

ClearCase and Samba

A Supported Configuration

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Introduction

This document is a practical guide that outlines how to configure Samba to work with IBM® Rational® ClearCase®.

You should walk away with a clear understanding of how to configure a supported ClearCase and Samba environment.

This information will allow you to set up a working configuration with ease and eliminate any known issues from impacting the configuration.

This documentation is not meant to be a replacement for the [Samba](#) vendor documentation or the ClearCase documentation in the Administrator's Guide which should be referenced for instructions on setting up the basic Samba configuration and integration respectively.

What is Samba?

For the purposes of this whitepaper, Samba is an [Open Source/Free Software](#) suite that enables Microsoft® Windows® to use file and print services from a Linux® or UNIX® server. Samba is freely available under the [GNU General Public License](#)."

The Samba project was originally created to remove barriers to interoperability between Windows and Linux/UNIX. Windows systems communicate using SMBs (Server Message Blocks) and UNIX/Linux systems communicate using NFS (Network File System). Although both systems will work with TCP/IP (Transmission Control Protocol/Internet Protocol), they cannot work together without a third party product to translate the underlying protocols (SMB and NFS).

Samba is available at <http://www.samba.org>

Getting Started

General Support Requirements

Supported SMB Server Products for UNIX and Linux

Before moving forward with the installation and setup, you need to be sure that you are using a supported version of Samba and meeting the supported ClearCase system requirements. Refer to the below technotes for the most up to date information.

- **Supported Samba versions**
 - [ClearCase 8.0](#) (refer to “SMB Server products” listing on the operating system tab)
 - [ClearCase 7.1.x Supported Samba versions](#)
 - [ClearCase 7.0.x Supported Samba versions](#)
 - [ClearCase 2003.06.00 Supported Samba versions](#)

These supported versions have been tested and certified by IBM Rational.

Note: While an unsupported version of Samba may appear to work, its use in a production environment is not recommended. Problems that occur with these versions may not be resolved by IBM Rational Support.

- **ClearCase System requirements**
 - [ClearCase 8.0 System Requirements](#)
 - [ClearCase 7.1.x System Requirements](#)
 - [ClearCase 7.0.x System Requirements](#)
 - [ClearCase 2003.06.00 System Requirements](#)

Installation and Setup

Information on how to install Samba

Refer to the [Installing and configuring Samba](#) section of the *ClearCase Administrator's Guide* for information about installing and setting up Samba for use with ClearCase.

Other Installation resources:

- **How to install and test Samba**

<http://us1.Samba.org/Samba/docs/man/Samba-HOWTO-Collection/install.html>

Follow the installation instructions for the operating system (Linux or UNIX) on which you are installing. Samba must be installed on each VOB and view server that will be accessed by Windows clients.



Common User and Group Names

User Names

Rational highly recommends that your user names in both Windows and Linux/UNIX match in both case and spelling. However, this is not a requirement if you are using USER security in Samba. You can use the username map file to map the Windows user to a valid Linux/UNIX user.

Each entry in the username map file should be listed as the UNIX/Linux user name, followed by an equal sign (=), followed by one or more whitespace-separated Windows user names. Samba will expect both the client and the server user to have the same password.

An example of the entries in the username map file is, as follows:

```
jjsmith = JosephJSmith
msunders = MarianneSunderson
pbuffer = PheobeBuffer
wfronti = WillardFrontizine
leroscil = LeroyScilicono
```

Any **cleartool describe** commands will list the owner as **NOBODY** when run from the Windows client.

A **cleartool describe** on a Linux/UNIX will show the correct user information for the object.

The reason is that the user's account on Linux/UNIX does not exist within the Windows environment.

Examples:

WINDOWS

```
C:\>cleartool describe -long vob:\cc_test
versioned object base "\cc_test"
  created 03-Apr-07.12:06:01 by vobadm.ccusers VOB admin
(vobadm.ccusers@host)
  VOB family feature level: 4
  VOB storage host:pathname "host:/clearcase/vob_store/cc_test.vbs"
  VOB storage global pathname "\\host\vob_store\cc_test.vbs"
  database schema version: 54
  VOB ownership:
    owner nobody
    group ccusers
  Additional groups:
    group user
  Attributes:
    FeatureLevel = 4
```

UNIX/Linux

```
unixbox% cleartool describe -long vob:/vob/cc_test
versioned object base "/vob/cc_test"
  created 03-Apr-07.12:06:01 by vobadm.ccusers VOB admin
(vobadm.ccusers@host)
  VOB family feature level: 4
  VOB storage host:pathname "host:/clearcase/vob_store/cc_test.vbs"
  VOB storage global pathname "/net/vob_store/cc_test.vbs"
  database schema version: 54
  VOB ownership:
    owner vobadm
    group ccusers
  Additional groups:
    group user
  Attributes:
    FeatureLevel = 4
```

Group Names

It is **mandatory** that the primary group on Linux/UNIX and Windows match. Rational strongly recommends that you limit your group name to 8 characters or less AND recommends that group names do not contain spaces. This is due to the fact that ClearCase on Linux/UNIX is compiled for POSIX compliance. Rational support has seen instances where groups such as "Domain Users" or groups containing more than 8 characters such as "clearcase_users" will work for a period of time; however, once these groups stop working due to group name truncation during a look-up, it is impossible to resolve the issue.

IBM Rational does not support the group mapping option available with Samba 3.xx. Only the username mapping is supported.

Note: Due to a limitation with SunRPC, the maximum number of groups used for credentials mapping for Linux/UNIX is 16.

Supported Configurations for 2.2x or 3.x

Supported Samba Security modes

User security

User security is the default security setting in Samba 2.2.x and later, as this is the most common setting required for Windows clients to communicate with the Linux/UNIX server. With user-level security a client must logon with a valid user name and password.

If the Windows users' login with user names that are the same as the user names on the Linux/UNIX Samba server, it may be best to use security = user. It has been our experience that this configuration is more commonly used in a non-domain Windows environment; however, it can also be used in a Windows domain environment.

Every user that will access Samba file services must be entered in a local, Samba specific encrypted password database on the server supporting those file services.

Guest accounts are not supported for use with ClearCase.

Note: The name of the resource being requested is not sent to the server until after the server has successfully authenticated the client.

Example of smb.conf entry:

```
[GLOBAL]
# security user implies that every user must have an UNIX account on
this server
security = user
```

Domain security (recommended)

When the Domain Security Mode is utilized, all of the user, group and machine accounts are stored on a Windows domain controller. This central repository is responsible for machine and user authentication.

If domain authentication is used, the Samba machine must be added to the Windows domain. Review the [Adding Samba servers to the Windows domain](#) section below for more details.

When you have Domain security enabled, the Samba server is required to have a computer account in the domain called "domain security trust account". Once the Samba server is made a "domain member server", all authentication requests for access to shares/services on the Samba server are passed to a Windows domain controller where the user is validated.

A UNIX/Linux account is required for each user in order to assign a UID once the account has been authenticated by a Windows domain controller. For example, if the user's login account to the Windows domain is *DOMAIN\phoebe*, there must be a UNIX/Linux account *phoebe* for this user.

The password server contains one or more Windows domain controllers in a comma separated list; alternatively it can be defined as an "*" to allow Samba to automatically query for domain controllers. For more information regarding the password server, refer to the smb.conf configuration file description on the samba.org site at: <http://www.samba.org/samba/docs/man/Samba-HOWTO-Collection/domain-member.html#id2571102>

Example of smb.conf entry:

```
[GLOBAL]
security = domain
workgroup = MARKETING
password server = *
```

ADS

When you have ADS security enabled, this allows you to use Kerberos to authenticate with a Windows 200x domain controller.

For additional information refer to *Samba ADS Domain Membership* at: <http://www.samba.org/samba/docs/man/Samba-HOWTO-Collection/domain-member.html#ads-member>

Globals

Unless otherwise noted, the following settings are for both Samba 2.X AND 3.X

Base options	
workgroup	Set to the name of the Windows domain to which Rational ClearCase users accessing this server belong
netbios name	Set to the host name of this computer
password server	Set this to the name of the Domain Controller in the Windows domain that will validate the users. You can also set this to * , which will look up all the Windows domain controllers in the same manner as Windows machines. Using a SAMBA server as a Domain Controller is not supported.
Security options	
security	DOMAIN (recommended), ADS or USER . ADS support has been added in ClearCase versions 7.0.1.5 and 7.1.0.2 and later for SAMBA versions 3.0.32 and 3.2.7. Refer to the following document for configuration information on ADS: http://samba.org/samba/docs/man/Samba-HOWTO-Collection/ServerType.html#id2560147 See the Samba documentation for smbpasswd for more information about Samba security options.
encrypt passwords * (2.x only)	Yes
create mask	0775
directory mask	0775
username map	Set to the local pathname of the username.map file
Locking options	
oplocks	No
level2 oplocks	No

(3.x only)	
kernel oplocks	No
File-name handling options	
case sensitive	No
preserve case	Yes
MS-DOS attribute mapping options	
map archive, map hidden, map system	No
Other	
follow symlinks (3.x only)	Yes
host msdfs ** (3.0.24 and later)	No
bind interfaces only (3.x only)	No

***Note:** Starting with Samba version 3.0, the default option for “encrypt passwords” is set to yes; therefore, this setting is optional on all Samba versions 3.x and later. It is required for all earlier versions.

Regardless of which version of Samba being used on the server, you will still need to use the smbpasswd password command to add users to the encrypted password file.

**** Note:** Prior to Samba version 3.0.24, the default behavior of “host msdfs” was no; therefore, no special setting was required. In version 3.0.24, the default behavior changed from “host msdfs = no” to “host msdfs = yes”. Since ClearCase is not supported for use on a DFS volume, it is mandatory to have this set for Samba versions 3.0.24 and later.

Mapping the clearcase_albd account

If users will be working with either Windows dynamic views or Windows snapshot views, it is mandatory that the server process account (by default named *clearcase_albd*) be mapped over to a valid UNIX/Linux account. This UNIX/Linux account must have access to all of the VOBs the Windows users will be accessing.

The reason for this is that the view server process on Windows runs with the identity of the *clearcase_albd* account. In order to write to the VOB storage, the *clearcase_albd* account needs access. Since the *clearcase_albd* account does not exist on UNIX/Linux and the user name is over the 8 character POSIX limit, a valid UNIX/Linux account must exist to perform this task.

In many environments, there is a single VOB owner account. Generally, we see the *clearcase_albd* mapped over to that user in the username map file.

For example, a typical solution to this map is:

- (For Samba version 2.x) `vobadmin = clearcase_albd`
- (For Samba version 3.x) `vobadmin = DOMAIN\clearcase_albd`

Adding Samba server to the Windows domain

In order to use **security = domain or ADS**, the Samba server must be added to the Windows domain as a "domain member server".

Here are the steps to add Samba to the domain:

1. On the Windows domain controller, add a machine account for the Samba server.

2. On the UNIX/Linux 2.x Samba system execute:

```
root# net rpc join -U administrator%password
```

3. Samba 2.2.4 and later can auto-join a Windows NT4-style Domain just by executing:

```
root# smbpasswd -j DOMAIN_NAME -r PDC_NAME -U Administrator%password
```

4. Samba 3.x can do the same by executing:

```
root# net rpc join -U Administrator%password
```

It is not necessary with Samba 3.x to specify the *DOMAIN NAME* or the *PDC NAME* as this information is stored in the `smb.conf` file settings.

Informational

Samba Version

There are 2 methods that can be used to obtain the Samba version string:

- **First (Short) Method:**

Run the following command on the Samba server:

smbclient -L localhost

Example:

```
#> smbclient -L localhost
added interface ip=192.229.62.35 bcast=192.229.62.255
nmask=255.255.255.0
Password: <just hit enter here>
Domain=[DOMAIN] OS=[UNIX] Server=[Samba 2.0.7]
```

Sharename	Type	Comment
-----	----	-----
share	Disk	Share on HOST2
IPC\$	IPC	IPC Service (Samba Server)

Server	Comment
-----	-----
HOST1	
HOST2	Samba Server

Workgroup	Master
-----	-----
DOMAIN	HOST1

- **Second (Longer) Method:**

1. Look at the **smb.conf** file to see where Samba writes the log file.

```
=====
# Global parameters
[global]
workgroup = DOMAIN
null passwords = yes
log file = /var/log/Samba/log.%m
comment = Shared on Host1
max log size = 50
socket options = TCP_NODELAY SO_RCVBUF=8192 SO_SNDBUF=8192
default service = homes
dns proxy = No
preload = homes
path = /share
server string = Samba Server
=====
```

2. Set into the logs directory and grep the **log.smb** file for the version string

```
# cd /var/log/Samba
# ls -lga
drwx-----  2 root    root          4096 Mar 21 09:01 .
drwxr-xr-x  10 root    root          4096 Mar 18 04:02 ..
-rw-r--r--   1 root    root              0 Dec 20 15:27
log.host2
-rw-r--r--   1 root    root          456 Mar 21 09:10
log.host3
-rw-r--r--   1 root    root              0 Dec 21 15:30
log.host4
-rw-r--r--   1 root    root          391 Mar 21 09:09 log.nmb
-rw-r--r--   1 root    root          885 Mar 21 04:02
log.nmb.1
-rw-r--r--   1 root    root         5489 Dec 22 09:55
log.nmb.2
-rw-r--r--   1 root    root          513 Mar 21 09:09 log.smb
-rw-r--r--   1 root    root          767 Mar 21 04:02
log.smb.1
-rw-r--r--   1 root    root         7279 Dec 21 18:05
log.smb.2
-rw-r--r--   1 root    root              0 Dec 19 14:31
log.host101

# more log.smb | grep version
smbd version 2.0.7 started.
```

Mnode setting for Windows clients (32 vs. 64 bit)

The following steps will instruct you with reconfiguring the ClearCase Windows client to support 32-bit or 64-bit Samba installations from either the command line or the ClearCase Control Panel.

Note: For all ClearCase clients on Windows that have the MVFS installed and need to access Samba shares, change the Mnodes settings.

Command Line:

1. Open a command prompt (**Start > Run** type `cmd`)

2. Run the following command

32 bit

```
cleartool setcache -mvfs -persistent -vobfreemax 200
```

64 bit

```
cleartool setcache -mvfs -persistent -vobfreemax 800
```

3. Reboot Windows client for setting to take effect.

The MVFS Performance tab in the ClearCase Control Panel:

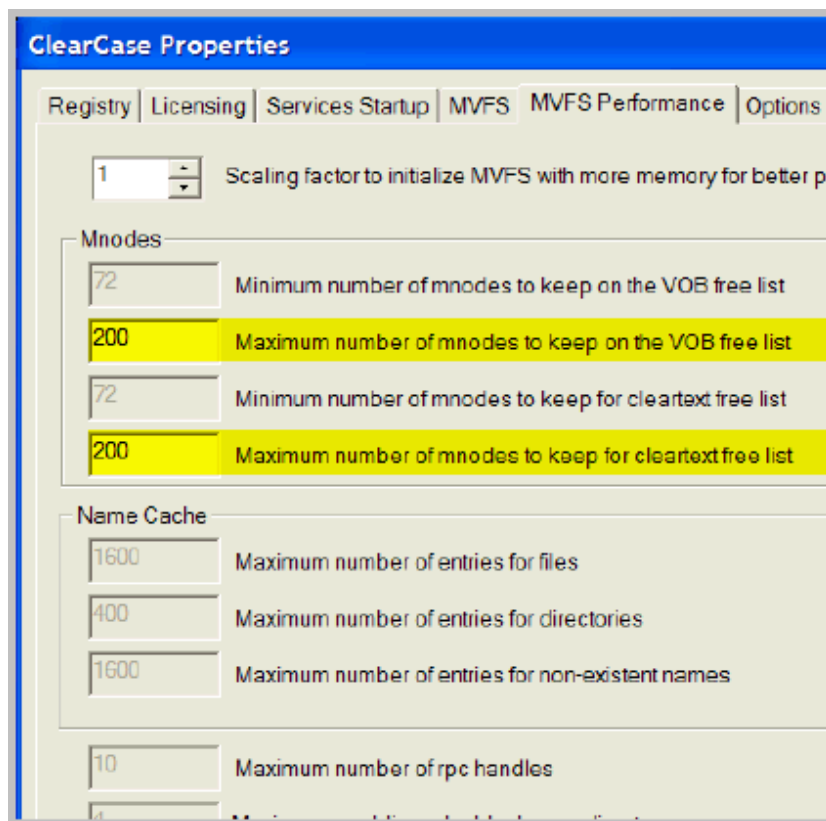
1. Click **Start > Settings > Control Panel**. Click ClearCase icon. (**Start > Run** type: `cc.cpl`)

2. Click the **MVFS Performance** tab and click **Override** for

Maximum number of Mnodes to keep on the VOB free list

Maximum number of Mnodes to keep for cleartext free list

3. Set the value for both to 200 for 32 bit Samba installation and for 64 bit installs set both to 800. See the screenshot below for an example. If you are unsure whether the installation is 32 or 64 bit, refer to the section below for instructions.



4. Click OK to apply the changes and close the dialog box.
5. Reboot the Windows client for the setting to take affect.

For more detailed information about Samba performance, refer to the [Samba Performance Tuning information](#) in the Samba product documentation.

How to determine if a UNIX or Linux application is 32-bit or 64-bit

On occasion it may become necessary to confirm the bit rate of a given UNIX or Linux application to determine if it is compatible with the bit rate of the operating system.

Note: A 32-bit application can run on a 64-bit operating system, but not vice versa.

•To determine the bit rate of an application, issue the following command:

file *application_name*

Example:

file /usr/local/Samba/bin/smbd

/usr/local/Samba/bin/smbd: ELF 32-bit MSB executable SPARC Version 1

•To determine the bit rate of the operating system's kernel, issue the following command:

isainfo -kv

The above command is only for solaris operating systems. The command and syntax for other supported unix operating systems.

HPUX: getconf KERNEL_BITS

Ie.

```
# getconf KERNEL_BITS
```

64

LINUX: getconf LONG_BIT

Ie.

```
# getconf LONG_BIT
```

64

AIX: bootinfo -K

Ie.

```
# bootinfo -K
```

32

Example:

isainfo -kv

64-bit sparcv9 kernel modules

Known issues

The following links contain information regarding all the currently known issues as of the writing of this paper.

Reformatview moves view private files into lost+found

<http://www.ibm.com/support/docview.wss?uid=swg21141860>

Samba share prompts clearcase_albd for password upon access

<http://www.ibm.com/support/docview.wss?uid=swg21142762>

Checkout fails from Windows only in an interop environment

<http://www.ibm.com/support/docview.wss?uid=swg21180096>

Windows Fatal Application Exit error accessing ClearCase VOBs with Samba

<http://www.ibm.com/support/docview.wss?uid=swg21169548>

Permission Denied accessing UNIX VOBs with Samba from Windows

<http://www.ibm.com/support/docview.wss?uid=swg21135336>

Refer to the [Rational ClearCase product support page](#) for more up to date information.

Unsupported Configurations

Security Authentications

The following security authentication methods are not supported for use with ClearCase:

1. security = share
2. security = server*

* **Note:** Known security risks with security = server.

Rational ClearCase will not be supported for use with **security = server** as Samba.org does not recommend this setting for security reasons.

As stated on Samba.org, this authentication method has many drawbacks that include:

- Potential Account Lockout on Microsoft Windows 200x password servers.
- Lack of assurance that the password server is the one specified.
- Does not work with Winbind, which is particularly needed when storing profiles remotely.

For more information on this security setting, review the [Server Security \(User Level Security\)](#) on Samba.org.

Samba Server configured as a Domain Controller

Rational ClearCase is not supported if Samba is configured as a Domain Controller.

Rational ClearCase is only supported using a Windows Domain Controller.

For more information review the *IBM Rational ClearCase Administrator's Guide* on the topic of **ClearCase and Windows Domains**.

Note: The following article available on [developerWorks](#) discusses how this configuration can be implemented, but it is not currently supported.

Change request (RFE) RATLC00730815 was submitted to add support for Samba configured as a Domain Controller when using Rational ClearCase; however, the decision was made by Product Management to exclude the resolution of this enhancement from future upgrades and releases due to the significant architectural changes required to implement the solution.

Distributed File System (DFS)

DFS is not supported with any version of ClearCase.
Review [technote 1131253](#) for more information.

Winbind

Winbind is software included in the Samba suite to provide unified log on mechanism between Microsoft Windows and UNIX or Linux.

Winbind unifies UNIX/Linux and Windows account management by allowing a UNIX/Linux host to become a full member of a Windows domain. Once this is done the UNIX/Linux host will see Windows users and groups as if they were native UNIX/Linux users and groups, allowing the Windows domain to be used in much the same manner that NIS+ is used within UNIX/Linux-only environments.

The use of winbind is currently not supported with ClearCase.

Change request (RFE) [RATLC00685145](#) has been submitted to add support for this feature.

Group Mapping

The Samba groupmap feature is currently not supported for use with ClearCase.

Note: The following article, available on [developerWorks](#), discusses how this configuration can be implemented, but it is not currently supported.

Starting with Samba version 3.x, new group mapping functionality is available to create associations between Windows group SIDs and UNIX group GIDs. The **groupmap** subcommand included with the net tool can be used to manage these associations.

The new facility for mapping Windows groups to UNIX/Linux system groups allows the administrator to decide which Windows domain groups are to be exposed to Windows clients. Only those Windows groups that map to a UNIX/Linux group that has a value other than the default (-1) will be exposed in group selection lists in tools that access domain users and groups

The architecture of ClearCase in an interop environment requires that user and group names are the same on both Windows and UNIX/Linux. One of the reasons for this requirement stems from some of the fundamental differences between Windows and UNIX/Linux.

For example:

- 1.Groups on Microsoft Windows can have spaces in the name.
- 2.Groups on Windows can be longer than 8 characters.

Both of these Windows standards do not apply to UNIX or Linux.

In order to configure Samba in a supported fashion to use ClearCase, follow the instructions outlined in the [Rational ClearCase network administration in a mixed environments](#) section of the *ClearCase Administrator's Guide*.

Unsupported Samba Mappings

IBM Rational does not support the use of the mapping features in Samba for any Rational ClearCase volumes.

The following options, if enabled, will cause the files in the ClearCase pool storage area to change and potentially break ClearCase permissions:

map archive (S)

This option controls whether the DOS archive attribute should be mapped to the UNIX owner execute bit. The DOS archive bit is set when a file has been modified since its last backup. One motivation for this option is to keep Samba and the client from making any file it touches from becoming executable under UNIX.

map hidden (S)

This option controls whether DOS style hidden files should be mapped to the UNIX world execute bit.

map system (S)

This option controls whether DOS style system files should be mapped to the UNIX group execute bit.

References

- Rational ClearCase System Requirements list:
<https://www.ibm.com/support/docview.wss?uid=swg27008776>
- ClearCase 8.0 System Requirements:
<https://www-304.ibm.com/support/docview.wss?uid=swg27020796>
- Technote 1239315: ClearCase 7.x Supported Samba versions
<http://www.ibm.com/support/docview.wss?uid=swg21239315#Supported%20SMB%20Server%20Products%20for>
- Technote 1136951: ClearCase 2003.06.00 Supported Samba versions
<http://www.ibm.com/support/docview.wss?uid=swg21136951#Supported%20SMB%20Server%20Products%20for>
- Technote 1239315: ClearCase 7.x System Requirements
<http://www.ibm.com/support/docview.wss?uid=swg21239315>
- Technote 1136950: ClearCase 2003.06.00 System Requirements
<http://www.ibm.com/support/docview.wss?uid=swg21136950>
- Information Center: ClearCase Administrator's Guide – Samba topic
http://publib.boulder.ibm.com/infocenter/cchelp/v7r0m1/index.jsp?topic=/com.ibm.rational.clearcase.cc_admin.doc/topics/t_pcnfssmb_smb_Samba.htm
- developerWorks Article: IBM Rational ClearCase MultiSite and Samba 3.0
http://www.ibm.com/developerworks/rational/library/05/0816_Tiwary/
- Technote 1131253: Support Policy for DFS (Distributed File System) and ClearCase
<http://www.ibm.com/support/docview.wss?uid=swg21131253>