

PlexConnect Your Classrooms

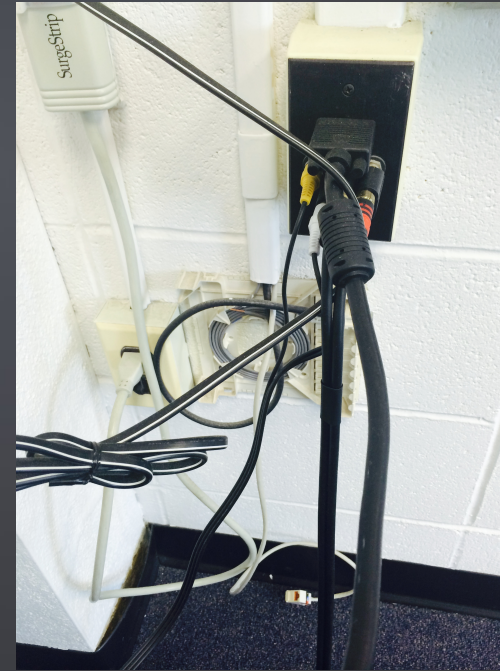
Damien Barrett
Mac System Technician

William Stites
Director of Technology
Montclair Kimberley Academy

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Introduction. Breathe. Talk Slower.

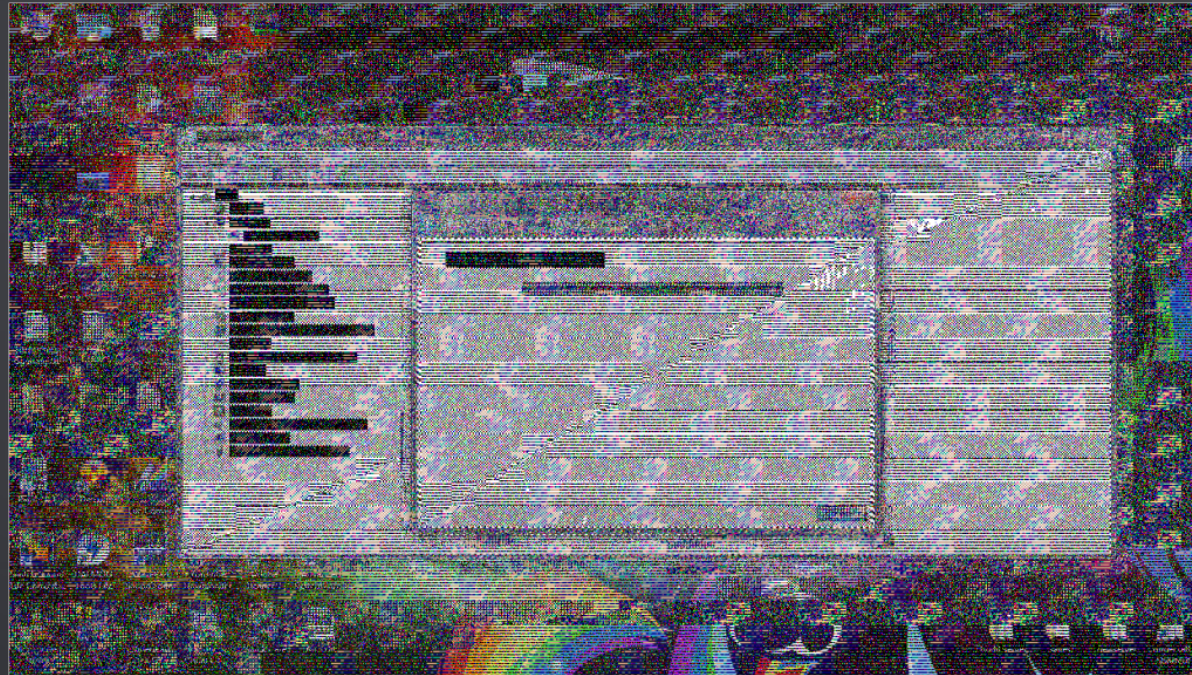
Problem #1: Legacy Tech



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BILL

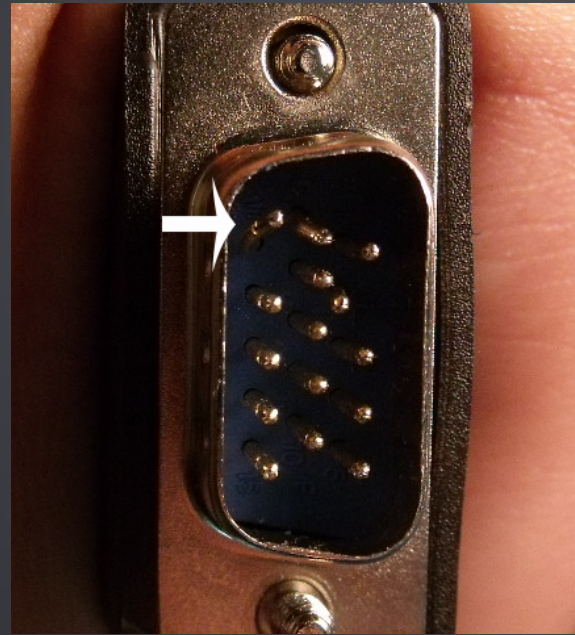
Or this?



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BILL

Or this?



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BILL

Problem #2



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- BILL
- Apple is shipping no computers with optical drives
- How to better facilitate DVD disc playback?

VHS? DVD?



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- BILL
- VHS is already dead.
- DVD sales are plummeting. Video rentals. One word: Blockbuster. Digital streaming.
- As goes the industry, so goes everyone, including Education.

Problem #3: Copyright



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- BILL

Out with the old...



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- BILL
- We'd already (mostly) eliminated the cabling from our classrooms
- How could we get rid of combo decks?

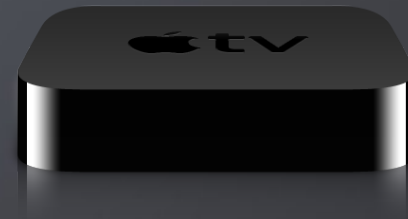
Phase 1: Projection



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- We replaced all our projectors with Epson 915W
- HDMI port
- 16-watt speaker; loud and clear enough (not tinny) for our classrooms

Phase 2: Choosing a Digital Streamer



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- Apple has “AirPlay” which we use for wirelessly screen mirroring. Big advantage.
- Big con: video playback over Airplay is not great (stuttering; drops)
- We sought out a solution that gave us both Airplay and also digital video streaming

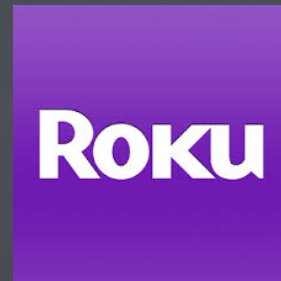
Phase 3: Build-out



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- Teacher can choose to AirPlay mirror their screen (or)
- Because of video stuttering/bandwidth issues, video playback over WiFi was still a problem and still no DVD drive; continued reliance on combo decks

Phase 4: Digital streaming solution



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- Many digital streaming devices on the market

Low-Cost Solution

- 75 classrooms across 3 campuses

	A	B	C	D
1	Equipment	Number	Unit Price	
2	Projectors	75	\$800	\$60,000
3	AppleTVs	75	\$95	\$7,125
4	Plex Media Servers	3	\$800	\$2,400
5	Backup HDs	3	\$200	\$600
6				\$67,425

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- I have student workers in the summertime doing this; each "driving" 4 computers at once.
- Projectors were paid for out of the Facilities budget; not Tech budget

What is Plex?



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- Media streamer (we're only using for video streaming; it does much more)
- Off-shoot of Xbox Media Center (XMBC)
- Open source; available for every major platform

Plex Connect on ATV3



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- But Apple has made it impossible to install Plex Channel on the AppleTV 3...not jailbreakable
- Plex Connect to the rescue

Normal AppleTV



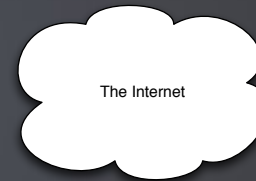
Teacher



Trailers
Channel
on AppleTV



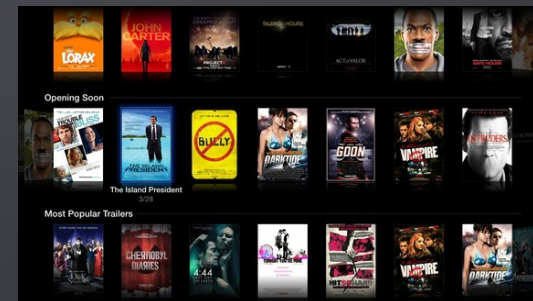
DNS Server
supplied by your
ISP or workplace



The Internet

<http://a1.phobos.apple.com/>

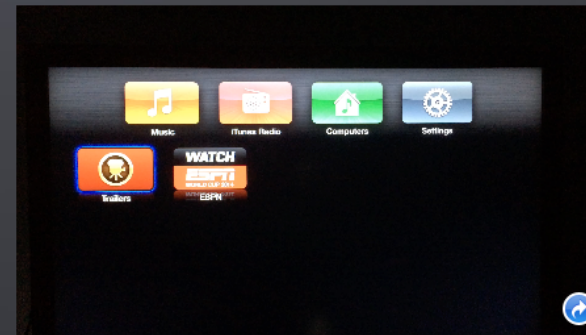
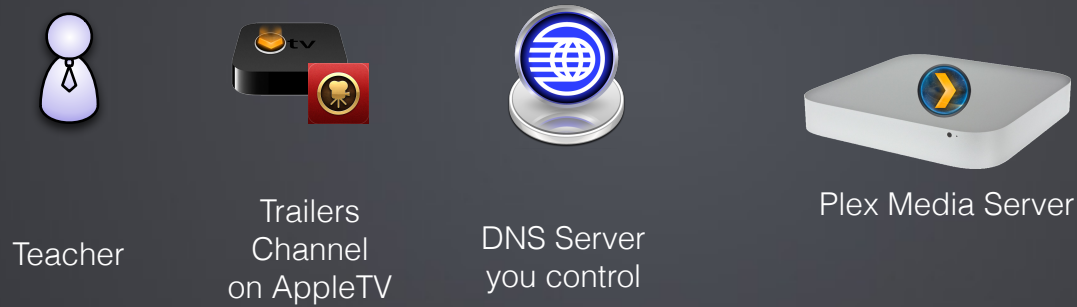
End Result:



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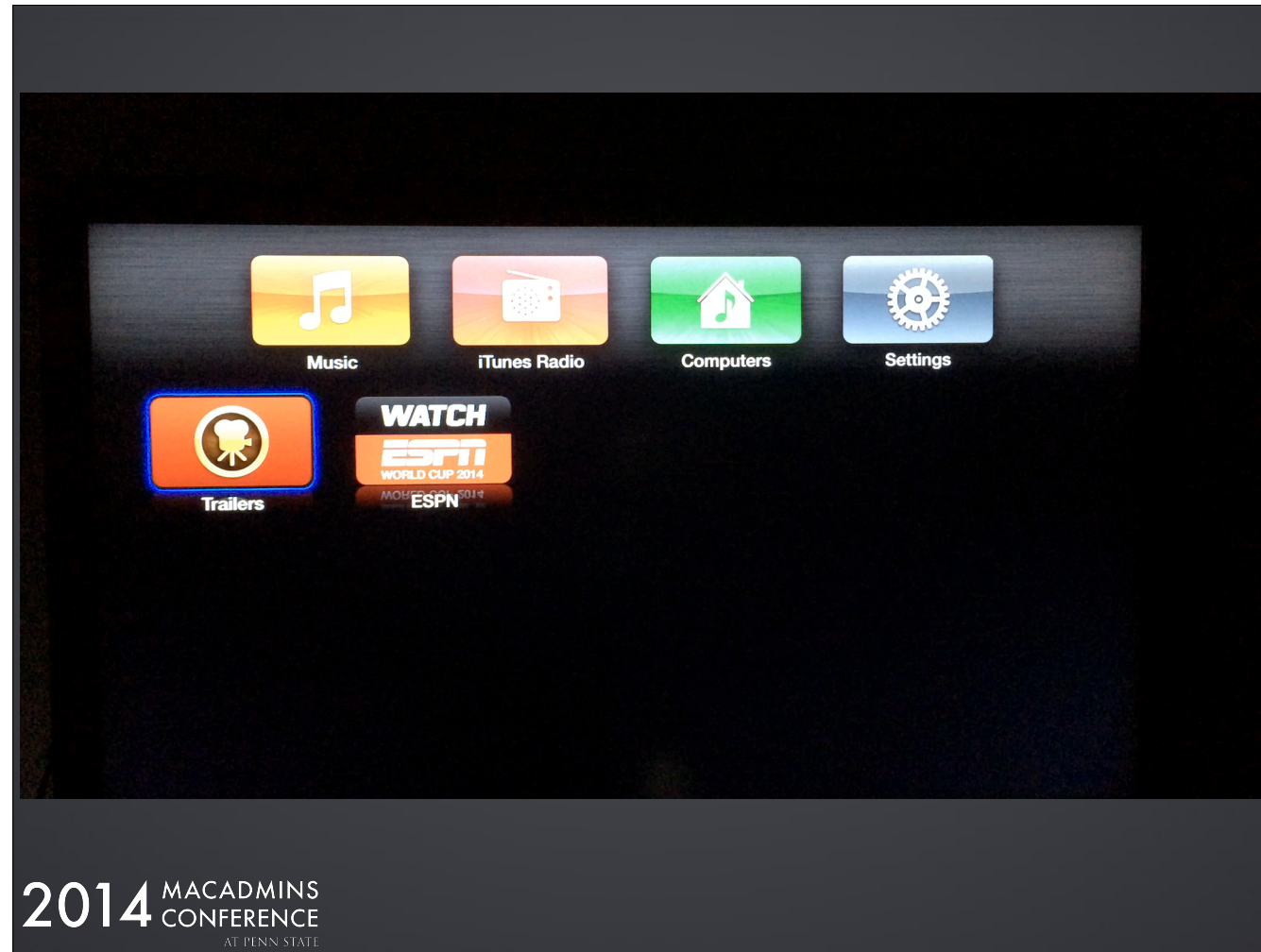
- Best way to understand PlexConnect is to compare it to normal AppleTV behavior
- Plex Connect uses a DNS redirect to work. It “hijacks” the traffic coming from the Apple Trailers channel and sends it to your own server running a customized DNS, web server, and Plex Connect python scripts.

AppleTV with Plex Connect



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- Plex Connect uses a DNS redirect to work. It “hijacks” the traffic coming from the Apple Trailers channel and sends it to your own server running a customized DNS, web server, and Plex Connect python scripts.



- Plex Connect uses a DNS redirect to work. It “hijacks” the traffic coming from the Apple Trailers channel and sends it to your own server running a customized DNS, web server, and Plex Connect python scripts.

How? DNS Redirection



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- DNS Redirection; hijacking or redirects traffic from Apple's servers to your own

How?

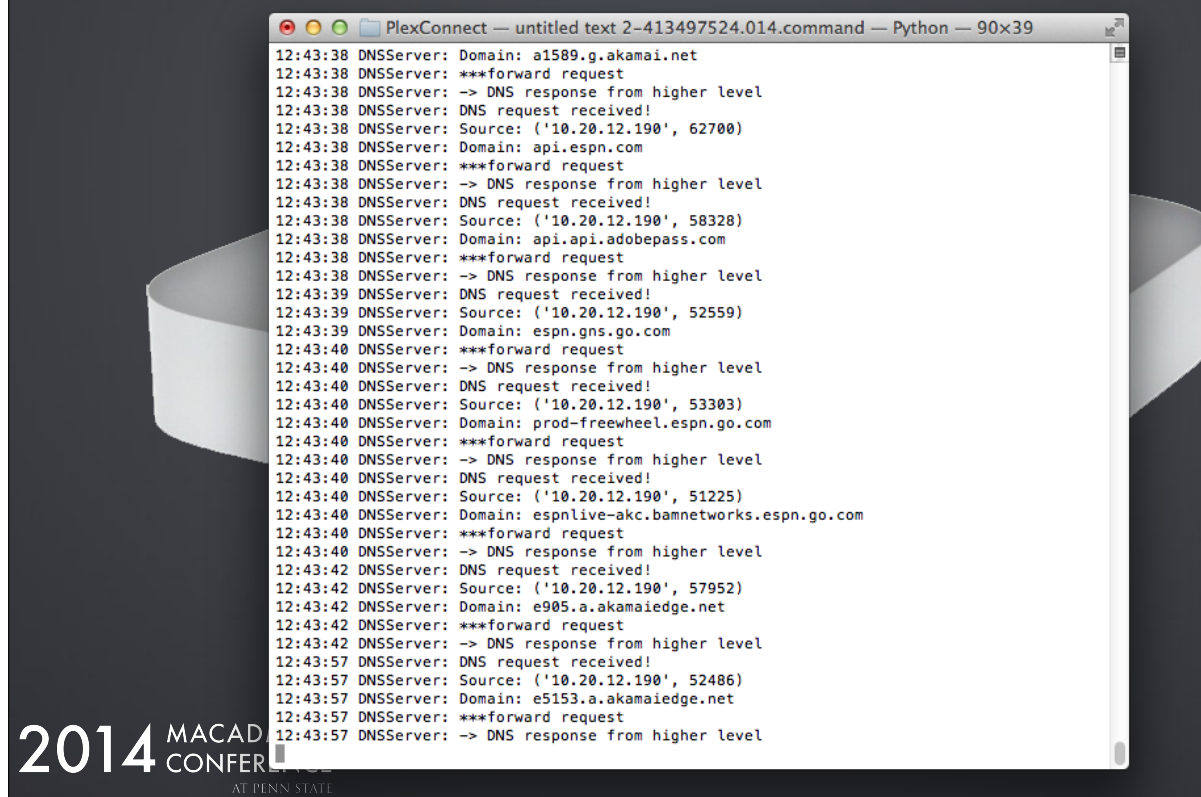
Certificates



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- Requires a config profile to be installed on each AppleTV. Two ways to do this:
 - 1) via micro-USB cable with iPhone Configuration Utility or Configurator
 - 2) load the PlexConnect-created certs on a web server and tell the AppleTV to grab it (hard to type long URLs)

PlexConnect

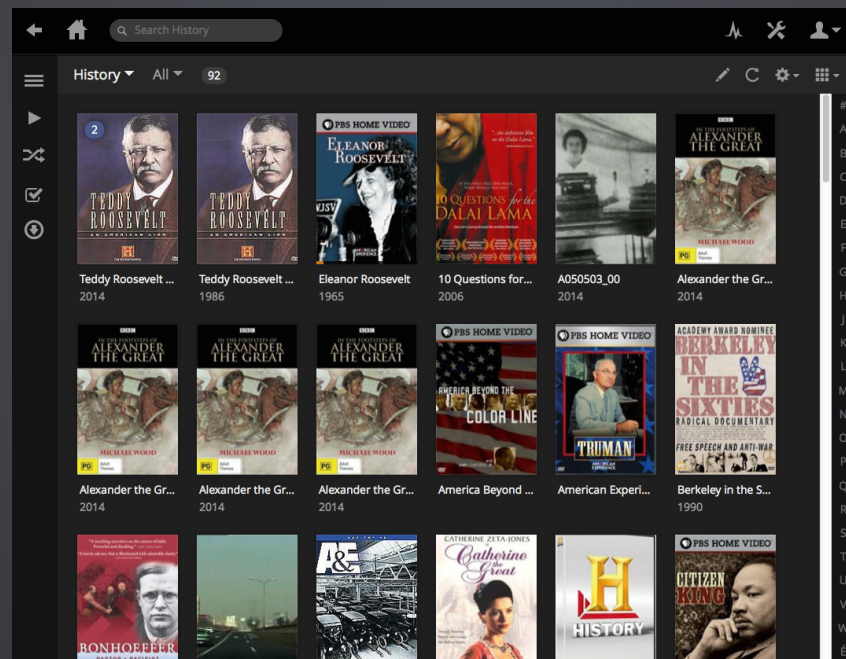


```
12:43:38 DNSServer: Domain: a1589.g.akamai.net
12:43:38 DNSServer: ***forward request
12:43:38 DNSServer: -> DNS response from higher level
12:43:38 DNSServer: DNS request received!
12:43:38 DNSServer: Source: ('10.20.12.190', 62700)
12:43:38 DNSServer: Domain: api.espn.com
12:43:38 DNSServer: ***forward request
12:43:38 DNSServer: -> DNS response from higher level
12:43:38 DNSServer: DNS request received!
12:43:38 DNSServer: Source: ('10.20.12.190', 58328)
12:43:38 DNSServer: Domain: api.api.adobepass.com
12:43:38 DNSServer: ***forward request
12:43:38 DNSServer: -> DNS response from higher level
12:43:39 DNSServer: DNS request received!
12:43:39 DNSServer: Source: ('10.20.12.190', 52559)
12:43:39 DNSServer: Domain: espn.gns.go.com
12:43:40 DNSServer: ***forward request
12:43:40 DNSServer: -> DNS response from higher level
12:43:40 DNSServer: DNS request received!
12:43:40 DNSServer: Source: ('10.20.12.190', 53303)
12:43:40 DNSServer: Domain: prod-freewheel.espn.go.com
12:43:40 DNSServer: ***forward request
12:43:40 DNSServer: -> DNS response from higher level
12:43:40 DNSServer: DNS request received!
12:43:40 DNSServer: Source: ('10.20.12.190', 51225)
12:43:40 DNSServer: Domain: espnlive-akc.bamnetworks.espn.go.com
12:43:40 DNSServer: ***forward request
12:43:40 DNSServer: -> DNS response from higher level
12:43:42 DNSServer: DNS request received!
12:43:42 DNSServer: Source: ('10.20.12.190', 57952)
12:43:42 DNSServer: Domain: e905.a.akamaiedge.net
12:43:42 DNSServer: ***forward request
12:43:42 DNSServer: -> DNS response from higher level
12:43:42 DNSServer: DNS request received!
12:43:57 DNSServer: Source: ('10.20.12.190', 52486)
12:43:57 DNSServer: Domain: e5153.a.akamaiedge.net
12:43:57 DNSServer: ***forward request
12:43:57 DNSServer: -> DNS response from higher level
```

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- Runs on OS X, Windows, or Linux
- I am using a late-model Mac mini; one for each of our 3 campuses
- 3 instances of PMS; 3 separate Plex libraries

Plex Media Server



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- PMS runs on Mac, Windows, Linux
- Is the “repository” for all your video files and their meta data
- Mine is on a 3 year old Mac mini

Digitizing DVD Content



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- Hundreds of DVDs. About 800 across all three campuses.

Digitizing DVD Content

Mac DVD Ripper Pro

The easiest DVD ripper for your Mac



Buy It

Get the full unlocked version
for ~~\$49.95~~ just \$24.95

Try It

Download a free trial version
Rip your first 5 DVDs for free

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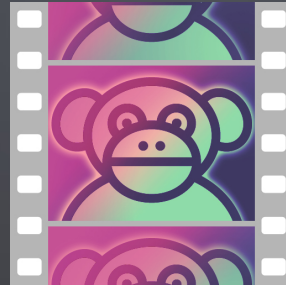
<http://www.ripdifferent.com>

- Mac DVD Ripper. \$25.00
- MTR4, RipIt, Handbrake

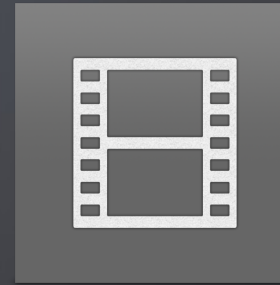
Transcoding Software



Handbrake



VideoMonkey

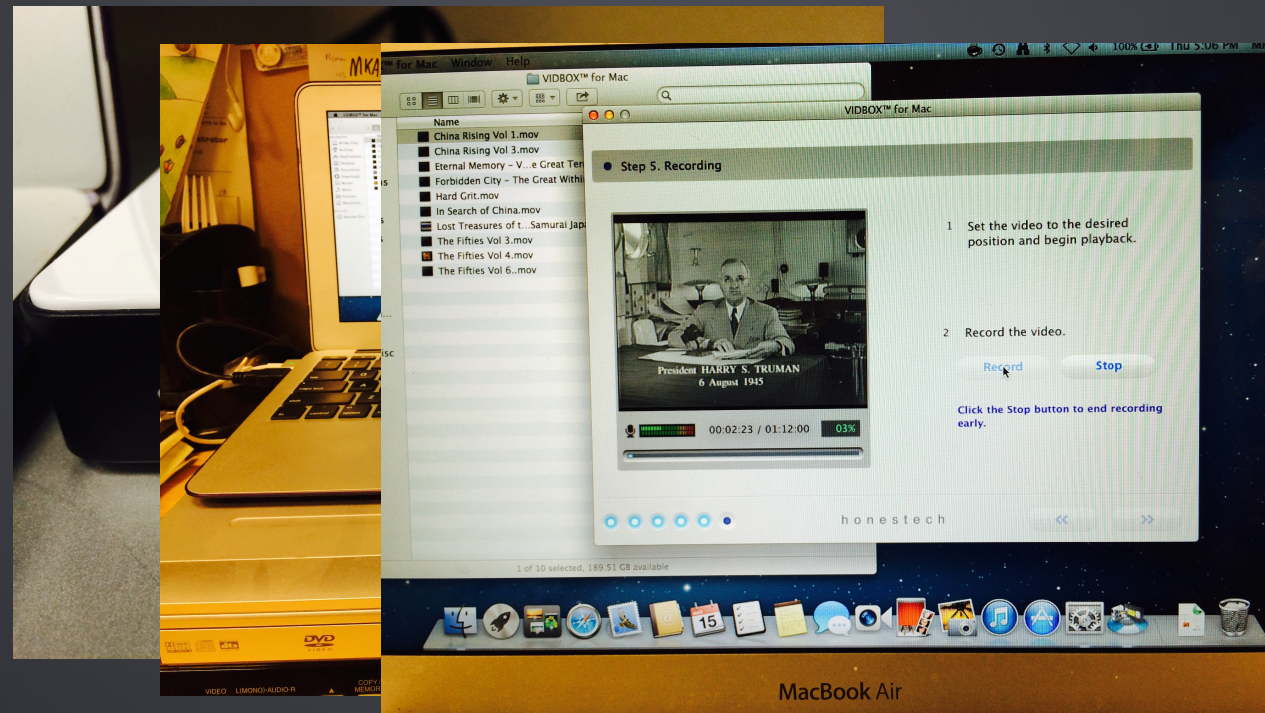


iFFMpegX

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- Handbrake
- Video Monkey (ffmpegx)
- iFFMpeg

Digitizing VHS Content



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Tips

- DVD Ripping is definitely the biggest task.
- When ripping DVDs, optimal quality is $\approx 25\text{fps}$
- Outputs files between 1.0 and 1.5GB each
- Be sure to have adequate backup of your video file library and also the Plex Media Server

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- I have student workers in the summertime doing this; each "driving" 4 computers at once.

Metadata Tagging



MetaX

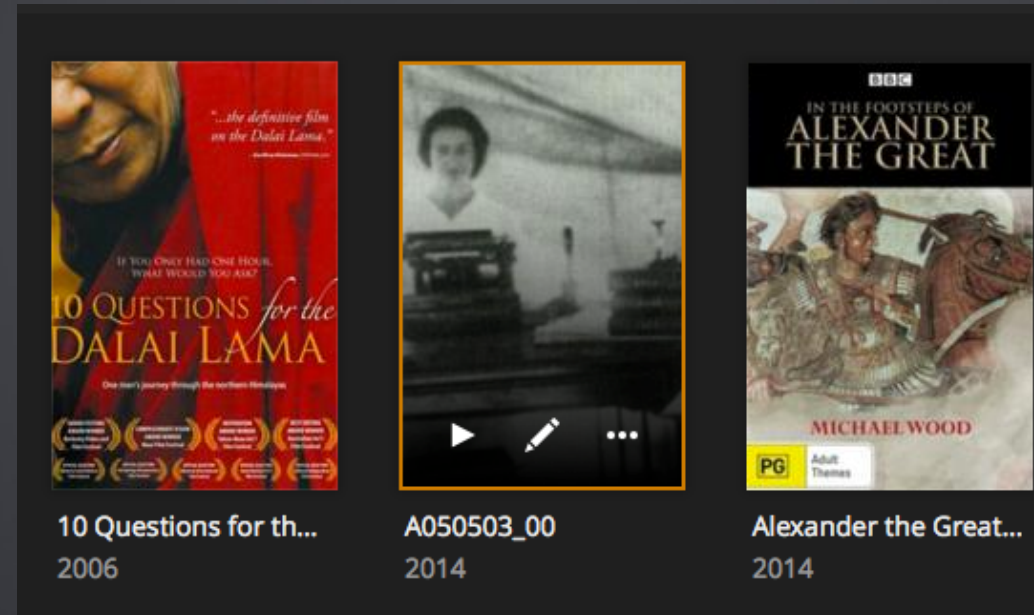


MetaZ

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- MetaX and its successor, MetaZ, can assist in metadata lookup

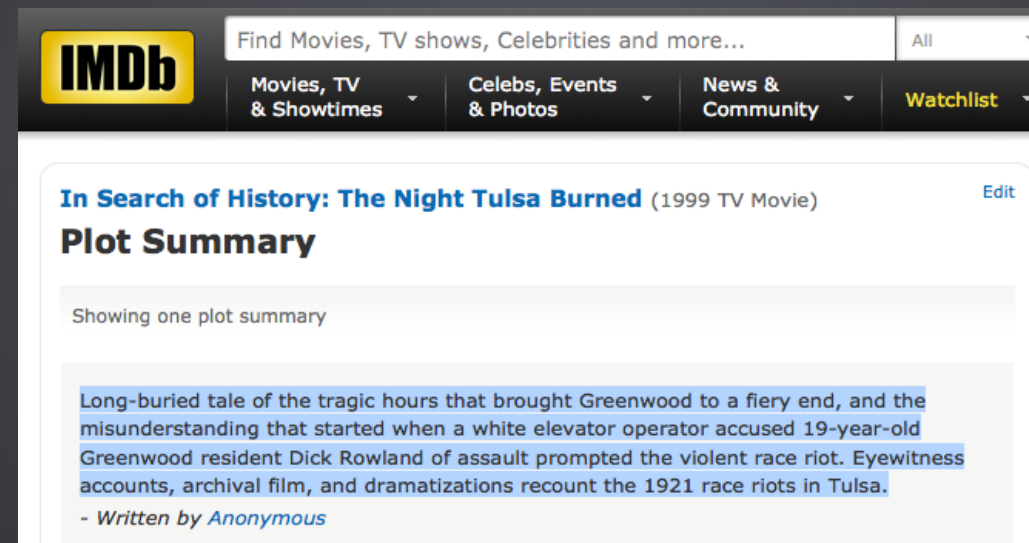
Metadata Tagging



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- Manually adding metadata

Metadata Tagging



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- Manually adding metadata

Metadata Tagging

The screenshot shows a metadata tagging interface for item A050503_00. The interface has a dark theme with a sidebar on the left containing menu items: General (selected), Tags, Poster, and Background. The main area contains several input fields, each with a lock icon indicating it is locked. The fields are organized as follows:

- Top row: Two empty input fields.
- Second row: Three input fields labeled "Year" (containing "2014"), "Rating", and "Content Rating".
- Third row: Two input fields labeled "Originally Available" (containing "2014-06-11") and "Tagline".
- Bottom section: A "Summary" field containing a paragraph of text.

At the bottom right of the form are two buttons: "CANCEL" and "SAVE CHANGES".

Year: 2014

Rating:

Content Rating:

Originally Available: 2014-06-11

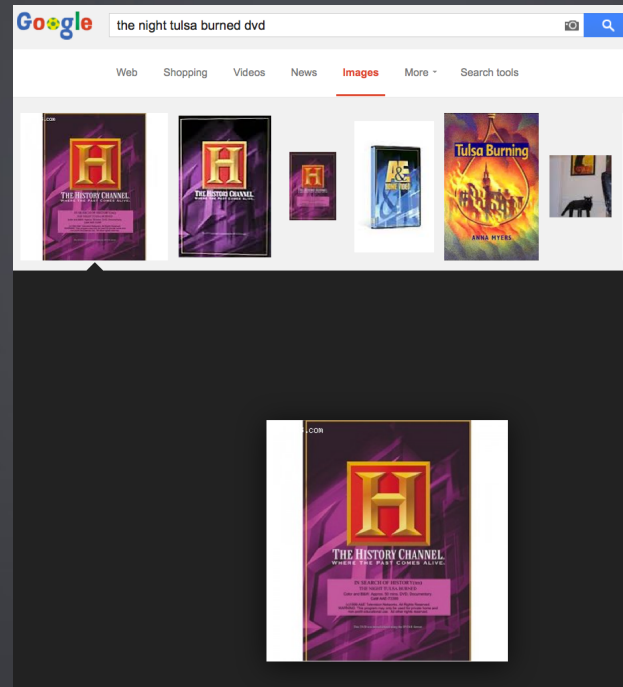
Tagline:

Summary: Long-buried tale of the tragic hours that brought Greenwood to a fiery end, and the misunderstanding that started when a white elevator operator accused 19-year-old Greenwood resident Dick Rowland of assault prompted the violent race riot. Eyewitness accounts, archival film, and dramatizations recount the 1921 race riots in Tulsa.

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- Manually adding metadata

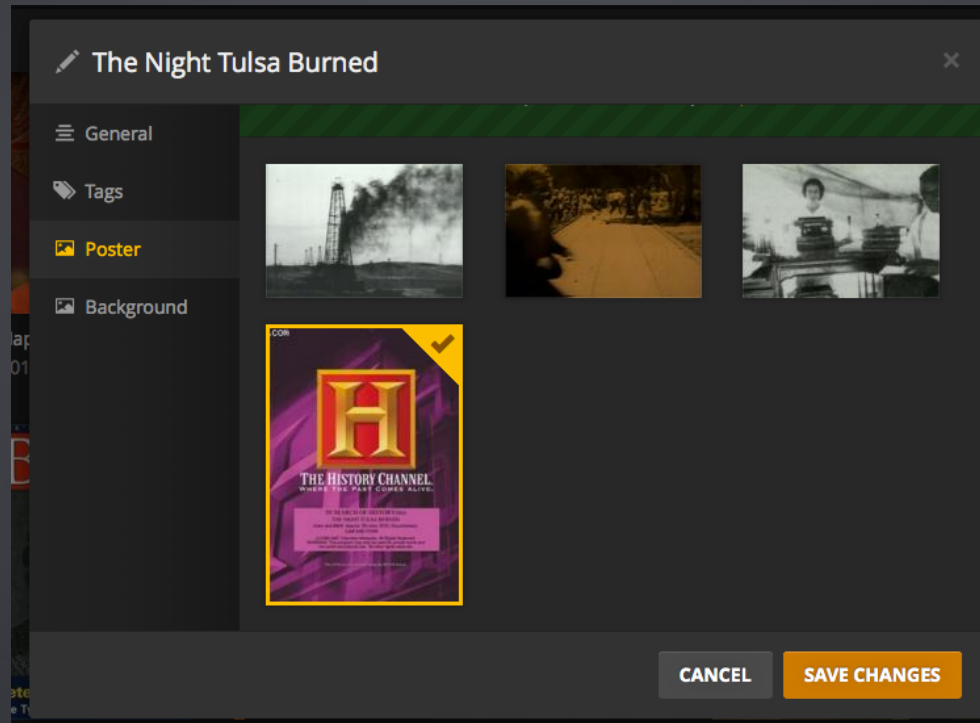
Metadata Tagging



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- Manually adding cover art
- IMDB, Google Images

Metadata Tagging



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- Manually adding cover art
- IMDB, Google Images

Metadata End-Result



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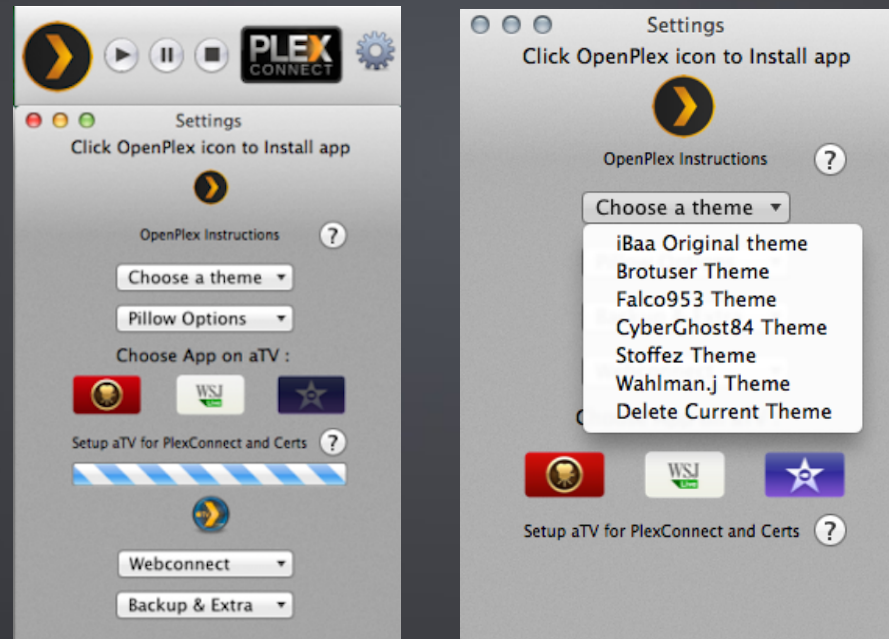
- Manually adding cover art
- IMDB, Google Images

Customizing

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- PlexConnect has been modified and forked in GitHub several times
- Note: there's a roadmap that can be consulted to see what's coming in the future

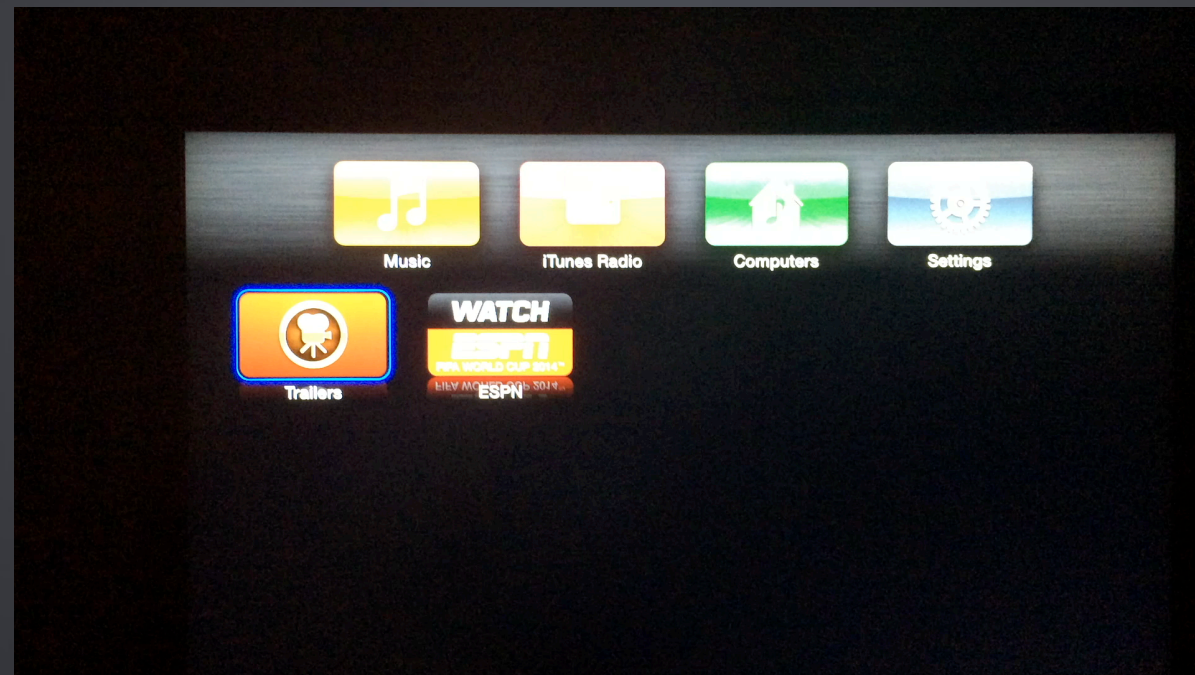
Open Plex: Themes



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- Installation is not too difficult.
- Made easier with a free open source App called "Open Plex"
- GUI for starting/stopping PlexConnect; App hijacking selection; installing themes

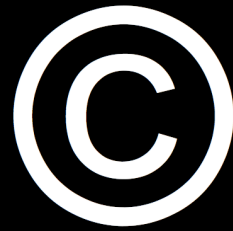
Example Theme



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- This is the “JWaltham” theme. There are about a dozen others and growing.
- Note the horizontal orientation instead of vertical.

Copyright Issues



copyright

all rights reserved

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- Is this even legal?
- Discuss that the actual act of ripping a DVD is technically still illegal

Copyright & the Dilemma



<http://www.schoollibraryjournal.com/article/CA6699100.html>

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If you own the content - school or institutionally produced

Public domain or orphaned works - once copyright applied, but no longer

Fair Use Doctrine

One of the rights accorded to the owner of copyright is the right to reproduce or to authorize others to reproduce the work in copies or phonorecords. This right is subject to certain limitations found in sections 107 through 118 of the copyright law (title 17, U. S. Code). One of the more important limitations is the doctrine of "fair use." The doctrine of fair use has developed through a substantial number of court decisions over the years and has been codified in section 107 of the copyright law.

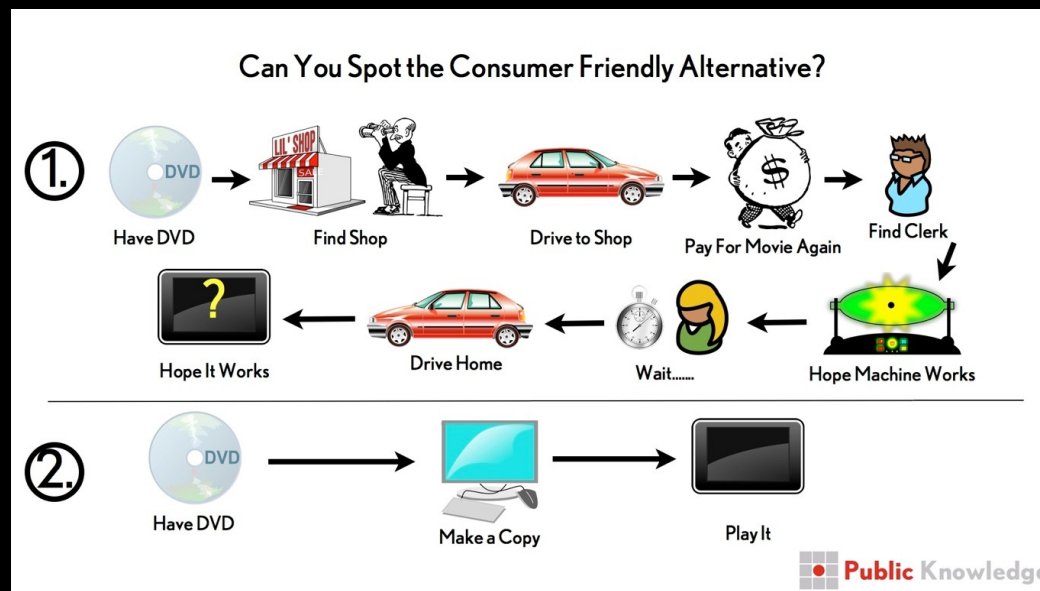
Section 107 contains a list of the various purposes for which the reproduction of a particular work may be considered fair, such as criticism, comment, news reporting, teaching, scholarship, and research. Section 107 also sets out four factors to be considered in determining whether or not a particular use is fair.

1. The purpose and character of the use, including whether such use is of commercial nature or is for nonprofit educational purposes
2. The nature of the copyrighted work
3. The amount and substantiality of the portion used in relation to the copyrighted work as a whole
4. The effect of the use upon the potential market for, or value of, the copyrighted work

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TEACH Act

A Industry Confused



<https://www.publicknowledge.org/news-blog/blogs/warner-bros-embarrasses-self-everyone-new-adi>

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Guidelines

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Need to look at what is out there in copyright, fair use, educational fair use and schools and industry in general.

Establish your own guidelines based on this work for you own institutions

Internal Use Only...

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Content can only be available from within the school.

Not to be stored on a public server

Ownership

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You MUST own the content either in physical or digital format

No Rent it and RIP it...

Analog & DVD copy

<http://www.copyright.gov/title17/92chap1.html#110>

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If there is a digital version of a resource it must be purchased in it's digital form for any analog OR dvd version

Public Display License

<http://www.movlic.com>

<http://www.mplc.org>

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Technically you are not allo

Work of others...

http://www.itpb.ucla.edu/documents/ITPB_IP_Video_Principles_Memo.htm

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Work done by UCLA by their Information Technology Planning Board in February of 2010

Time-shifting aspect of teaching

UCLA must maximally assert its rights to use intellectual property within the bounds of existing copyright laws.

Communicate

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Be sure that the guidelines that you create are clearly communicated to you constituents.

Make them easily available for reference via your web site's faculty or staff portal.

Gotchas

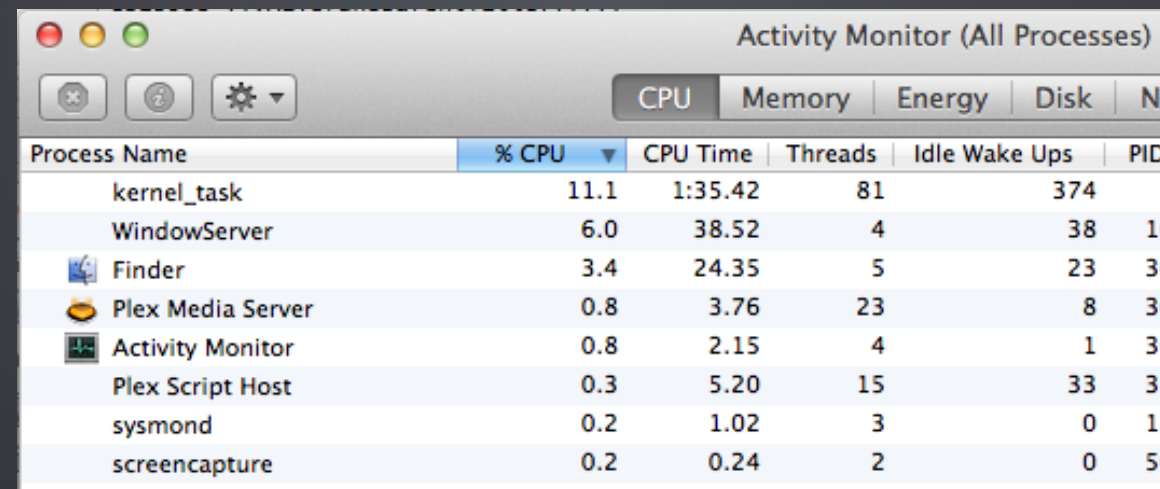
- Your network backbone must be adequate
- Turn OFF automatic updates on AppleTVs; at any given point, Apple could release an update that breaks PlexConnect

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- Note: there's a roadmap that can be consulted to see what's coming in the future

Maintenance

- Seen success with 7+ simultaneous streams
- Low CPU overhead



The screenshot shows the macOS Activity Monitor window with the 'CPU' tab selected. The table lists the following processes and their CPU usage:

Process Name	% CPU	CPU Time	Threads	Idle Wake Ups	PID
kernel_task	11.1	1:35.42	81	374	
WindowServer	6.0	38.52	4	38	10
Finder	3.4	24.35	5	23	30
Plex Media Server	0.8	3.76	23	8	30
Activity Monitor	0.8	2.15	4	1	30
Plex Script Host	0.3	5.20	15	33	35
sysmond	0.2	1.02	3	0	15
screencapture	0.2	0.24	2	0	50

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- Very low CPU overhead

Maintenance

- There's a roadmap to see what's coming

Complete:

- Channels working in MyPlex
- Refresh sections on servers via the ATV (press and hold select when the sections highlighted)
- Validation of settings.cfg file (incorrect settings revert to default)
- Flatten seasons if only one is present
- Ability to run PlexConnect as a service on Windows (see support/Win folder - note requires install of pyWin32 for your specific version of Python)
- Create a more relevant template for Home videos sections as opposed to reusing the Movies template
- Support Plex dialogue boxes

Underway:

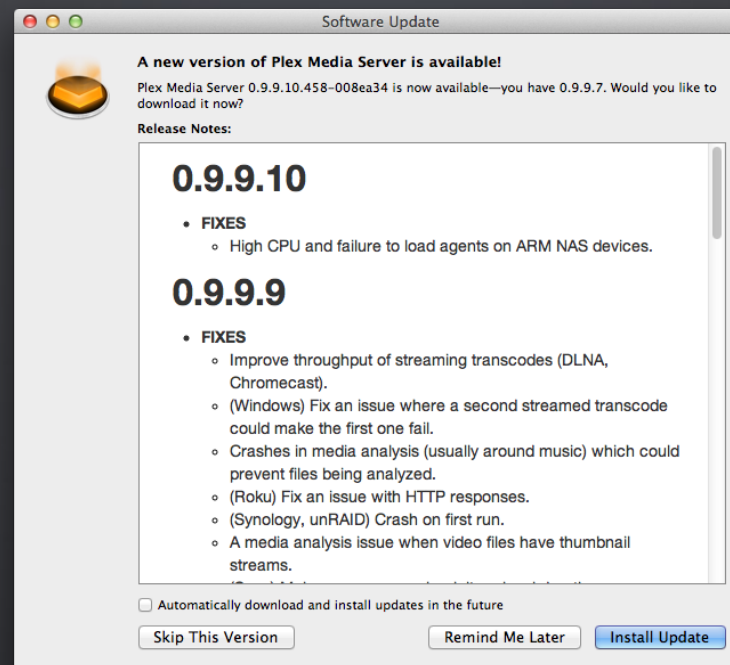
- GUI improvements (possibly including fanart if the bugs can be worked out)
- Subtitle renderer
- Fix stacked files support

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<https://github.com/iBaa/PlexConnect/wiki/Roadmap>

- Note: there's a roadmap that can be consulted to see what's coming in the future

Maintenance



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- Keep Plex Media Server up-to-date

Maintenance

- Watch the PlexConnect forums and wiki for updates and solutions to common problems

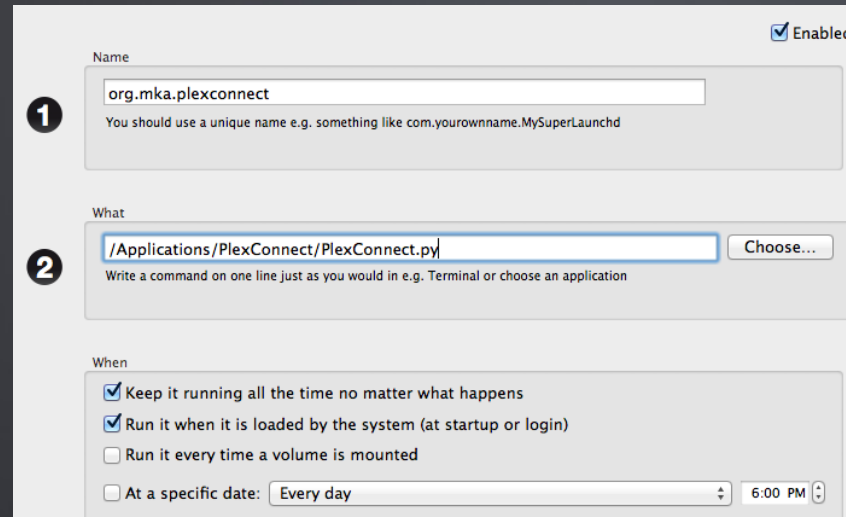
<https://forums.plex.tv/index.php/forum/136-appletv-plexconnect/>

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- There are quite a few active developers and users on the forums. It's where I get almost all my answers

Maintenance

- Create a LaunchDaemon to start PlexConnect at system startup; the same LaunchDaemon can be set to keep the PlexConnect python scripts running



The screenshot shows the Lingon application window with the following configuration:

- Name:** org.mka.plexconnect (with a note: "You should use a unique name e.g. something like com.yourownname.MySuperLaunchd")
- What:** /Applications/PlexConnect/PlexConnect.py (with a "Choose..." button and a note: "Write a command on one line just as you would in e.g. Terminal or choose an application")
- When:**
 - ☒ Keep it running all the time no matter what happens
 - ☒ Run it when it is loaded by the system (at startup or login)
 - ☐ Run it every time a volume is mounted
 - ☐ At a specific date: Every day (with a time dropdown set to 6:00 PM)

The "Enabled" checkbox is checked in the top right corner.



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<http://sourceforge.net/projects/lingon/>

- I use Lingon to create my LaunchDaemons and LaunchAgents

ANY
QUESTIONS
?

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