

GlusterFS 1.3 User Guide

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This is the user manual for GlusterFS 1.3.

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Table of Contents

Acknowledgements	1
1 Introduction	2
1.1 Contacting us	2
2 Installation and Invocation	3
2.1 Pre requisites	3
2.1.1 FUSE	3
2.1.2 libibverbs (optional)	3
2.1.3 Bison and Flex	3
2.2 Getting GlusterFS	3
2.3 Building	3
2.4 Running GlusterFS	4
2.4.1 Server	4
2.4.2 Client	4
2.5 A Tutorial Introduction	4
3 Concepts	5
3.1 Filesystems in Userspace	5
3.2 Translator	5
3.3 Volume specification file	5
4 Translators	6
4.1 Storage Translators	6
4.1.1 POSIX	6
4.2 Client and Server Translators	6
4.2.1 Transport modules	6
4.2.2 Client	7
4.2.3 Server	7
4.3 Clustering Translators	7
4.3.1 Unify	7
4.3.2 Automatic File Replication (AFR)	8
4.3.3 Stripe	8
4.4 Performance Translators	8
4.4.1 Read Ahead	8
4.4.2 Write Behind	8
4.4.3 IO Threads	8
4.4.4 IO Cache	9
4.5 Features Translators	9
4.5.1 POSIX Locks	9
4.5.2 Fixed ID	9
4.6 Miscellaneous Translators	9
4.6.1 ROT-13	9
4.6.2 Trace	9
5 Usage scenarios	10

6	Performance	11
7	Troubleshooting	12
Appendix A	GNU Free Documentation Licence	13
A.0.1	ADDENDUM: How to use this License for your documents	19
Index		20

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1 Introduction

GlusterFS is a distributed filesystem. It works at the file level, not block level.

1.1 Contacting us

You can reach us through the mailing list **gluster-devel** (gluster-devel@nongnu.org).

You can also find many of the developers on IRC, on the **#gluster** channel on Freenode (irc.freenode.net).

For commercial support, you can contact Z Research at:

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You can also email us at support@zresearch.com.

2 Installation and Invocation

2.1 Pre requisites

Before installing GlusterFS make sure you have the following components installed.

2.1.1 FUSE

You'll need FUSE version 2.6.0 or higher to use GlusterFS. You can omit installing FUSE if you want to build *only* the server. Note that you won't be able to mount a GlusterFS filesystem on a machine that does not have FUSE installed.

FUSE can be downloaded from: <http://fuse.sourceforge.net/>

2.1.2 libibverbs (optional)

This is only needed if you want GlusterFS to use InfiniBand as the interconnect mechanism between server and client. You can get it from:

<http://www.openfabrics.org/downloads.htm>.

2.1.3 Bison and Flex

These should be already installed on most Linux systems. We recommend using GNU Bison and Flex.

2.2 Getting GlusterFS

There are many ways to get hold of GlusterFS. For a production deployment, the recommended method is to download the latest release tarball. Release tarballs are available at: <http://gluster.org/download.php>.

If you want the bleeding edge development source, you can get them from the GNU Arch¹ repository. First you must install GNU Arch itself. Then register the GlusterFS archive by doing:

```
$ tla register-archive http://arch.sv.gnu.org/archives/gluster
```

Now you can check out the source itself:

```
$ tla get -A gluster@sv.gnu.org glusterfs--mainline--2.5
```

If you are on an RPM based system, you can also try RPMs contributed by Matthew Paine (matt@mattsoftware.com), for CentOS 5, available at:

http://www.mattsoftware.com/msw_repo/centos/5/

Leonardo Rodrigues de Mello (l1lmello.eu.org) has created Ubuntu (Etch) packages of GlusterFS. They are available at:

<http://guialivre.governoeletronico.gov.br/guiaonline/downloads/pacotes-cluster/dists/etch/glusterfs/>

2.3 Building

You can skip this section if you're installing from RPMs or DEBs.

GlusterFS uses the Autotools mechanism to build. As such, the procedure is straight-forward. First, change into the GlusterFS source directory.

¹ <http://www.gnu.org/software/gnu-arch/>

```
$ cd glusterfs--1.3
```

If you checked out the source from the Arch repository, you'll need to run `./autogen.sh` first. Note that you'll need to have Autoconf and Automake installed for this.

Run `configure`.

```
$ ./configure
```

The configure script accepts the following options:

`--disable-ibverbs`

Disable the InfiniBand transport mechanism.

`--disable-fuse-client`

Disable the FUSE client.

`--disable-server`

Disable building of the GlusterFS server.

2.4 Running GlusterFS

2.4.1 Server

2.4.2 Client

2.5 A Tutorial Introduction

3 Concepts

3.1 Filesystems in Userspace

application -> kernel -> fuse -> /dev/fuse -> user process -> server -> underlying filesystem

3.2 Translator

3.3 Volume specification file

4 Translators

4.1 Storage Translators

Amazon S3 support is planned.

4.1.1 POSIX

```
type storage/posix
```

reuses POSIX compatible underlying filesystem.

```
directory <path>
    j
```

```
inode-lru-limit <n> (1000)
    k
```

4.2 Client and Server Translators

4.2.1 Transport modules

three types of transports

```
non-blocking-connect [no|off|on|yes] (on)
```

```
remote-port <n> (6996)
```

```
remote-host <hostname> *
```

infiniband h/w gives api called verbs. lowest level of s/w access. (= ib-verbs). highest performance. ib-verbs reliable connection-oriented channel transfer. (Mellanox notes).

options:

```
ib-verbs-work-request-send-count <n> (64)
    foo
```

```
ib-verbs-work-request-recv-count <n> (64)
    asf
```

```
ib-verbs-work-request-send-size <size> (128KB)
    asdf
```

```
ib-verbs-work-request-recv-size <size> (128KB)
    adsf
```

```
ib-verbs-port <n> (1)
    iuiio
```

```
ib-verbs-mtu [256|512|1024|2048|4096] (2048)
```

```
ib-verbs-device-name <device-name> (first device in the list)
    oaisdf
```

“impedance matching” is necessary.

ib-sdp. kernel implements socket interface for ib hardware. SDP is over ib-verbs.

ib-verbs is preferred over ib-sdp.

4.2.2 Client

type procotol/client

client protocol.

```
transport-type [tcp,ib-sdp,ib-verbs] (tcp/client)
remote-subvolume <volume_name> *
inode-lru-limit <n> (1000)
transport-timeout <n> (120- seconds)
```

4.2.3 Server

type protocol/server

```
client-volume-filename <path> (<CONFDIR>/glusterfs-client.vol)
transport-type [tcp,ib-verbs,ib-sdp] (tcp/server)
```

4.3 Clustering Translators

4.3.1 Unify

type cluster/unify

unify unifies its subvolumes. it has children, and will do stuff on them.

scheduler is used for creates. rr, random nufa - prefers local. otherwise does rr alu - adaptive least usage. Various criteria. order of preference. entry & exit threshold.

```
alu.order <order> *
("disk-usage:write-usage:read-usage:open-files-usage:disk-speed")
alu.disk-usage.entry-threshold <size> (1GB)
alu.disk-usage.exit-threshold <size> (512MB)
alu.write-usage.entry-threshold <%> (25)
alu.write-usage.exit-threshold <%> (5)
alu.read-usage.entry-threshold <%> (25)
alu.read-usage.exit-threshold <%> (5)
alu.open-files-usage.entry-threshold <n> (1000)
alu.open-files-usage.exit-threshold <n> (100)
alu.limits.min-free-disk <%>
alu.limits.max-open-files <n>
rr.limits.min-free-disk <%> (5)
rr.refresh-interval <t> (10 seconds)
random.limits.min-free-disk <%> (5)
random.refresh-interval <t> (10 seconds)
nufa.limits.min-free-disk <%> (5)
nufa.refresh-interval <t> (10 seconds)
nufa.local-volume-name <volume>
```

Namespace volume needed because: - persistent inode numbers. - file exists even when node is down. namespace files are simply touched. on every lookup it is checked.

Self heal: two rules: - dir structure should be consistent. - file should exist on only one node.

```
namespace <volume> *
self-heal [on|off] (on)
inode-lru-limit <n> (1000)
```

4.3.2 Automatic File Replication (AFR)

```
type cluster/afr
```

Replication is via *pattern:n*. Extended attributes needed for self heal functionality. Version number and ctime is stored in the attributes.

All of this not recommended: If you increase n, new file will be created. If you decrease n, nothing happens.

If you change subvolume order, it asserts that the first n **available** (nodes which are up) subvolumes have the file.

If a file is missing on a node, the latest version available will be written there. Missing directories are created during lookup.

self heal happens on open.

subvolume list must be same on all clients. Recommended configuration is to have exact same spec. Use -s.

```
debug [on|off] (off)
self-heal [on|off] (on)
replicate <pattern> (*:1)
lock-node <child_volume> (first_child)
inode-lru-limit <n> (1000)
```

4.3.3 Stripe

```
type cluster/stripe
```

uses extended attrs to store info.

```
inode-lru-limit <n> (1000)
block-size <pattern> (*:0 no striping)
```

4.4 Performance Translators

4.4.1 Read Ahead

```
type performance/read-ahead
```

all reads are broken into page counts. page+n are read. if the read is not consecutive read ahead is stopped. page-count is per file.

```
page-size <n> (256KB)
page-count <n> (2)
force-atime-update [on|off|yes|no] (off|no)
```

4.4.2 Write Behind

```
type performance/write-behind
```

flush behind

```
aggregate-size <n> (0)
flush-behind [on|yes|off|no] (off|no)
```

4.4.3 IO Threads

```
type performance/io-threads
```

cache size = maximum that can be pending inside a thread.

```
thread-count <n> (1)
cache-size <n> (64MB)
```

4.4.4 IO Cache

```
type performance/io-cache
page-size <n> (128KB)
cache-size (n) (32MB)
force-revalidate-timeout <n> (1)
priority <pattern> (*:0)
```

4.5 Features Translators

4.5.1 POSIX Locks

```
type features/posix-locks
record locking. Only supports fcntl. flock not supported. caveat about mandatory lock-
ing+changing perms.
mandatory [on|off] (on)
Turns mandatory locking on.
```

4.5.2 Fixed ID

```
type features/fixed-id
fixed-uid <n> [if not set, not used]
fixed-gid <n> [if not set, not used]
```

4.6 Miscellaneous Translators

4.6.1 ROT-13

```
type encryption/rot-13
v.simple translator
encrypt-write [on|off] (on)
decrypt-read [on|off] (on)
```

4.6.2 Trace

```
type debug/trace
debugging
```

5 Usage scenarios

- usage as network filesystem - clustering (normal unify) - HA setup (from HA tutorial)

6 Performance

- effect of direct_io mode.

7 Troubleshooting

GlusterFS log files.

Reporting a bug: `--from howto report bug doc`

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If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.

Index

A

AFR	8
alu (scheduler)	7
Arch	3
automatic file replication (AFR)	8

F

fcntl	9
FDL, GNU Free Documentation License	13

I

InfiniBand transport	6
InfiniBand, installation	3
io cache (translator)	9
io threads (translator)	8

L

libibverbs	3
locking	9

N

namespace	7
nufa (scheduler)	7

P

POSIX locks (translator)	9
--------------------------------	---

R

random (scheduler)	7
read ahead (translator)	8
RPM package	3
rr (scheduler)	7

S

scheduler (unify)	7
self heal (AFR)	8
self heal (unify)	7
stripe (translator)	8

U

Ubuntu package	3
unify (translator)	7

W

write behind (translator)	8
---------------------------------	---