

# Max Buxton

Max has been a full time Macintosh consultant for over fifteen years.

He's been a certified member of the Apple Consultants Network since 2003.

He's been a peer, colleague and friend of Andy for much of that time, and joined the Call Andy! team in 2011.

Fun fact: Max is an avid motorcyclist and for ten years was a motorcycle safety instructor for the state of Massachusetts.



Call Andy!

# Time Machine Deep Dive, and Fitting it Into a Backup Strategy



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# How Did We Get Here?



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A quick flashback:

Remember “Backup”?

# Time Machine Tidbits

- Introduced as part of Leopard
- Bootable Backups in Lion
  - Only to directly connected drive
- Local Snapshots in Lion
- Multiple volume support in Mountain Lion
- There's a command line tool:
  - Time Machine Utility



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- Introduced with 10.5 in October 2007!
  - Time Capsule didn't get released until Feb 2008.
- Bootable Backups in 10.7.2
  - Creates a recovery partition on backup drive
- Local Snapshots:
  - Not "real" backups
  - On same partition as data
  - Temporary and expendable
- Multiple Volume support in 10.8 (2012): TM will automatically rotate between volumes with each backup.

# tmutil: the Overview

- man tmutil

```
TMUTIL(8)                      BSD System Manager's Manual          TMUTIL(8)

NAME

    tmutil -- Time Machine utility

SYNOPSIS

    tmutil verb [options]

DESCRIPTION

    tmutil provides methods of controlling and interacting with Time Machine,
    as well as examining and manipulating Time Machine backups. Common abilities
    include restoring data from backups, editing exclusions, and comparing
    backups.

    Several, but not all, verbs require root privileges.

BACKUP STRUCTURE

    Throughout this manual, specific language is used to describe particular
    "realms" associated with Time Machine backups. It is important to understand
    this terminology to make effective use of tmutil and its manual.

    backup source
        A volume currently being backed up by Time Machine.

    backup disk
```



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one of the best written man pages ever

Command-line interface for configuring and controlling Time Machine.

Very useful for broadcasting Time Machine commands to all your Macs.

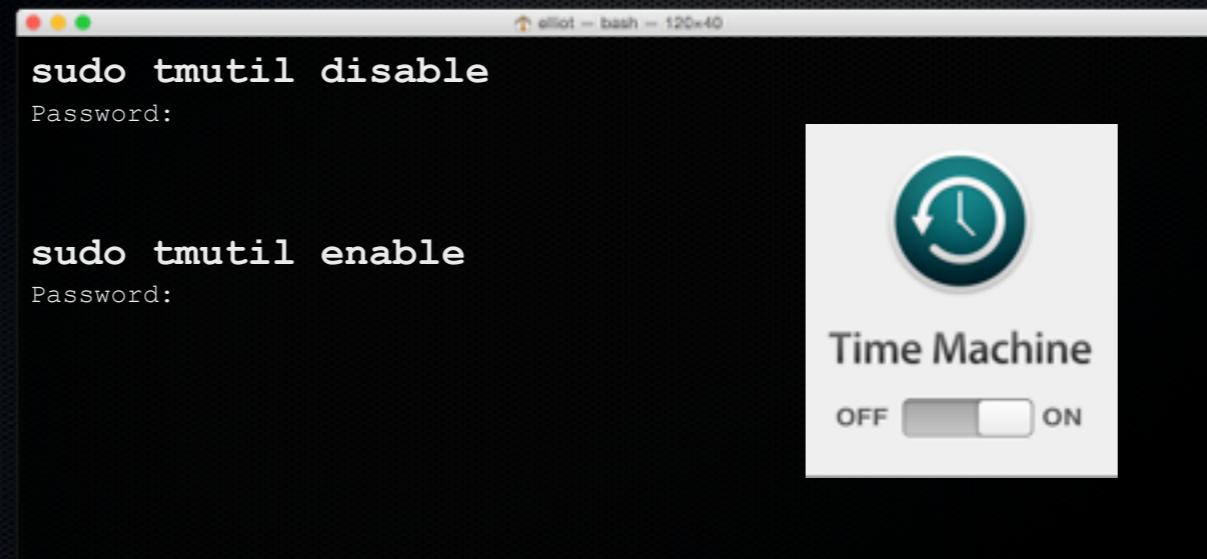
# tmutil: verbs you want to know about

- setdestination
- startbackup
- restore
- destinationinfo
- compare
- inheritbackup
- associatedisk
- calculatedrift
- uniquesize
- disablelocal



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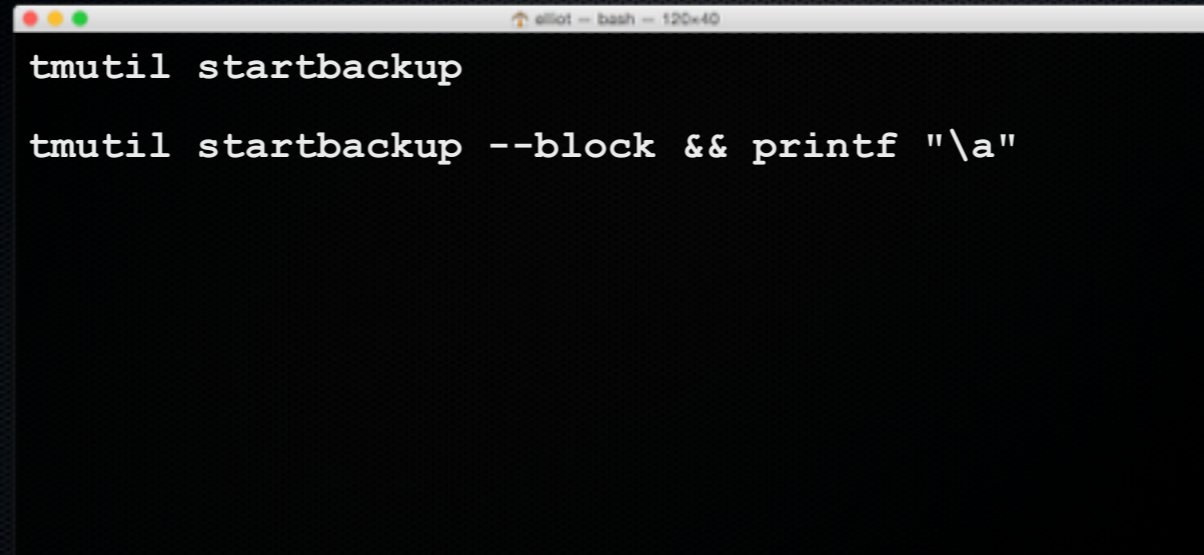
# Time Machine Utility



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Let's start with the basics: Turning TM off, then on again.

# Time Machine Utility

A terminal window with a dark background and light text. The window title bar shows 'elliott - bash - 120x40'. The terminal contains two lines of code: 'tmutil startbackup' and 'tmutil startbackup --block && printf "\a"'.

```
tmutil startbackup

tmutil startbackup --block && printf "\a"
```



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Begin a backup if one is not already running.

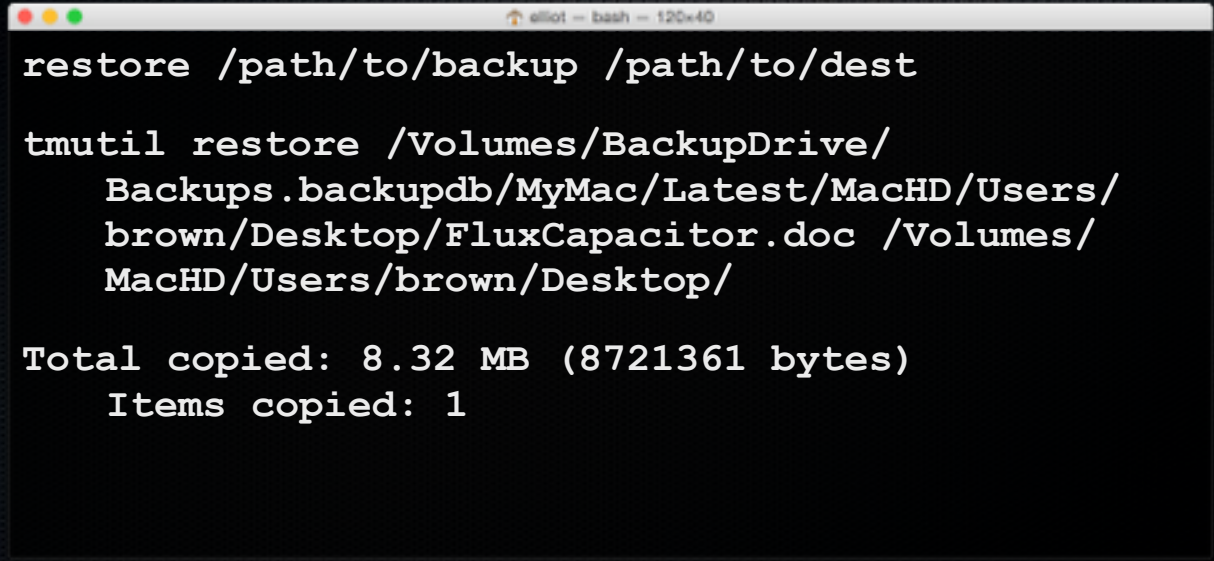
Block keeps it from moving on until the backup finishes. (printf "\a" is a beep)

## Options:

- auto Run the backup in a mode similar to system-scheduled backups.
- block Wait (block) until the backup is finished before exiting.
- rotation Allow automatic destination rotation during the backup.
- destination Perform the backup to the destination corresponding to the specified ID.

The --auto option provides a supported mechanism with which to trigger "automatic-like" backups, similar to automatic backups that are scheduled by the system. While this is not identical to true system-scheduled backups, it provides custom schedulers the ability to achieve some (but not all) behavior normally exhibited when operating in automatic mode.

# Time Machine Utility



```
restore /path/to/backup /path/to/dest

tmutil restore /Volumes/BackupDrive/
Backups.backupdb/MyMac/Latest/MacHD/Users/
brown/Desktop/FluxCapacitor.doc /Volumes/
MacHD/Users/brown/Desktop/

Total copied: 8.32 MB (8721361 bytes)
Items copied: 1
```



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Restore the item from the backup path (inside a snapshot) to the location destination. The dst argument mimics the destination path semantics of the cp tool.

When using the restore verb, tmutil behaves largely like Finder. Custom Time Machine metadata (extended security and other) will be removed from the restored data, and other metadata will be preserved.

Root privileges are not strictly required to perform restores, but tmutil does no permissions preflighting to determine your ability to restore src or its descendants. Therefore, depending on what you're restoring, you may need root privileges to perform the restore, and you should know this ahead of time. This is the same behavior you would encounter with other copy tools such as cp or ditto. When restoring with tmutil as root, ownership of the restored items will match the state of the items in the backup.

# Time Machine Utility

```
tmutil restore /Volumes/BackupDrive/  
Backups.backupdb/MyMac/Latest/MacHD/Users/  
brown/Documents/DeLorean/Before.jpg /Volumes/  
BackupDrive/Backups.backupdb/MyMac/Latest/  
MacHD/Users/brown/Documents/DeLorean/  
After.jpg /Volumes/MacHD/Users/brown/Desktop/
```



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restore multiple items to a given destination  
similar to cp or ditto

Restore the item from the backup path (inside a snapshot) to the location destination. The dst argument mimics the destination path semantics of the cp tool.

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# Time Machine Utility

```
elliot ~ bash 120x40
sudo tmutil setdestination -p afp://
    elliot@server01.pretendco.com/
    TimeMachineBackup
Destination password: *****

sudo tmutil setdestination -p -a afp://
    elliot@server02.pretendco.com/
    TimeMachineBackup2
Destination password: *****
```



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Creating backup destinations. (First setting, then adding another.)

Never specify the password in the command itself. Best to do this interactively, for security reasons.

# Time Machine Utility

```
elliot ~ bash -- 120x40

sudo tmutil inheritbackup "/Volumes/Time
Machine/Backups.backupdb/My Mac"
Destination password: *****

sudo tmutil associatedisk -a "/Volumes/Macintosh
HD" "/Volumes/Macintosh HD/Backups.backupdb/
My Mac/Latest/Macintosh HD"
Destination password: *****
```



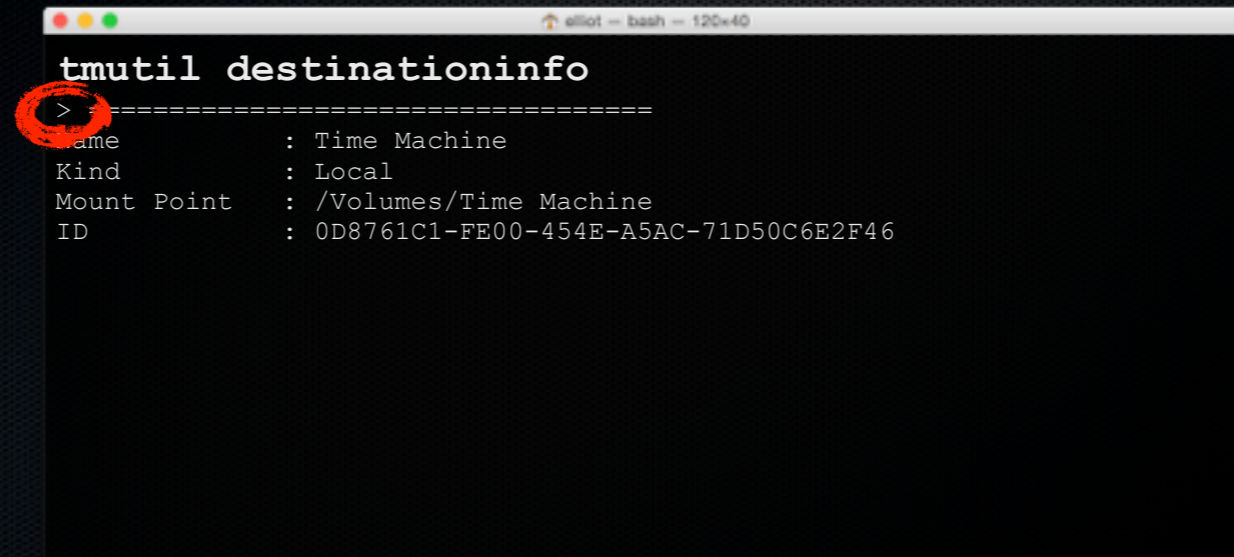
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Inherit an existing backup database.

First claim the machine directory...

Then bind the snapshot volume directory to the backup destination

# Time Machine Utility

A terminal window titled 'elliott ~ bash ~ 120x40' displays the command 'tmutil destinationinfo'. The output shows a single destination with a red circle around the '>' indicator. The output text is: '>=====  
>ame : Time Machine  
Kind : Local  
Mount Point : /Volumes/Time Machine  
ID : 0D8761C1-FE00-454E-A5AC-71D50C6E2F46'.

```
elliott ~ bash ~ 120x40
tmutil destinationinfo
>=====
>ame      : Time Machine
Kind      : Local
Mount Point : /Volumes/Time Machine
ID        : 0D8761C1-FE00-454E-A5AC-71D50C6E2F46
```



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Get information about where Time Machine is configured to back up.

When more than one destination is configured, the most recent backup destination will be marked with the > indicator.

When the -X option is provided, output will be printed in XML property list format.

# Time Machine Utility

```
tmutil listbackups
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-20-000234
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-094104
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-112510
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-131701
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-144205
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-160345
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-172106
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-183606
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-193929
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-202115

tmutil latestbackup
/Volumes/Time Machine/Backups.backupdb/My Mac/2015-02-23-202115
```



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List all the backup snapshots.  
Or just list the latest one.

# Time Machine Utility

```
tmutil compare
! 158B      (mtime)  /Library/Application Support/CrashReporter/SAV.plist
!           (mtime)  /Library/Caches
+ 2.9M      /Library/Managed Installs/swupd/content/downloads/01
+ 472.8K    /Library/Managed Installs/swupd/content/downloads/04
+ 243.3K    /Library/Managed Installs/swupd/content/downloads/09
!           (mtime)  /private/var/spool/cups
!           (mtime)  /private/var/tmp
-----
Added:      3.6M
Removed:    0B
Changed:    158B
```



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Compare any two snapshots, or compare the latest snapshot with the files on disk.

# Time Machine Utility

```
tmutil calculatedrift "/Volumes/Time Machine/Backups.backupdb/My Mac"
2014-02-11-001041 - 2014-02-18-000255
-----
Added:          0B
Removed:        0B
Changed:        21.7K

2014-02-25-105915 - 2014-03-10-005517
-----
Added:          4.0G
Removed:        0B
Changed:        8.0M
```



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Calculate the amount of data that has changed between snapshots.

# Time Machine Utility

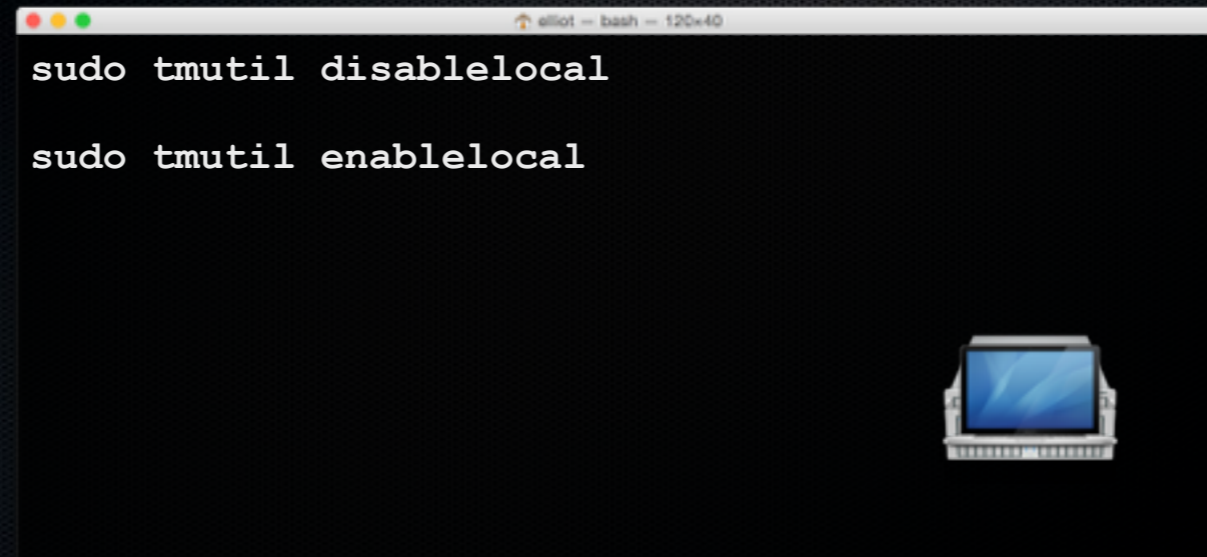
```
tmutil uniquesize "$(tmutil latestbackup)"  
173.4M    /Volumes/Time Machine/Backups.backupdb/My Mac/2015-03-08-175309
```



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Calculate the unique size of a particular backup snapshot.

# Time Machine Utility

A screenshot of a macOS terminal window. The title bar shows 'elliott - bash - 120x40'. The terminal contains two lines of text: 'sudo tmutil disablelocal' and 'sudo tmutil enablelocal'. In the bottom right corner of the terminal window, there is a small icon of a Time Machine backup disk.

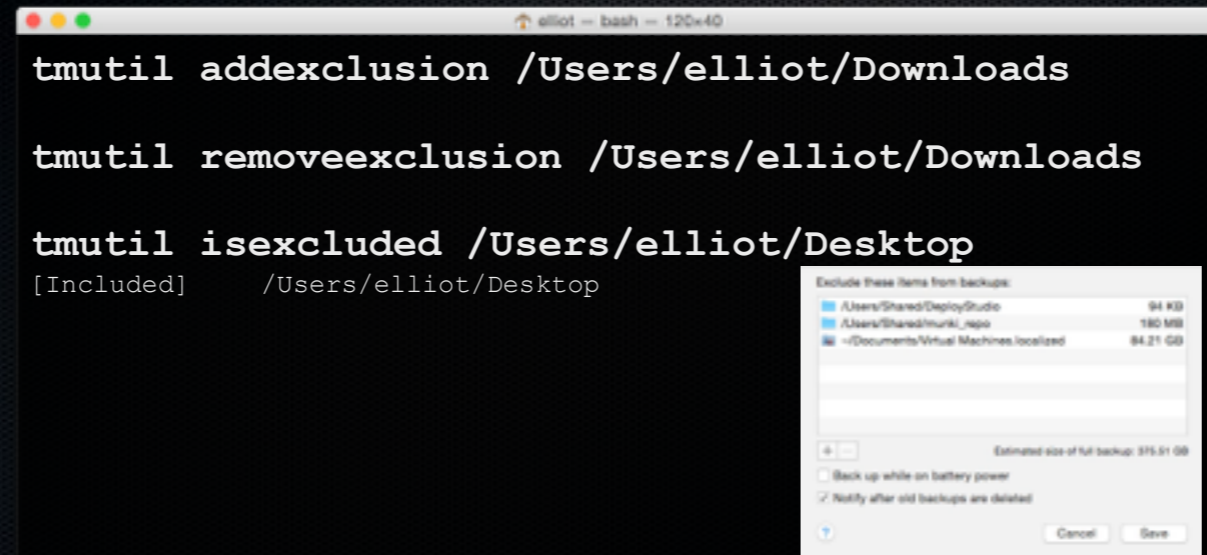
```
elliott - bash - 120x40
sudo tmutil disablelocal
sudo tmutil enablelocal
```



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TM Machine creates local snapshots even when the TM destination isn't connected. This isn't always ideal (file servers) and can be turned off.

# Time Machine Utility



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Add exclusions.

Remove exclusions.

Check to see whether a file is excluded or included.

# Time Machine Utility

```
tmutil addexclusion "/System" "/Library" "/"  
Applications" "/var" "/etc" "/Developer" "/"  
Groups" "/Incompatible Software" "/Volumes"  
"/bin" "/cores" "/usr" "/tmp" "/temp" "/opt"  
"/net" "/home" "/Shared Items" "/Network" "/"  
Groups"
```



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Exclude system files and applications. Only backup /Users

# Using Time Machine to Backup Servers

- use `tmutil disablelocal`
- ServerBackup native backup service for OS X Server
  - takes part in the restoration of server services
  - look for OpenDirectoryMaster.sparseimage in `/var/backups/`
- Restoring OS X Server from a Time machine backup. See [\[HT202406\]](#)



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Disable the local cache.

ServerBackup is a native service for backing up OS X Server.

If you're running Open Directory, check `/var/backups` for the sparse image. Set 3rd party clients to back up `/var/backups`. More details on restoring OS X Server can be found on Apple's Article [HT202406](#).

# OS X Server Time Machine Service

- Enable Time Machine in just a few clicks



- Direct backups to different storage locations
- Set Space Restrictions (Mavericks and above only)



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Enable Time Machine

How it becomes a destination on the network

Configuration options

Tracking backups

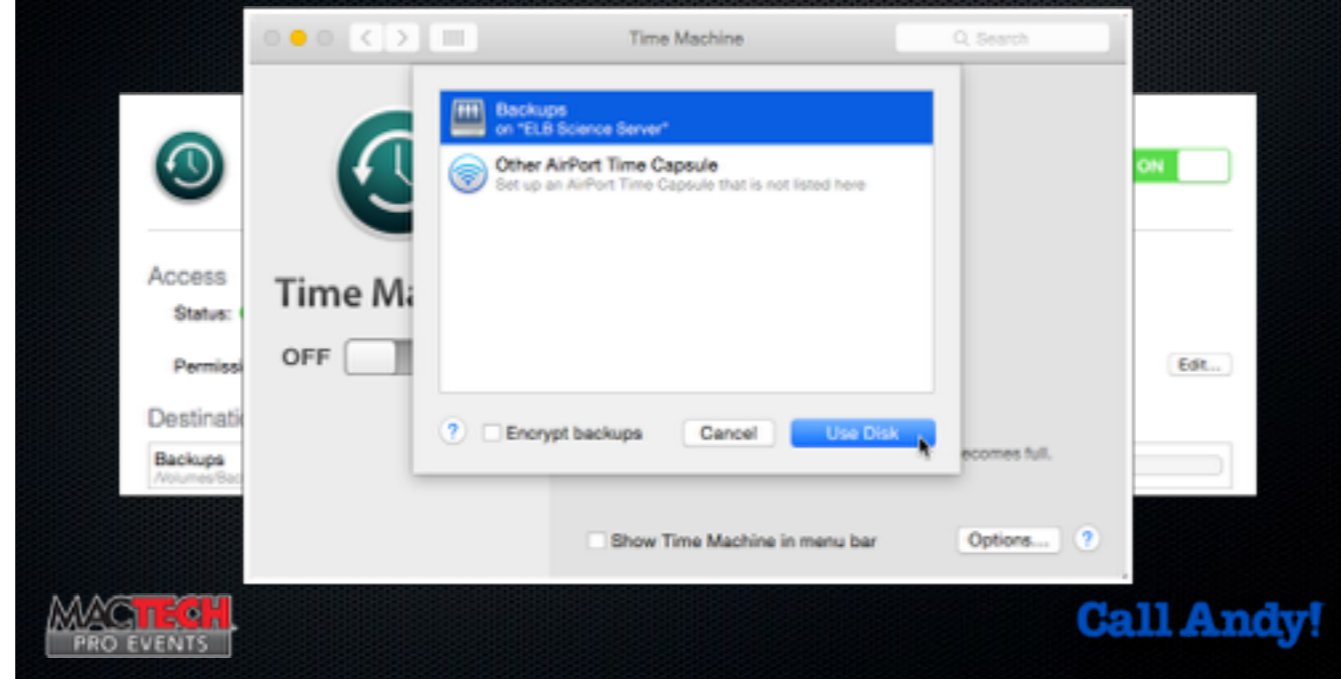
Space Restrictions (Mavericks and above only)

Directing backups to different storage locations

Notified push and email if a user has not completed a backup

# OS X Server Time Machine Service

- Time Machine is now a destination on the network



Enable Time Machine

How it becomes a destination on the network

Configuration options

Tracking backups

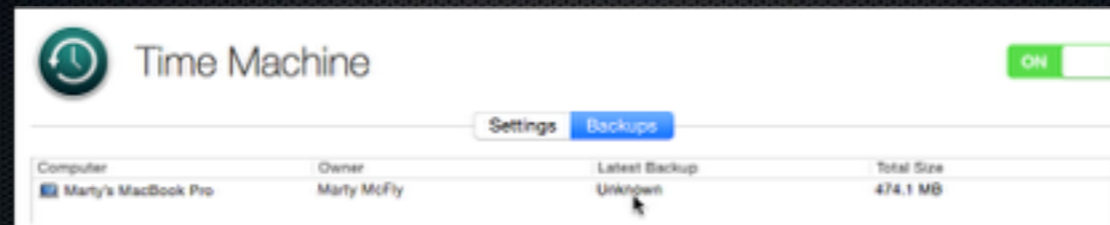
Space Restrictions (Mavericks and above only)

Directing backups to different storage locations

Notified push and email if a user has not completed a backup

# OS X Server Time Machine Service

- Track backups
- Push and email notification if a backup has not completed



# Backup Best Practices



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What guidelines should a backup process follow?

# The 3-2-1 Rule

- 3 copies of each important file
- 2 different media (disk, cloud, etc..)
- 1 copy stored in another location



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# Is it ok to use Time Machine as the only solution?

## Advantages

- Dead simple to configure
- Built-in to OS X
- Supported by Apple
- Simple restore interface
- Versioned
- Free



Time Machine

## Limitations

- Doesn't always recover well from corruption and errors
- Central reporting is minimal, do-it-yourself
- Requires hardware (hard drive or network storage)
- No automatic offsite backup



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The answer is almost always “no”

Time Machine is not strong on reporting

# Third Party Options

## Advantages

- Creates bootable clones
- Minimizes downtime during recovery
- Email reporting
- Very customizable



## Limitations

- Not versioned
- Difficult to configure for offsite backup
- Great for servers, not so good for backing up endpoint Macs
- Costs more than free\*

\*and worth it



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# Third Party Options

## Advantages

- Scalable
- Backs up to a local server, to cloud, or both
- Deduplication and compression
- LDAP integration
- Extensive reporting
- Relatively easy to deploy to your Mac fleet



## Limitations

- Great for endpoint Macs, not so good for backing up servers
- Costs more than free\*

\*and worth it



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# More Third Party Options

- Backblaze: Easy, inexpensive
- Acronis: Remote client speed
- Archiware for large archives
- Retrospect: Media types, legacy
- Consumer Cloud: Carbonite, Mozy
- Sync Utils: ChronoSync, Synchronize! X Plus
- Clones: dmg, SuperDuper, CopyCatX



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# Example Configurations



Local backup to one local drive

# Example Configurations



Local backup to two local drives

# Example Configurations



Local backup to one local drive and one networked drive

# Example Configurations



Local backup to one local drive & a bootable clone backup.  
Useful for servers for minimal downtime.

# Big Data Questions

- What do you do when you have 5, 10, or 25 TB of data?
- What are real, practical ways to get this much data backed up?
- What's the expectation for restore time?
  - 15 Mbs: 1 TB = 7 days
  - 100 Mbs: 1 TB = 23 hours
- What's the best ways to have multiple copies, and off site?



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A 15 Meg connection will take about 7 days to download 1 Terabyte of data. 100 Mbs connection will take nearly a day, 23 hours, to download 1 Terabyte of data.

You could carry your data off-site, but a better idea for this much data might be a fireproof, waterproof data safe like this one from ioSafe.

# More Resources

- Time Machine
  - [Transfer Time Machine backups to a new drive \[HT202380\]](#)
  - [Local Snapshots \[HT202301\]](#)
  - [Time Machine Troubleshooting \[PH18850\]](#)
  - [Krypted: Yosemite Server Time Machine Service](#)
  - [Pondini.org](#)
- TimeMachine Tools/GUIs/etc.
  - [Watchman Monitoring](#) (reporting, set trigger time and frequency)
  - [Time Machine Editor](#) (schedule editor)
  - [iScheduleTimeMachine](#) (schedule editor & toolbar replacement)
  - [TimeMachineScheduler](#) (beta for Mavericks, no updates over a year)
  - [BackupLoupe](#)
- tmutil
  - [Man Page](#)
  - [Krypted: Mass Deploying Time Machine](#)
- [OS X Server Essentials 10.10](#) by Arek Dreyer, Ben Greisler
- [BackBlaze Best Drive Survey](#)



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# Questions?



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