Macintosh Forensics

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Rules of the game

- Make no changes to suspect system
- Document everything
- Document, document and then document some more…
- Take very good notes
- A case could take 2-3 years to go to court, your memory will never last

Data changes fast

- Under normal conditions as soon as an HFS partition mounts on your desktop, you will change your last modified date and time
- You want to avoid this, if you can't document it
- You can use physical write-blockers or turn off diskarbitrationd (In Panther and Tiger)

Interesting commands

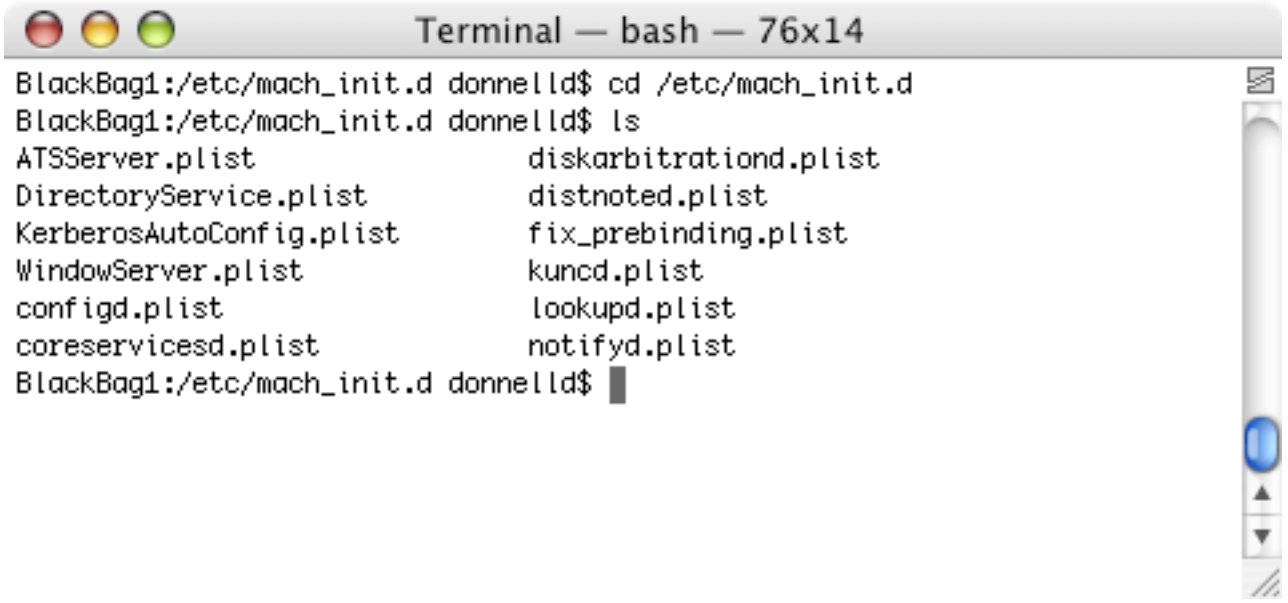
- Mount
- ls /dev/disk?
- ioreg -c “IOMedia”
- dd and dcfldd
- pdisk
- hdiutil pmap
- hdiutil attach
- Hdiutil attach /some/image.dmg -shadow

Disk Arbitration

- Diskarbitration is now the main process in Panther used to manage and mount disk partitions
- BBT has provided a GUI app to disable Diskarbitrationd similar to the autodiskmounting procedure in 10.1-10.2
- /etc/mach_init.d/diskarbitrationd.plist

Disk Arbitration

- /etc/mach_init.d directory example



Disk Arbitration

- Contents of diskarbitrationd.plist
- Contents in standard XML

Terminal — bash — 89x16

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple Computer//DTD PLIST 1.0//EN" "http://www.apple.com/DTDs
/PropertyList-1.0.dtd">
<plist version="1.0">
<dict>
        <key>ServiceName</key>
        <string>com.apple.DiskArbitration.diskarbitrationd</string>
        <key>Command</key>
        <string>/usr/sbin/diskarbitrationd</string>
        <key>OnDemand</key>
        <false/>
</dict>
</plist>
BlackBag1:/etc/mach_init.d donnelld$
```

Disk Arbitration - Disabling

- Go to the /etc/mach_init.d Directory
  - cd /etc/mach_init.d
- Create a directory in /Library called DiskArb_Backup
  - sudo mdir /Library/DiskArb_Backup
- Copy diskarbitrationd.plist to DiskArb_Back (Always make sure you have a backup before you remove the file)
  - sudo cp /etc/mach_init.d/diskarbitrationd.plist /Library/DiskArb_Backup
- Now you can remove (delete) the file
  - sudo rm /etc/mach_init.d/diskarbitrationd
- Once the file has been removed, you can Reboot the System

- To re-enable DiskArbitration reverse the process, copy the file (diskarbitrationd.plist back to /etc/mach_init.d

- Always make sure you make a Backup of diskarbitrationd.plist before you delete or move it

Diskarbitration

- When diskarbitration is off partitions do not get mounted automatically
- It is not a write-blocker, if you do something stupid you can change data on a suspect system
- You have to mount destination partitions manually
- You can also mount read-only

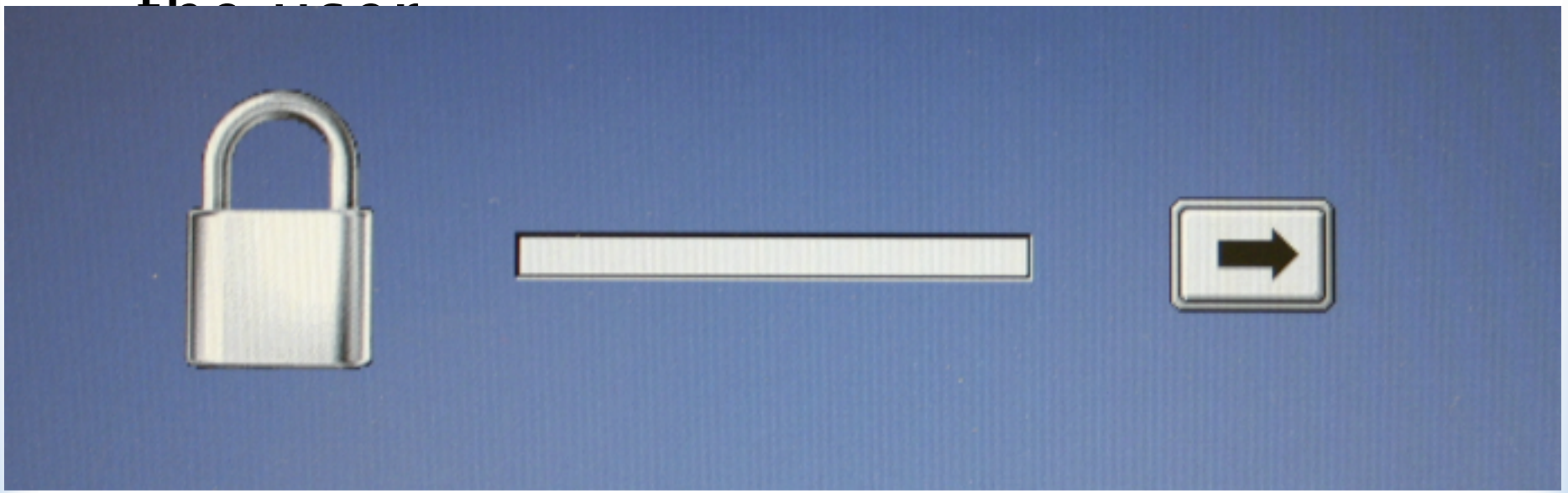
Open Firmware

- Use “Open Firmware Password” to set a password for your Open Firmware
- You can find this utility on the first CD of your Install CDs
- If a user sets the firmware password it may interfere with FireWire Target Mode

Open Firmware Password

Open Firmware

- If you boot up and hold the “Option” key and you see this screen a firmware password has been set by the user



Open Firmware

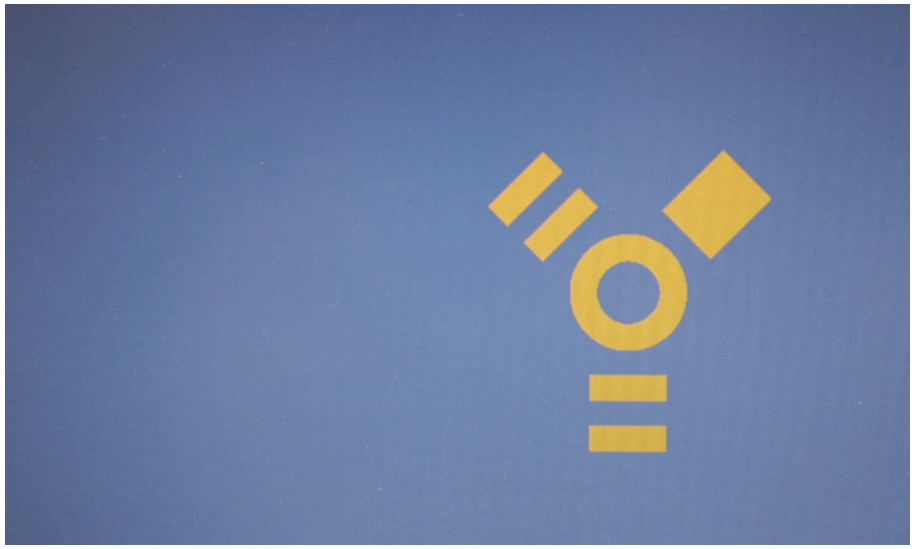
- Or the computer might continue to Boot as normal, if you see this you want to kill the power

Open Firmware

- Normal bootup screen

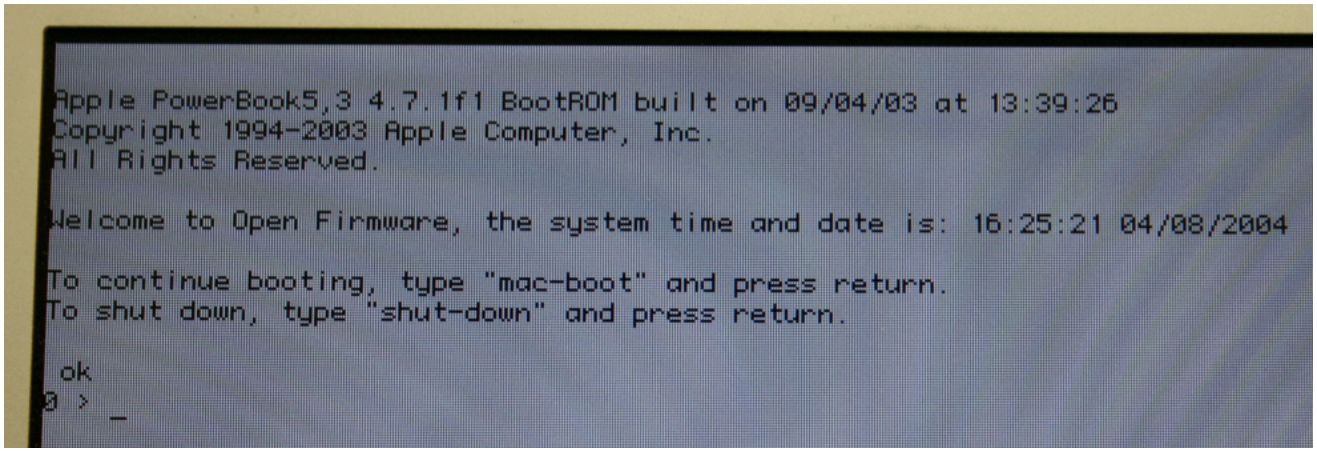
Open Firmware

- For proper FireWire target mode you should see the yellow FireWire logo



Open Firmware

- If you hold down “Apple” + “Option” + “O” + “F” you will drop into the Open Firmware

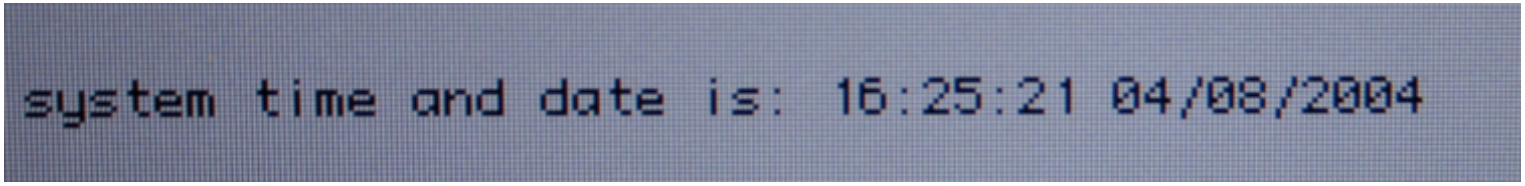


Open Firmware

- To continue normal booting type:
  - mac-boot (you do not want to do this on a suspect system)
- To shutdown from open firmware type:
  - shut-down
- This can be handy if you just want to check the system time
- This process will not write to the drive

Open Firmware

- Notice you can see the system time from this screen
- Time will be in GMT



Imaging drives

- Standard dd command (suspect drive=/dev/disk1)
- sudo dd if=/dev/disk1 bs=1024 conv=noerror,sync of=/evidence/Imagefile.dmg
- sudo dd if=/dev/disk1 bs=1024 conv=noerror,sync | split - -b2000m /evidence/Imagefile.

Working dcfldd

- sudo dcfldd if=/dev/disk1 hashwindow=0 conv=noerror,sync bs=1024 of=/evidence/imagefile.dmg
- Sudo dcfldd if=/dev/disk1 hashwindow=0 conv=noerror,sync bs=1024 | split - -b2000m /evidence/imagefile.
- Dcfldd has been updatednow called dccidd (Supports sha1, sha-256)

Imaging Live systems

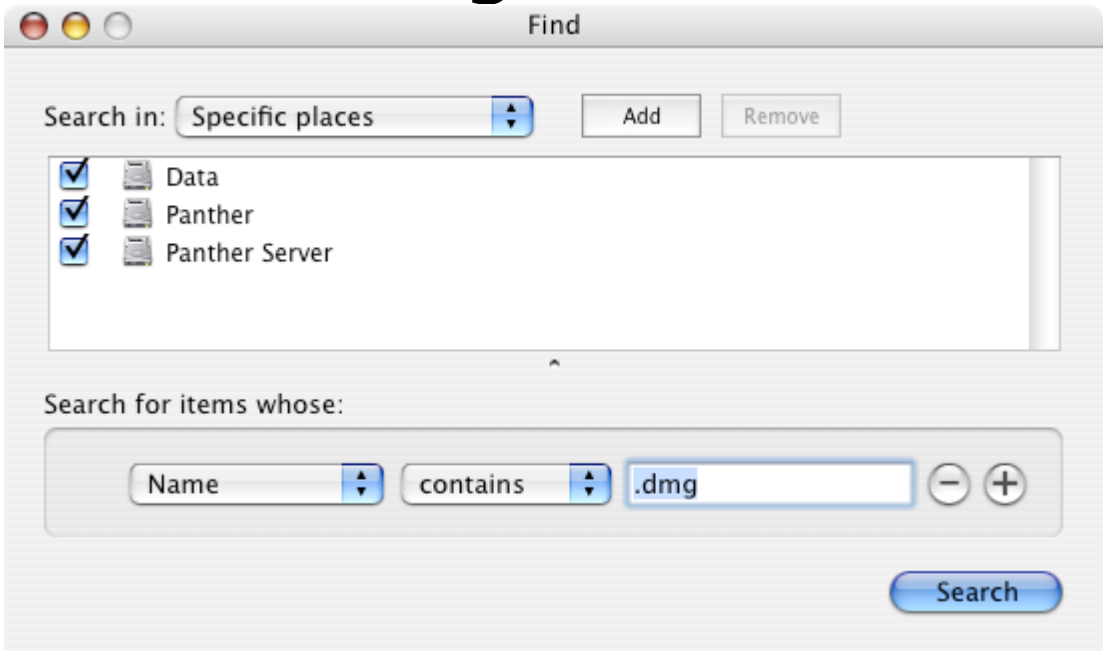
- Use rdisk entries (ls /dev/rdisk?)
- Rdisk= raw disk (buffered copy)
- Sudo dd if=/dev/rdisk0 conv=noerror,sync bs=1024 of=/evidence/imagefile.dmg
- Make sure you have enough space to image a full drive
- Lock your image files before mounting them with DiskCopy (DiskUtility)

Places to look for evidence

- Remember Mac OS X is a Unix based system
- Most user files are created and saved in the User's home directory
- A Mac OS X System can have multiple users

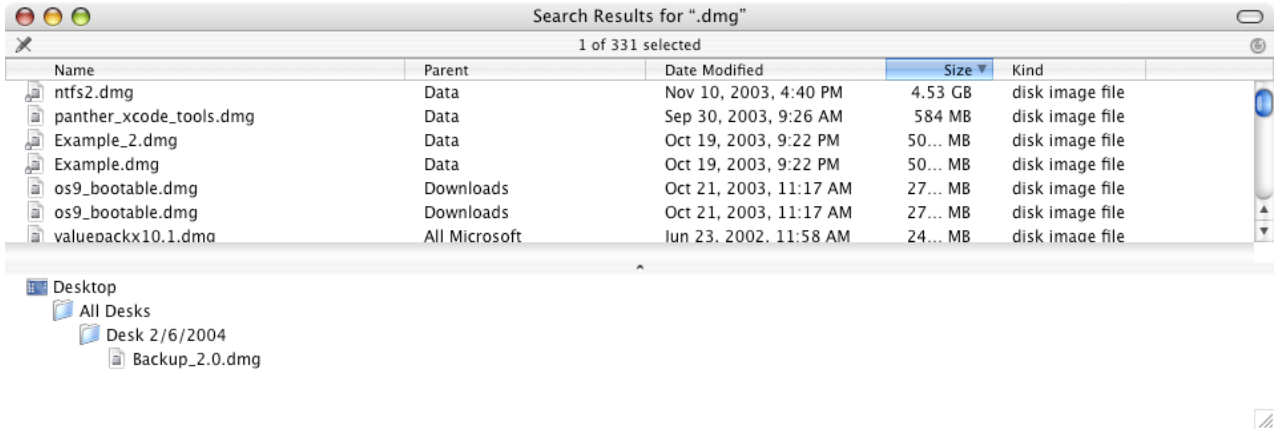
Panther Built in Tools

- Always use find to search for large .dmg or sparse files
- You could be missing entire sub volumes



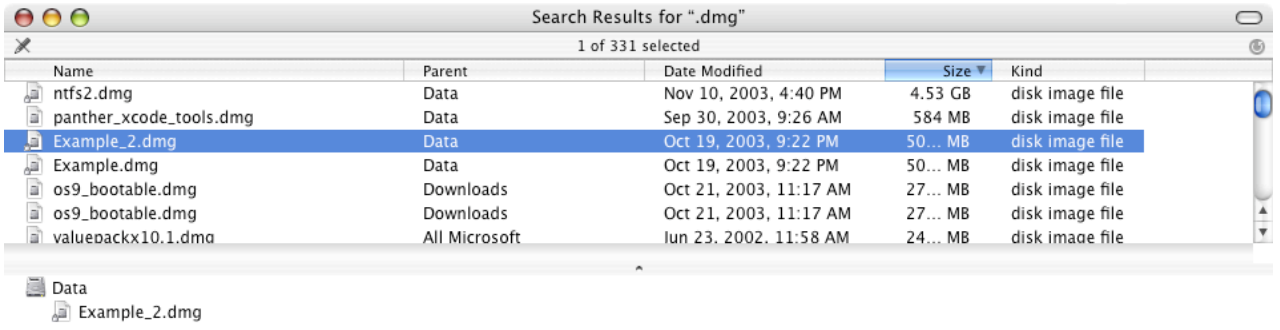
Panther Built in Tools

- Sort results by size, to find all the large disk images



Panther Built in Tools

- Click on the results to find the paths to the files in question



Open Source Solutions

- SleuthKit
  - Forensic Tools from Brain Carrier
  - Installation
    - Requirements:
      Developer Tools
    - Available from www.sleuthkit.org
  - Use
    - For SluethKit to see data, you need to manually break out the partitions.
- Autopsy
  - Graphical Front end to SleuthKit

iPod

- Music only FAT 32 formatted

```
Differential:/dev charnota$ ioreg -c IOMedia+-o Apple iPod Media  <class IOMedia, registered,
    matched, active, busy 0, retain count 10$
| |  |     | |  |     |  | {
| |  |     | |  |     |  |   "Leaf" = No
| |  |     | |  |     |  |   "Writable" = Yes
| |  |     | |  |     |  |   "BSD Minor" = 8
| |  |     | |  |     |  |   "Preferred Block Size" = 512
| |  |     | |  |     |  |   "BSD Major" = 14
| |  |     | |  |     |  |   "BSD Name" = "disk2"
| |  |     | |  |     |  |   "Size" = 5007744000
| |  |     | |  |     |  |   "Content Hint" = ""
| |  |     | |  |     |  |   "Removable" = Yes
| |  |     | |  |     |  |   "IOMediaIcon" =
    {"CFBundleIdentifier"="com.apple.iokit.IOStorageFamily","IOBundleRes$
```

iPod (in ioreg)

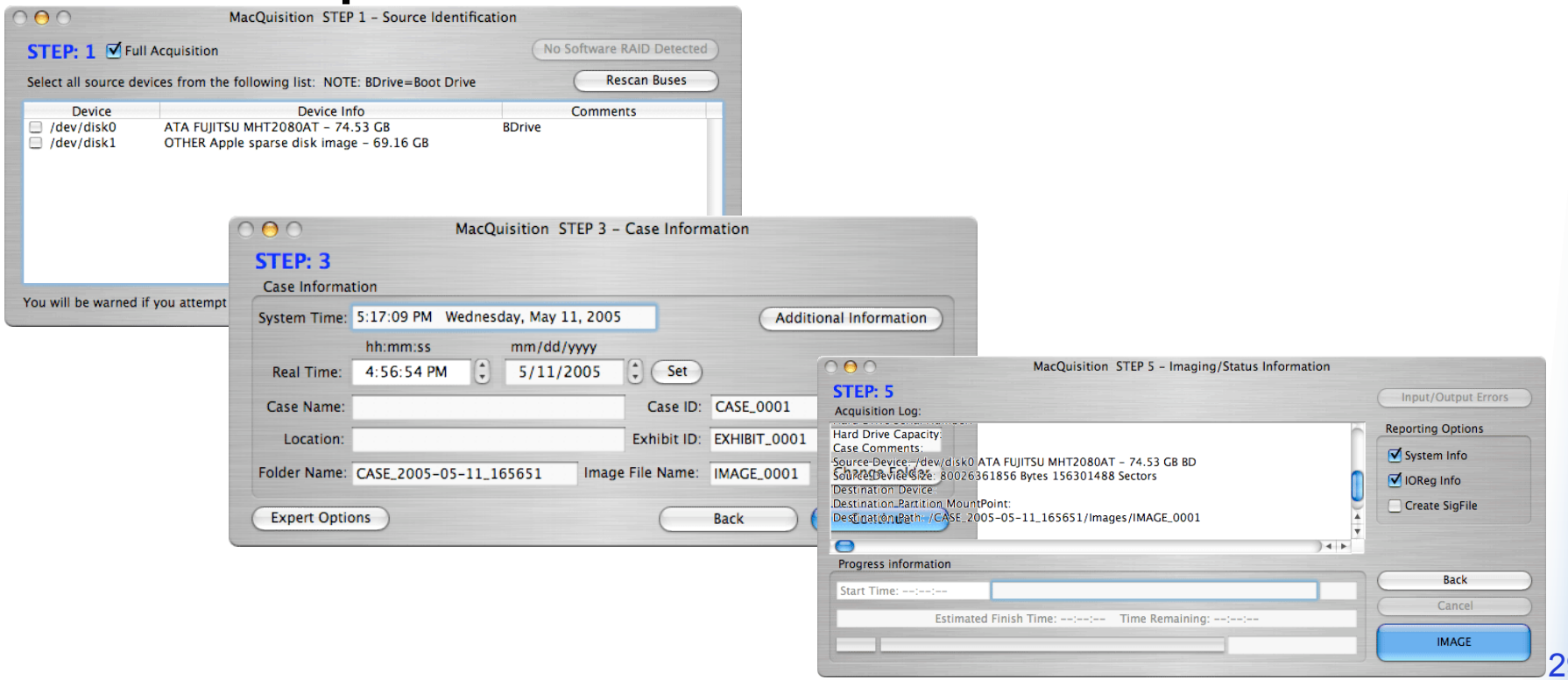
```
| | |     | |  |     |  |  "BSD Unit" = 2
| | |     | |  |     |  |  "Ejectable" = Yes
| | |     | |  |     |  |  "Content" = "FDisk_partition_scheme"
| | |     | |  |     |  |  "Whole" = Yes
| | |     | |  |     |  | }
| | |     | |  |     |  |
| | |     | |  |     |  +-o IOMediaBSDClient  <class IOMediaBSDClient, registered, matched, active, busy 0, reta$
| | |     | |  |     |  +-o IOFDiskPartitionScheme  <class IOFDiskPartitionScheme, !registered, !matched, active$
| | |     | |  |     |    +-o Untitled 2@2  <class IOMedia, registered, matched, active, busy 0, retain count 9>   | |  |     | |  |
      |     | {
| | |     | |  |     |      |  "Leaf" = Yes
| | |     | |  |     |      |  "Writable" = Yes
| | |     | |  |     |      |  "BSD Minor" = 9
| | |     | |  |     |      |  "Preferred Block Size" = 512
| | |     | |  |     |      |  "Partition ID" = 2
| | |     | |  |     |      |  "BSD Major" = 14
| | |     | |  |     |      |  "BSD Name" = "disk2s2"
| | |     | |  |     |      |  "Size" = 4959843840
| | |     | |  |     |      |  "Content Hint" = "DOS_FAT_32"
| | |     | |  |     |      |  "Removable" = Yes
| | |     | |  |     |      |  "BSD Unit" = 2
| | |     | |  |     |      |  "Ejectable" = Yes
| | |     | |  |     |      |  "Content" = "DOS_FAT_32"
| | |     | |  |     |      |  "Whole" = No
| | |     | |  |     |      | }
| | |     | |  |     |      |
| | |     | |  |     |      +-o IOMediaBSDClient  <class IOMediaBSDClient, registered, matched, active, busy 0, $
```

Commercial Data Recovery

- FileSalvage SubRosa Soft
- DataRescue
- DiskWarrior
- Drive 10
- Tech Tool

MacQuisition Boot CD

- Image Mac systems without taking them apart



BlackBag Services

- Software Forensic Suite
- Forensic Hardware (Firebox)
  - IDE and SCSI Write Blocker using the Firewire bus
- Mac Forensic Training
  - (Local Santa Clara and Mobile Class)
- Forensic analysis consulting and Data Recovery

Mac Forensic Forum

- Join us on the Mac Forensic forum on Yahoo
- http://groups.yahoo.com/group/macos_forensics/
- http://www.blackbagtech.com/forensics.html
- The group is closed group mostly for Law enforcement

Contact

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