



BakBone[®]

Redefining Data Protection[™]

NetVault[®] : Replicator

database configuration guide

for

MySQL

Copyrights

NetVault: Replicator - Database Configuration Guide for MySQL Server

Software Copyright © 2007 BakBone Software

Documentation Copyright © 2007 BakBone Software

This software product is copyrighted and all rights are reserved. The distribution and sale of this product are intended for the use of the original purchaser only per the terms of the License Agreement. All other product trademarks are the property of their respective owners.

The *NetVault: Replicator - Database Configuration Guide for MySQL Server* documentation is copyrighted and all rights are reserved.

This document may not, in whole or part, be copied, photocopied, reproduced, translated, reduced or transferred to any electronic medium or machine-readable form without prior consent in writing from BakBone Software.

THIS PUBLICATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

THIS PUBLICATION COULD INCLUDE TECHNICAL INACCURACIES OR TYPOGRAPHICAL ERRORS. CHANGES ARE PERIODICALLY ADDED TO THE INFORMATION HEREIN; THESE CHANGES WILL BE INCORPORATED INTO NEW EDITIONS OF THE PUBLICATION. BAKBONE SOFTWARE MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCT(S) AND/OR THE PROGRAM(S) DESCRIBED IN THIS PUBLICATION AT ANY TIME.

BakBone Software

NetVault[®]: Replicator

database configuration guide

Configuring an Automated Warm Standby Solution for MySQL on Linux

1.0.0 - NetVault: Replicator and MySQL – An Overview	5
• 1.0.1 - The Purpose of this Guide	5
- 1.0.1.a - Target Audience	5
- 1.0.1.b - Companion Documentation	5
- 1.0.1.c - Terminology Used in this Guide	5
1.1.0 - Phase 1: Installation	6
• 1.1.1 - Step 1: Installation Prerequisites	6
• 1.1.2 - Step 2: NetVault: Replicator Pre-Installation	8
• 1.1.3 - Step 3: Installing Replicator	8
• 1.1.4 - Step 4: Licensing Replicator	8
1.2.0 - Phase 2: Configuring for MySQL Server	8
• 1.2.1 - Step 1: Creating the “nvr.conf” File	8
1.3.0 - Phase 3: Replication	11
• 1.3.1 - Initial Synchronization	11
- 1.3.1.a - Step 1: Initiating the Synchronization	11
• 1.3.2 - On-going Replication Operations	12
1.4.0 - MySQL Server Recovery Examples	12
• 1.4.1 - Using the Secondary MySQL Server as the Main MySQL Server	12
• 1.4.2 - Recovering the Primary MySQL Server	13
1.5.0 - Technical Support	13



Configuring an Automated Warm Standby Solution for MySQL on Linux

1.0.0 NetVault: Replicator and MySQL – An Overview

NetVault: Replicator™ (also referred to herein as “Replicator”) is installed on a MySQL Server to provide continuous data protection. This application can be installed on these servers in the data center or on remote servers in other offices or data centers. Once installed and configured, Replicator continuously replicates changing byte-level data to dedicated hot-standby servers located anywhere on a network. NetVault: Replicator continuously maintains an on-line mirror backup on another server for increased protection and faster recovery.

Replicator is an efficient software that replicates only the changing bytes, independent of the underlying storage. This unique capability allows the solution to scale to protect any size of data.

1.0.1 The Purpose of this Guide

This guide is intended to instruct IT managers, on any considerations and specific configurations for NetVault: Replicator when installed on Servers running MySQL software.

The procedures outlined in this guide will allow you to target a single MySQL Database Server and replicate its full range of database data to a second system. This second system will then be usable as the MySQL Database Server in the event that the primary server is to fail.

1.0.1.a Target Audience

This guide is designed to assist an IT Manager in setting up Replicator to run in a MySQL environment. Therefore, it is recommended that only those individuals with Administrator-level knowledge and access attempt any of the procedures outlined herein.

1.0.1.b Companion Documentation

This document may reference both the *NetVault®: Replicator - Installation Guide* and the *NetVault®: Replicator - Administrator's Guide*. Have both of these documents readily available for reference.

1.0.1.c Terminology Used in this Guide

Following are some common terms used throughout this document, and a brief definition for each.

- **MySQL/MySQL Database Server** – Terms used to describe the machine with the MySQL software installed on which a MySQL database is configured. This machine will serve as the target of the replication.
- **Primary Production Server** – This is the MySQL Server that will serve as the target of the Replication (i.e., the machine being replicated).



Configuring an Automated Warm Standby Solution for MySQL on Linux

- **Standby Server** – This is the machine that is configured to serve as the destination of the replication (i.e., data is replicated from the Primary Production Server *to* this machine).
- **“Active” vs. “Passive”** – These two terms refer to the intended “end result” state of the Hot-Standby Server. If the system is to be set up so that it can immediately assume the role of a new MySQL Server upon failure of the Primary Production Server, it is considered “Active”. If the Hot-Standby Server is intended to serve simply as a target for replicated data (e.g., individual MySQL database data is to be stored on the machine for later recovery to the Primary Production Server), it is considered “Passive”.
- **Replication Sets (“Repsets”)** – Repsets define the relationship between hosts and data sets that are to be replicated. A repset contains information that defines which machine is serving as the Primary Production Server (the replication “source”), and which machine is acting as the Hot-Standby Server (the replication “destination”). A Repset must consist of one source and at least one destination.
- **Replication Scheme** – This phrase is used to describe all of the systems involved in the replication process (e.g., a Primary Production Server replicating its MySQL Database data to a Hot-Standby Server would constitute a “Replication Scheme”).

1.1.0 Phase 1: Installation

Replicator does not require separate components be installed in order to support the replication of a MySQL Server. However, it **does** require that you perform certain prerequisite procedures before actually installing the Replicator software (i.e., these prerequisites must be met before installing any NetVault: Replicator software on the MySQL Server that is to be replicated as well as the system to which it is to be replicated).

1.1.1 Step 1: Installation Prerequisites

Prior to installing Replicator, the following prerequisites must be met in order to successfully use the software:

Important: If you have already installed Replicator on any of the machines in a MySQL Server replication scheme, without first performing the prerequisite procedures outlined below, it may be necessary to remove and re-install Replicator from all relevant machines. In this instance, please contact BakBone Software Technical Support for further instructions – for contact information, please see the section, *Technical Support* on page 13.

- **All Machines in the Replication Scheme Must Have Identical Versions of MySQL Server Installed** – This applies to both the primary production server and the standby server. In the event that the standby server is to be used in an “Active” role (i.e., set up so that it can immediately be used in the event of failure of the primary production server), identical versions of MySQL Server must be installed and licensed on **both** machines.
- **All Database Servers Must Have Identical Configurations** – Both the primary production server and standby server must be configured in the same way so that they contain identical data (e.g. database instances, tables, etc.)
- **All Servers Must Be Able to Resolve Hostnames** – All servers must be able to resolve the hostnames of all other servers in the replication scheme. To ensure all servers are capable of resolving hostnames, run a “ping” or “dig/nslookup” command.
- **MySQL in a Non-running State** – Prior to installing, ensure that MySQL is **not** running on **any** system that is to exist in the replication scheme. In addition, ensure that MySQL is **not** configured to start upon boot.
- **Make Replicator a Permanent System Service** – It is recommended that Replicator be made a permanent system service on the primary and standby server. By doing so, the **nvr_replicator** service will automatically restart after a system reboot.

Issue the following command:

```
chkconfig -level 2345 nvr_replicator on
```

For Debian/Ubuntu Operating Systems issue the following command:

```
update-rc.d nvr_replicator defaults
```

- **Prevent MySQL from Automatically Restarting** – The **mysql** service will not automatically restart after a system reboot.

Issue the following command:

```
chkconfig -level 0123456 mysqld off
```

For Debian/Ubuntu Operating Systems issue the following command:

```
update-rc.d -f mysqld remove
```



1.1.2 Step 2: NetVault: Replicator Pre-Installation

Before installing Replicator determine the location of the database files for both MySQL servers. The database files can be located by examining the “**my.conf**” file which is located in the “**/etc**” subdirectory by default. The location of the database files can be found under the **[mysql_safe]** section of the configuration setting, and with “**datadir**” setting as follows:

datadir = DatabaseFileLocation

The “**my.conf**” file may not exist after installing MySQL, in which case, you can enter the following command to locate the **datadir**.

```
# grep datadir /etc/init.d/mysqld
```

1.1.3 Step 3: Installing Replicator

With all of the prerequisites discussed in the previous section completely met, review and perform all of the steps outlined in the *NetVault®: Replicator - Installation Guide* in order to install the Replicator application on all machines in the replication scheme.

1.1.4 Step 4: Licensing Replicator

Once installation has been completed successfully on all relevant systems in the MySQL replication scheme, you must install a NetVault: Replicator license for each. Please see the *NetVault®: Replicator - Installation Guide* for complete instructions on obtaining and installing licenses.

Important: NetVault: Replicator must be licensed with at least its 30-day evaluation license. Failure to do so will result in an inability to use the software.

1.2.0 Phase 2: Configuring for MySQL Server

The sections that follow illustrate configuration of Replicator once it has been successfully installed in order to accommodate the replication of a MySQL Server environment.

1.2.1 Step 1: Creating the “nvr.conf” File

Among other things, the “**nvr.conf**” is the file used by Replicator to specify what is to be replicated on the Primary Production Server, and where it is to be replicated to on the Standby Server. In order to properly replicate a MySQL Server, you must create an appropriate **nvr.conf** file. This can be accomplished by using any text editing application.

Create an NVR configuration file similar to the following. The configuration supplied should be modified, as it assumes a number of things that may not be true for any given environment:

- The primary system is named **"primary"**.
- The secondary system is named **"secondary"**.
- There's a machine called **"gateway"** that's reliable and can be used to arbitrate splitbrain.
- The MySQL data is all under **"/var/mysql"**.
- The startup script for mysql is **"/etc/init.d/mysqld"**.
- The systems are in a **10.1.16.0** network with a **/25 netmask**

An example of an **nvr.conf** file is as follows:

```
<replicator>
  <global bidir = "1" multiwrite="/var/mysql/" />

  <source hostname = "primary">
    <to
      host = "secondary"
      repset = "failover"
      includeregex = "^/var/mysql/"
      deferred = "1"
      fo_ifname = "eth0:1"
      fo_peer = "secondary"
      fo_pingnode = "gateway"
      fo_preferred = "1"
      fo_resource = "1"
      fo_vaddr = "10.1.16.126/25"
      fo_deadtime = "1"
      fo_postscript = "/etc/init.d/mysqld start"
    />
  </source>

  <source hostname = "secondary">
    <to
      host = "primary"
      repset = "failover"
      includeregex = "^/var/mysql/"
      deferred = "1"
      fo_ifname = "eth0:1"
```

```
        fo_peer = "primary"
        fo_pingnode = "gateway"
        fo_resource = "1"
        fo_vaddr = "10.1.16.126/25"
        fo_deadtime = "1"
        fo_postscript = "/etc/init.d/mysqld start"
    />
</source>

<destination hostname = "primary">
    <from
        host = "secondary"
        repset = "failover"
        destdir = "/"
    />
</destination>

<destination hostname = "secondary">
    <from
        host = "primary"
        repset = "failover"
        destdir = "/"
    />
</destination>
</replicator>
```

This configuration should be placed on both the primary and secondary systems using a network copy tool such as **scp**. The **nvr_verifyconfig** utility should then be used on both systems to verify that the two hosts can successfully communicate with one another. After configuration, use the **chkconfig** utility or your system's equivalent to ensure that NetVault: Replicator will start upon reboot.

Important:

1. All **MySQL** clients should be configured to access **MySQL** through the “**fo_vaddr**” setting used in the **nvr.conf** configuration file. For ease of configuration and use, BakBone recommends that this IP address be associated with a hostname using DNS so that all clients can be configured simply and correctly. NetVault: Replicator will set up this IP address on the interface described in the configuration file for the primary system. It will migrate this IP to the secondary system if the primary system fails. This configuration will also ensure that **MySQL** is only running on the primary system at any given time.
2. The **deferred** feature in the **nvr.conf** file should be used with the **Constant HA Cluster Toolkit**. It should not be enabled unless you have licensed the **BakBone Software HA Cluster Toolkit**. A **Cluster Manager** should be configured to manage replication before using the **deferred** feature. For more information open a CLI prompt and enter the **nvr_hacluster(5) manpage** command.

1.3.0 Phase 3: Replication

With all configuration procedures completed, it is now possible to begin the replication process. The sections here outline the steps required to begin the replication process.

1.3.1 Initial Synchronization

The first step in beginning replication is to perform an initial synchronization of the MySQL Server database files and log files. This will sync all MySQL database files between the Primary Production Server and the Standby Server.

1.3.1.a Step 1: Initiating the Synchronization

The initial synchronization can be performed using the procedure outlined below:

Important: MySQL Server services must remain disabled on both the Primary Production Server and the Hot-Standby Server during this procedure.

1. Run the NVR startup script on both systems, starting with the primary system, and then from the primary server run the **nvr_sync** tool as follows:

```
nvr_sync -d /var/mysql
```

(where **/var/msql** is **<mysql datadir>**).

2. Verify that the initial synchronization completed successfully by running the **nvr_stat -l** command, and verifying that the zeros are shown as “**PENDING**” and “**PROGRESS**”. Ensure there are no rescheduled tasks (or use the **nvr_waitempty** command). To monitor the progress of this initial synchronization, input the following command at the prompt:

```
nvr_stat -l
```

While replication is active, the number of “pending” and “in progress” items in the replication queue will be greater than zero. When the initial synchronization finishes, the number of pending and in progress items should be zero.

3. Start up the MySQL Server in the primary production server.

1.3.2 On-going Replication Operations

The day-to-day operation of NetVault: Replicator requires little if any user intervention. The “**nvr_stat**” tool may be used to monitor the status of the replication service, including the number of replication events that have occurred, the number of items currently being replicated, and the number of items that are pending replication.

1.4.0 MySQL Server Recovery Examples

After a failover, where the primary MySQL server is down, and the secondary MySQL server is up and running, there are two options for continuing replication:

1.4.1 Using the Secondary MySQL Server as the Main MySQL Server

In this case, follow the steps below after you install/recover **MySQL** and NetVault: Replicator to set the Standby Server as the Primary Production Server.

1. After the Primary Production Server recovers, ensure that the Primary and Standby (secondary) Servers’ MySQL services are not running. Stop the services if they are running.
2. Enter “**nvr_sync -d <mysql datadir>**” in the command line prompt on the Standby MySQL server.
3. After the **nvr_sync** replication is complete, start the MySQL services on the Standby Server.
4. At this point, the Primary Server is now the Standby Server, and the Standby Server has become the Primary Server.
5. The setup is ready for another failover.

1.4.2 Recovering the Primary MySQL Server

In this case, follow the steps below to make the server that failed over resume functioning as the Primary Server.

1. Start up the Primary MySQL Server system.
2. Stop the Primary and Standby MySQL services if running.
3. Enter the `nvr_sync -d <mysql datadir>` command on the Standby MySQL server.
4. After the replication is complete, disconnect / shutdown the system that the Standby (secondary) MySQL server is running.
5. Wait for NetVault: Replicator to failover and startup the Primary MySQL server.
6. Boot the Standby (secondary) MySQL server system.
7. The setup is ready for another failover.

1.5.0 Technical Support

BakBone Software is dedicated to providing friendly, expert advice to NetVault customers. Our highly trained professionals are available to answer questions, offer solutions to problems and generally help make the most of any NetVault purchase. Log on to our web site, or contact our Helpdesk, for more information.

<http://www.bakbone.com/supportportal>



Configuring an Automated Warm Standby Solution for MySQL on Linux