



Using `filesync` for Disaster Recovery, Business Continuance, and Mobility

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Using `filesync(1)` for Disaster Recovery, Business Continuance, and Mobility

Since the September 11th disaster, many information technology professionals are looking for disaster recovery and business continuance solutions. Disaster recovery and business continuance are intended to ensure that a business can survive a disaster, recover from it, and continue to handle normal business activities. Implementation of a disaster recovery and business continuance plan can include offsite data storage, disaster recovery procedures, security implementations, and hot, disaster recovery sites.

The Solaris™ Operating Environment (Solaris OE) `filesync(1)` command can be used to help with both disaster recovery and business continuance. The `filesync(1)` command synchronizes ordinary, directory, or special files. It can be used to synchronize data between two servers that are in the same data center or miles apart. In the event of a primary server failure, the synchronized secondary data can be used to continue business activities. Additionally, mobile employees can synchronize data between a laptop and an office server in the event of laptop damage or loss.

UNIX® users have been copying and synchronizing files and directories for a long time. For instance, the `RSYNC` command has been used for some time for one-way synchronization between two files or directories. The `filesync(1)` command does bidirectional synchronization. If files in the source directory change or if files change in the destination directory, the `filesync(1)` command synchronizes the files in both places. You can also use the `-o` option with the `filesync(1)` command to overwrite only the files that were modified, which might be quicker than restoring the whole directory.

With the `filesync(1)` command, you can do the following:

- Recover from a disaster

You can recover files from a previously synchronized directory on a backup server to a production directory on a production server. You can also use `filesync(1)` to recover files that were synchronized to a production server if the files on that server are lost or corrupted. Finally, if your laptop computer is lost, stolen, or damaged, you can use `filesync(1)` to restore your files to a new laptop computer.

- Continue business activities

You can work from your laptop or workstation at home if the office servers are down.

- Create a point-in-time copy of your data

You can use the point-in-time copy of your data for testing or for returning your system to a known state.

- Enable mobility

You can synchronize your laptop so that you are prepared to give presentations, read your email, or maintain your web site—anywhere, anytime.

Note – The `filesync(1)` command creates the `.packingrules` file and the `.filesync-base` file in the home directory of the user ID that evoked the command. The `.packingrules` file controls the functionality of the `filesync(1)` command, and the `.filesync-base` file lists every file that was synchronized, along with the file's checksum value.

If you edit the same file on both servers, the `filesync(1)` command will notify you that you need to fix this situation. Also, you can use the `-f` option to force a synchronization one way or the other. For example, the `filesync -f src` command will overwrite the files on the destination server with the files on the source server (`src`). If there is a conflict in which the same file was changed in both the source directory and the destination directory, the `-f` option will overwrite the incorrect file with the correct file. The following example, shows the output of a reconciliation operation:

```
user%: filesync
RECONCILE /production and /databackup (1 files)
  ->    0 copies,    0 deletes,    0 ownership
  <-    0 copies,    0 deletes,    0 ownership
UNRESOLVED CONFLICTS: 1
      data.txt (two different versions)
```

In this example, both files were changed since the last synchronization, so you have to determine which file is the good file. For instance, if you determine that `/production/data.txt` is the good file, use the `-f` option with the `filesync(1)` command. Because the `/production` directory is the source directory, use the following command:

```
user%: filesync -f src
cp /production/data.txt /databackup/data.txt
RECONCILE /production and /databackup (1 files)
-> 1 copies, 0 deletes, 0 ownership
<- 0 copies, 0 deletes, 0 ownership
```

Synchronizing Two Directories

This section contains a procedure for synchronizing two directories. After you have synchronized the directories the first time, use the `filesync(1)` command without options to resynchronize the directories. You can use `crontab(1M)` to resynchronize the directories on a regular basis.

▼ To Synchronize Two Directories

- 1. Choose the directory you want to synchronize.**

In this example, we use the `/data/oracle` directory.

- 2. Choose the directory to which you want to synchronize.**

In this example, we use the `/backupdisk/oracle` directory. The first time you use the `filesync(1)` command, the `/backupdisk/oracle` directory must be empty. Otherwise, the `filesync(1)` command will return errors, indicating that it cannot resolve conflicts, for every file in both directories.

3. Execute the following command:

```
user%: filesync -s /data -d /backupdisk oracle
```

When you want to resynchronize your files, issue the `filesync(1)` command without options. To synchronize your files automatically, use the `cron(1M)` command. For instance, to synchronize your files nightly at 1:00 a.m., add the following line to the `crontab(1)` file:

```
0 1 * * * /usr/bin/filesync
```

Using the `filesync(1)` Command With NFS and `automount(1M)`

This section contains a procedure for using the `filesync(1)` command with NFS and the `automount(1M)` command. This can be part of a business disaster recovery and business continuance solution. The synchronized servers can be within a data center or between two servers that are miles apart.

▼ To Use NFS and `automount(1M)`

1. Choose the directory you want to synchronize.

In this procedure, we use `/mycaddata`, which is on `oldserver`.

2. Ensure that the server is running the automount(1M) daemon.

If it is not running the automount(1M) daemon, add the following lines to the `/etc/auto_master` file:

```
# Master map for automounter
#
+auto_master
/net -hosts -nosuid,nobrowse
```

After adding these lines, start the automount daemon with the following command:

```
# /etc/init.d/autofs start
```

See `automountd(1M)` for more information about the automount daemon.

3. Choose the server and directory to which you want to synchronize.

In this procedure, we use `newserver` and `/mycaddata` on that server.

4. Ensure that `newserver` is sharing (that is, exporting) the directory to which you want to synchronize and that `oldserver` can mount the directory.

To ensure that the automounter is working, log on to `oldserver`, and execute the following command:

```
user% cd /net/newserver/mycaddata
```

5. Ensure that the `/mycaddata` directory on `newserver` is empty.

6. Use the following command on `oldserver`.

```
user% filesync -s / -d /net/newserver mycaddata
```

When you want to resynchronize your files, issue the `filesync(1M)` command without options.

Note – The `filesync(1M)` command works over NFS or other network-based file systems, such as AFS or DFS with Linux, HP UX, IBM AIX, and Apple OS-X, by using a solution that lets the Solaris OE mount the disk over the network. It also works with Microsoft Windows by using PC NFS.

Synchronizing Files Between a Sun Server and a Linux Laptop

The procedure in this section explains how to synchronize a home directory between a Sun server and a Linux laptop that is using DHCP.

▼ To Synchronize Files Between a Sun Server and a Linux Laptop

1. **Ensure that the laptop is sharing (that is, exporting) the directory to which you want to synchronize.**

You must add the directory and server name to which you want to synchronize in the `/etc/exports` file on the Linux laptop. For example, if the server name is `SunServer123` and the directory is your user directory on that server (that is, `/home/user_name`), then add the following line to the `/etc/exports` file:

```
/home/user_name SunServer123(rw, sync)
```

2. **Activate the changes to the `/etc/exports` file on the Linux laptop, execute the following command:**

```
user% exportfs -a
```

See `exportfs(1B)` for more information on how to use *sharing* in Linux.

3. Ensure that the Sun server is running the automount(1M) daemon.

If it is not running the automount(1M) daemon, add the following lines to the `/etc/auto_master` file:

```
# Master map for automounter
#
+auto_master
/net -hosts -nosuid,nobrowse
```

After adding these lines, start the automount daemon with the following command:

```
# /etc/init.d/autofs start
```

See `automountd(1M)` for more information about the automount daemon.

4. To ensure that the automounter is working, log on to sunserver123, and execute the following command:

```
user% cd /net/dhcp_address_of_laptop/home/user_name
```

5. Ensure that the directory on the laptop to which you are synchronizing is empty.

6. Execute the following command:

```
user% filesync -s /home/user_name -d /net/dhcp_address_of_laptop/home/user_name Mail
```

This command copies your *local* mail directory from the Sun server to the laptop.

7. Wait 10 minutes for the laptop to be unmounted from the server.

The Solaris OE automount daemon has a default timeout of 10 minutes before it unmounts an inactive NFS mount. Thus, you must wait 10 minutes for the Sun server to unmount the laptop. For instruction on how to change the default timeout value, see `automount(1M)`.

When you want to resynchronize your files, issue the `filesync(1)` command without options.

Automatically Updating the filesync(1) Files

If your laptop receives a new DHCP address, use the following script to modify the .packingrules file and the .filesync-base file.

CODE EXAMPLE 1 DHCP Script

```
#!/bin/sh
#set -fx          # Uncomment this line if you would like to debug this script.
#
# Filename: changeip.sh
#
# Availability: Sun only because filesync is a Solaris OE only feature
#
# Description: This Borne shell script changes the host name in the
#              two files that the "filesync" command uses. NOTE: The
#              packing.rules file and the filesync-base file are
#              created by the filesync command and should not be
#              edited manually.
#
# Usage: changeip.sh
#
#   Rev.   Programmer      Date                               Changes
#   ----   -
#   1.0    John Rosander   06/08/2003                Original Implementation
#
# Known problems: There is no error checking for user input.
#####

FILE1=$HOME/.packingrules
FILE1DATE=$HOME/.packingrules.`date +%m%d%y`
FILE2=$HOME/.filesync-base
FILE2DATE=$HOME/.filesync-base.`date +%m%d%y`
#
# Remove the date stamped files if run more than once today.
#
if [ -f $FILE1DATE ] ; then
    rm $FILE1DATE
fi
if [ -f $FILE2DATE ] ; then
    rm $FILE2DATE
fi
```

CODE EXAMPLE 1 DHCP Script (Continued)

```
# Backup the old files with a date stamp
cp -p $FILE1 $FILE1DATE
cp -p $FILE2 $FILE2DATE

#
# Get input from user
#
echo "Enter the old host name: "
read OLDSTRING

echo "Enter the new host name: "
read NEWSTRING

#
# Create a temporary file for use by sed
#
FILE1TMP=$HOME/.packingrules.tmp
FILE2TMP=$HOME/.filesync-base.tmp

sed "s/$OLDSTRING/$NEWSTRING/g" $FILE1 > $FILE1TMP
sed "s/$OLDSTRING/$NEWSTRING/g" $FILE2 > $FILE2TMP

mv $FILE1TMP $FILE1
mv $FILE2TMP $FILE2
```

On a regular basis, you should delete old copies of the `.packingrules` and `.filesync-base` files. For example, if the month is July (that is, 07) and you want to delete the June files (that is, 06), use the following command:

```
user% rm -i .packingrules.06* .filesync-base.06*
```



Caution – Ensure that you do not delete the mandatory files (that is, `.packingrules` and `.filesync-base`) that do not have date extensions.

About the Author

John Rosander is a Systems Engineer with Sun's Global Sales Organization. He has over 20 years of experience in a variety of technical positions, including Data Processing Manager, Systems Analyst, Systems Administrator, Data Base Administrator, and Senior Programmer. John has worked with the following companies: General Motors, Ford Motor Company, Daimler Chrysler, Sun Microsystems, Cisco Systems, IBM, Novell, MAI Basic Four, and World Computer Company. He is Sun 2000 Certified, a Cisco Certified Systems Instructor, and an IBM AIX Support Professional.

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