**Compression and Archive**

**Archive**: Saving data from different places into one file.

* **Windows Tool**: WinRAR
* **Linux Tool**: tar (Tape Archive)

**Creating an Archive**:

* **Commands**:
  + Create archive: tar -cvf cloud.tar aa bb cc /mnt/zz /tmp/aa (-c = create, -v = verbose, -f = file)
  + View contents without extracting: tar -tvf cloud.tar (-t = list)
  + Append data to archive: tar -rvf cloud.tar dd (-r = append)
  + Extract data: tar -xvf cloud.tar (-x = extract)
  + Extract to another location: tar -xvf cloud.tar -C /mnt (-C = change directory)

**Compression**

**Types of Compression**:

1. **Gzip**: gzip cloud.tar (Result: cloud.tar.gz)
2. **Bzip2**: bzip2 cloud.tar (Result: cloud.tar.bz2)
3. **Xz**: xz cloud.tar (Result: cloud.tar.xz)

**Decompression**:

* Gzip: gzip -d cloud.tar.gz
* Bzip2: bzip2 -d cloud.tar.bz2
* Xz: unxz cloud.tar.xz

**Compression Speed and Size Reduction**:

* **Gzip**: Fast compression, less size reduction (-z)
* **Bzip2**: Average speed, average size reduction (-j)
* **Xz**: Slow compression, more size reduction (-J)

**Archiving and Compressing Together**:

* Gzip: tar -czvf aa.tar.gz /etc (Result: 4.6M)
* Bzip2: tar -cjvf bb.tar.bz2 /etc (Result: 3.8M)
* Xz: tar -cJvf cc.tar.xz /etc (Result: 2.9M)

**Decompressing and Extracting**:

* Gzip: tar -xzvf aa.tar.gz
* Bzip2: tar -xjvf bb.tar.bz2
* Xz: tar -xJvf cc.tar.xz

**Attributes**

**Attributes**: Security settings for files and folders.

* **Types**:
  1. **Editable (**e**)**: Default, allows edit, rename, delete.
  2. **Append (**a**)**: Only see and add data.
  3. **Immutable (**i**)**: Only see, cannot modify.

**Commands**:

* List attributes: lsattr
* Set append: chattr +a abc
* Remove append: chattr -a abc
* Set immutable: chattr +i abc

**Runlevels (Targets)**

**Runlevels**: Indicate the mode of the OS.

1. **0**: Power off (poweroff.target, init 0)
2. **1**: Single user mode (rescue.target)
3. **2**: Multi-user, no networking (not used)
4. **3**: Multi-user with networking (multi-user.target, CLI)
5. **4**: Research (not used)
6. **5**: Graphical mode (graphical.target, GUI)
7. **6**: Reboot (reboot.target, init 6)

**Viewing Runlevels**:

* systemctl get-default
* runlevel
* who -r

**Changing Runlevels**:

* **Temporary**: systemctl isolate graphical.target
* **Permanent**: systemctl set-default graphical.target

**Runlevel Files**:

* Located in /lib/systemd/system
* List runlevel targets: ls runlevel\*target