Versant Warm Standby Usage Guide

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VERSANT

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Warm Standby Usage

This guide gives a detailed explanation of the Warm Standby feature of Vbackup.

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INTRODUCTION TO WARM STANDBY (INCREMENTAL RESTORE)

Warm Standby i.e., Incremental restore - strengthens Versant's high availability capabilities.

This feature is used as an incremental rollforward recovery. It is designed to minimize the downtime in an emergency event, which requires a database recovery.

To achieve this, an up-to-date copy of the primary database needs to be maintained - this is the Warm Standby database. In case of an emergency, this Warm Standby database can be updated very quickly to the state of the primary database - just by applying the last roll forward archive plus the logical.log of the primary database (Rather than starting a full database restore that may take a considerable time with large databases).

The purpose of Warm Standby:

- Whenever the restore process requests a new rollforward archive file, the restore process can be interrupted by a suspend (rather than a quit).
- Whenever the restore process gets suspended, the restore process can be resumed again by applying the next available rollforward archive files and/or the logical.log file.
- Between suspend and resume process, the database is in “Restore suspended (unstartable) mode”, i.e., only the vbackup -resume is allowed to start and access this database.
- In case of an emergency the restore process needs only to be resumed with the last roll forward archive file(s) and/or the logical.log of the primary database in order to have the last transactions recovered in the Warm Standby database that is now ready to be used as the new primary database.

NOTE:- For this utility a separate license is necessary.

WARM STANDBY USAGE

```
vbackup -restore dbname -resume
```

Resumes a suspended restore procedure.

During the restore operation, when the data in the given backup media, is successfully restored, “vbackup” prompts the DBA to change the media or to complete/suspend the restore procedure.

There are different cases in this:

- If there is still backup data to be restored, the DBA can change the media (or change the device name) and then continue the restore procedure.
- If there is no backup data left and the DBA considers the restore is complete, he can issue a “quit” command at the command prompt. Then eventually a existing logical.log will be applied, which will complete the restore procedure and terminate the “vbackup” utility. After this the database is ready to be used.
- If there are no more roll forward archives available at the moment, but the DBA wants to resume the restore procedure when new roll forward archives become available at a later time, he can issue a “suspend” command at the prompt. This will terminate the “vbackup” utility. The database is now “partially restored”, i.e., it is in a “restore suspended (unstartable)“ mode. Later, by using “-resume” option, DBA can continue to restore the database when new roll forward archives are available or complete the restore procedure.

The vbackup process shuts down the database server after each suspend.

Setting up the Warm Standby

The “Warm Standby” i.e., the Incremental restore always requires a second machine - the Warm Standby machine.

For successful incremental restore, the user machine needs to be setup with the following:

1. The Warm Standby machine needs one new Versant database domain, to avoid `dbid` problems (to simplify the maintainability and the restore itself - as the Warm Standby database always needs to have the same dbid like the original database), i.e. a new `osc-dbid` file needs to be created on that machine.
2. A `makedb` has to be performed before the actual restore begins (like with a full restore).
3. The `profile.be` file of the original database should be either extracted from the backup or obtained from the original database. Before starting the restore process the `profile.be` might

be adapted to the requirements of the new machine, in particular of raw devices are being used for the database volumes.

4. One location should be prepared where the logical.log of the original database will be located at the last steps of the incremental restore (e.g.,.`/tmp/logical.log`).

Starting the Warm Standby Process

The Warm Standby i.e., Incremental restore needs to be started with the normal restore.

After the Incremental restore has been setup as described above, the restore process can be started by:

```
vbackup -dev /backup/test_db/test_db.bac1 -restore test_db
```

The restore process will apply all existing backup devices to the database it just created, on the Warm Standby machine. After that it may eventually apply higher level backup devices also (from level 1 or 2). Then it requests for RF archives.

Every time the restore process requests an additional RF archive, the user has the choice to:

- Complete the restore by typing “quit” - the restore gets completed and (depending on the answer to the question about applying logical.log at the begin of the restore) the logical.log file gets applied.
- Suspend the restore by typing “suspend” - the restore goes into “restore suspended (unstartable)" mode.
- To continue the restore by typing the name of the next RF archive, e.g.,. "d /rf/test_db.rf34" and confirming - the restore process continues.

Suspending the Warm Standby Process

```
suspend
```

By typing "suspend" when being asked for the next RF archive the following will happen:

- The database is being set into "suspended restore” (unstartable) mode, ensuring that the database cannot be accessed by any database utility or application except the vbackup -resume.
- It terminates the vbackup process and stops the database.

Restoring the Suspended Mode

In the "restore suspended" (unstartable) mode the database is unstartable.

Only the `vbackup -restore <dbname> -resume` may start the database.

`dbinfo -p` will give the following output as an answer to the state of the database.

```
VERSANT Utility DBINFO Version 7.0.1.3
Copyright (c) 2006 VERSANT Corporation
Database is in Restore suspended (unstartable) mode ...
```

Resuming the Database (-resume)

The restore process that has been suspended by the `suspend` option as described above, can be continued by the `-resume` option of the restore command.

```
vbackup -dev <rf archive name> -restore <database-name> -resume
```

This command resumes a suspended restore procedure.

When this option is used, data in the volume provided by the "`-device`" option, is roll-forward log archived by "vbackup" with "-log" option.

NOTE:- When a logical.log is requested (at the very end of the resume process), then the absolute path names have to be provided in case the resume has been started remotely.

During the resume process, following steps take place:

- Starting the database
- Changing the database mode to "restore"
- Requesting the next RF archive from the user.

  Here the user can select from three options:
  - Enter the name of the next RF archive - then this archive will get restored and after that ask for the next one (again these three options possible)
  - Enter suspend (one letter "s" is sufficient) - then the resume gets suspended.
  - Enter quit (one letter "q" is sufficient) - then the restore completes and asks if you want to apply a logical.log at the end. If you answer "Y(es)" then it will ask for the location of the logical.log. It will apply the logical.log and bring the database back into multi-user mode.

Completing the Restore process

Once the user wants to complete the restore process (typically in an emergency case, i.e. when the original database cannot be started anymore), there are three cases possible:

1. There is still one RF archive and the logical.log file available from the original database
2. There is only one RF archive there, but no more logical.log file available
3. Neither a RF archive nor a logical.log file are available

For 1, the normal resume procedure applies as described above, completed by ("quit"). After that user is asked if he wants to apply the logical.log. The answer is "Yes". Then he will be asked for the location of this logical.log file.

For 2, Like 1. until entering "quit", only when being asked if you want to apply the logical.log, the answer will be "No".

For 3, a specific keyword has to be used as a device name - "llog_only".

```
vbackup -dev llog_only -restore <dbname> -resume
```

It is possible to omit the device name if a default device name has been defined by setting the environment variable "VERSANT_TYPE".

For Example,

```
setenv VERSANT_TYPE llog_only
```

In this case the following command will do the same like the above command:

```
vbackup -restore <dbname> -resume
```

In all three cases the database state will be switched back to multi-user state and can be started.

NOTE:- The handling of the logical.log depends on whether you are using the -restore option or the -resume option.

The -restore option creates a new database (and a new logical.log file) and therefore needs to interact with the user in order to save the logical.log before it starts working.

The -resume option can ask this question after the last roll forward archive got applied (and the resume process has been terminated by typing "quit"). In most practical cases the DBA

can only then answer the question if the logical.log should be applied and where it is located (locally on the Warm Standby machine).

Activating the Warm Standby Database

After completing the restore process, the Warm Standby database needs to get activated for the application.

In order to activate the Warm Standby database, it is necessary to update the VERSANT_DBID, VERSANT_DBID_NODE and VERSANT_DB environment variables to the new locations (host and location of the Warm Standby database).

After this, the Warm Standby database is accessible for the application again.

WARM STANDBY EXAMPLE

Following is an example to illustrate the typical usage of Warm Standby.

In this example, we have a database `mydb` running on host1 and we maintain an almost up-to-date copy of `mydb` on host2. In case `mydb` on host1 is down, the database `mydb` on host2 will be activated to take over the services. The database on host2 is kept up-to-date through Versant backup/restore mechanism.

Setting up the Warm Standby

1. Install Versant Object Database on the Warm Standby host.
2. Create a new `osc-dbid` file on that machine if the installation has not done already by default.
   `dbid -N`
3. makedb mydb
4. Copy `profile.be` from the original database to the directory created by the `makedb` (step 2). The profile can be obtained from the backup file directly or by an OS copy operation from the database directory of the original database.
5. Adapt the `profile.be` to the new machine appropriately (mostly the volume locations)
6. Choose a directory where to copy the original `logical.log` file, e.g.,.. `/tmp/mydb/logical.log` on the Warm Standby host.

Maintaining the Warm Standby database up-to-date

First, a full backup of the `mydb` on host1 needs to be taken and the roll-forward backup mechanism is activated:

```
vbackup -dev mybackup -rollforward -backup mydb@host1
```

The backup "mybackup" is restored on host2 to create the backup database "mydb".

```
vbackup -dev mybackup -restore mydb@host2

VERSANT Utility VBACKUP Version 7.0.1.3
Copyright (c) 2006 VERSANT Corporation
Restoring database `mydb' from device `mybackup':
```

```
During roll forward, would you like to apply records
from the database's current log file in addition to any
archived records ? [default = yes ] no
  0%        50%        100%

  |    |    |    |    |

  ....................................

Restore has completed successfully.
Would you like to do another level of restore on database `mydb'? [
default = no ] no
Current settings are:
    device   = `mybackup'
    position = `current'
    capacity = `dynamic'
    blocking = `10 Kilobytes'
Insert log archive #1 of database `mydb'. [?=help] s
```

NOTE:- The command "suspend" suspends the restore procedure of "mydb@host2". This suspended restore procedure can be "resumed" any time later by using the "-resume" option of the restore. No other operation is permitted on "mydb@host2".

After restoring the full backup on the host2, on host1 roll-forward logs are archived regularly to files "log_1", "log_2", ... "log_n" …etc. i.e. on host 2 we have the standby database, while on host1 production is running. The database actions of the production machine are saved in the RF archives.

```
vbackup -dev log_n -log mydb@host1
```

Periodically, the archived roll-forward logs are applied to the Warm Standby database on host2 to keep "`mydb@host2`" up to date.

To apply the archive file "log_n", option "-resume" is used.

```
vbackup -dev log_n -restore mydb -resume

VERSANT Utility VBACKUP Version 7.0.1.3
Copyright (c) 2006 VERSANT Corporation
Current settings are:
    device   = `log_n'
    position = `current'
```

```
    capacity = `dynamic'
    blocking = `10 Kilobytes'
Insert log archive #n of database `mydb'. [?=help]
```

Here, the user has three options:

- Press “enter”
- This confirms the correct settings. The archive number n gets applied to the database and the user will be asked to insert archive #(n+1). Here the user has three choices again:
- Type "suspend" (or abbreviate by "s")
- This will suspend the resume process and can be resumed at any later point in time.
- Type "quit" (or abbreviate by "q") To quit.

Again the user is asked:

```
Do you have a copy of logical.log file that you would like to apply at
this point ? [default = yes ]
   -A "no" here will complete the restore. The default is “yes” and
   will lead to:

Enter the path of logical.log :

   -Enter the full path name of the logical.log. For example,

Enter the path of logical.log :  /tmp/mydb/logical.log
   -Here you get the command prompt back.
```

The restore is now completed and the database is back into the multi-user mode.

A Special Case of Resume

In case the primary database is down, the restore procedure on "`mydb@host2`" might need to get completed immediately without applying any further RF archives.

Two cases are possible:

- Last RF archive has been applied already and the logical.log of the original database is available.
- Last RF archive is not available or the logical.log of the original database is not available.

Case A:

If "mydb@host1" is down but host1 is alive, logical log file of the down database is usually available. If this is the case, the log records in the logical.log can be applied to the backup database (in case all written RF archives are applied already!).

```
vbackup -dev llog_only -restore mydb@host2 -resume
VERSANT Utility VBACKUP Version 7.0.1.3
Copyright (c) 2006 VERSANT Corporation
Do you have a copy of logical.log file that you would like to apply at
this point ? [default = yes ] y
Enter the path of logical.log : /tmp/mydb/logical.log
```

After that, "mydb@host2" is ready to be used.

See also “Activating the Warm Standby Database” on page 9.

Every committed transaction is in the database. After a startdb the database is physically and logically consistent.

Case B:

If the host1 is down, but neither the last archived logs nor the logical log of the down database might be available(e.g., disk crash on host1). In order to complete the restore procedure on host 2 in this case, the following needs to be done:

```
vbackup -dev llog_only -restore mydb@host2 -resume
VERSANT Utility VBACKUP Version 7.0.1.3
Copyright (c) 2006 VERSANT Corporation
Do you have a copy of logical.log file that you would like to apply at
this point? [default = yes] no
```

After that, "mydb@host2" is ready to be used.

See also “Activating the Warm Standby Database” on page 9.

Every archived and committed transaction is in the database. After a `startdb` the database is physically and logically consistent.

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