuration of your RaQ 4 and the configuration reported in the Server Desktop UI.

Knox Arkeia

Tailoring the backup service

Server-side tailoring is required for Knox Arkeia. Specifically, you must add a pre-command and post-command to the tree options for each RaQ 4 being backed up.

Arkeia performs backups with groups of clients called *savepacks*; you need to create a savepack, add your RaQ 4 to the savepack and tailor the savepack for the backup. See the instructions below for doing this using the arkx GUI program on the Arkeia backup server.

To create a new savepack:



Note: If you are adding your RaQ 4 client to an existing savepack, jump to Step 6 to tailor the backup for the new client.

1. Select **Backup > Savepacks** from the arkx GUI.
2. Click **New**.
3. Enter the name of a savepack.
4. Click to enable (check mark) the check box.
5. Click the **Navigator** icon. The icon has 4 arrows pointing different directions. Tool tips will appear if you hold the cursor over the icon for a moment.
6. Select your RaQ 4 from the list of clients.
If your RaQ 4 is not available, enable the Arkeia backup client through the browser-based Server Desktop and enter the name of the server you are configuring.
7. Click the check box to close the window.
8. Highlight the client and right click your mouse. A popup menu appears.
9. Select “Tree options” from the popup menu.

10. In the box “command before tree”, enter:

```
hostname:/usr/local/sbin/cobalt_prebackup
```

where *hostname* is the client name of the RaQ 4 you are backing up.

11. In the box “command after tree”, enter:

```
hostname:/usr/local/sbin/cobalt_postbackup
```

where *hostname* is the client name of the RaQ 4 you are backing up.

12. Click the check box to close the window.

Files associated with Knox Arkeia tailoring

```
/usr/local/sbin/cobalt_prebackup
```

This script runs before a backup to create an archive of the cobalt postgres database.

```
/usr/local/sbin/cobalt_postbackup
```

This script runs after a backup to delete the archive created by `cobalt_prebackup`.

```
/etc/rc.d/init.d/cobalt_restore
```

This script runs at startup and detects whether an archive of the configuration database exists. An extant archive is recovered and has its name changed.

```
/var/cobalt/backups/cobalt.sql
```

This is the archive of the cobalt postgres database that is created by `cobalt_prebackup` and deleted by `cobalt_postbackup`. The archive is renamed to `restored.cobalt.sql` by `cobalt_restore` after disaster recovery.

Backing up a RaQ 4 with Knox Arkeia

With Knox Arkeia, you start backups with the Arkeia UI. As indicated previously, this is done by running a savepack.

To start an interactive backup using the arkx GUI program on the Arkeia server:

1. In the arkx UI, select **Backup > Interactive Backup**.
2. Click the check box to start the backup immediately. A window showing the progress appears.

During the backup, you can see the `cobalt.sql` file in the `/var/cobalt/backups` directory.

When the backup has successfully completed, the script `cobalt_postbackup` removes this file.

Performing disaster recovery of a RaQ 4 with Knox Arkeia

Preparing for disaster recovery

Prepare your RaQ 4 for disaster recovery by performing the following steps:

1. Perform an OS restore to wipe the hard disk drive and return the RaQ 4 to a factory-fresh state.
2. Configure the RaQ 4 through the Setup Wizard and return it to the network. The RaQ 4 must be able to communicate with the backup server.
3. If possible, configure the RaQ 4 to use a network time protocol (NTP) server to set the clock on the server.

On the Server Desktop, select **Control Panel > Time** to configure the time settings or to specify an NTP server.

4. On the Server Desktop, select **Control Panel**. The Service Settings table appears.
5. In the Service Settings table, click the Parameters link next to Knox Arkeia File Backup. The Arkeia Parameters table appears.

6. Configure the Knox Arkeia client on the RaQ 4.
 - **Backup Server Name**—Enter the fully qualified domain name or the IP address of the Knox Arkeia backup server.
 - **Port Number**—Leave the port number as the default value of 617.
7. Click **Save Changes**. The Service Settings table reappears.
8. Click to enable the check box Arkeia File Backup.
9. Click **Save Changes**.

Performing a disaster-recovery operation

After completing the preparation steps in the previous section, the RaQ 4 is now ready to be restored. In the arkx UI on the backup server:

1. Select **Restoration > Restoration Options**.
2. Check the box labelled “Files modified since backup date”.
3. Check the box labelled by user ID.
4. Click the check box to close the window.
5. Select **Restoration > Restoration**.
6. Click the Navigator icon. The icon has four arrows pointing in different directions. Ensure that all clients are de-selected.



Important: Ensure that you also de-select all the hard-to-see partial selections.

7. Double click on the icon for the RaQ 4 client and select the following directories and files:

```
/home  
/root  
.nsr  
/usr  
/nsr  
/var  
/etc  
opt
```

8. Click the check box to close the navigator window.
9. Click the check box to close the restoration window.
10. A list of tapes appears. Select **OK**.

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11. A progress window appears. Wait for the restore to complete.
12. Reboot the RaQ 4.



Important: Disaster recovery is not complete until you reboot the RaQ 4.

13. After the RaQ 4 server has rebooted, ensure that the Cobalt database was recovered. Inspect the directory `/var/cobalt/backups/` for files. If `cobalt.sql` exists and does not have a 'restored' prefix, then you need to run the command:

```
/etc/rc.d/init.d/cobalt_restore start
```

as the root user and reboot the RaQ 4 again.



Important: DO NOT select `/lib`, `/boot`, or `/vmlinuz.gz` or your RaQ 4 will crash during recovery and most likely will not reboot.

The Arkeia log window indicates that the following files are “busy” and that it cannot overwrite the files. This is both normal and acceptable.

```
/usr/bin/perl5.00503  
/usr/sbin/httpd  
/usr/knox/bin/opbs  
/usr/knox/bin/nlservd
```

Legato NetWorker

Tailoring the backup service

No server-side tailoring is required for NetWorker other than adding the client to the backup server. Before creating a new backup client, ensure that the client does not already exist in the server.

NetWorker allows more than one instance of a client, so ensure that you do not create additional instances unless you are certain that is what you want to do.

To create a new backup client, or determine if a backup client exists, use the `nwadmin` program on the NetWorker server:

1. Select **Clients > Client Setup**. The list of current clients is presented in a scrolling list at the top of the window.
2. Click **Create** to create a new client. Enter the following information in the fields; do not change fields other than those listed below.
 - **Name**—Enter the fully qualified domain name of your RaQ 4 server (for example, `raq4.cobalt.com`).
 - **Group**—Select your backup group (for example, `default` or `bob`).
 - **Directives**—Select “Unix Standard Directives”.
 - **Aliases**—Enter the host name of your RaQ 4 (for example, `foo`).
 - Optionally, select **Details** from the **File** menu and set the “Owner Notification” field to:

```
/bin/mail -s 'client backup completed' owner@domain
```

where *client* is the fully qualified domain name of the RaQ 4 and *owner@domain* is the email address of the person to receive the savegroup completion notifications from NetWorker.



Note: The command shown above assumes that the mail program on the Legato NetWorker backup server is located in the directory `/bin/mail`.

If the mail program is in a different location on your backup server, specify that path instead in the command for the email notification.

3. Click **Apply**.

Files associated with Legato NetWorker tailoring

`/.nsr`

These are directives for handling RaQ 4 file systems.

`/var/lib/pgsql/.nsr`

These are directives for handling the cobalt postgres database.

`/usr/bin/postgresasm`

This is an Application Specific Module (ASM) for postgres databases.

Backing up a RaQ 4 using Legato NetWorker

NetWorker backs up groups of clients, not individual clients. To backup an individual client, you must create a new group or add new RaQ 4s to an existing group.

To create a new group using `nwadmin` on a UNIX NetWorker server:

1. Select **Customize > Groups**.
2. Click **Create**. Give your new group a name.
3. Click **Apply** to select the default settings.
4. Close the window.
5. Select **Clients > Client Setup**.
6. Select each client in turn and view the groups to which each client belongs. Ensure that only the RaQ 4s you want to back up are members of your new group.

To start the backup:

1. Click **Group Control** in the `nwadmin` tool bar.
2. Select your group and click **Start**.

In the main window, you see a message indicating that your group is running.

Performing disaster recovery on a RaQ 4 with Legato NetWorker

Preparing for disaster recovery

Prepare your RaQ 4 for disaster recovery by performing the following steps:

1. Perform an OS restore to wipe the hard disk drive and return the RaQ 4 to a factory-fresh state.
2. Configure the RaQ 4 through the Setup Wizard and return it to the network. The RaQ 4 must be able to communicate with the backup server.
3. If possible, configure the RaQ 4 to use a network time protocol (NTP) server to set the clock on the server.

On the Server Desktop, select **Control Panel > Time** to configure the time settings or to specify an NTP server.

4. On the Server Desktop, select **Control Panel**. The Service Settings table appears.
5. In the Service Settings table, click the Parameters link next to Legato NetWorker File Backup. The Legato NetWorker Parameters table appears.
6. Configure the Legato NetWorker client on the RaQ 4.
 - **Legato Server Hostnames**—Enter the fully qualified domain names or IP addresses of Legato NetWorker backup servers. Legato servers must have valid host names.
 - **Service port range**—Sets the range of the system's service ports to the one specified (7937—10000).
 - **Connection Port Range**—Sets the range of the system's connection ports to the one specified (10001—30000).
7. Click **Save Changes**. The Service Settings table reappears.
8. Click to enable the check box Legato File Backup.
9. Click **Save Changes**.

Performing a disaster-recovery operation

After completing the preparation steps in the previous section, the RaQ 4 is now ready to be restored.

1. Telnet to the RaQ 4 and become the root user.
2. Execute the command:

```
$ /usr/bin/recover -s server -iY -a /var > /var/cobalt/  
recover.log 2>&1
```

where *-s server* indicates the NetWorker backup server (for example, *-s legato.cobalt.com*), *-iY* indicates to overwrite all files and *-a /var* instructs the recover command to restore the listed partitions

3. Wait for the command to finish.
4. Execute the command:

```
$ /usr/bin/recover -s server -iY -a / /home > /var/cobalt/  
recover.log 2>&1
```

5. Wait for the command to finish.
6. Reboot the RaQ 4.



Important: Disaster recovery is not complete until you reboot the RaQ 4.

When the commands have completed, reboot the RaQ 4 for all the changes to take effect.



Important: The first recover operation must complete before the second begins. The */var* directory must be recovered before the */* directory or an error will occur when recovering the Cobalt database in postgres. If this happens, the system administration database and the OS configuration files will be out of synchronization, and the UI will have inconsistent information.

Technical notes

If the root directory `/` is recovered before the directory `/var`, a *postgresasm* error occurs in the log, indicating that the password is invalid. During the OS restore process (using Cobalt's OS Restore Disc), a new random admin password is created for *postgres*. This password is stored in the file `/etc/cobalt/.meta.id`, which is restored by Legato NetWorker as part of the `/` file system. The Cobalt database is restored with the `/var` file system and uses the password stored in this file. After recovery, the password reflects the admin password that will be used after the database is restarted, not the password for the running database.

It is possible to restore the cobalt postgres database without restoring the machine configuration files in `/etc`. If this is done, the configuration database and the UI will have different information than the actual system, which is generally considered to be a bad situation.

The recover log may contain entries similar to the following when restoring the postgres database. These entries relate to dropping a non-existent index and are not actually errors.

```
> ERROR: pg_ownercheck: class "vsite_pkey" not found
> CREATE
> ERROR: pg_ownercheck: class "users_pkey" not found
> CREATE
> ERROR: pg_ownercheck: class "bw_pkey" not found
> CREATE
```

Veritas NetBackup

Tailoring the backup service

No server-side tailoring is required for Veritas NetBackup. Pre- and post-backup scripts are already installed and are run automatically by the NetBackup client (see “Files associated with Veritas NetBackup tailoring” on page 15 for a list of files).

Basic instructions for performing a backup with Veritas NetBackup

Veritas NetBackup uses *Policies* to perform backups of groups of clients. Before performing a backup, you must first create a policy through the Backup Policy Management UI.

To start this program using NetBackup on Windows™ NT:

1. On the on the NetBackup server, select **Start > Programs > Veritas NetBackup** and start the NetBackup Administration program.
2. Start the Backup Policy Management program.
3. Select the menu **Edit > New**.
4. Select “Use add class wizard” and type in an identifier for the new class (for example, your name). Click **Next**.
5. Select the Standard class type. Click **Next**.
6. Click to disable (no check mark) the check box Detect OS. The feature works only with Windows machines.
7. Click **Add**. In the Name field, enter the fully qualified host name of your RaQ 4.
8. Click on the Operating System title bar to view a list of OS types. Select “Linux, Redhat” from the popup list. Click **Next**.
9. Click to enable (check mark) the check box Back up all local drives.
10. Select the type of backup: Full Backup, Incremental Backup or Differential Backup. Click **Next**.
11. Use the default schedules. Click **Next**.
12. Use the default start times. Click **Next**.
13. Click **Finish**.

Backing up a RaQ 4 with Veritas NetBackup

To start a backup:

1. On the NetBackup server, open the Backup Policy Management program and select your group.
2. Select **Class > Manual Backup** from the menu bar.
3. Select **Full backup**.
4. Select your RaQ 4 and your backup starts.

You can view the progress or stop the backup operation through **Server Management > Active Monitor**.

Files associated with Veritas NetBackup tailoring

`/opt/opensv/netbackup/bin/bpstart_notify`

This script is started automatically by NetBackup before a backup runs. It calls the script `cobalt_prebackup`.

`/opt/opensv/netbackup/bin/bpend_notify`

This script is started automatically by NetBackup after a backup runs. It calls the script `cobalt_postbackup`.

`/usr/local/sbin/cobalt_prebackup`

This script runs before a backup to create an archive of the cobalt postgres database.

`/usr/local/sbin/cobalt_postbackup`

This script runs after a backup to delete the archive created by `cobalt_prebackup`.

`/etc/rc.d/init.d/cobalt_restore`

This script runs at startup and detects whether an archive of the configuration database exists. An extant archive is recovered and has its name changed..

```
/var/cobalt/backups/cobalt.sql
```

This is the archive of the cobalt postgres database that is created by `cobalt_prebackup` and deleted by `cobalt_postbackup`. The archive is renamed to `restored.cobalt.sql` by `cobalt_restore` after disaster recovery.

Performing disaster recovery on a RaQ 4 with Veritas NetBackup

Preparing for disaster recovery

Prepare your RaQ 4 for disaster recovery by performing the following steps:

1. Perform an OS restore to wipe the hard disk drive and return the RaQ 4 to a factory-fresh state.
2. Configure the RaQ 4 through the Setup Wizard and return it to the network. The RaQ 4 must be able to communicate with the backup server.
3. If possible, configure the RaQ 4 to use a network time protocol (NTP) server to set the clock on the server.

On the Server Desktop, select **Control Panel > Time** to configure the time settings or to specify an NTP server.

4. On the Server Desktop, select **Control Panel**. The Service Settings table appears.
5. In the Service Settings table, click the Parameters link next to Veritas NetBackup File Backup. The Veritas NetBackup Settings table appears.
6. Configure the Veritas NetBackup client on the RaQ 4.
 - **Master Veritas Server**—Enter the fully qualified domain name of Veritas NetBackup master backup server. The Veritas master backup server must have a valid host name.
 - **Extra Veritas Servers**—Enter the fully qualified domain names of any extra Veritas NetBackup backup servers. All Veritas servers must have valid host names.
7. Click **Save Changes**. The Service Settings table reappears.
8. Click to enable the check box Legato File Backup.
9. Click **Save Changes**.

Performing Disaster Recovery

After completing the preparation steps in the previous section, the RaQ 4 is now ready for disaster recovery. The following instructions may be used to perform the recovery using the text-based UI on the RaQ 4 itself.

1. Telnet to the RaQ 4 and become the root user.
2. Run the following command:

```
# /opt/openssl/netbackup/bin/bp
```
3. Select “r” for restore.
4. Select “b” to restore from backup.
5. Select “p” and set the restore path to / .
6. Select “s” to select files and directories. Select the following directories only:

```
/home  
  /root  
  .nsr  
  /usr  
  /nsr  
  /var  
  /etc  
  opt
```
7. Select “i” to initiate the restore.
8. Select “y” to over-write existing files.
9. Select “y” to restore directories.
10. Select “y” to use a progress log.
11. Enter the progress log path:

```
/var/cobalt/restore.log
```

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12. Wait for the restore to complete.

You may quit from the bp program and monitor progress in the progress log file, or monitor progress on the NetBackup server.

13. Reboot the RaQ 4.



Important: Disaster recovery is not complete until you reboot the RaQ 4.

14. After the RaQ 4 server has rebooted, ensure that the Cobalt database was recovered. Inspect the directory `/var/cobalt/backups/` for files. If `cobalt.sql` exists and does not have a 'restored' prefix, then you need to run the command:

```
/etc/rc.d/init.d/cobalt_restore start
```

as the root user and reboot the RaQ 4 again.

The restore is initiated at this point.



Note: The restore log indicates that the restore was only partially completed.