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Using Dalma's /archive

High Performance Computing Center
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Backup VS Archive

- A backup is an operation where a disk's contents is automatically copied to tape
- Archiving is an operation where a disk's contents is manualy moved to a long-term storage device

backup: automatically & periodically **COPY** data to tape

archival: manually **MOVE** data to long-term storage (tape or other)

Dalma's Archiving Components

What `/archive` does

- DMF (**D**ata **M**igration **F**acility) is an automatic data archiving tool
- It buffers data to a disk cache before copying it (eg migration) to the tape drive
- Old data on disk cache is eventually removed to make room for more data
- Once removed from disk cache files still appear in cache – file hierarchy remains, but not data
- Accessing such files automatically triggers their migration back to the disk cache
- Migration to tape drive actually makes two tape copies
- One copy is periodically sent to an outside data recovery site
- The tapes have a data retention of 30+ years
- Each time you modify a file on the disk cache two new copies of the latest version are made to tape
- There are no limits on how many file versions that can be made
- There is no disk quota for the amount of space used on tape or disk cache

DO NOT MISUSE /archive

- No directories with more than 500 files
- Don't archive files that aren't meaninful
- Don't move files in and out
- Don't use it to backup your work weekly / monthly
- Don't request a file restore unless absolutely necessary
- Don't use /archive as a way around your /scratch disk quotas

CORRECT DISK USAGE /archive

- Periodically clean your /scratch & /fastscratch space
- Once a project is completed move the data over to /archive
- Use tar files to archive directories with large file count
- Use "git" or similar versioning tool to keep track of changes in code, data sets
- Remove any data from /archive which is you are sure will not be used ever again

  (the previous tape copies of that data still remain)

Tool to use `/archive`

- dmfls
- Same options to "ls"
- "-l" option display state of file

REG	File not managed by DMF
MIG	Migrating
ARC	Archiving
DUL	Dual-state (both on tape and disk cache)
OFL	Offline
UNM	Unmigrating
NMG	Nonmigratable file
PAR	Partial-state file
N/A	DMF can't determine state
INV	Invalid state

```
> dmfls -l /archive/zidane/
total 16
drwxrwxr-x  112 apps    apps        4096 2015-04-30 08:25 (REG) builds
-rw-rw-r--    1 apps    apps      693985 2015-06-22 12:49 (OFL) eigen-intel14.tar.gz
-rw-rw-r--    1 apps    apps    10546302 2015-06-22 12:46 (OFL) eigensoft-intel14.tar.gz
-rw-rw-r--    1 apps    apps     2438932 2015-06-22 12:40 (OFL) fftw2-intel14.tar.gz
-rw-rw-r--    1 apps    apps     7921210 2015-06-22 12:40 (OFL) fftw3-intel14.tar.gz
-rw-rw-r--    1 apps    apps     2730147 2015-06-22 12:43 (OFL) gsl-intel14.tar.gz
-rw-rw-r--    1 apps    apps    25386040 2015-06-22 12:42 (OFL) hdf5-intel14.tar.gz
drwxrwxr-x    3 apps    apps          26 2015-02-08 08:39 (REG) jags
-rw-rw-r--    1 apps    apps      223502 2015-06-22 12:46 (OFL) mpiblacs-intel14.tar.gz
-rw-rw-r--    1 apps    apps    10244400 2015-06-22 12:44 (OFL) mvapich2-intel14
-rw-rw-r--    1 apps    apps     7083606 2015-06-22 12:45 (OFL) netcdf-c-intel14.tar.gz
-rw-rw-r--    1 apps    apps    33848579 2015-06-22 12:44 (OFL) openmpi-intel14.tar.gz
-rw-rw-r--    1 apps    apps    10295250 2015-06-22 12:48 (OFL) scalapack-intel14.tar.gz
drwxrwxr-x   67 apps    apps        4096 2016-01-21 09:08 (REG) scripts
drwxrwxr-x    2 apps    apps        4096 2016-01-21 09:02 (REG) tars
drwxrwxr-x    3 apps    apps          24 2015-02-05 10:16 (REG) toolshed
-rw-rw-r--    1 apps    apps      147937 2015-06-22 12:43 (OFL) zlib-intel14.tar.gz
```

Tool to use `/archive`

- dmfrm
- Similar options to "rm"

Remove a file:

```
> dmfrm /archive/beckham/myfile
```

Remove a directory:

```
> dmfrm -r /archive/beckham/mydir
```

NOTE: deleted files can be recovered within two weeks

Tool to use `/archive`

- dmfdu
- Similar options to "du"

blocks used by a directory / file:

```
> dmfdu /archive/ronaldinho
27567617  /archive/ronaldinho/WIEN2K
27567617  /archive/ronaldinho
```

Human readable (-h) and grand total (-c):

```
> dmfdu -ch  /archive/ronaldinho
27G /archive/ronaldinho/WIEN2K
27G /archive/donaldinho
27G total
```

Tool to use `/archive`

- dmfput
- Copy data to /archive
- Usage: dmfput <source> <destination>
- Audit of directories before archiving
- If destination directory exists then only synchronize with new source content (rsync)

```
> dmfput /scratch/neymar/mydir /archive/neymar

> dmfput /scratch/neymar/myfile /archive/neymar/dir1/

> dmfput /scratch/neymar/dir1/myfile /archive/neymar/dir1/myfile

> dmfput /scratch/neymar/mycrazydir /archive/neymar
Auditing /scratch/neymar/mycrazydir
Directory /scratch/neymar/mycrazydir has too many entries (1000 max=500)
Archiving terminated on account of directories failing to meet limits
```

Tool to use `/archive`

- dmfget
- Copy data from /archive
- Usage: dmfget <source> <destination>

```
> dmfget /archive/ibrahimovic/dir1/fileX /scratch/ibrahimovic/dir2
```

Tool to use /archive

- dmfput / dmfget how to specify the destination directory
- When creating a new directory at the destination

```
dmfput <source> /archive/<netID>/.../<new dir>/
dmfget /archive/<netID>/.../<source>  /scratch/<netID>/.../<new dir>/
```

NOTE: The trailing "/" is what triggers the creation of the new destination directory

- When using an existing directory at the destination

```
dmfput <source> /archive/<netID>/.../<old dir>/
dmfput <source> /archive/<netID>/.../<old dir>

dmfget /archive/<netID>/.../<source>  /scratch/<netID>/.../<old dir>/
dmfget /archive/<netID>/.../<source>  /scratch/<netID>/.../<old dir>
```

Here <source> can either be a file or a directory. And the "..." stand for a directory path.

Archiving directories with large number of files

- Very wasteful of resources
- Very very slow to scan (eg "ls", "find", etc)
- **DO NOT ATTEMPT TO ARCHIVE SUCH DIRECTORIES**
- Create "compressed tar files" of them instead and archive those tar files

```
> tar -czf mycrazydir.tgz mycrazydir

> rm -fr mycrazydir

> dmfput /scratch/messi/mycrazydir.tgz /archive/messi
```

Archiving several versions of the same directory

- Write the data into individual directories

```
> dmfput /scratch/ronaldo/mydir /archive/ronaldo/mydir.20170822
```

some *time later...*

```
> dmfput /scratch/ronaldo/mydir /archive/ronaldo/mydir.20170905
```