

# Creating and Managing Packages For Use with Multiple Images

MacWorld SF 2007  
Session IT811



# About us

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MacEnterprise Steering Member

Job Position Title

# Application inventory

# How to know what you know?

- Apple Remote Desktop



Desktop management made easy.

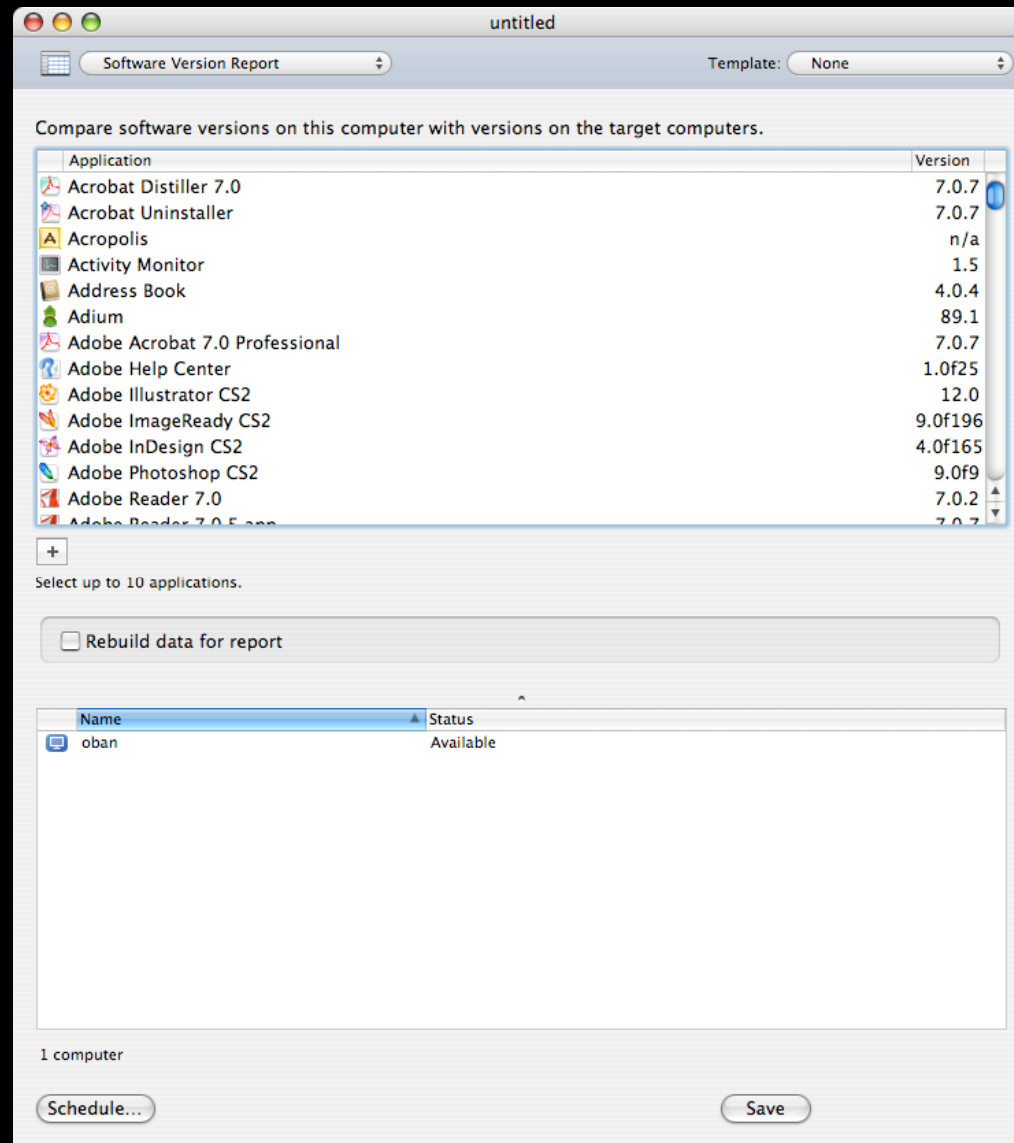
- Terminal Command line (Shell)



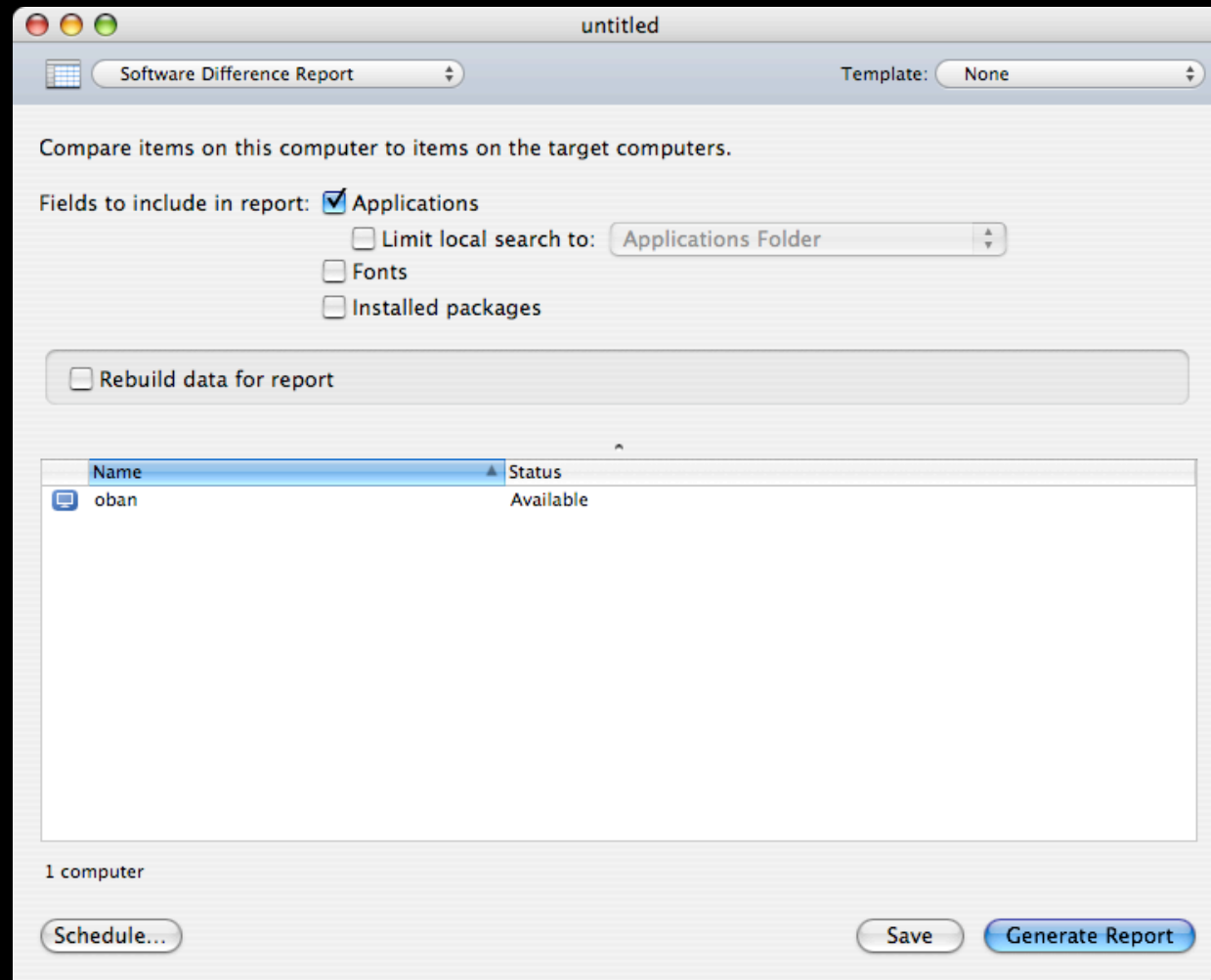
- Other ways

# Apple Remote Desktop 3

# Software version report



# Software Difference report

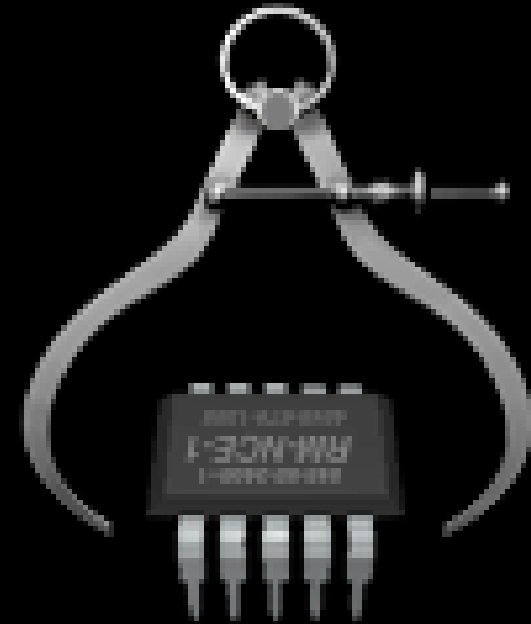


# Using system\_profiler

```
system_profiler SPApplicationsDataType
```

```
system_profiler SPFontsDataType
```

```
system_profiler SPPrefPaneDataType
```



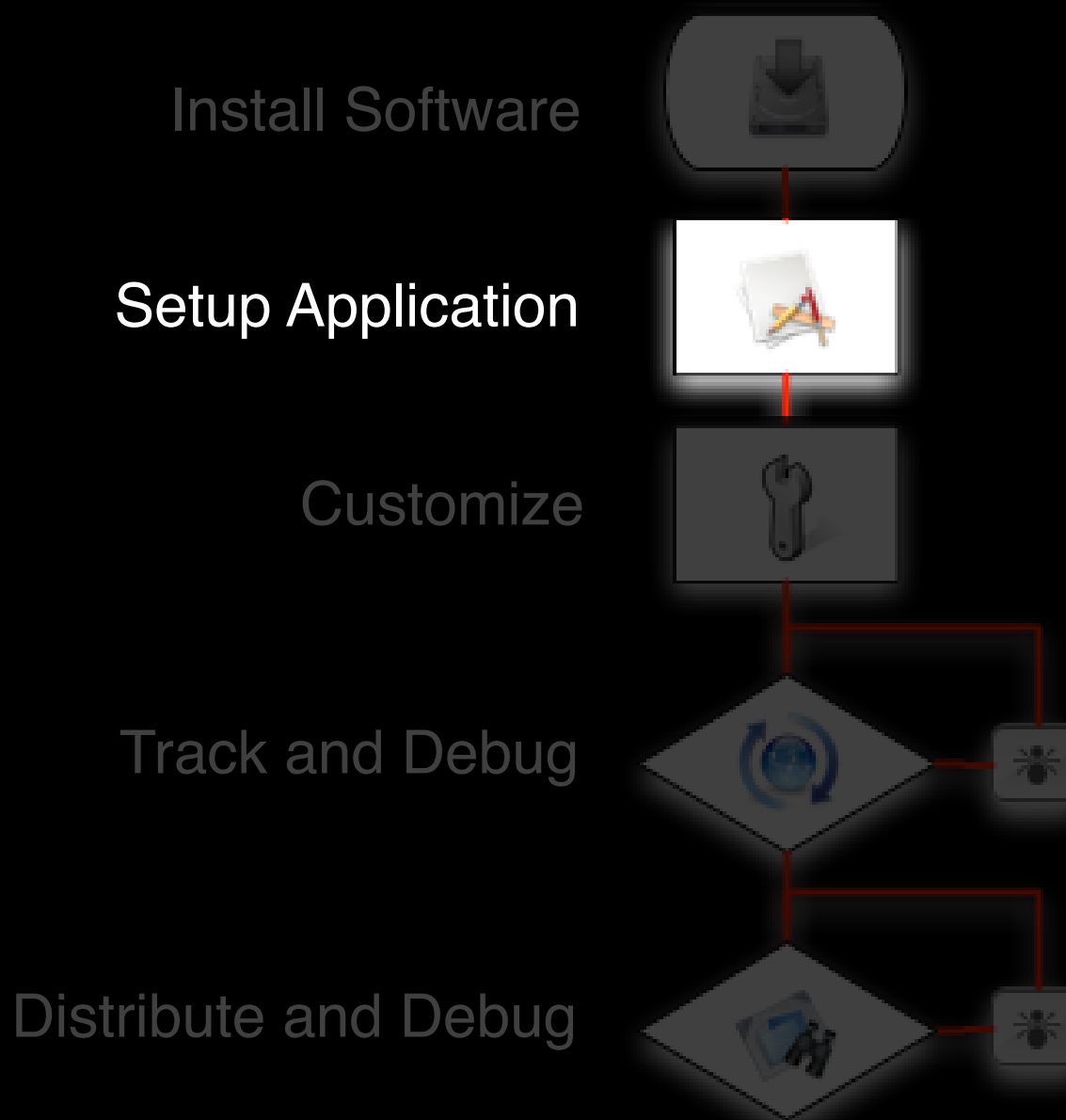


# The process

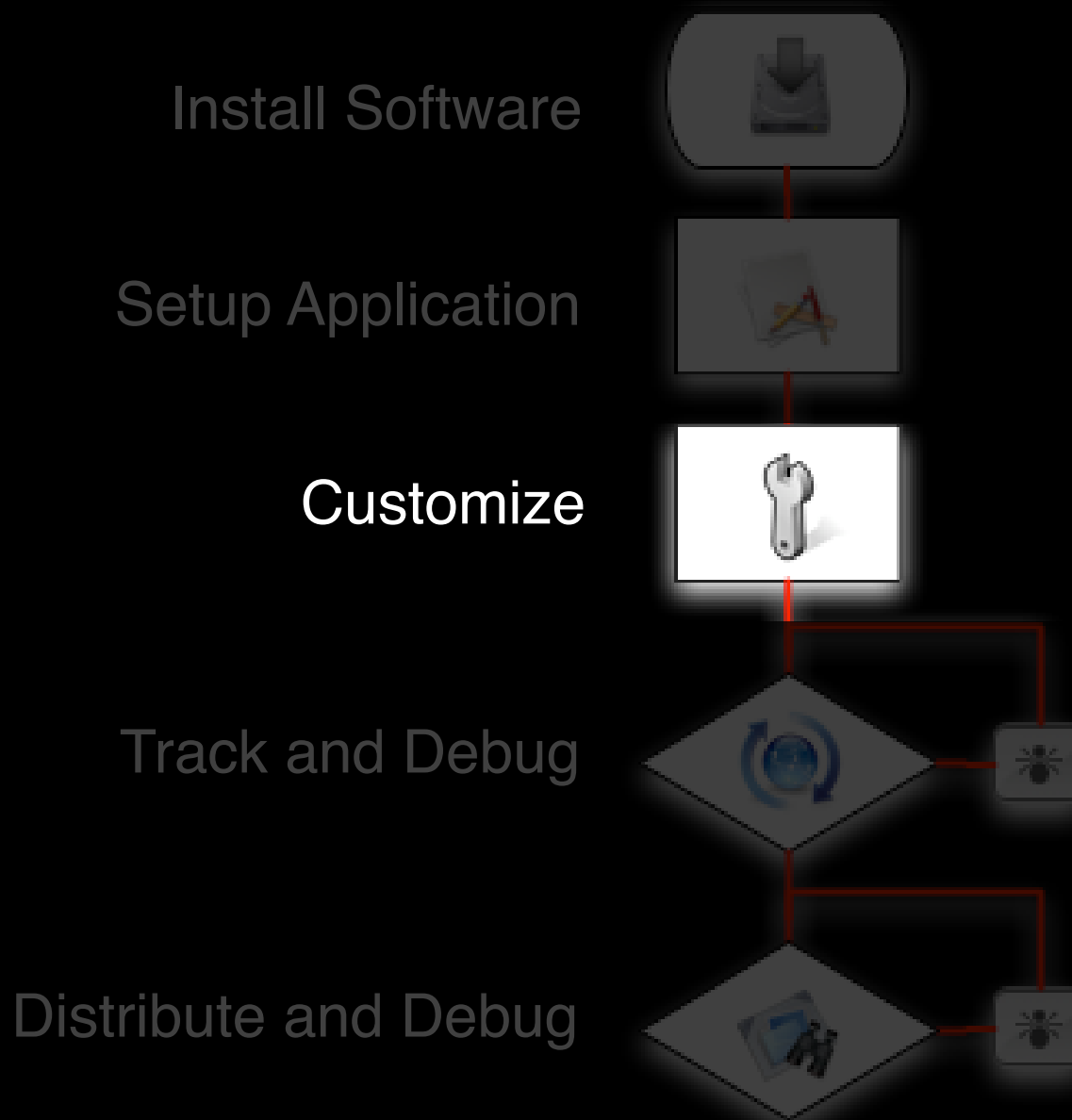
# The Basic Process



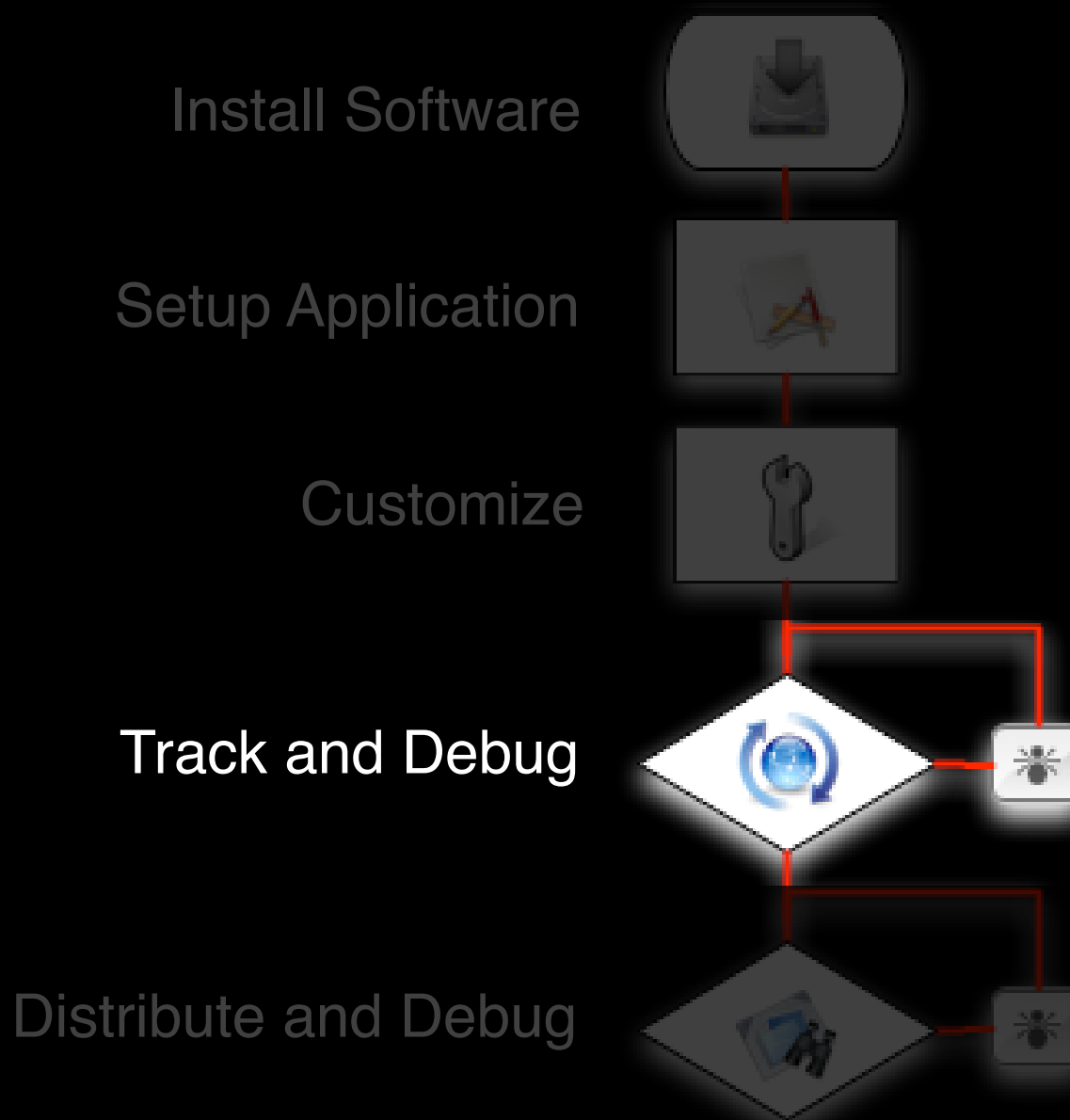
# The Basic Process



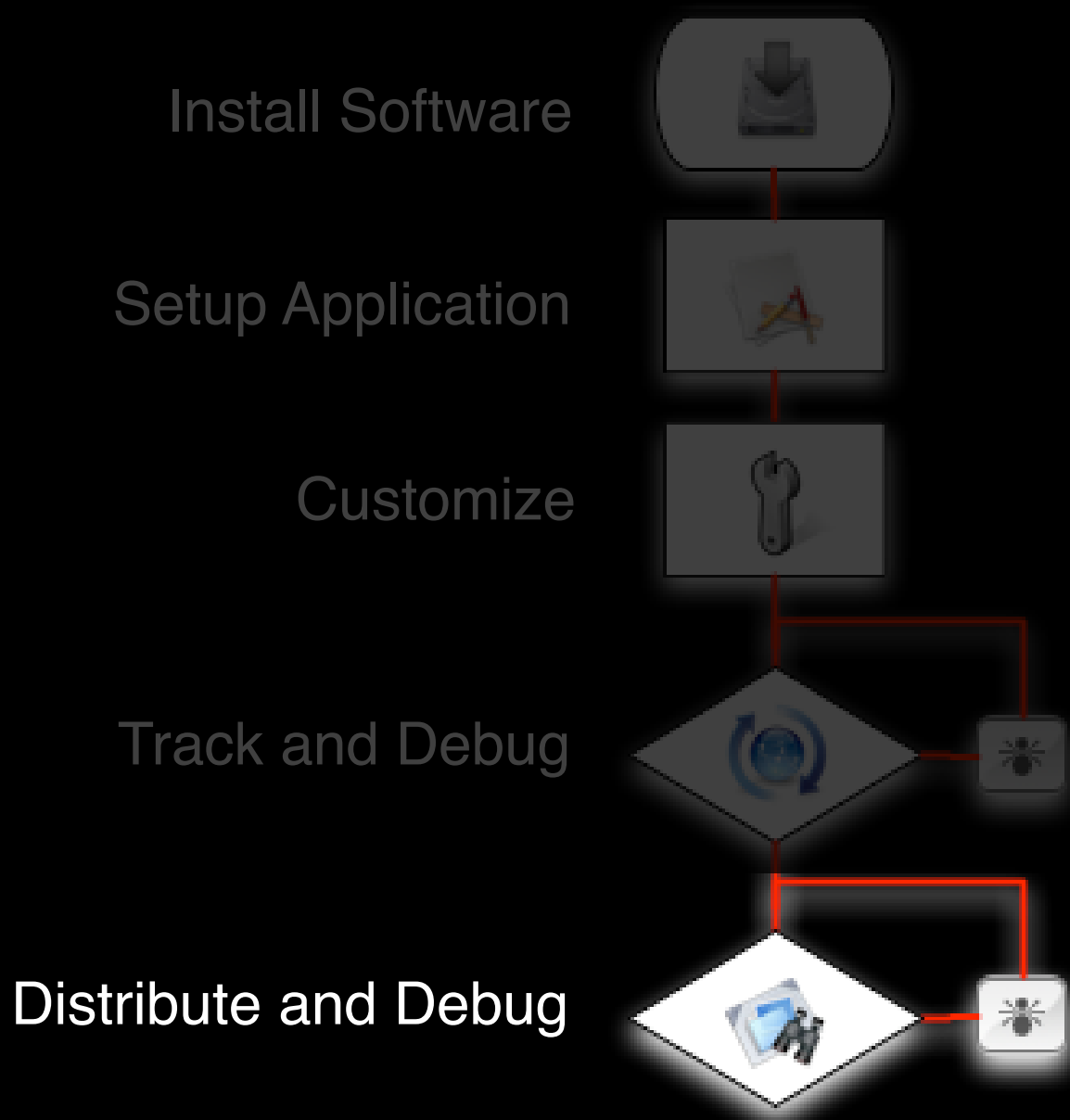
# The Basic Process



# The Basic Process



# The Basic Process

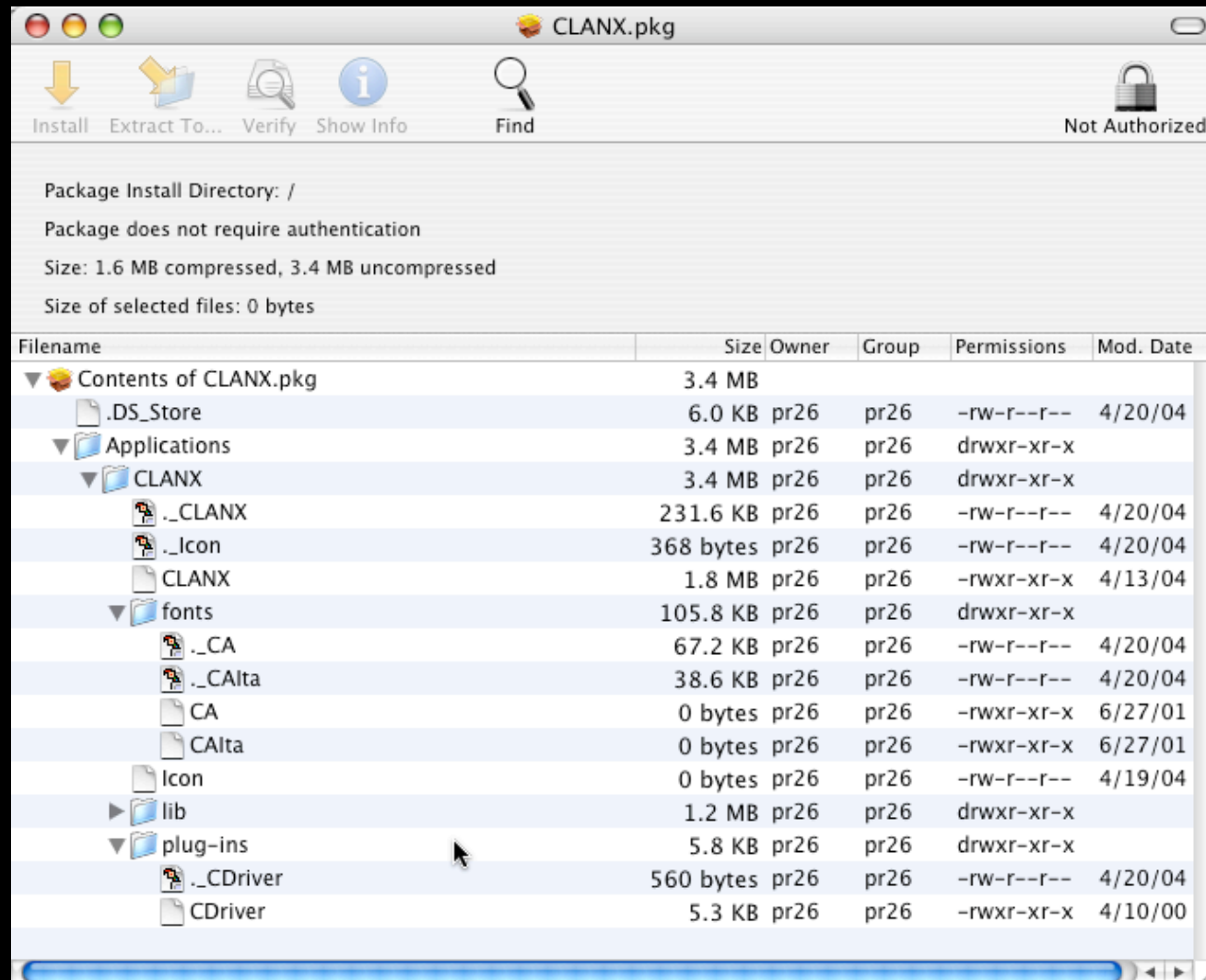


# Tracking Installations

Tools and techniques

# Pacifist

## Package Installer Utility





# lsbom

- **List Resources of Package**

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

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

- **Browse “Bill of Materials”**

```
lsbom -p MUGTsfc iTunes4.bom
```

```
drwxrwxr-x    root    admin    ./Applications
drwxrwxr-x    root    admin    ./Applications/iTunes.app
drwxrwxr-x    root    admin    ./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          4760 May 22 20:57 ..
drwxr-xr-x   7 pr26           238 Oct 24  2003 Contents
drwxr-xr-x   3 pr26           102 Oct 24  2003 .
```

```
...
```



Fugu 1.1

# 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
```

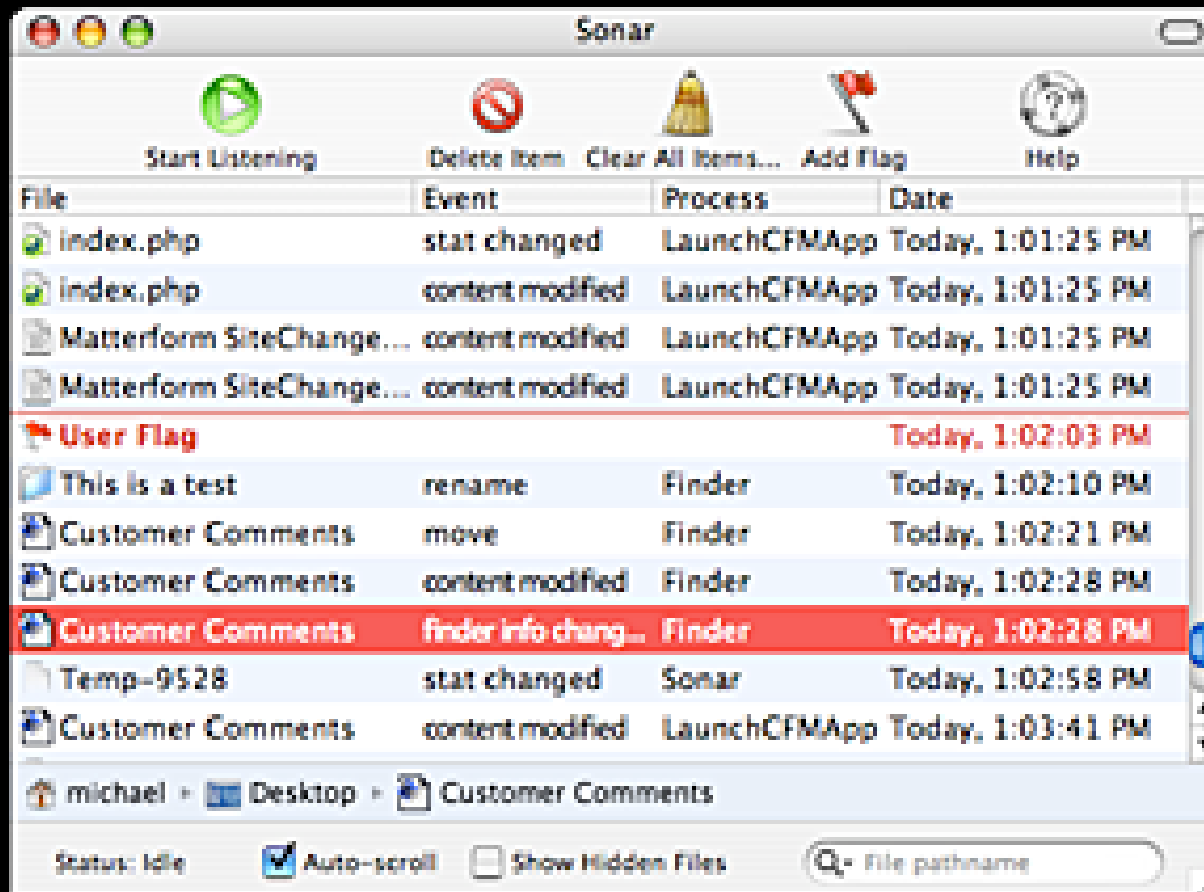
```
pid           = 229 (Finder)
```

```
# Details
```

# type	len	data
FSE_ARG_VNODE	41	path = /Applications/PSU Blast Image Config 2.6
FSE_ARG_DEV	4	fsid = 0xe000002
FSE_ARG_INO	4	ino = 1300716
FSE_ARG_MODE	4	mode = drwxr-xr-x (0x0041ed, 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



# Radmind

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



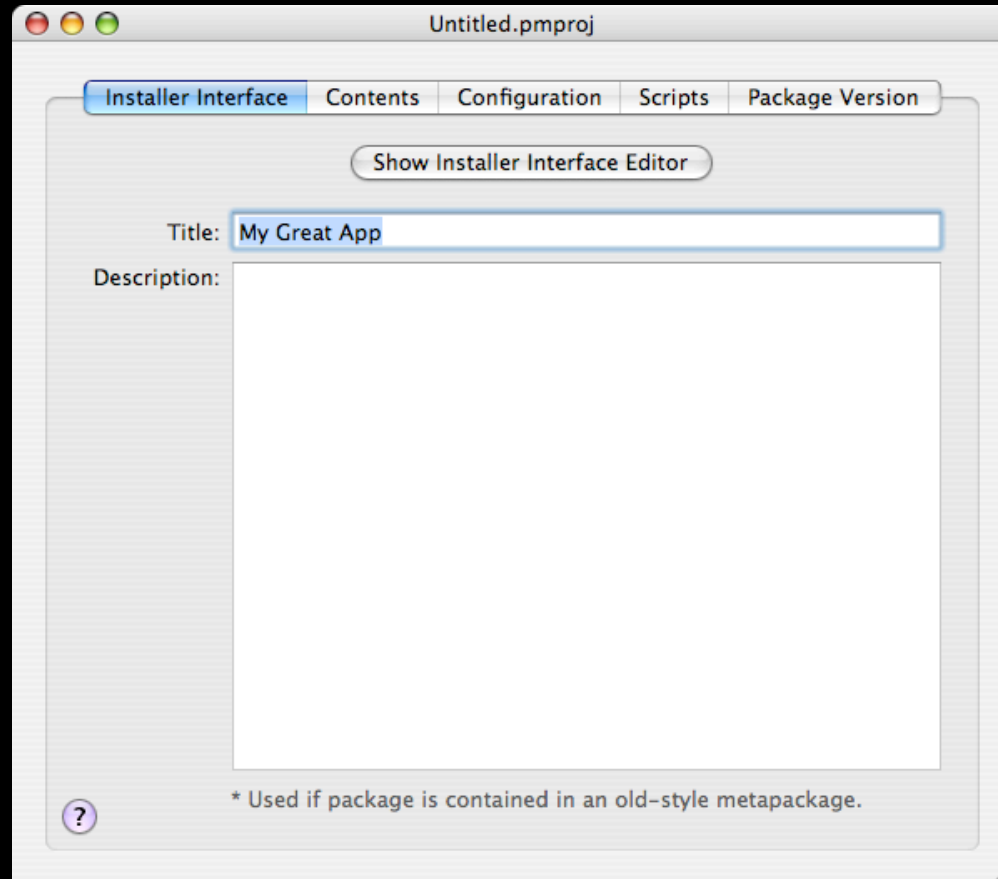
# Filewave

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

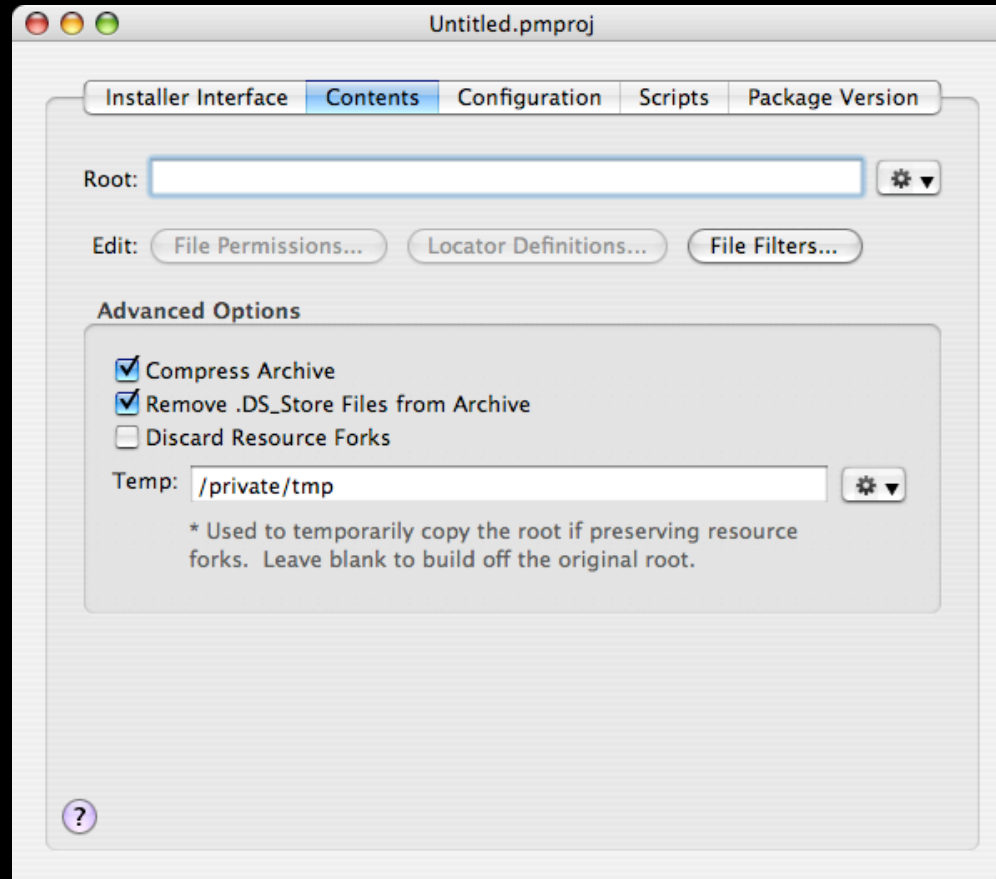


# PackageManager

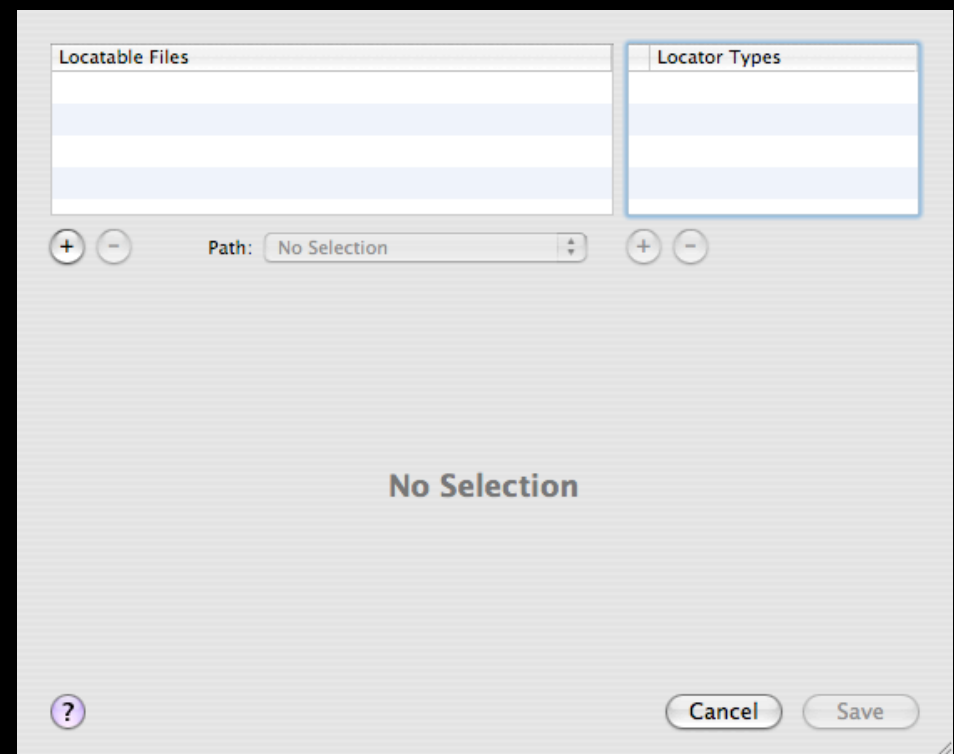
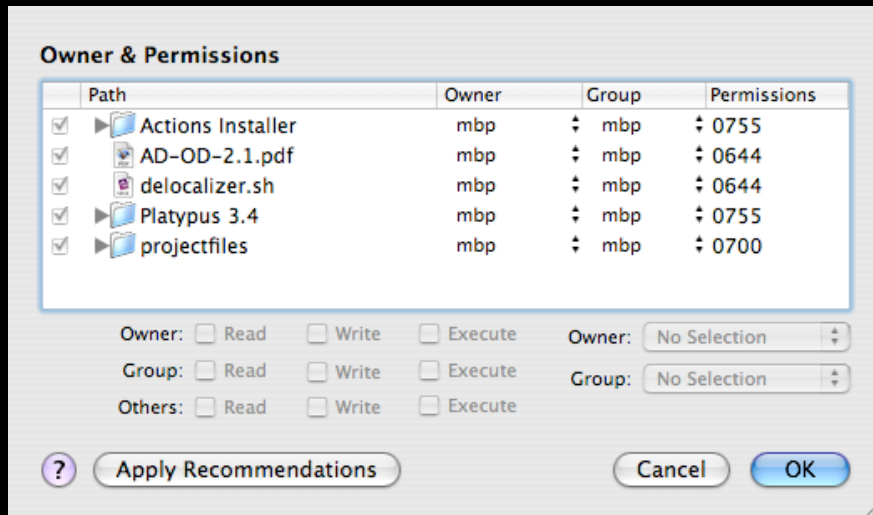
# Customizing the user experience



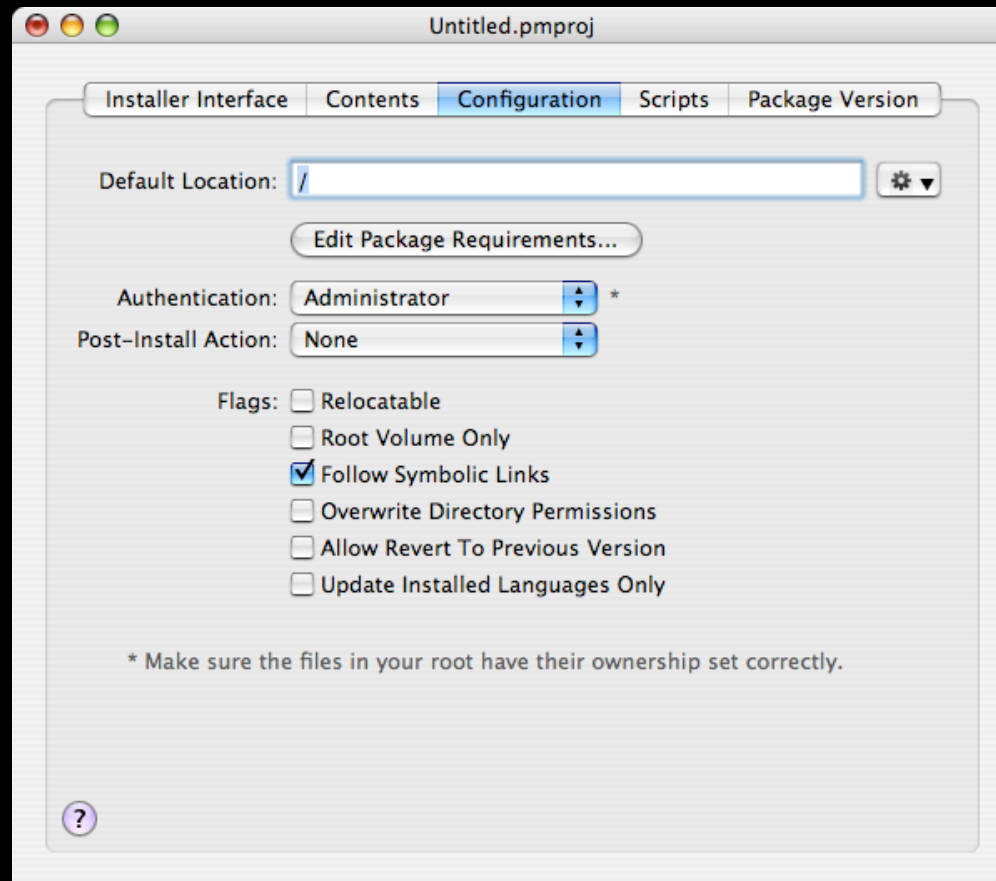
# PackageMaker - Installer Contents



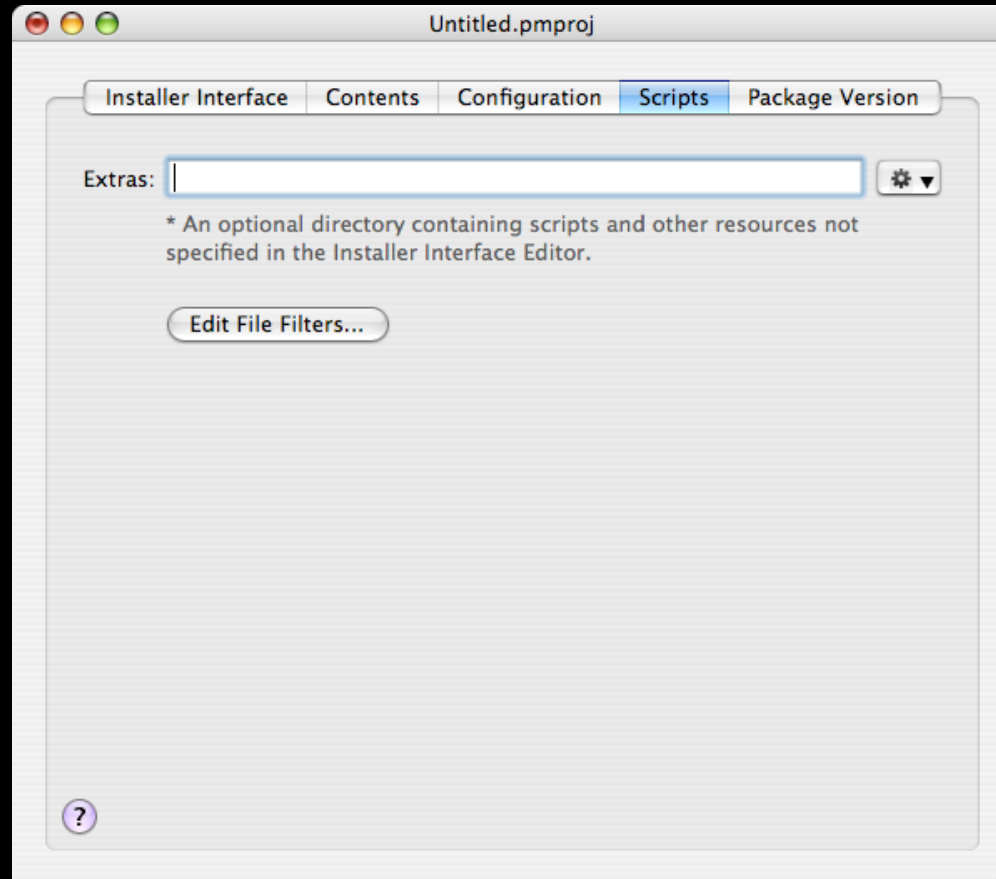
# Permissions & Locator



# Authentication, Filesystem Defaults

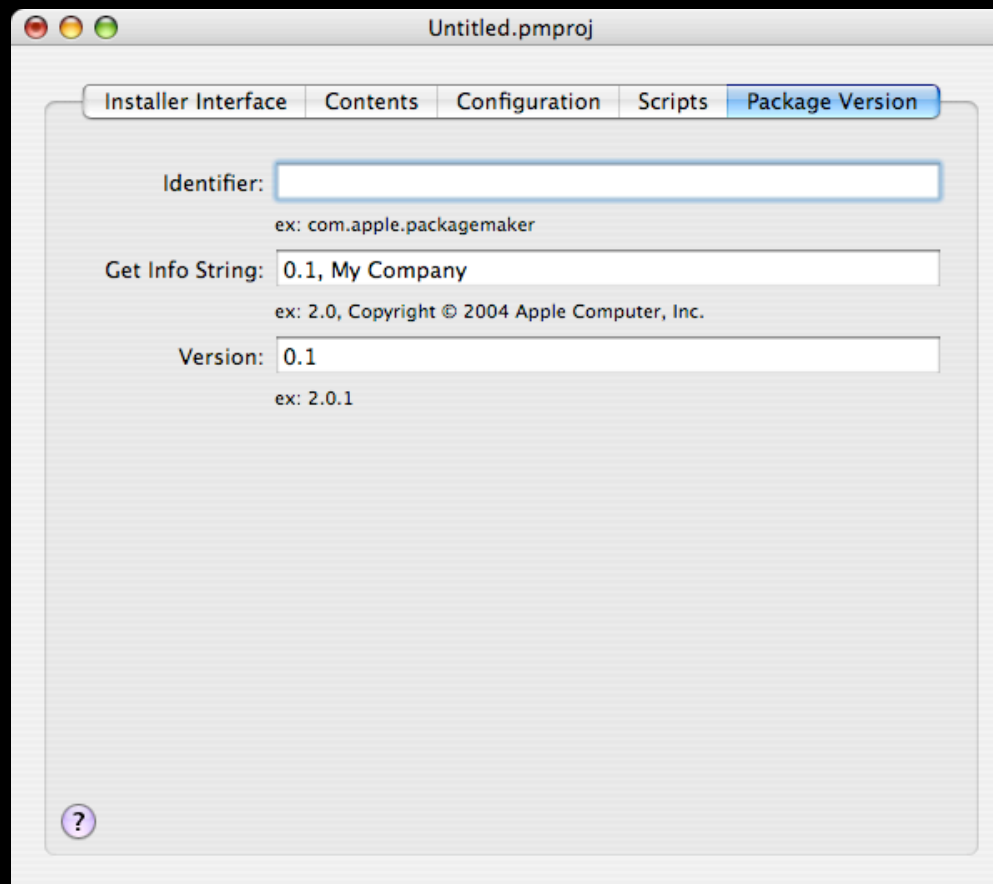


# Post-install / Flight scripts



# Installer Version Information...

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



# Iceberg!

A packagemaker replacement!

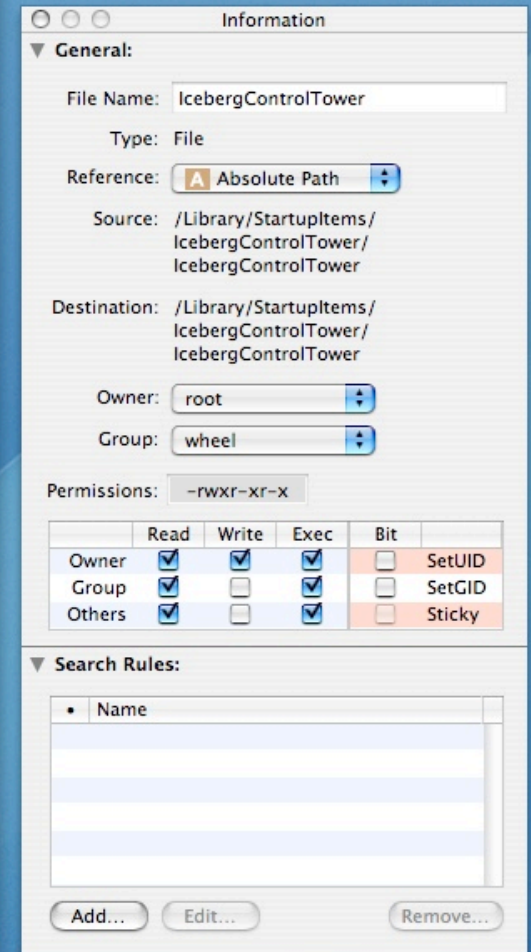
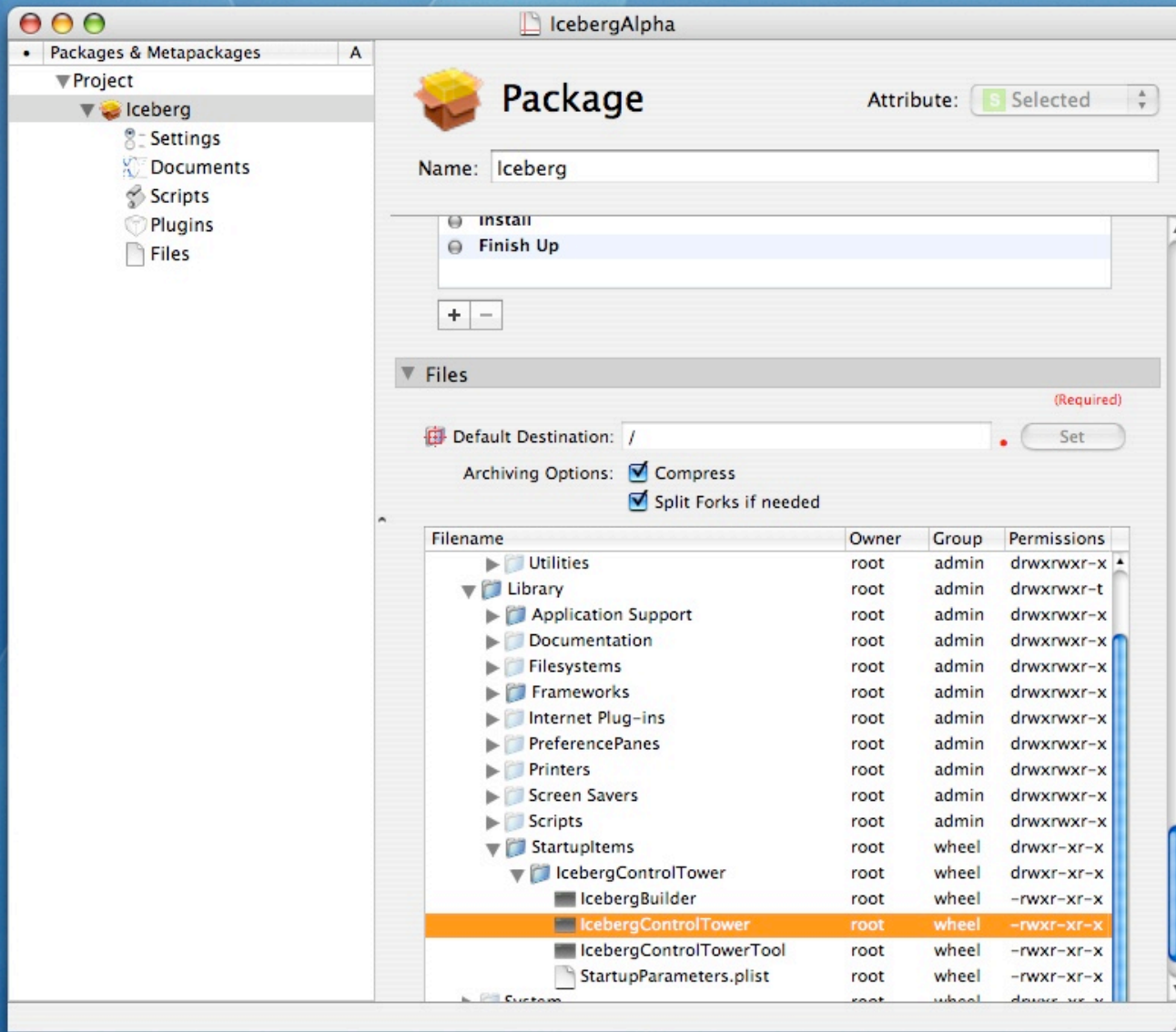


# Why use a different packaging application?

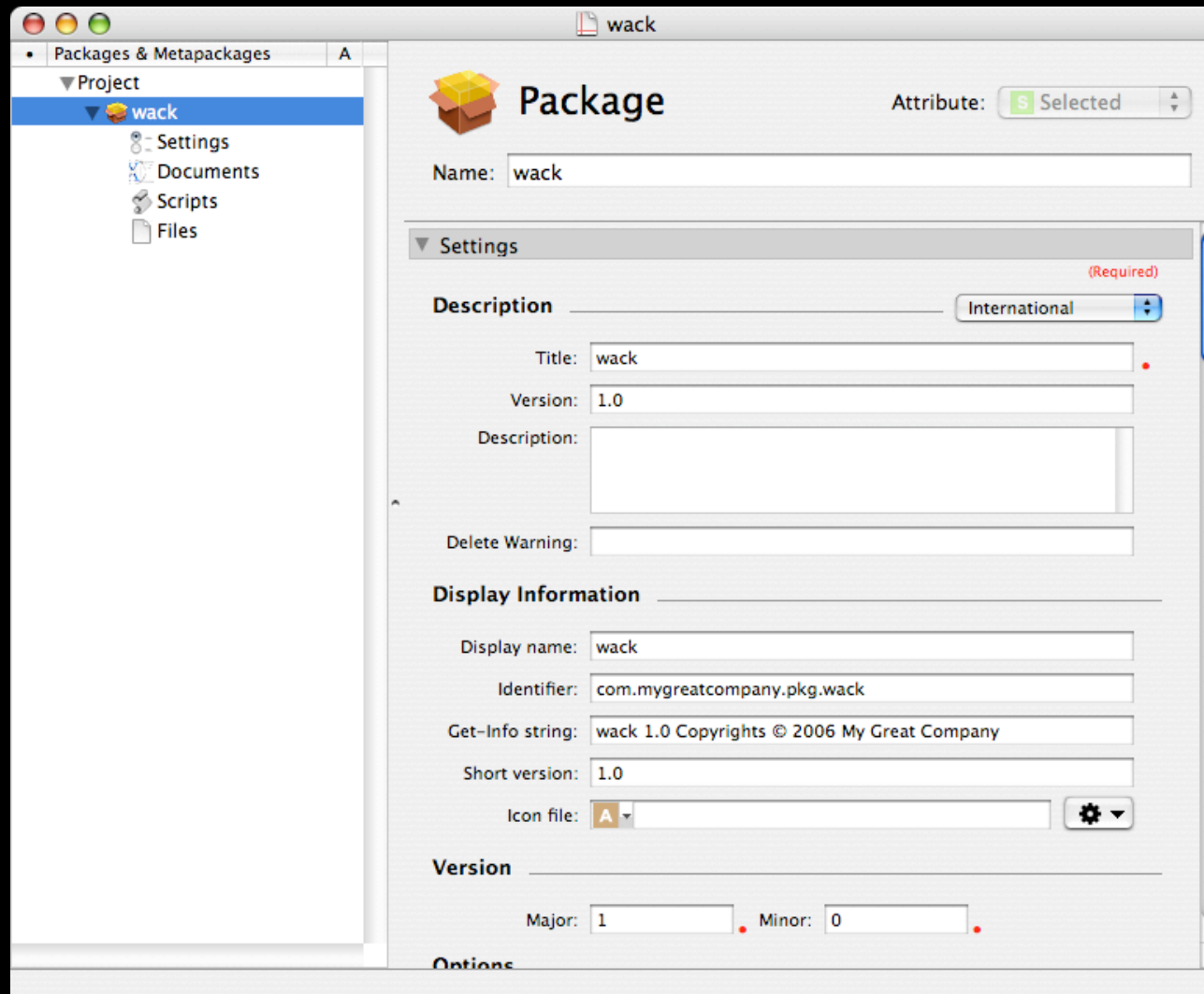
- More intuitive to use
- More granularity allowed
- Very XCode-like
- Allows preview!



# Iceberg Interface



# Starting a package



Package

Attribute: S Selected

Name:

▼ Documents

**Background Image**

Default

Path:  ⚙️

Scaling:  Proportionnally

To Fit

None

Alignment:  ⬆️

**Welcome** International ⬆️

Default

Path:  ⚙️

**ReadMe** International ⬆️

None

Path:  ⚙️

**License** International ⬆️

None

Path:  ⚙️

Template:

Keyword	Value

Package Editor for 'wack'

Attribute: **S** Selected

Name: wack

▼ Scripts

**Requirements**

Label	Level

Add... Edit... Remove...

**Installation Scripts**

Name	Ref.	Path
<input type="checkbox"/> preflight	A	
<input type="checkbox"/> preinstall	A	
<input type="checkbox"/> preupgrade	A	
<input type="checkbox"/> postinstall	A	
<input type="checkbox"/> postupgrade	A	
<input type="checkbox"/> postflight	A	

Choose...

**Additional Resources** International


Add... Remove...

Package

Attribute: S Selected

Name:

Files

Default Location:  (Required) Set

Archive Options:  Compress  
 Split Forks if needed

Filename	Owner	Group	Permissions
▼ /	root	admin	drwxrwxr-t
▼ Applications	root	admin	drwxrwxr-x
Lunalmaging	root	admin	drwxr-xr-x
▼ Utilities	root	admin	drwxrwxr-x
▶ Library	root	admin	drwxrwxr-x
▶ System	root	wheel	drwxr-xr-x

# Optimizing!

Package Editor window for a package named "wack".

**Left Panel (Project Structure):**

- Project
  - wack
    - Settings
    - Documents
    - Scripts (highlighted)
    - Files

**Main Panel (Package Configuration):**

Attribute: **S Selected**

Name:

**Scripts**

**Requirements**

Label	Level

Buttons: Add... Edit... Remove...

**Installation Scripts**


Name	Ref.	Path
<input type="checkbox"/> preflight	A	
<input type="checkbox"/> preinstall	A	
<input type="checkbox"/> preupgrade	A	
<input type="checkbox"/> postinstall	A	
<input type="checkbox"/> postupgrade	A	
<input type="checkbox"/> postflight	A	

Buttons: Choose...

**Additional Resources**

International


Buttons: Add... Remove...





# 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 only 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

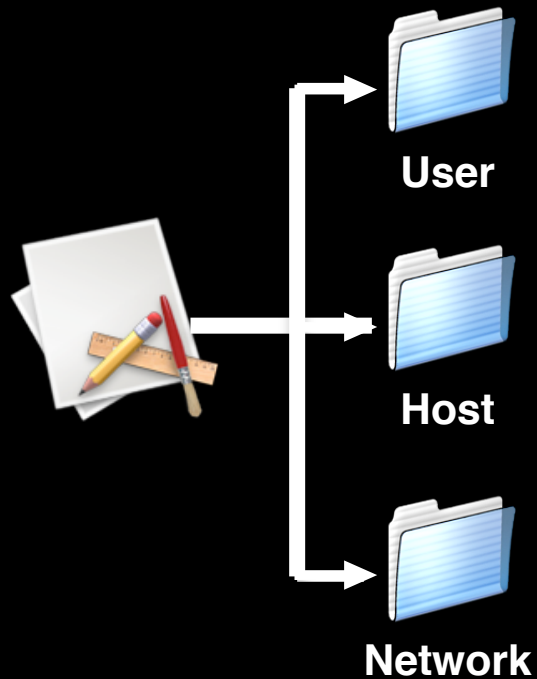
- Problems arise if the application or folder is moved, renamed, or disk is cloned using Apple Software Restore

# Preferences hierarchy

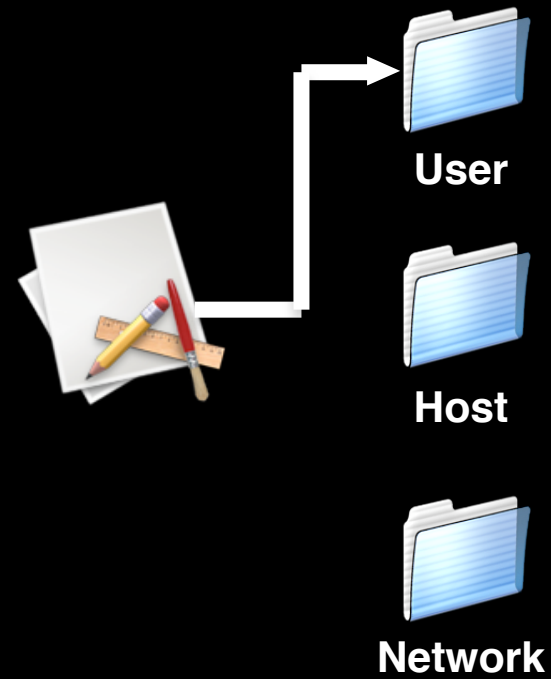
- **Hierarchy of folders that can contain preferences**
  - User  
/Users/<username>/Library/Preferences  
Preferences limited to specific user
  - Host  
/Library/Preferences  
Preferences limited to users of machine
  - Network  
/Network/Library/Preferences  
Preferences available for all users of 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`

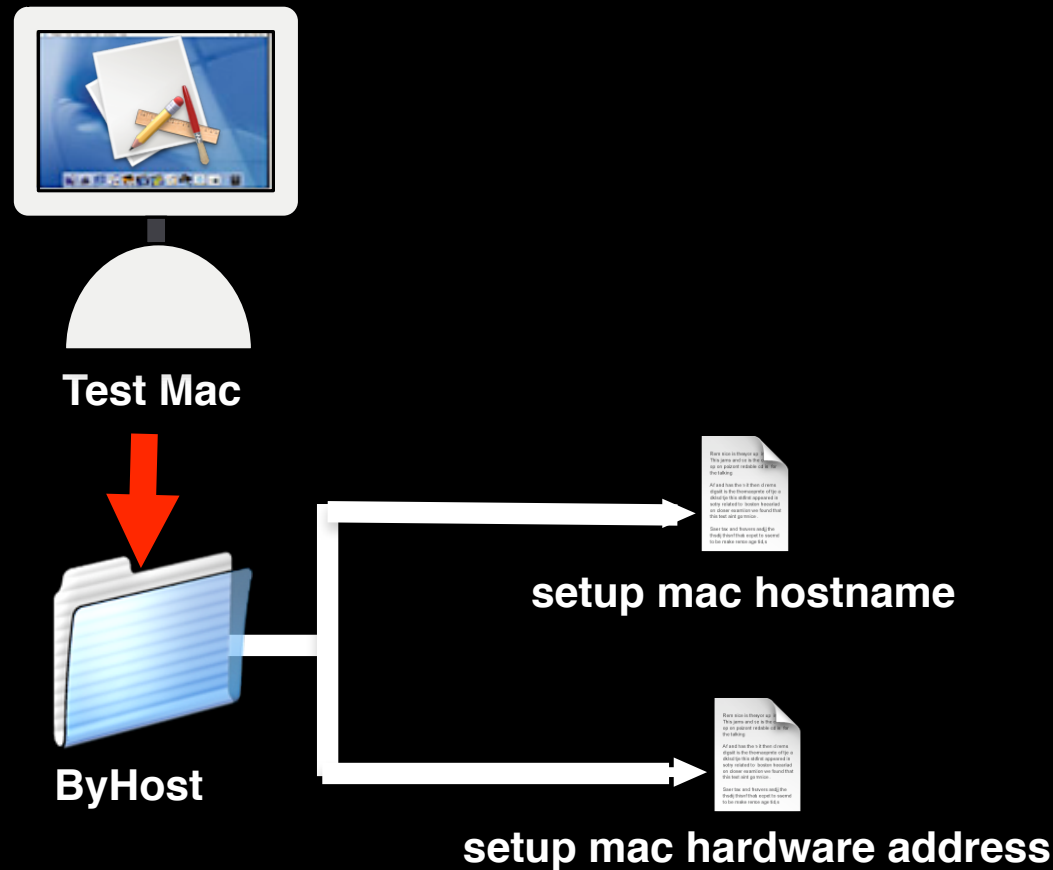
- Specific to original machine vs deployed machines
- Preferences stored in:

`~/Library/Preferences/ByHost`

`/Library/Preferences/ByHost`

# ByHost Preferences

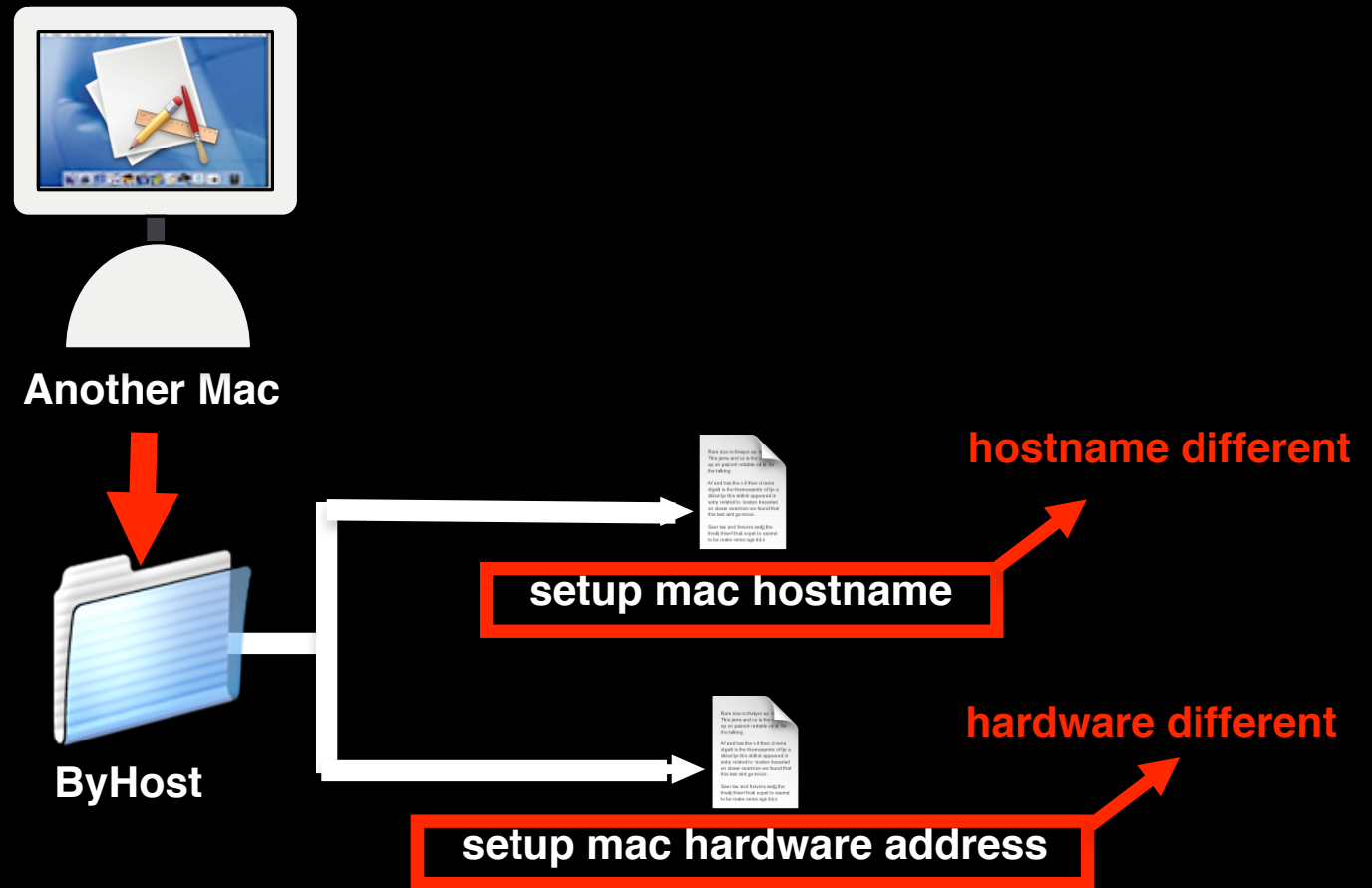
## Example - Part I



**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
    - HI Toolbox
    - MIDI
    - Preference Panes
    - Software Update
    - iTunes
    - iWork
    - screensaver
    - PrintCache



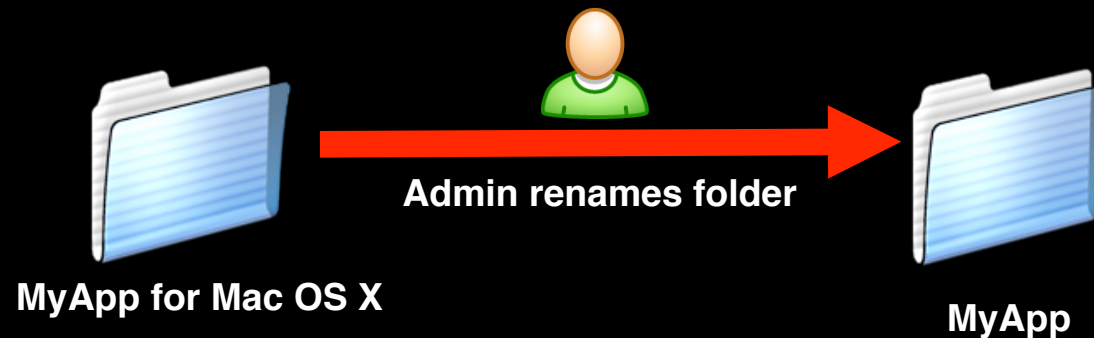
# Hard Coded Paths

- Tied to default install location & name
- Some apps expect default install pathway

../MyApp

/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

- 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>

# 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

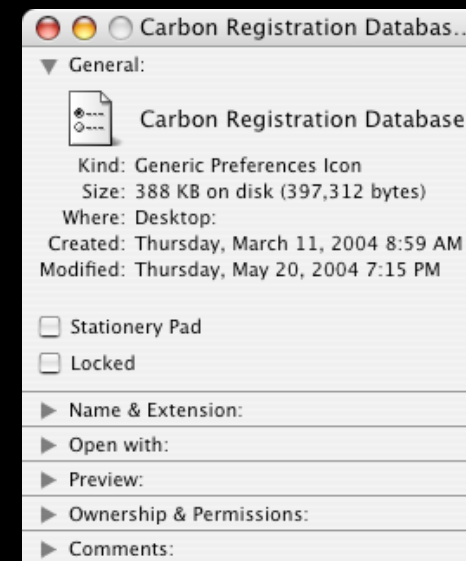
- How to get information

```
/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
- Radmin
- 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