zstd Fast compression

START HERE

`zstd <file>`
Compress to <file>.zst

`tar --zstd -cf <a>.tar.zst <dir>`
Archive a directory

`zstd -d <file>.zst`
Decompress

`zstd --rm <file>`
Delete original after

`zstd -19 <file>`
Smaller, slower

`zstd -T0 <file>`
Use all cores

`zstd -l <file>.zst`
Show sizes and ratio

`zstd -dc <file>.zst`
Print to stdout

CONCEPTS

zstd keeps the input file by default and adds .zst. Use --rm to delete the original once it succeeds.

--fast=N fastest, largest
↓ -1
-3 default balance
↓ -19
--ultra -22 smallest, slow, lots of RAM
Level versus speed

COMPRESS

`zstd <file>`
Compress, keep original (<file>.zst)

`zstd <file> -o <out>`
Choose the output name

`zstd -<n> <file>`
Level 1-19 (default 3)

`zstd -c <file> > <out>`
Write to stdout, keep input

`zstd --rm <file>`
Remove input after success

`zstd -f <file>`
Overwrite existing output

`zstd -r <dir>`
Compress each file in a directory
Makes one .zst per file, not one archive. Use tar for a single archive.

`zstd <a> <b> <c>`
Compress several files at once

`zstd --fast=<n> <file>`
Faster than level 1, lower ratio

COMPRESS (cont.)

`zstd --ultra -22 <file>`
Levels 20-22, heavy memory use
Decompression then needs lots of memory too, so check the target machine.

`zstd --adapt <file>`
Auto-tune level to I/O speed

`zstd --exclude-compressed -r <dir>`
Skip already compressed files

`zstd --no-check <file>`
Skip the XXH64 checksum

`zstd --format=gzip <file>`
Write gzip, xz, lzma or lz4 instead

DECOMPRESS

`zstd -d <file>.zst`
Decompress, keep the .zst

`unzstd <file>.zst`
Same as zstd -d

`zstd -dc <file>.zst`
Decompress to stdout

`zstdcat <file>.zst`
Print a compressed file

`zstdless <file>.zst`
Page a compressed file

`zstdgrep <pattern> <file>.zst`
Search inside a compressed file

`zstd -d <file>.zst -o <out>`
Choose the output name

DECOMPRESS (cont.)

`zstd -df <file>.zst`
Overwrite existing output

`zstd -d -M<mb> <file>.zst`
Cap decompression memory

`zstd --test <file>.zst`
Verify integrity only

`zstd -d --long=<n> <file>.zst`
Needed if made with a large --long window
Windows above 27 bits must be allowed explicitly on decompression.

INSPECT

`zstd -l <file>.zst`
Frames, sizes, ratio, checksum

`zstd -lv <file>.zst`
Verbose: window size, dictionary ID

`zstd -b<n> <file>`
Benchmark level n on a file

`zstd -b1 -e19 <file>`
Benchmark a range of levels

`zstd -v <file>`
Verbose output

SPEED AND MEMORY

`zstd -T0 <file>`
Use all physical cores

`zstd -T<n> <file>`
Use n threads

SPEED AND MEMORY (cont.)

`zstd --auto-threads=logical -T0 <file>`
Count logical cores for -T0

`zstd --long <file>`
Long-range matching for big, repetitive data

`zstd --long=<n> <file>`
Window of 2^n bytes (default 27)

`zstd --rsyncable <file>`
Output that rsync can delta well

`zstd --single-thread <file>`
One thread for I/O and compression

`zstd -B<size> <file>`
Set job size per thread

`zstd --size-hint=<bytes>`
Tune for piped input of known size

PIPES AND TAR

`tar --zstd -cf <a>.tar.zst <dir>`
Create a tar.zst

`tar --zstd -xf <a>.tar.zst`
Extract a tar.zst

`tar -tf <a>.tar.zst`
List contents
Modern GNU tar detects the zstd format on read, so --zstd is only needed when creating.

PIPES AND TAR (cont.)

`tar -I 'zstd -T0 -19' -cf <a>.tar.zst <dir>`
Pick level and threads for tar

`tar -cf - <dir> | zstd -T0 > <a>.tar.zst`
Pipe tar into zstd

`zstd -dc <a>.tar.zst | tar -xf -`
Pipe zstd into tar

`zstdmt <file>`
Alias for multithreaded zstd

`zstd -c <file> | ssh <host> 'zstd -d > <out>'`
Compress over ssh

DICTIONARIES AND PATCHES

`zstd --train <files> -o <dict>`
Build a dictionary from samples
Needs many small, similar sample files to work well.

`zstd --train --maxdict=<bytes> <files>`
Limit the dictionary size

`zstd -D <dict> <file>`
Compress with a dictionary

`zstd -D <dict> -d <file>.zst`
Decompress with the same dictionary

`zstd --patch-from=<old> <new> -o <patch>`
Make a binary diff against old

DICTIONARIES AND PATCHES (cont.)

`zstd -d --patch-from=<old> <patch> -o <new>`
Apply that patch to old

`zstd --filelist <list>`
Read file names from a list

`zstd --output-dir-flat <dir> <files>`
Put outputs in one directory

`zstd --output-dir-mirror <dir> -r <src>`
Mirror the source tree structure

RECIPES

Fast backup archive

```
tar -I 'zstd -T0 -10' -cf
backup.tar.zst <dir>
zstd --test backup.tar.zst
zstd -l backup.tar.zst
```

Maximum compression for a release

```
zstd --ultra -22 -T0 --long=27
<file> -o <file>.zst
# decompress with the same
window
zstd -d --long=27 <file>.zst
```

Dump a database through zstd

```
pg_dump <db> | zstd -T0 >
<db>.sql.zst
zstd -dc <db>.sql.zst | psql
<db>
```

Dictionary for many small files

```
zstd --train logs/*.json -o
logs.dict
zstd -D logs.dict logs/*.json
zstd -D logs.dict -d logs/*.zst
```