

# Introduction

What is a moxibox?

It's your personal cloud storage system.

First, it's a NAS – Network Attached Storage – in other words a file server, which allows all the computers in your home to store files and take backups on a central device. And it's a home media server: you can store your movies and TV shows and music collection on it, and then stream the content to any of the 'smart' media devices in your home.

It does much more than commercial NAS products...

- It uses ZFS in addition to RAID, so it's extremely reliable -- a very safe place to store your most important stuff
- It transparently compresses data to improve performance and reduce disk space use
- ZFS snapshots automatically capture backups of your data using little or no disk space
- When streaming video, it automatically transcodes video streams on-the-fly to the appropriate format for each device you use to view media
- It can share files and sync directories with computers, tablets, and smartphones (Windows, Apple, Android)
- It can rip movies from DVDs and music from CDs
- ... and it's less expensive than many commercial NAS products that lack these features.

How much does it cost?

Component prices fluctuate, but today the components for an entry level system with 2x 1TB disk drives would cost about \$325, plus tax and shipping charges. A beefier system with 3x 2TB hard drives and a DVD player would cost around \$500 (plus). That system provides up to 4TB of usable RAID protected space for storage; both systems provide enough processor power to transcode 1080p HD video on-the-fly to one media device at a time. You can customize this to increase the performance or capacity, or reduce the size of the system.

What is in this ebook?

This ebook provides step-by-step instructions for building your own moxibox personal cloud platform. It includes options so you can customize the system to meet your specific budget and requirements.

It includes a complete bill of materials with suppliers and part numbers for two basic system configurations, and several options or upgrades.

It provides step-by-step instructions for assembling the system, with photographs. It provides a 'kickstart' script to automate the installation of the Linux operating system and most of the necessary software. It provides a post-install script to do almost everything else: install ZFS, set up the filesystems, and configure automatic snapshots and backups. And it contains

complete instructions to help you through these procedures.

Finally, a web based management console enables you to manage the moxibox from any web browser.

## Features

This state-of-the-art system includes the following features:

- RAID – If you take our advice and build RAID into your system, you will have a very robust system that can tolerate the complete failure of a disk drive without loss of function or data. This requires a minimum of two disk drives.
- Backup – If you install an additional disk drive for backup your moxibox will automatically save a copy of all of its contents to the backup disk. Alternatively you can use an external USB attached disk drive or flash drive for backup.
- ZFS – moxibox utilizes the ZFS file system for extreme reliability. ZFS ensures all your data is safe – even when using inexpensive consumer grade disk drives, and even if power is interrupted frequently. It protects against 'bit rot', the gradual fading of data that can occur on disk drives over time. It transparently compresses your data, improving performance and allowing more data to be stored on limited disk space. And moxibox uses a ZFS feature to automatically take snapshots of your files, allowing you to recover files if you accidentally delete or change them. If you want to know more about ZFS, visit <http://en.wikipedia.org/wiki/ZFS#Features>
- NAS (Network Attached Storage) –The moxibox is a very reliable, very powerful and economical file server. All the computers in your home can use the moxibox to store their files and backups in a single safe place.
- Media Server – Install Plex on your moxibox to store movies, TV shows, and music and stream them to any of the 'smart' devices in your home: computers, tablets, smart TVs, mobile devices, etc. See <http://plexapp.com/connected/index.php> for a list of compatible devices. Plex transcodes videos on-the-fly to put them in the right format for any device you use to view video.
- If you install a DVD reader, your moxibox can rip music or movies from CD/DVDs, assuming you own the rights to copy the contents. The e-book does not provide instructions for ripping media.
- Personal Cloud – Tonido Desktop makes your moxibox files easily accessible from anywhere, using all kinds of devices.
- Expandable – You can expand your moxibox to make it more powerful. You can add memory, disk drives, solid state disk drives, even an additional CPU, subject to the limits of your case and motherboard.

- A web based management tool allows you to monitor and manage your moxibox from any device with a web browser, and upload files from your devices to the moxibox.

## A platform for the future

The moxibox provides a versatile platform you can build on by adding new functions, such as:

- Use the Transmission software to share (upload and download) files using torrents – peer-to-peer networks.
- Configure Sick Beard to automatically grab the latest episodes of your favorite TV shows from Usenet newsgroups.
- Backup to cloud storage services such as Amazon S3 or Backblaze.

Future revisions of this e-book may cover the installation and use of these applications.

## Requirements

Are you up for this?

You will need to buy and assemble the components to build the moxibox hardware. This e-book provides hardware assembly instructions with pictures, but you need some experience assembling PCs -- at least replacing components such as power supplies, memory, and disk drives.

If you prefer, you can buy a pre-assembled system from us. We will buy the components, assemble them, and test the complete system, for a very reasonable cost.

Can you recycle an old computer for the moxibox platform? Maybe. An old system with a 64-bit CPU and two identical disk drives may suffice for a simple NAS, but a fairly fast CPU is needed for media functions such as ripping and transcoding. See the Hardware chapter for more details on system requirements. But that system would consume a lot of electricity, while a real moxibox cruises along on just 30 watts of power. Think of the planet! Think of your electric bill!

You must have a working network connected to the internet via a broadband connection, and an available Ethernet port. If you have a DSL or cable internet connection and your firewall or switch has a wired Ethernet port available, you're all set. Of course the various computers and media devices that will access the moxibox must also have network connections, either wired or wireless. And you need to know how to allocate a static IP address on your network for the moxibox.

You will temporarily need a monitor with a VGA connector and a keyboard and mouse to connect to the moxibox during the initial setup. You can borrow these devices from a desktop PC, or you can buy them – new monitors are around \$100, but used monitors can be obtained very cheaply from craigslist or ebay. Once the installation is complete, the moxibox can run headless – without a display, keyboard, or mouse connected – so these peripherals can be returned to the donor PC or your lab.

You will need a Windows or Linux PC with access to the internet. This PC will be used to download the files for your moxibox, and to manage and maintain it. It must have a DVD burner – alternatively you can purchase a DVD from us. (Q: Why can't an Apple computer be used? A: It can, we just haven't worked out the procedures yet. If you're able to translate the Windows steps to OSX, go ahead and use your Apple computer.)

## Foundations

The moxibox is built from a collection of free and open source software:

CentOS Linux operating system - <http://www.centos.org/>

ZFS file system - <http://zfsonlinux.org/>

Samba file and print server for Windows clients - <http://www.samba.org/>

ownCloud - <http://owncloud.org/>

Netatalk AFP server for Mac clients - <http://netatalk.sourceforge.net/>

Firefox web browser - <http://www.mozilla.org/en-US/firefox/features/>

HandBrake video transcoder - <http://handbrake.fr/>

libdvdcss DVD access library - <http://www.videolan.org/developers/libdvdcss.html>

Transmission BitTorrent Client - <http://www.transmissionbt.com/>

In addition moxibox uses this proprietary software:

Plex Media Server - <https://my.plexapp.com/>

Tonido Desktop - <http://www.tonido.com/tonidodesktop/>