Creating and Managing Packages For Use with Multiple Images

> MacWorld SF 2007 Session IT811



About us

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Application inventory

How to know what you know?

Apple Remote Desktop



Desktop management made easy.

Terminal Command line (Shell)

• Other ways



Apple Remote Desktop 3

Software version report

00	untitled	
Software Version Report	\$	Template: None +
Compare software versions on	this computer with versions on th	e target computers.
Application		Version
Acrobat Distiller 7.0		7.0.7
📃 🏷 Acrobat Uninstaller		7.0.7
A Acropolis		n/a
Activity Monitor		1.5
📔 🞑 Address Book		4.0.4
adium 🔒		89.1
😕 Adobe Acrobat 7.0 Profess	ional	7.0.7
🚯 Adobe Help Center		1.0f25
😔 Adobe Illustrator CS2		12.0
🛛 🔌 Adobe ImageReady CS2		9.0f196
Adobe InDesign CS2		4.0f165
Adobe Photoshop CS2		9.0f9
Adobe Reader 7.0		7.0.2
Adobe Booder 7 D E app		7075
+		
Select up to 10 applications.		
Rebuild data for report		
Name	A Status	
oban	Available	
1 computer		
Schedule		Save

Software Difference report

Software Difference Report * Compare items on this computer to items on the target computers. Fields to include in report: Applications Limit local search to: Applications Folder Fonts Installed packages	•
Compare items on this computer to items on the target computers. Fields to include in report: Applications Limit local search to: Applications Folder Fonts Installed packages	
Fields to include in report: Applications Limit local search to: Applications Folder + Fonts Installed packages	
 Limit local search to: Applications Folder Fonts Installed packages 	
Fonts Installed packages	
linstalled packages	
Rebuild data for report	
Name Status	
oban Available	
1 computer	
Schedule Save Concrate Pane	rt
Schedule	

Using system_profiler

system_profiler SPApplicationsDataType

system_profiler SPFontsDataType

system_profiler SPPrefPaneDataType



The process











Tracking Installations

Tools and techniques

Pacifist

Package Installer Utility

$\bigcirc \bigcirc \bigcirc \bigcirc$	😺 CLAN>	K.pkg			0
Install Extract To Verify Show Info	Find			N	Dt Authorized
Package Install Directory: /					
Package does not require authentication					
Size: 1.6 MB compressed, 3.4 MB uncompres	sed				
Size of selected files: 0 bytes					
Filename		Size Owner	Group	Permissions	Mod. Date
🔻 😝 Contents of CLANX.pkg		3.4 MB			
DS_Store		6.0 KB pr26	pr26	-rw-rr	4/20/04
		3.4 MB pr26	pr26	drwxr-xr-x	
V CLANX		3.4 MB pr26	pr26	drwxr-xr-x	
😤CLANX		231.6 KB pr26	pr26	-rw-rr	4/20/04
🐴lcon		368 bytes pr26	pr26	-rw-rr	4/20/04
CLANX		1.8 MB pr26	pr26	-rwxr-xr-x	4/13/04
🔻 🗊 fonts		105.8 KB pr26	pr26	drwxr-xr-x	
🐴CA		67.2 KB pr26	pr26	-rw-rr	4/20/04
🐕CAlta		38.6 KB pr26	pr26	-rw-rr	4/20/04
CA		0 bytes pr26	pr26	-rwxr-xr-x	6/27/01
CAlta		0 bytes pr26	pr26	-rwxr-xr-x	6/27/01
📄 lcon		0 bytes pr26	pr26	-rw-rr	4/19/04
🕨 🧊 lib		1.2 MB pr26	pr26	drwxr-xr-x	
V 🗊 plug-ins	-	5.8 KB pr26	pr26	drwxr-xr-x	
😤CDriver		560 bytes pr26	pr26	-rw-rr	4/20/04
CDriver		5.3 KB pr26	pr26	-rwxr-xr-x	4/10/00

lsbom

. . . .

List Resources of Package

ls iTunes4.mpkg/Contents/Resources/iTunes4.pkg/Contents/Resources

BundleVersions.plist Dutch.lproj English.lproj French.lproj German.lproj VolumeCheck background.tif da.lproj fi.lproj iTunes4.bom ko.lproj
no.lproj
package_version
postflight
software_version

Browse "Bill of Materials"

lsbom -p MUGTsfc iTunes4.bom

drwxrwxr-x	root	admin
drwxrwxr-x	root	admin
drwxrwxr-x	root	admin

./Applications
./Applications/iTunes.app
./Applications/iTunes.app/Contents

Drag and Drop Installers

- Tracking is simple
 - Command line tool, ls
 - Use latR switches with tool
 - Produces listing of permissions
 - Example Fugu
 - ls -latR Fugu.app

Fugu.app: total 0 drwxrwxr-x 140 root drwxr-xr-x 7 pr26 drwxr-xr-x 3 pr26



Fugu 1.1

4760 May 22 20:57 .. 238 Oct 24 2003 Contents 102 Oct 24 2003 .

•••

logGen

- Open Source command line tool
- Depends on perl modules available in Mac OS X 10.3
- Supports details like Permissions & Attributes
- Supports File Checksums



logGen - Example

Baseline Snapshot

sudo /usr/local/sbin/logGen before_snapshot.dat

Install & Setup Software and Log Changes

sudo /usr/local/sbin/logGen after_snapshot.dat before_snapshot.dat >
changes.txt

273 new files:

/Applications/Application.app/

3 changed files:

/Library/Logs/Console/User/console.log

/Library/Logs/DirectoryService/DirectoryService.server.log

/Library/Preferences/SystemConfiguration/com.apple.airport.preferences.plist

0 deleted files

fslogger

- Command line tool using fsevent framework
- "A File System Change Logger for "Tiger" Amit Singh (Mac OS X Internals author)

```
fslogger > /tmp/trackedChanges.log
```

```
fsevents device cloned (fd 5)
fslogger ready
=> received 95 bytes
# Event
 type = FSE_CREATE_DIR
 pid = 229 (Finder)
 # Details
   # type len data
                          = /Applications/PSU Blast Image Config 2.6
   FSE_ARG_VNODE 41 path
   FSE_ARG_DEV 4 fsid = 0 \times e000002
   FSE_ARG_MODE 4 mode = drwxr-xr-x (0 \times 0041ed, vnode type VDIR)
   FSE_ARG_UID 4 uid = 501 (jde6)
   FSE_ARG_GID
                  4 gid
                          = 80 (admin)
   FSE_ARG_DONE (0xb33f)
```

Sonar

Graphical frontend to fslogger

000	Sonar			0
Ø	0	× 🐧	٢	
Start Listening	Delete Item Clear	All Items Add FI.	ag Help	
File	Event	Process	Date	
🗟 index.php	stat changed	LaunchCFMApp	Today, 1:01:25 PM	r
index.php	content modified	LaunchCFMApp	Today, 1:01:25 PM	
Matterform SiteChange	content modified	LaunchCFMApp	Today, 1:01:25 PM	
Matterform SiteChange	content modified	LaunchCFMApp	Today, 1:01:25 PM	
🏞 User Flag			Today, 1:02:03 PM	
📁 This is a test	rename	Finder	Today, 1:02:10 PM	
Eustomer Comments	move	Finder	Today, 1:02:21 PM	
Customer Comments	content modified	Finder	Today, 1:02:28 PM	
Customer Comments	finder info chang	Finder	Today, 1:02:28 PM	
Temp-9528	stat changed	Sonar	Today, 1:02:58 PM	C
Customer Comments	content modified	LaunchCFMApp	Today, 1:03:41 PM	
👚 michael + 📷 Desktop + 🖲	Customer Comm	vents		Lat
Status: Idle 🗹 Auto-scro	sli 📃 Show Hidde	n Files Q+ F	le pathname)

Radmind

- Open source suite of command line tools
- Powerful and flexible file system management tool
- Supports details like Permissions, Owner & Group
- Supports Checksums



Filewave

- Can be used for total package and patch management
- For more information, attend IT831

PackageMaker

Customizing the user experience

000		U	Intitled.pmproj		
Installer Inte	erface Conte	ents	Configuration	Scripts	Package Version
	3	Show I	nstaller Interface	Editor	
Title:	My Great App				
Description:					
			and the data and		
?	* Used if packa	age is	contained in an	old-style n	ietapackage.

PackageMaker - Installer Contents

Installer Interface	Contents	Configuration	Scripts	Package Version
loot:				t a
Edit: File Permi	ssions)	ocator Definition	s) (Fi	le Filters
Advanced Option	15			
🗹 Compress Ar	chive			
✓ Compress Ar ✓ Remove .DS_	chive Store Files fron	n Archive		
✓ Compress Ar ✓ Remove .DS_ □ Discard Reso	chive Store Files fron urce Forks	n Archive		
Compress Ar Remove .DS_ Discard Reso Temp: /private	chive Store Files fron urce Forks /tmp	n Archive		\$ v
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to	chive Store Files from urce Forks /tmp temporarily co	n Archive	eserving re	source ₹
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to forks. Le	chive Store Files from urce Forks /tmp temporarily co eave blank to b	n Archive opy the root if pre uild off the origin	eserving re al root.	source ₹
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to forks. Le	chive Store Files from urce Forks /tmp o temporarily co eave blank to b	n Archive opy the root if pre uild off the origin	eserving re al root.	source ₹
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to forks. Le	chive Store Files from urce Forks /tmp temporarily co eave blank to b	n Archive opy the root if pre uild off the origin	eserving re al root.	source
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to forks. Le	chive Store Files from urce Forks /tmp o temporarily co eave blank to b	n Archive opy the root if pre uild off the origin	eserving re al root.	source ₹
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to forks. Le	chive Store Files from urce Forks /tmp o temporarily co eave blank to b	n Archive opy the root if pre uild off the origin	eserving re al root.	source
Compress Ar Remove .DS_ Discard Reso Temp: /private * Used to forks. Le	chive Store Files from urce Forks /tmp o temporarily co eave blank to b	n Archive opy the root if pre uild off the origin	eserving re al root.	source ₹

Permissions & Locator

Path Actions Installe AD-OD-2.1.pdf delocalizer.sh Pi Platypus 3.4 Pi projectfiles	r f	Owner mbp mbp mbp mbp mbp	Group mbp mbp mbp mbp mbp mbp	Permissio	ons
Owner: 📃 Read	Urite	Execute	Owner:	No Selection	-
Group: 📃 Read	Urite	Execute	Group:	No Selection	
Others: Read	Write	Execute			

Locatable Files	•	Locator Types	
(+) (-)	Path: No Selection	÷ + -	
0.0			
	No Selectio	ion	
	No Sciecti		
(?)		(Cancel) Save	
?		Cancel Save	1

Authentication, Filesystem Defaults

000	ι	Jntitled.pmproj		
Installer Interfac	e Contents	Configuration	Scripts	Package Version
Default Location:	1			☆ ▼
	Edit Package	e Requirements	\supset	
Authentication:	Administrato	or 🗘 *		
Post-Install Action:	None	•		
Flags:	 Relocatable Root Volum Follow Sym Overwrite I Allow Reve Update Inst 	e ne Only bolic Links Directory Permissi rt To Previous Ver talled Languages (ons sion Only	
* Make sure th	e files in your r	oot have their ow	nership se	t correctly.
				1

Post-install / Flight scripts

00		ι	Jntitled.pmproj			
(
Insta	ller Interface	Contents	Configuration	Scripts	Package Version	1
Extras:	* An optional specified in th Edit File Filt	directory co ne Installer In ters	ntaining scripts a nterface Editor.	nd other re	esources not	
?						

Installer Version Information...

 If installer for customer user base, easier to keep track of versions, or for your own tracking

	ι	Intitled.pmproj		
Installer Interfac	e Contents	Configuration	Scripts	Package Version
ldentifier:				
	ex: com.apple.pac	kagemaker		
Get Info String:	0.1, My Compa	iny		
	ex: 2.0, Copyright	© 2004 Apple Com	outer, Inc.	
Version:	0.1			
	ex: 2.0.1			
?				

Iceberg!

A packagemaker replacement!

Why use a different packaging application?

- More intuitive to use
- More granularity allowed
- Very XCode-like
- Allows preview!



Iceberg Interface



Starting a package

● ⊖ ⊖		a wack
Packages & Metapackages A		
▼Project	Pacl	Attribute: Selected
V vack		age Autore Stretce
S_ Settings	Name: wack	
Scripts	Hame. Wack	
🖺 Files	▼ Settings	1
		(Required)
	Description	International 🗘
	Title:	wack
	Version	1.0
	Description:	
	Description.	
	-	
	Delete Warning:	
	Display Inform	ation
	Display name:	wack
	Identifier:	com.mygreatcompany.pkg.wack
	Get-Info string:	wack 1.0 Copyrights © 2006 My Great Company
	Short version:	1.0
	lcon file:	A.
	Version	
	Major:	1 Minor: 0
	Ontions	
		1

● ⊖ ⊖	wack	
Packages & Metapackages A ▼Project ▼	Package	Attribute: Selected
Documents	Name: wack	
🐒 Scripts 🗋 Files	Documents	
	Background Image	
	💿 Default	
	O Path: A -	÷ -
	Scaling: OProportionnally To Fit None Alignment: Left	
	Welcome	International
	 Default 	
	○ Path: A	☆ -
	ReadMe	International 🛟
	None Path:	•
	License	International
	• None	
	🔘 Path: 🔼 🗸	\$ •
	O Template:	
	Keyword Value	

0 😝 😝	wack	
Packages & Metapackages A ▼Project ▼	Package	Attribute: Selected
0 Documents	Name: wack	
Scripts	 Scripts Requirements Label 	Level
	Add Edit Installation Scripts • Name Ref. Path preflight A \$	Remove
	Additional Resources	International
	Add	Remove

	🕒 wack		
Packages & Metapackages A Vroject v wack % - Settings	💗 Package	Attribu	ute: Selected
Scripts	Name: wack		
📄 Files	V Eilor		
	* Files		(Required)
	C Default Leasting (
	Archive Options: Compress		• Set
	Filename	Owner	Group Permissions
	▼ ⊕ /	root	admin drwxrwxr-t
	▼ [] Applications	root	admin drwxrwxr-x
	Dunalmaging	root	admin drwxr-xr-x
	Vilities	root	admin drwxrwxr-x
	System	root	wheel drwxr-xr-x

Optimizing!

Vame: wack Scripts Requirements Label Add Edit Installation Scripts	Attribute: Selected
Scripts Requirements Label Add Edit Installation Scripts	Level Remove
Scripts Requirements Label Add Edit Installation Scripts	Level Remove
Add Edit	Remove
Name Ref. Path preflight A ‡ preinstall A ‡ postinstall A ‡ postupgrade A ‡ postupgrade A ‡ postflight A ‡	
Additional Resources	
Add	Remove
	Add

Example postflight action

#!/bin/sh

ROOT_DIR="\$3"
DELETED_FILES="\$1/Contents/Resources/cleanup-list"

"\$1/Contents/Resources/deleteomatic" "\$ROOT_DIR" "\$DELETED_FILES"

exit 0

Postflight script example

```
open (FILE, $DATA_FILE) || die ;
```

• • • •

```
while (defined ($deleteme = <FILE>)) {
    chomp $deleteme;
# system("/bin/rm -rf \"" . $ROOT_DIR . $deleteme . "\"");
    if (length($deleteme) > 0)
    {
        deleteTree($ROOT_DIR . $deleteme);
    }
}
```

Advantages of postflight scripts

Unnecessary files can be removed

• Files can be edited on the fly



Package can be targeted for a specific operating system

One more thing....

Payload Free Packages

• What are they?

What advantages to they give a system administrator?

• Very powerful!



Enterprise Deployment

Apple Remote Desktop - Task Server

- Distribute packages to all machines in ARD
- Machines can be offline or online
- Can <u>only</u> distribute Apple package installers

Common Problems

Things to Watch Out For...

- Broken Links
- Preference Hierarchy
- ByHost Preferences
- Hard Coded Paths



- Directory Location Limitations
- File Attributes

Broken links

Symbolic Links

- Use Unix File Paths

MyApp --> /Applications/MyAppFolder/MyApp

- Problems when app or folder moved or renamed

Aliases

- Prior to Mac OS X 10.2
 - Used unique identity
- Mac OS X 10.2 and higher
 - Pathname has higher priority, then unique identity
- Problems arise if the application or folder is moved, renamed, or disk is cloned using Apple Software Restore

Preferences hierarchy

Hierarchy of folders that can contain preferences

User
 /Users/<username>/Library/Preferences
 Preferences limited to specific user

 Host /Library/Preferences
 Preferences limited to users of machine

 Network /Network/Library/Preferences
 Preferences available for all users of a network

 Problems arise when app restricts or specifies a specific preference location, can be esp. true with Network Homes

Preference Hierarchy

Flexible vs Problematic Apps



Flexible App

Problematic App

ByHost Preferences

- Used by some apps for initial setup or customization
- Tied to either hardware address or hostname
 - Prefs files filename contain this info:

com.my_app_domain.my_app.000a95c3713a.plist
com.my_app_domain.my_app.client.hostname.edu.plist

- Specific to original machine vs deployed machines
- Preferences stored in:

~/Library/Preferences/ByHost
/Library/Preferences/ByHost

ByHost Preferences

Example - Part I



Install/Setup App on Test Mac

ByHost Preferences

Example - Part II



Distribute App to another Mac

Fixing ByHost Preferences

- Run a shell script post-image or at login
 - Grab current machine hardware address, set to new machine hardware address
 - ByHost prefs
 - Classic
 - HIToolbox
 - MIDI
 - Preference Panes
 - Software Update
 - iTunes
 - iWork
 - screensaver
 - PrintCache

Hard Coded Paths

- Tied to default install location & name
- Some apps expect default install pathway
 - ../МуАрр
 - /Applications/MyAppFolder/MyApp

Problems when app or parent folder moved or renamed



Directory Location Limitations

- Some Apps require installation at specific location
 - Root level of the hard disk
 - Root level of the Applications
 /Applications
- Many installers & apps do not support "special characters"
 - Spaces, § (Keyserver anyone?), etc.



 This can cause problems if updating or using specific features of apps

File (Finder) Attributes

- Some apps use file attributes for setup
- Many distribution tools don't support this information

"/Developer/Tools/GetFileInfo Carbon Registration Database"

file: "Carbon Registration Database"
type: "pref"
creator: "RgEd"
attributes: avbstclinmed
created: 03/19/2004 12:21:42
modified: 03/31/2004 14:23:36

Solving Issues

Redirection with links or aliases

Symbolic links can fool application

Example:

/Applications/Test/WorldWriteFolder

ln -s /Applications/Test/WorldWriteFolder /Users/Shared/WorldWriteFolder

- Aliases can also fool application
 - Use Finder to create Alias

- Command line osxutils, http://sourceforge.net/projects/osxutils

Redirection with links or aliases

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Example:

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Directory location

- Use symbolic links to preserve directory location
- Preserves path for upgrades
- Custom name can be given without altering original name
- Safest to use full path, not relative links
 - ln -s /Myapp.app /Applications/MyApp

Shadow files - why?

- Application requires World Write, SUID, or SGID
- Modifications are discarded
- Transparent to end-user
- Should be removed at exit of app or logout
- Example AppleScript:

```
do shell script "/usr/bin/hdid '/Applications/Applications/app.dmg' -shadow
AppShadow'"
delay 5
tell application "Finder"
  open file "Mac OS X:Applications:Application"
end tell
```



Scripts

Scripts can be used as a workaround for issues

- Create needed files
- Remove files in world write folders
- Modify Preferences
- Stop/start problematic apps

Can be performed any time

- Login
- Logout
- Startup
- As a wrapper



File Attributes Revisited

How to get information

/Developer/Tools/GetFileInfo "~/Library/Preferences/Microsoft/OLE Registration
Database 11"

file: "OLE Registration Database"
type: "pref"
creator: "RgEd"
attributes: avbstclinmed
created: 03/11/2004 12:21:42
modified: 05/20/2004 14:23:36

- How to set information
- /Developer/Tools/SetFile -d \
- `` 03/11/2004 12:21:42`` \

"~/Library/Preferences/Microsoft/OLE Registration Database 11"



Distribution

Many tools for distribution

- Apple Remote Desktop 3
- Netboot/Netinstall
- SSH copy and installer from command line
- Radmind
- Filewave

Continue the learning ...

- **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