

LIGO-E040182-00-C

LLO CDS Backup Procedure

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Introduction

The purpose of this document is to provide a reference for backing up and/or restoring the CDS file systems in the event of data loss.

CDS File System Backup

The ufsdump utility was chosen as the backup utility for the CDS file system. As of March 2004, a tape drive has been installed on control14 and is the current backup device.

Preliminary Setup

Before beginning the actual backup one must collect file system information. The first step is deciding which mount points you wish to backup. At this time the following mounts points have been selected for backup,

```
/cvs  
/opt  
/data  
/opt/apps
```

Next one must determine where these mount points are located. To do so open a terminal on any control room Sun station and at the prompt type,

```
df -k <enter>
```

where <enter> means press the enter key. You should receive a display similar to

Filesystem	kbytes	used	avail	capacity	Mounted on
/dev/dsk/c0t0d0s0	1715531	74115	1589951	5%	/
/dev/dsk/c0t0d0s5	1181219	855493	266666	77%	/usr
/proc	0	0	0	0%	/proc

with several more lines. So if you were looking for /cvs you would scan the 'Mounted on' column. Once you find the mount point you are looking for, look for the corresponding entry under the 'Filesystem' column. That entry shows the

machine where /cvs is mounted. For example, if a df -k is done on the Sun station control3 you would get the following,

Filesystem	kbytes	used	avail	capacity	Mounted on
/dev/dsk/c0t0d0s0	482824	65805	368737	16%	/
/dev/dsk/c0t0d0s5	1986439	862207	1064639	45%	/usr
/proc	0	0	0	0%	/proc
.					
.					
LLO1:/cvs/cds	35033908	22677495	12006074	66%	/cvs/cds

In the above example note that /cvs is located on the machine LLO1, it's actually /cvs/cds that's visible to control3 but the important thing is that /cvs is on LLO1. So in order to backup /cvs we must do it from the machine LLO1.

The locations of the mount points that are currently backed up are as follows,

- /cvs** is on **LLO1**
- /opt** is on **LLO1**
- /data** is on **control3**
- /opt/apps** is on **control3**

So LLO1 and control3 are the two machines that contain the file systems that need backing up. All other file systems should be restorable by reinstalling the operating system from the master disks.

Backing up the file systems

First make certain that you have a blank tape that is not write protected in the tape drive that's connected to control14 and that the drive is on. Also make sure control14 is operating, control14 is currently the left scimon station. The tape drive is located in the mass storage room in the rack that contains control14. It is currently on the top shelf on the right side of control18. A complete backup of the four file systems above will take three tapes, the LLO1 file systems should fit on one tape and the control3 file systems will be spread out on two tapes.

Now we will need to log in to LLO1, this can be done from any CDS machine but is probably easiest to use the machine in the mass storage room. On that machine you tap the 'Scroll Lock' key twice and you will be presented with a menu to choose which machine you wish to access. Choose LLO1 press enter and log in to the machine if necessary. Once on the LLO1 machine open a terminal. If using a different machine say control15, you would open a terminal on that machine and secure shell to LLO1,

ssh ops@LLO1 <enter>

Again this can be done from any CDS machine however LLO1 is already setup to write backups to the tape drive, so use LLO1. If LLO1 is unavailable you may need a system administrator to set /.rhosts permissions to allow remote transfers, consult the man pages for ufsdump for more information.

Once you have a terminal open on LLO1 you will need to become root to proceed. So at the prompt type,

su <enter>

and enter the root password for LLO1 when prompted. Once you are root it can be helpful to invoke a shell before continuing so type,

tcsh <enter>

Once the c shell starts you will need to confirm which file system you are backing up. So at the prompt type,

df -k <enter>

Once the disk information is displayed check which file system /cvs and /opt are on. Currently the LLO1 file systems for /cvs and /opt are

```
/dev/dsk/c1t3d0s6    is    /cvs
/dev/dsk/c0t0d0s6    is    /opt
```

Once you know the file systems you can enter the dump command. So to perform a full backup of /cvs and /opt on LLO1 to the tape drive on control14 enter the following command at the prompt,

ufsdump 0uf control14:/dev/rmt/0cn /dev/rdisk/c1t3d0s6 && ufsdump 0uf control14:/dev/rmt/0c /dev/rdisk/c0t0d0s6 <enter>

It is VERY important that the device order in the ufsdump command is not reversed. In the above, **control14:/dev/rmt/0cn** is the tape device and **/dev/rdisk/c1t3d0s6** is the file system that is to be backed up. **If those two devices are reversed then you will backup the tape drive to the file system! So you will essentially erase the file system you wanted to backup!**

The above command is actually two ufsdumps executed sequentially. The first ufsdump makes a level 0, or full, copy of the /cvs disk. The second ufsdump makes a level 0 copy of the /opt disk. Both commands update the dumpdates file so that incremental backups can be made. Also both commands compress the data. The first ufsdump doesn't rewind the tape after it finishes, which is necessary since we want to start the second dump at the end of the first.

For incremental backups of the LLO1 file system use the following command,

```
ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c1t3d0s6 && ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c0t0d0s6 <enter>
```

Notice in the above we are requesting a level 1 backup, which is defined as backing up all file changes since the last level 0 backup. Also, neither command rewinds the tape drive when the dump finishes.

The procedure for backing up the file systems on control3 is identical except that you must be logged onto control3 as root. It's easiest to just open a terminal on LLO1 in the mass storage room and secure shell to control3. Once logged into control3 become root and enter the following commands.

The command for a full backup of the control3 file systems is,

```
ufsdump 0uf control14:/dev/rmt/0cn /dev/rdisk/c2t5d0s6 && ufsdump 0uf control14:/dev/rmt/0c /dev/rdisk/c0t1d0s5 <enter>
```

This backup will require two tapes, so once the end of media is reached on the first tape, the dump will wait till the tape is removed and replaced with a new tape.

For an incremental backup of control3 enter the following command,

```
ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c2t5d0s6 && ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c0t1d0s5 <enter>
```

this will create a level 1 backup of control3.

Restoring a backup from tape

Important! Read ALL of the this section before attempting a restore!

The ufsrestore command is used to recall data from a previous dump. There are two primary methods for recalling the data, an interactive restore and a complete restore. When ufsdump writes data to the tape drive it stores each ufsdump into a volume on the tape. So it may be necessary to manually position the tape to read the correct volume for data recovery. The command that is used to position the tape drive is **mt** and you must be logged into control14 as root to use it. For example, suppose we need to restore the latest level 1 backup of /cvs. First we locate the appropriate tape and load it into the tape drive. Next open a terminal on LLO1 in the mass storage room and at the prompt type

```
ssh control14 <enter>
```

and enter the ops password. Then type

```
su <enter>
```

and enter the root password. The tape you inserted should be rewound but just in case type

```
mt -t /dev/rmt/0cn rewind <enter>
```

that will rewind the tape to its beginning. Next type

```
ufsrestore tfy /dev/rmt/0cn <enter>
```

this will give you a list of files on the tape and near the top of the listing it will tell you what file system has been dumped to the current volume of the tape drive. If the current file system is the one that needs restoring then skip down to **Restoring the Data** else continue.

Since this is not the file system you need to restore use the following command to proceed to the next volume on the tape drive

```
mt -t /dev/rmt/0cn fsf 1 <enter>
```

Again type

```
ufsrestore tfy /dev/rmt/0cn <enter>
```

and examine the list of files to see if this is the correct volume. If it is the needed volume then proceed to **Restoring the Data** else proceed to the next tape volume as above till you find the volume you need.

Restoring the Data

To restore data first you must be logged into either LLO1 or control3 depending on what you need to restore. Also you must be root and you must be in the directory that the restore will take place. So if you are restoring a complete file system you must rebuild the initial file system and cd to it before starting the restore. For example, suppose you needed to completely restore /cvs and /opt on LLO1 because LLO1's disk crashed. You would first need to reload the operating system. In addition to the default partitions that are created by the operating system you would also need to specify a partition for /cvs and one for /opt. Once the operating system was up, you would then cd to /cvs and then ufsrestore the /cvs backup. You'd do the same for the /opt file system.

To perform a full restore switch to the file system that needs to be restored. Once in the file system as root type the following command,

ufsrestore rfy control14:/dev/rmt/0c <enter>

To perform an interactive restore once again switch to the file system as root and type,

ufsrestore ify control14:/dev/rmt/0c <enter>

When using the interactive method ufsrestore will start a pseudo shell that you can use to specify which files or directories to restore. You can type help at the shell command prompt for a list of available commands, here are the most important,

add file or directory - adds a file or a directory to the restore list.

delete file or directory - deletes a file or a directory from the restore list. This does not remove the file from the tape or delete it in any way, it only removes it from the restore list.

cd directory – changes current working directory, same as unix shell command

pwd – prints current working directory, same as unix shell command

ls – lists all files in the current working directory, any files marked with an asterisk is currently on the restore list

extract – restores all files that are currently on the restore list

quit – quits ufsrestore without restoring any files

So suppose I wanted to restore the directory /cvs/cds/llo using the interactive procedure. First I would log on to LLO1 as root. Next I would cd to the working directory /cvs/cds. Then I would enter the above ufsrestore command. After the ufsrestore shell starts I would,

cd cds <enter>

add llo <enter>

ls <enter>

After verifying that the llo directory has an asterisk next to it I would type,

extract <enter>

At that point ufsrestore will extract all files and directories on the tape in /cvs/cds/llo to the LLO1 file system.

At the end of any restore that you perform `ufsrestore` will ask you if you want to set owner/mode for '.'?

Type **n** to answer no! You want the original owner and mode for the files you restore.

Backup Quick Guide

This quick guide assumes all file systems are set up identical to the March 2004 setup. If file systems have been reconfigured then the following commands will need to be modified.

Full Backup of /cvs and /opt.

Log in to the LLO1 machine in the mass storage room. At the prompt type

su <enter>

and enter the root password for LLO1. Make sure that a new tape is in the tape drive and that control14 is operating normally, control14's displays are the left scimon station. At the prompt type,

ufsdump 0uf control14:/dev/rmt/0cn /dev/rdisk/c1t3d0s6 && ufsdump 0uf control14:/dev/rmt/0c /dev/rdisk/c0t0d0s6

and press the enter key. Again it is VERY important not to reverse the devices in the above command. The tape drive is **control14:/dev/rmt/0cn** and must come before the file system to be backed up, in this case **/dev/rdisk/c1t3d0s6** and **/dev/rdisk/c0t0d0s6**.

This backup fits on one tape and takes about 3 hours and 30 minutes.

Full Backup of /data and /opt/apps.

From the LLO1 machine in the mass storage room secure shell to control3,

ssh root@control3 <enter>

and enter the root password. Check the tape drive again and when ready type,

ufsdump 0uf control14:/dev/rmt/0cn /dev/rdisk/c2t5d0s6 && ufsdump 0uf control14:/dev/rmt/0c /dev/rdisk/c0t1d0s5

and press the enter key.

This backup will require two tapes so you will need to check on it occasionally so that you can remove the old tape and insert a new one.

This backup takes about 5 hours.

Incremental backups

Incremental backups of the file systems should be performed daily and should fit on one tape. For LLO1,

Log in to the LLO1 machine in the mass storage room. At the prompt type

su <enter>

and enter the root password for LLO1. Make sure that a new tape is in the tape drive and that control14 is operating normally, control14's displays are the left scimon station. At the prompt type,

ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c1t3d0s6 && ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c0t0d0s6

and press the enter key. Once complete make an incremental backup of control3,

From the LLO1 machine in the mass storage room secure shell to control3,

ssh control3 <enter>

and enter the ops password. At the prompt type

su <enter>

and enter the root password. Check the tape drive again and when ready type,

ufsdump 1uf control14:/dev/rmt/0cn /dev/rdisk/c2t5d0s6 && ufsdump 1uf control14:/dev/rmt/0c /dev/rdisk/c0t1d0s5

and press the enter key. Once complete you will have a backup of all new and changed files since the last full backup.

There is no quick and easy method to restoring a backup so please read my detailed discussion beginning on page 4.