Archiving & Compression (Core)

Linux Commands Course \cdot Section $\dot{}$

What Is Archiving?

Archiving combines multiple files or folders into one container file. Compression makes that container smaller.

Common reasons to archive:

- Backup and transfer data
- Package projects or logsPreserve directory structures

Linux standard tools: tar, gzip, bzip2, xz, zstd, zip.

Creating Tar Archives



Compressed Tarballs

tar can compress directly using gzip, bzip2, xz, or zstd.

Create compressed archive (gzip)

tar -czvf project.tar.gz project/

tar -xzvf project.tar.gz

You can also use different extensions to choose the compression algorithm automatically.

bzip2 and xz Examples

Create bzip2 tarball

Extract it:

Create xz tarball

Extract it:

Flag Algorith		m Extension	
z	gzip	.gz	
j	bzip2	.bz2	

tar -cjvf data.tar.bz2 data/

tar -xjvf data.tar.bz2

tar -cJvf data.tar.xz data/

tar -xJvf data.tar.xz

Modern Compression — zstd

zstd (Zstandard) is a fast modern compressor with excellent ratios.

tar -I zstd -cvf project.tar.zst project/

Extract:

tar -I zstd -xvf project.tar.zst

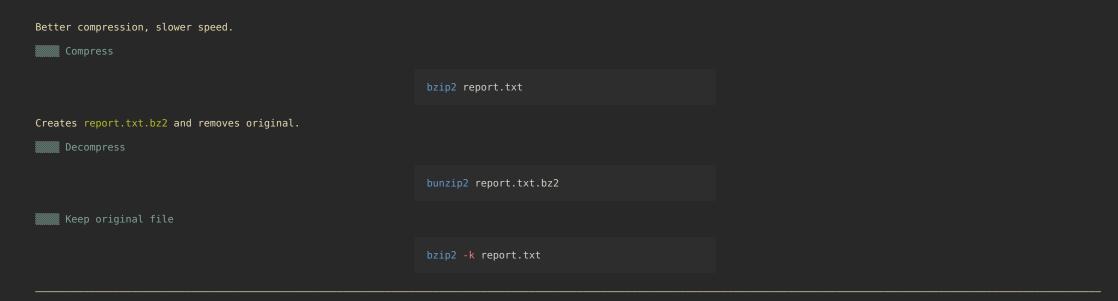
You can also use the standalone tools:

zstd file.txt # creates file.txt.zst # decompresses it

gzip and gunzip (Classic Pair)



bzip2 and bunzip2



xz and unxz

High compression ratio; often used for distributing software packages.								
Compress								
	xz archive.tar							
Produces archive.tar.xz.								
Decompress								
	unxz archive.tar.xz							
To view progress while compressing:								
	xz -v archive.tar							

Cross-Platform Archives — zip and unzip

ZIP is widely supported across operating systems.		
Create zip archive		
	zip -r project.zip project/	
Extract zip file		
	unzip project.zip	
Extract to specific folder		
	unzip project.zip -d /tmp/project	
List contents:		
	unzip -l project.zip	

Choosing the Right Tool

Tool	Format	Speed	Compression	Portability	Use case
gzip	.gz	Fast	Medium	High	Everyday backups
bzip2	.bz2	Medium	Higher	Medium	Logs, archives
xz	.xz	Slow	Very High	Medium	Software packaging
zstd	.zst	Very Fast	High	Medium	Modern systems
zip	.zip	Fast	Medium	Very High	Cross-platform

Inspecting Archive Contents

List files in an archive without extracting:

tar -tvf archive.tar
unzip -l project.zip

Test integrity (for .zip):

unzip -t project.zip

Combine with Pipelines

Create and compress on the fly:

tar -czf - project/ | ssh backup@server "cat > /backups/project.tgz"

Or decompress remotely:

ssh backup@server "cat /backups/project.tgz" | tar -xz

This allows archiving without intermediate files.

Recap

- tar archive multiple files (-cvf, -xvf)
 gzip / bzip2 / xz / zstd compression algorithms
 zip / unzip cross-platform archives
 Choose based on speed, ratio, and compatibility needs.