gzip

The data compression program
for Gzip Version 1.3.8
8 December 2006

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This manual is for Gzip (version 1.3.8, 8 December 2006), and documents commands for compressing and decompressing data.

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1 Overview

`gzip` reduces the size of the named files using Lempel-Ziv coding (LZ77). Whenever possible, each file is replaced by one with the extension '`.gz`', while keeping the same ownership modes, access and modification times. (The default extension is '`-gz`' for VMS, '`z`' for MSDOS, OS/2 FAT and Atari.) If no files are specified or if a file name is `"-"`, the standard input is compressed to the standard output. `gzip` will only attempt to compress regular files. In particular, it will ignore symbolic links.

If the new file name is too long for its file system, `gzip` truncates it. `gzip` attempts to truncate only the parts of the file name longer than 3 characters. (A part is delimited by dots.) If the name consists of small parts only, the longest parts are truncated. For example, if file names are limited to 14 characters, gzip.msdos.exe is compressed to gzi.msd.exe.gz. Names are not truncated on systems which do not have a limit on file name length.

By default, `gzip` keeps the original file name and timestamp in the compressed file. These are used when decompressing the file with the '`-N`' option. This is useful when the compressed file name was truncated or when the time stamp was not preserved after a file transfer. However, due to limitations in the current `gzip` file format, fractional seconds are discarded. Also, time stamps must fall within the range 1970-01-01 00:00:00 through 2106-02-07 06:28:15 UTC, and hosts whose operating systems use 32-bit time stamps are further restricted to time stamps no later than 2038-01-19 03:14:07 UTC. The upper bounds assume the typical case where leap seconds are ignored.

Compressed files can be restored to their original form using '`gzip -d`' or `gunzip` or `zcat`. If the original name saved in the compressed file is not suitable for its file system, a new name is constructed from the original one to make it legal.

`gunzip` takes a list of files on its command line and replaces each file whose name ends with '`.gz`', '`.z`', '`.Z`', '`-gz`', '`-z`' or '`_z`' and which begins with the correct magic number with an uncompressed file without the original extension. `gunzip` also recognizes the special extensions '`.tgz`' and '`.taz`' as shorthands for '`.tar.gz`' and '`.tar.Z`' respectively. When compressing, `gzip` uses the '`.tgz`' extension if necessary instead of truncating a file with a '`.tar`' extension.

`gunzip` can currently decompress files created by `gzip`, `zip`, `compress` or `pack`. The detection of the input format is automatic. When using the first two formats, `gunzip` checks a 32 bit CRC (cyclic redundancy check). For `pack`, `gunzip` checks the uncompressed length. The `compress` format was not designed to allow consistency checks. However `gunzip` is sometimes able to detect a bad '`.Z`' file. If you get an error when uncompressing a '`.Z`' file, do not assume that the '`.Z`' file is correct simply because the standard `uncompress` does not complain. This generally means that the standard `uncompress` does not check its input, and happily generates garbage output. The SCO '`compress -H`' format (`lzh` compression method) does not include a CRC but also allows some consistency checks.

Files created by `zip` can be uncompressed by `gzip` only if they have a single member compressed with the 'deflation' method. This feature is only intended to help conversion of `tar.zip` files to the `tar.gz` format. To extract a `zip` file with a single member, use a command like '`gunzip <foo.zip`' or '`gunzip -S .zip foo.zip`'. To extract `zip` files with several members, use `unzip` instead of `gunzip`.

`zcat` is identical to '`gunzip -c`'. `zcat` uncompresses either a list of files on the command line or its standard input and writes the uncompressed data on standard output. `zcat` will uncompress files that have the correct magic number whether they have a '.gz' suffix or not.

gzip uses the Lempel-Ziv algorithm used in zip and PKZIP. The amount of compression obtained depends on the size of the input and the distribution of common substrings. Typically, text such as source code or English is reduced by 60-70%. Compression is generally much better than that achieved by LZW (as used in compress), Huffman coding (as used in pack), or adaptive Huffman coding (compact).

Compression is always performed, even if the compressed file is slightly larger than the original. The worst case expansion is a few bytes for the gzip file header, plus 5 bytes every 32K block, or an expansion ratio of 0.015% for large files. Note that the actual number of used disk blocks almost never increases. gzip normally preserves the mode, ownership and time stamps of files when compressing or decompressing.

The gzip file format is specified in P. Deutsch, GZIP file format specification version 4.3, Internet RFC 1952 (ftp://ftp.isi.edu/in-notes/rfc1952.txt) (May 1996). The zip deflation format is specified in P. Deutsch, DEFLATE Compressed Data Format Specification version 1.3, Internet RFC 1951 (ftp://ftp.isi.edu/in-notes/rfc1951.txt) (May 1996).

2 Sample Output

Here are some realistic examples of running `gzip`.

This is the output of the command '`gzip -h`':

```
gzip version-number
usage: gzip [-cdfhlLnNrtvV19] [-S suffix] [file ...]
 -c --stdout      write on standard output, keep original files unchanged
 -d --decompress  decompress
 -f --force       force overwrite of output file and compress links
 -h --help        give this help
 -l --list        list compressed file contents
 -L --license     display software license
 -n --no-name     do not save or restore the original name and time stamp
 -N --name        save or restore the original name and time stamp
 -q --quiet       suppress all warnings
 -r --recursive   operate recursively on directories
 -S .suf  --suffix .suf     use suffix .suf on compressed files
 -t --test        test compressed file integrity
 -v --verbose     verbose mode
 -V --version     display version number
 -1 --fast        compress faster
 -9 --best        compress better
 file...          files to (de)compress. If none given, use standard input.
Report bugs to <bug-gzip@gnu.org>.
```

This is the output of the command '`gzip -v texinfo.tex`':

```
texinfo.tex:             69.7% -- replaced with texinfo.tex.gz
```

The following command will find all `gzip` files in the current directory and subdirectories, and extract them in place without destroying the original:

```
find . -name '*.gz' -print | sed 's/^\(.*\)[.]gz$/gunzip < "&" > "\1"/' | sh
```

3 Invoking gzip

The format for running the gzip program is:

```
gzip option ...
```

gzip supports the following options:

'--stdout'
'--to-stdout'
'-c'
: Write output on standard output; keep original files unchanged. If there are several input files, the output consists of a sequence of independently compressed members. To obtain better compression, concatenate all input files before compressing them.

'--decompress'
'--uncompress'
'-d'
: Decompress.

'--force'
'-f'
: Force compression or decompression even if the file has multiple links or the corresponding file already exists, or if the compressed data is read from or written to a terminal. If the input data is not in a format recognized by gzip, and if the option '--stdout' is also given, copy the input data without change to the standard output: let zcat behave as cat. If '-f' is not given, and when not running in the background, gzip prompts to verify whether an existing file should be overwritten.

'--help'
'-h'
: Print an informative help message describing the options then quit.

'--list'
'-l'
: For each compressed file, list the following fields:

```
compressed size: size of the compressed file
uncompressed size: size of the uncompressed file
ratio: compression ratio (0.0% if unknown)
uncompressed_name: name of the uncompressed file
```

The uncompressed size is given as '-1' for files not in gzip format, such as compressed '.Z' files. To get the uncompressed size for such a file, you can use:

```
zcat file.Z | wc -c
```

In combination with the '--verbose' option, the following fields are also displayed:

```
method: compression method (deflate,compress,lzh,pack)
crc: the 32-bit CRC of the uncompressed data
date & time: time stamp for the uncompressed file
```

The crc is given as ffffffff for a file not in gzip format.

With '--verbose', the size totals and compression ratio for all files is also displayed, unless some sizes are unknown. With '--quiet', the title and totals lines are not displayed.

The `gzip` format represents the input size modulo 2^32, so the uncompressed size and compression ratio are listed incorrectly for uncompressed files 4 GB and larger. To work around this problem, you can use the following command to discover a large uncompressed file's true size:

```
zcat file.gz | wc -c
```

'`--license`'
'`-L`' Display the `gzip` license then quit.

'`--no-name`'
'`-n`' When compressing, do not save the original file name and time stamp by default. (The original name is always saved if the name had to be truncated.) When decompressing, do not restore the original file name if present (remove only the `gzip` suffix from the compressed file name) and do not restore the original time stamp if present (copy it from the compressed file). This option is the default when decompressing.

'`--name`'
'`-N`' When compressing, always save the original file name and time stamp; this is the default. When decompressing, restore the original file name and time stamp if present. This option is useful on systems which have a limit on file name length or when the time stamp has been lost after a file transfer.

'`--quiet`'
'`-q`' Suppress all warning messages.

'`--recursive`'
'`-r`' Travel the directory structure recursively. If any of the file names specified on the command line are directories, `gzip` will descend into the directory and compress all the files it finds there (or decompress them in the case of `gunzip`).

'`--suffix` *suf*'
'`-S` *suf*' Use suffix '*suf*' instead of '`.gz`'. Any suffix can be given, but suffixes other than '`.z`' and '`.gz`' should be avoided to avoid confusion when files are transferred to other systems. A null suffix forces gunzip to try decompression on all given files regardless of suffix, as in:

```
gunzip -S "" *        (*.* for MSDOS)
```

Previous versions of gzip used the '`.z`' suffix. This was changed to avoid a conflict with `pack`.

'`--test`'
'`-t`' Test. Check the compressed file integrity.

'`--verbose`'
'`-v`' Verbose. Display the name and percentage reduction for each file compressed.

'`--version`'
'`-V`' Version. Display the version number and compilation options, then quit.

'`--fast`'
'`--best`'
'`-n`' Regulate the speed of compression using the specified digit *n*, where '`-1`' or '`--fast`' indicates the fastest compression method (less compression)

and '`--best`' or '`-9`' indicates the slowest compression method (optimal compression). The default compression level is '`-6`' (that is, biased towards high compression at expense of speed).

4 Advanced usage

Multiple compressed files can be concatenated. In this case, `gunzip` will extract all members at once. If one member is damaged, other members might still be recovered after removal of the damaged member. Better compression can be usually obtained if all members are decompressed and then recompressed in a single step.

This is an example of concatenating `gzip` files:

```
gzip -c file1  > foo.gz
gzip -c file2 >> foo.gz
```

Then

```
gunzip -c foo
```

is equivalent to

```
cat file1 file2
```

In case of damage to one member of a '`.gz`' file, other members can still be recovered (if the damaged member is removed). However, you can get better compression by compressing all members at once:

```
cat file1 file2 | gzip > foo.gz
```

compresses better than

```
gzip -c file1 file2 > foo.gz
```

If you want to recompress concatenated files to get better compression, do:

```
zcat old.gz | gzip > new.gz
```

If a compressed file consists of several members, the uncompressed size and CRC reported by the '`--list`' option applies to the last member only. If you need the uncompressed size for all members, you can use:

```
zcat file.gz | wc -c
```

If you wish to create a single archive file with multiple members so that members can later be extracted independently, use an archiver such as `tar` or `zip`. GNU `tar` supports the '`-z`' option to invoke `gzip` transparently. `gzip` is designed as a complement to `tar`, not as a replacement.

5 Environment

The environment variable `GZIP` can hold a set of default options for `gzip`. These options are interpreted first and can be overwritten by explicit command line parameters. For example:

```
for sh:    GZIP="-8v --name"; export GZIP
for csh:   setenv GZIP "-8v --name"
for MSDOS: set GZIP=-8v --name
```

On Vax/VMS, the name of the environment variable is `GZIP_OPT`, to avoid a conflict with the symbol set for invocation of the program.

6 Using gzip on tapes

When writing compressed data to a tape, it is generally necessary to pad the output with zeroes up to a block boundary. When the data is read and the whole block is passed to gunzip for decompression, gunzip detects that there is extra trailing garbage after the compressed data and emits a warning by default if the garbage contains nonzero bytes. You have to use the '--quiet' option to suppress the warning. This option can be set in the GZIP environment variable, as in:

```
for sh:    GZIP="-q"  tar -xfz --block-compress /dev/rst0
for csh:   (setenv GZIP "-q"; tar -xfz --block-compress /dev/rst0)
```

In the above example, gzip is invoked implicitly by the '-z' option of GNU tar. Make sure that the same block size ('-b' option of tar) is used for reading and writing compressed data on tapes. (This example assumes you are using the GNU version of tar.)

7 Reporting Bugs

If you find a bug in `gzip`, please send electronic mail to `bug-gzip@gnu.org`. Include the version number, which you can find by running '`gzip -V`'. Also include in your message the hardware and operating system, the compiler used to compile `gzip`, a description of the bug behavior, and the input to `gzip` that triggered the bug.

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