

# Planning and creating Mac OS X images for Mass Deployment

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IT Session 801



# About us

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# The perfect box

Is there really such a thing?

# Target audience?

Non-technical  
Somewhat technical  
Highly technical

# Non-technical

- Customize entire look and feel
- Build image with everything
- Least-user privilege



# Least user privilege?

- User runs as normal, non-administrative user
  - Prevents damage from buggy code
  - Mitigates risk for other users in your environment

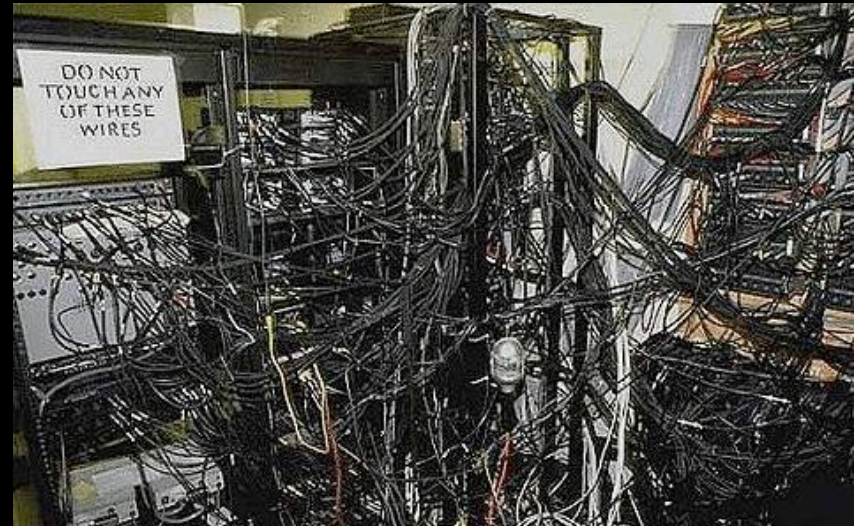
# Somewhat technical

- Build image with most applications
- Leave default look and feel
- Least user privilege?



# Highly technical

- Build image with operating system only
- No customizing at all
- Users are administrators





# Software installation

- Software in pkg format



- Third party software



- Compiled software

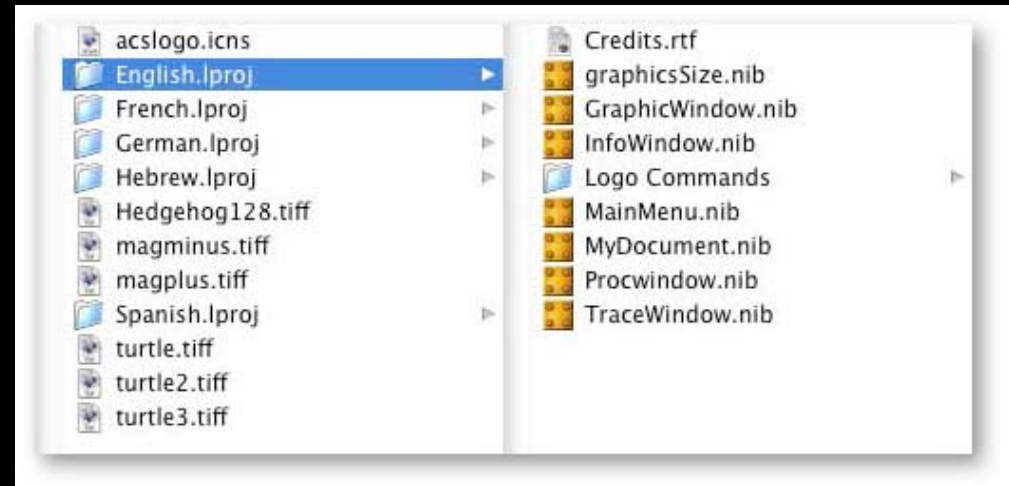
# Image optimization

# Expendable files

Maybe...

# Language localizations?

- /System/Library/User Template/\* .lproj
- \*.lproj files from every application
- \*.lproj files from entire system



# A one liner

```
find / \! -name "English.lproj" -name  
"*.*lproj" -type d -exec rm -rf -- { } \; -  
prune
```

# Cache files

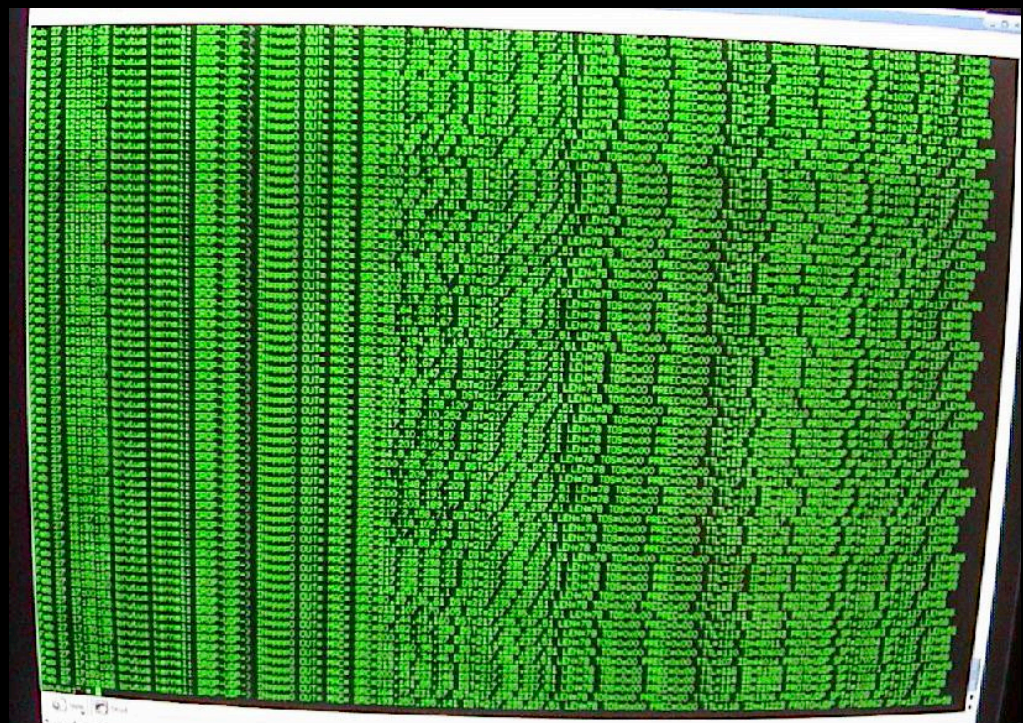
- `/Library/Caches/*`
- `/System/Library/Caches/*`
- `/System/Library/Extensions.kextcache`
- `/System/Library/Extensions.mkext?`
- `/var/db/BootCache.playlist`

# Swapfiles

- Dynamically created by system at boot
- Secure VM only included in 10.4+

# Log files

- /Library/Logs
- /private/var/log
- /private/var/spool/cups





# User file cleanup

- ~/Library/Logs/\*
- ~/Library/Caches/\*
- ~/Library/Keychains
- and ....

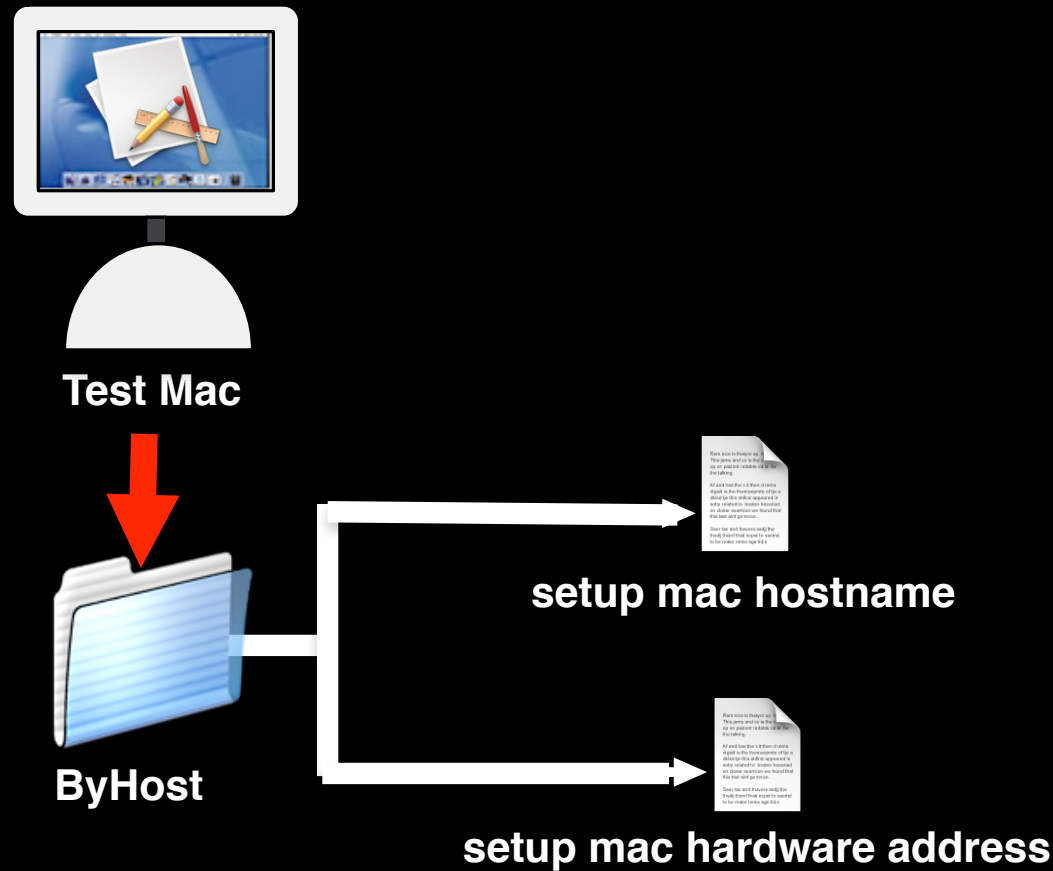


# ByHost Files!

- Unique to each and every machine
- Must be changed to match new machine
- iTunes, screensaver, iWork, xgrid, and others

# ByHost Preferences

- Example - Part I



**Install/Setup App on Test Mac**

# Shared User files

- /Users/Shared
- Adobe Acrobat
- Garageband
- Flash MX 2004



# Other candidates for removal

- /private/var/db/dhcpclient/leases
- /private/var/db/crashdump
- /private/var/db/volinfo.database
- /private/var/db/.AppleSetupDone
- /cores

# Post-optimizing

Test, test, and test again!

# Potential areas for testing

- Printing
- Spell checking
- Notable feature of applications
- Application Interoperability (iLife)

# Upgrading from earlier operating systems



# Considerations

# Low level files

- System may reboot twice
- Additional users
- Changes in authentication methodology
- Binary replacement

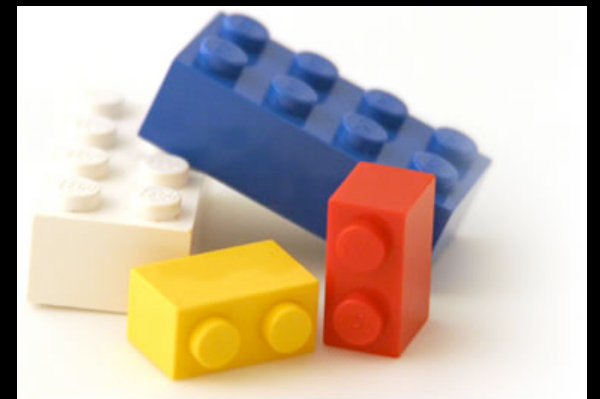
# Image Design Philosophies

# Image Design Philosophies

- Monolithic image



- Additive or Modular image



# Image Design Philosophies

## Monolithic image

- Meant to be deployed “as-is”
- Everything needed is included



# Image Design Philosophies

## Monolithic image

- Pros
  - All imaged machines are the same
  - Great for kiosks or labs
  - Building a machine is fast
  - No other dependancies



# Image Design Philosophies

## Monolithic image

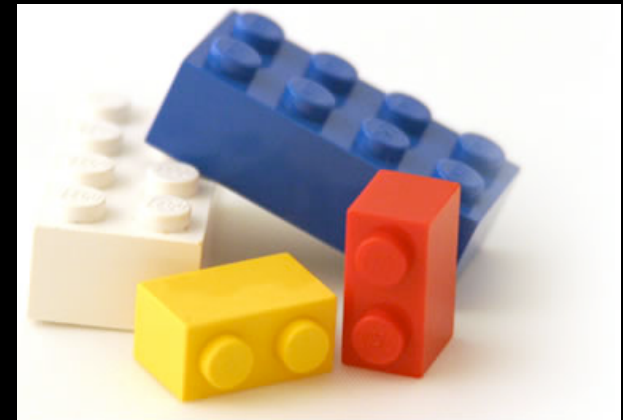
- Cons
  - Images must be constantly updated
    - OS updates
    - Security updates
    - Hardware updates
  - Need different images for different roles:
    - Email/web kiosk
    - Multimedia lab
    - Staff laptop



# Image Design Philosophies

## Modular image

- Image is a base
- Additional applications and packages are installed on top of the base

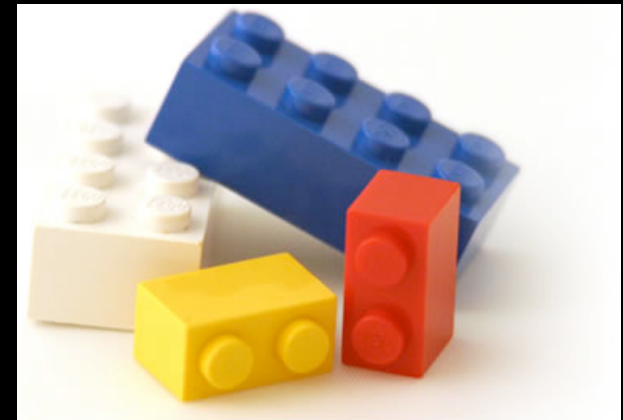




# Image Design Philosophies

## Modular image

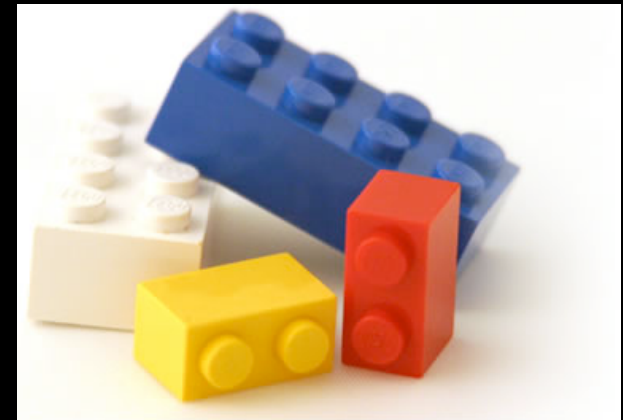
- Pros
  - Flexible
  - Updates are just an addition to the base
  - Less frequent updates to the base image



# Image Design Philosophies

## Modular image

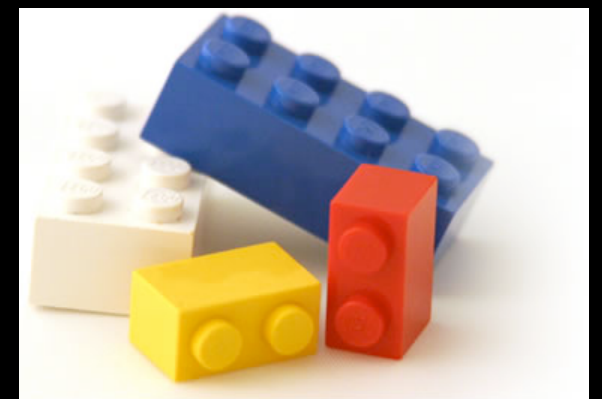
- Cons
  - Need a separate mechanism to install additions
    - radmind, ARD, FileWave, NetInstall, etc
  - Building a machine is slower
  - More complex



# Image Design Philosophies

Monolithic or Modular -  
which is better?

Depends...



# Images and Hardware

# Images and Hardware



# Images and Hardware



- Before Intel:
  - One image for all your Mac hardware
    - G3s, G4s, G5s
    - Laptops and Desktops



# Images and Hardware



- After Intel:
  - Two images
    - one for PowerPC hardware
    - one for Intel hardware

But wouldn't it be nice to have a “universal” image?



# Universal Images



## Why a Universal Image?

- **Less Work**

You maintain one image instead of two.

- **Fewer Mistakes**

You don't have to worry about installing a PowerPC image on an Intel Mac.

- **More Convenient**

If you are a technician, you could have a single FireWire drive with a single image that could boot all your Macs for diagnosis and repair.



# Universal Images



## How do you make a Universal Image?

- No official Apple method, but...
- Andrew Mortensen's method  
<http://www-personal.umich.edu/~admorten/CreatingUniversalTigerWithRadmin.pdf>
- Sam Agnew's method for a Universal NetBoot image  
<http://listserv.cuny.edu/Scripts/wa.exe?A2=ind0603&L=MACENTERPRISE&P=R13313&I=-3>  
(This has been superseded by System Image Utility in Mac OS X Server 10.4.7 and later, which can create Universal NetBoot and NetInstall images:  
<http://docs.info.apple.com/article.html?artnum=304157>)
- Rolf Kocherhans' method  
<http://www.macosxhints.com/article.php?story=20060322054212363&lsrc=osxh>

# Universal Images



## Issues

- Stability
  - Apple hasn't tested this configuration, and there may be bugs
  - Drivers for Intel build not tested against PPC hardware and vice-versa

# Universal Images



## Issues (continued)

- Support
  - Apple doesn't support this configuration, so you are on your own.

### Andrew Mortensen:

“The system came to life and displayed the grey Apple logo with spinning wheel, and then went to the console, white text on a black background, which the system shows during a verbose boot. The kernel loaded but the system promptly kernel panicked, observing that it was unable to locate the drivers for the PowerMac7,3 platform before hanging. This seemed logical.”

# Universal Images



## Issues (continued)

- Maintainability
  - No clean way to apply all relevant OS and security updates
  - “Universal” build on PPC hardware confuses Apple Software Update
  - Need to maintain separate builds; apply relevant updates, then re-combine them to make updated universal build
    - This adds a lot more work! I thought a universal image would simplify things....

# Universal Images



## Conclusions

- Creating and maintaining a universal Tiger image is a lot of work.
- The end result is (almost) entirely unsupported.
- Should you deploy?
  - For NetBoot/NetRestore images, yes. Apple supported!
  - For diagnostic drives - maybe
  - For end-user machines -  
only you can decide if the benefits outweigh the risks and the effort required.

“It seems like a lot of work to maintain all of your workstations in an unsupported state. :)” - Josh Wisenbaker on “Universal” builds, 10/3/2006

# Q&A / Discussion

# Continue the learning ...

- *IT811: Creating and Managing Packages for use with Multiple Images*
  - Wednesday @ 4:15 pm - 5:45 pm
- *IT821: Image Creation Techniques*
  - Thursday @ 10:30 pm - 12:00 pm
- *IT831: Image Deployment Methodologies*
  - Thursday @ 1:00 pm - 2:30 pm
- *IT841: Maintaining Order - Effective Image Maintenance Techniques*
  - Thursday @ 3:30 pm - 5:00 pm