Windows Deployment on MacOS X

http://tinyurl.com/macworld09-windows-qa

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Session IT853

Windows Deployment on MacOS X

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About this Presentation

About this Presentation
Credits

- Great credit goes to the other team members

  - Surajit Bose

  - Dusting King - Windows Developer

  - Fangling Zhang - Student Developer

- Mike Bombich's Site

- WinClone site

About this Presentation
Defining Dual Boot Images

- 1-to-1 deployments
  - Users typically have full control
- Training Labs
  - Switches from one image to another as a group
  - Maintenance highly controlled
- Computer Labs
  - Users switch OS's regularly
  - Need for regular, automated cleanup

About this Presentation
What won't be covered

- Methods to prepare the images (SysPrep)

- User Management (AD, LDAP, etc)

- Other OS's (Linux, FreeBSD, etc)

About this Presentation
A mention of Virtualization

- Great solutions for some situations

- High hardware requirements

- Incompatible with some software

- Makes one OS dependent on the other

About this Presentation
Sections

- Planning

- Booting Methods

- Partitioning

- On-Image Concerns

- Deploying the Image

- Image Maintenance

- An Example

Planning

Planning
Goals

- Define your goals ahead of time

- Why are you doing this

  - Adding a service

  - Replacing a service

- How do the platforms relate

  - Can one dominate, or are they equals

- Shared users - home directories, passwords, etc

Planning
Concerns

- XP or Vista

- Software Licensing costs

  - Concurent vs. per seat

  - Upgrade pricing for Windows

- Binding to Directory Servers

Planning
Resources

- Setup can take a long time

- Know the resources you have available

  - Developer and Tech time

  - Lead time before the deployment

Booting Methods

Booting Methods
Goals

- Discoverable: no user training

- Be available for remote management

- Not require admin users

- As quick a change as possible

Booting Methods
Background information

- Convient tool to programatically set boot device on MacOS: bless

  - Sets variables in EFI variable namespace

- On Windows no scripted access (COM, etc)

  - Things passed through different NVRAM space

  - Requires creative workarounds
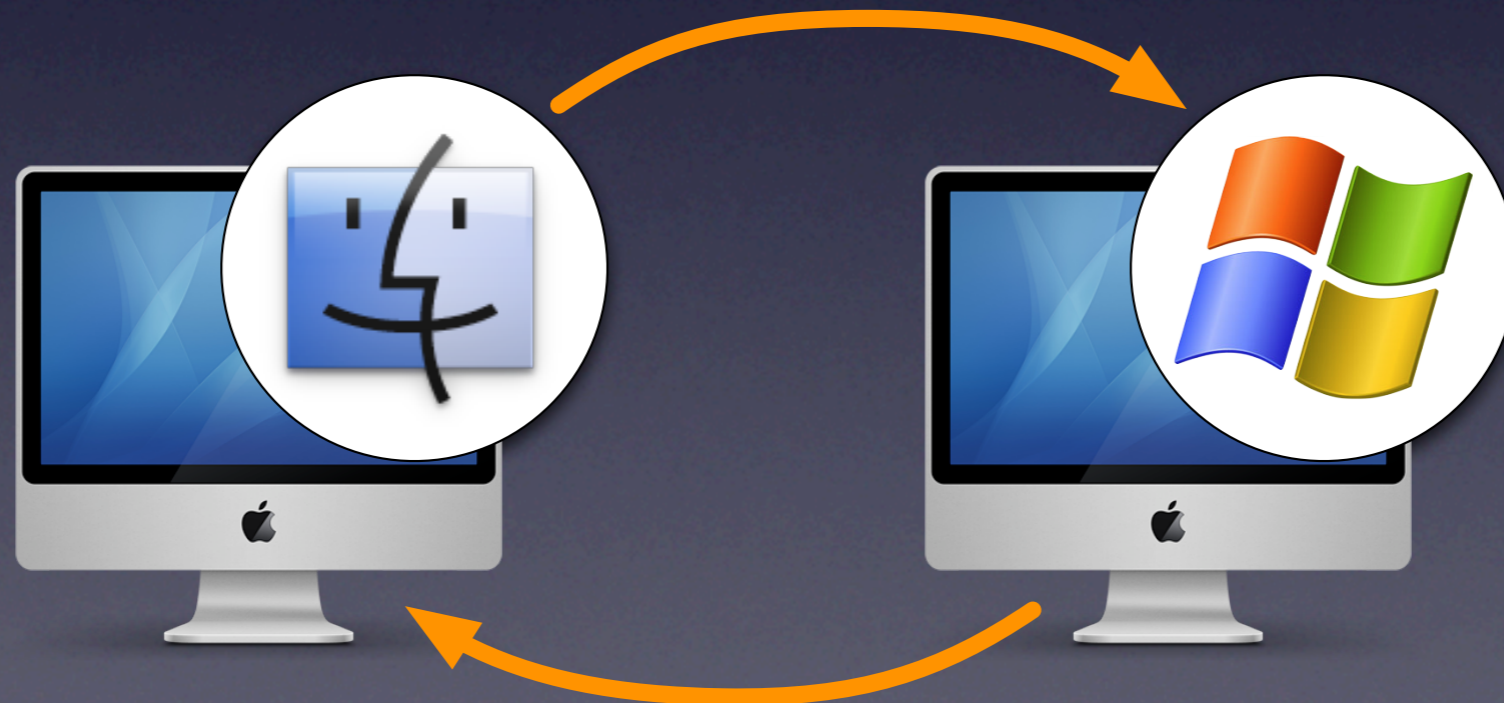
Booting Methods
Built in Methods

- "Option Key" and Control Panel

Pros:
- Built in
- Simple

Cons:
- Requires Admin
- Not Discoverable

Booting Methods
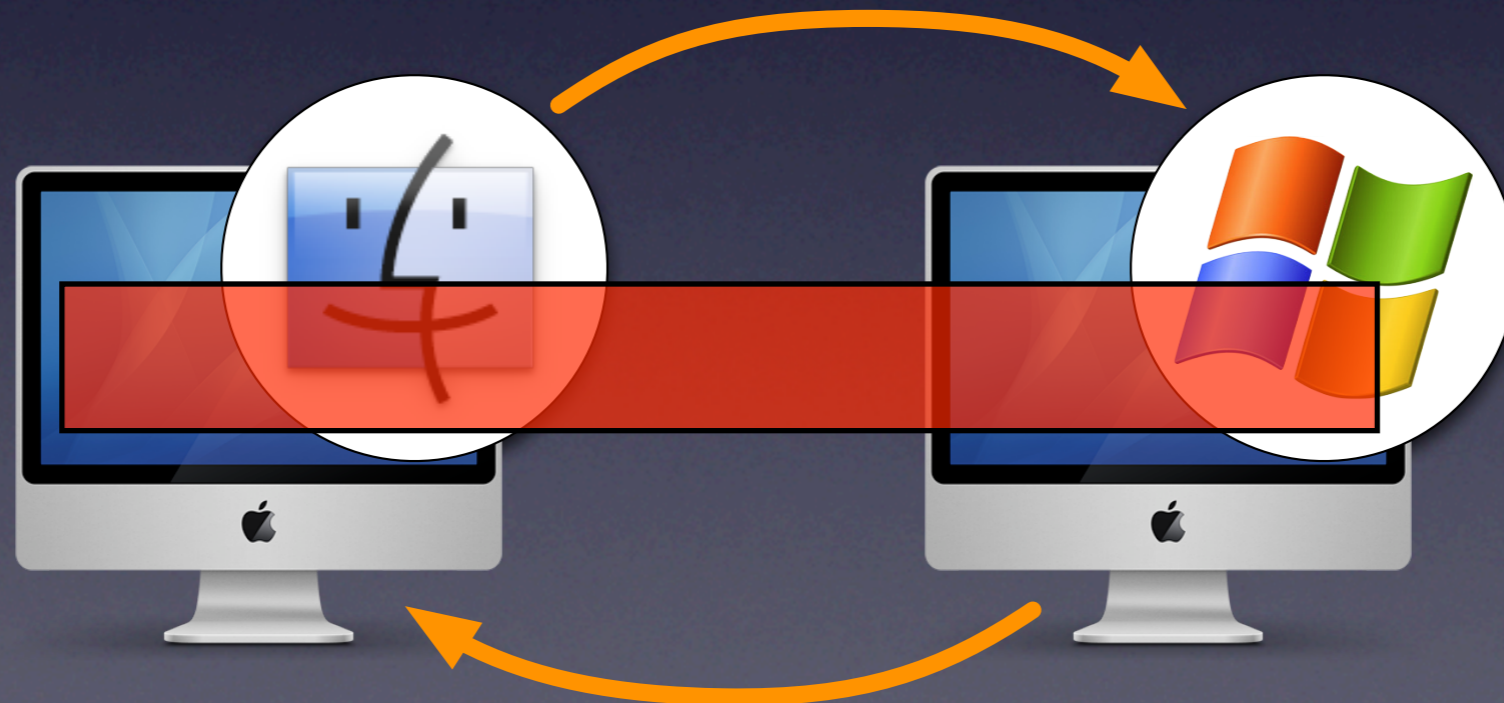## Built in Methods

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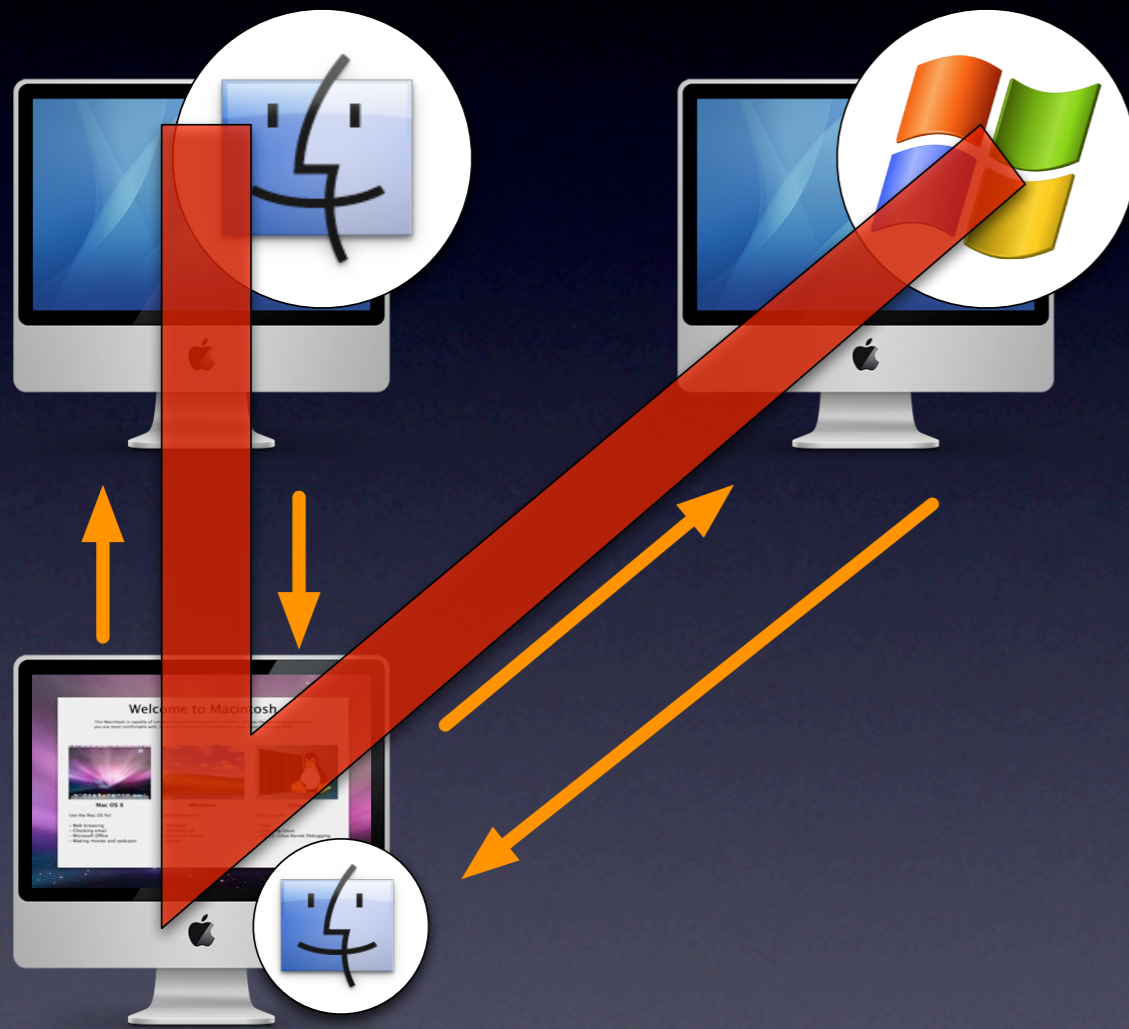
Booting Methods
Bootpicker

- Apple Education Support

- Easily discoverable

- Handles up to 3 OS's

- Logout goes to MacOS

  - MacOS is dominant

- Long Delay between Windows users

Booting Methods
Bootpicker
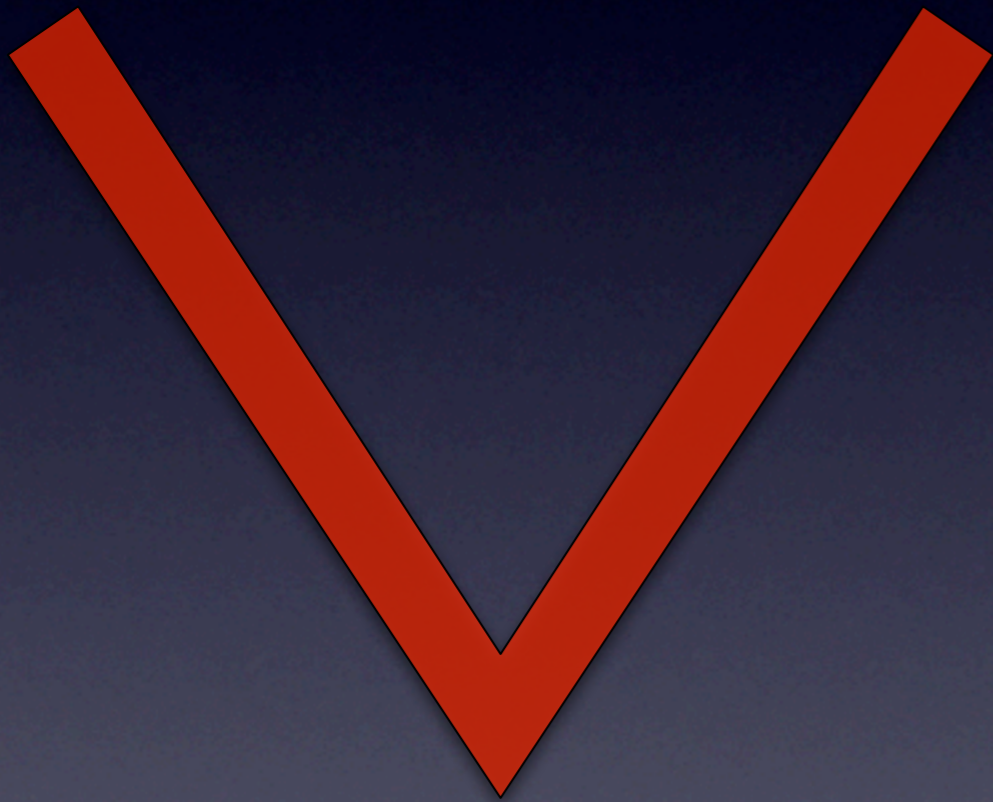
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Booting Methods
rEFIt

- Open source

- Easily discoverable

- Handles up to 3 OS's

- Every logout is a restart

- Not manageable at chooser screen

- No Screensaver
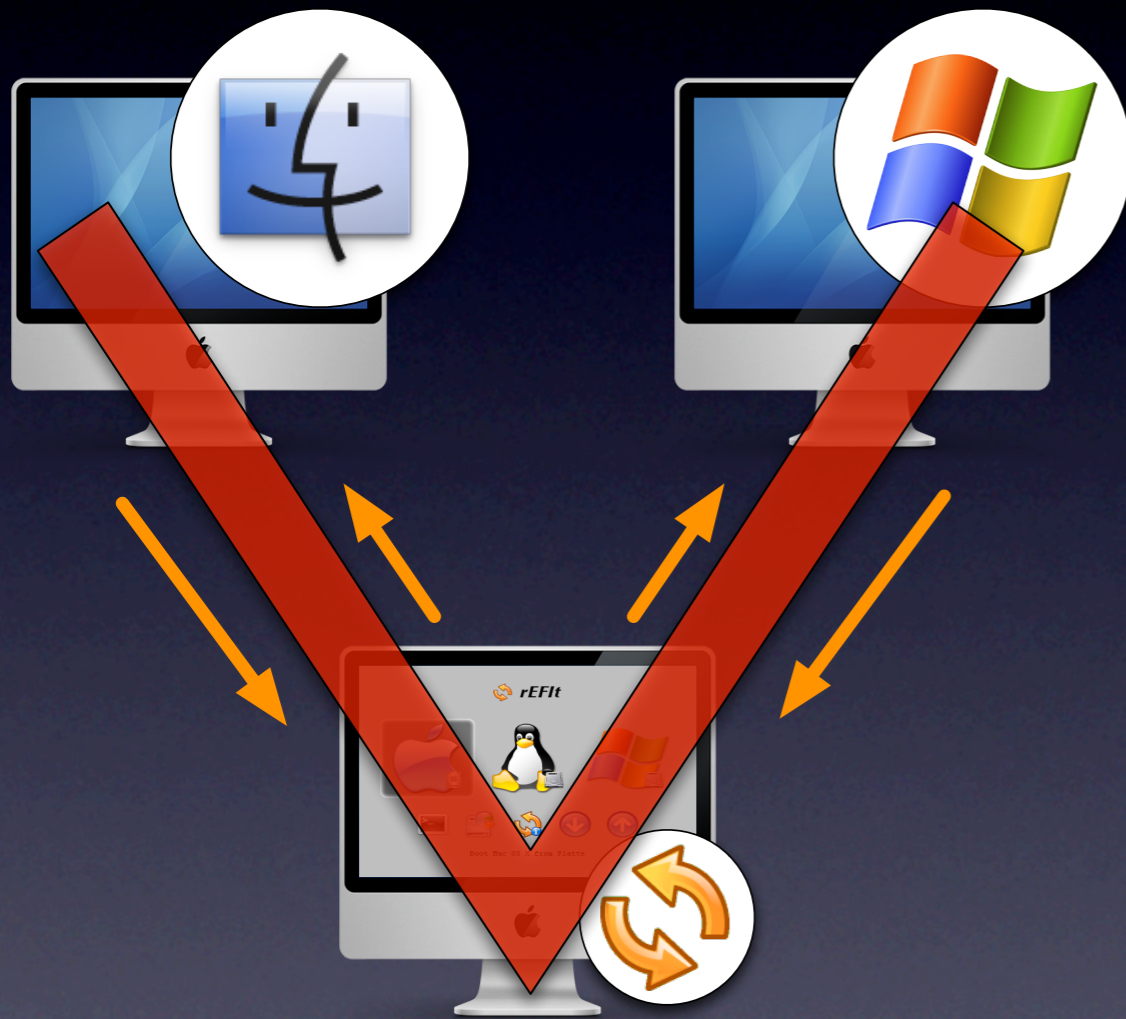
Booting Methods
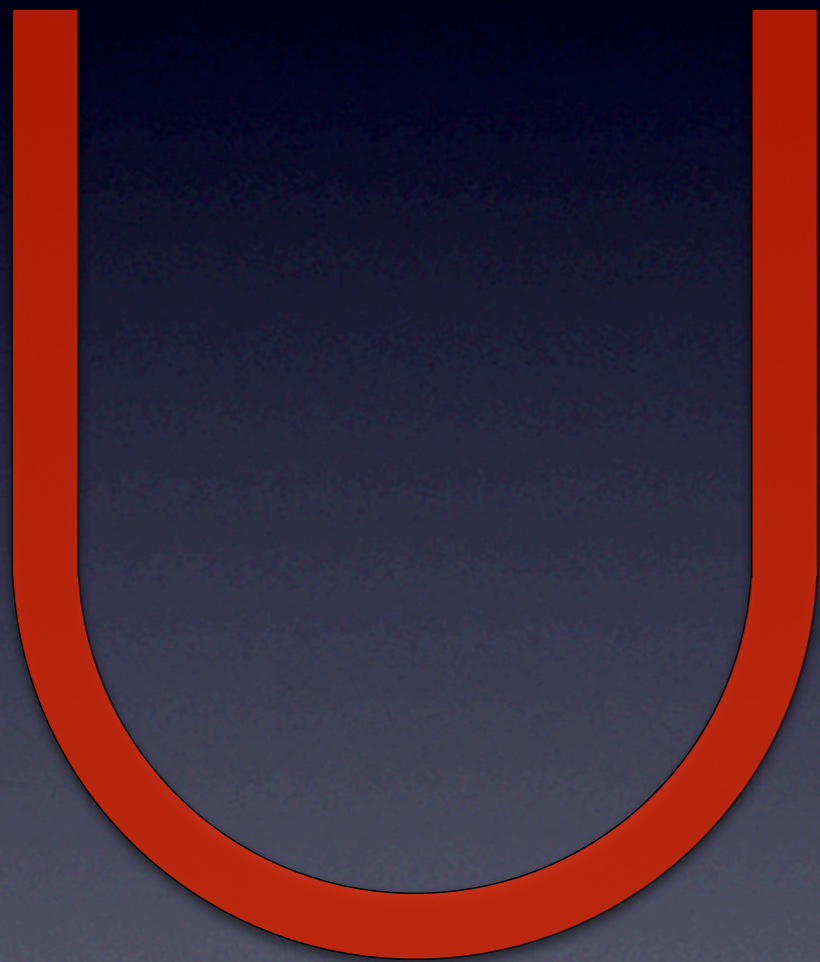## rEFIt

- Open source

- Easily discoverable

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Booting Methods
SCUBA

- Easily discoverable

- Allows Management

- Mac, Windows, and EFI parts

- First part is open source

  - Others on the way

- Remote Controlled

Booting Methods
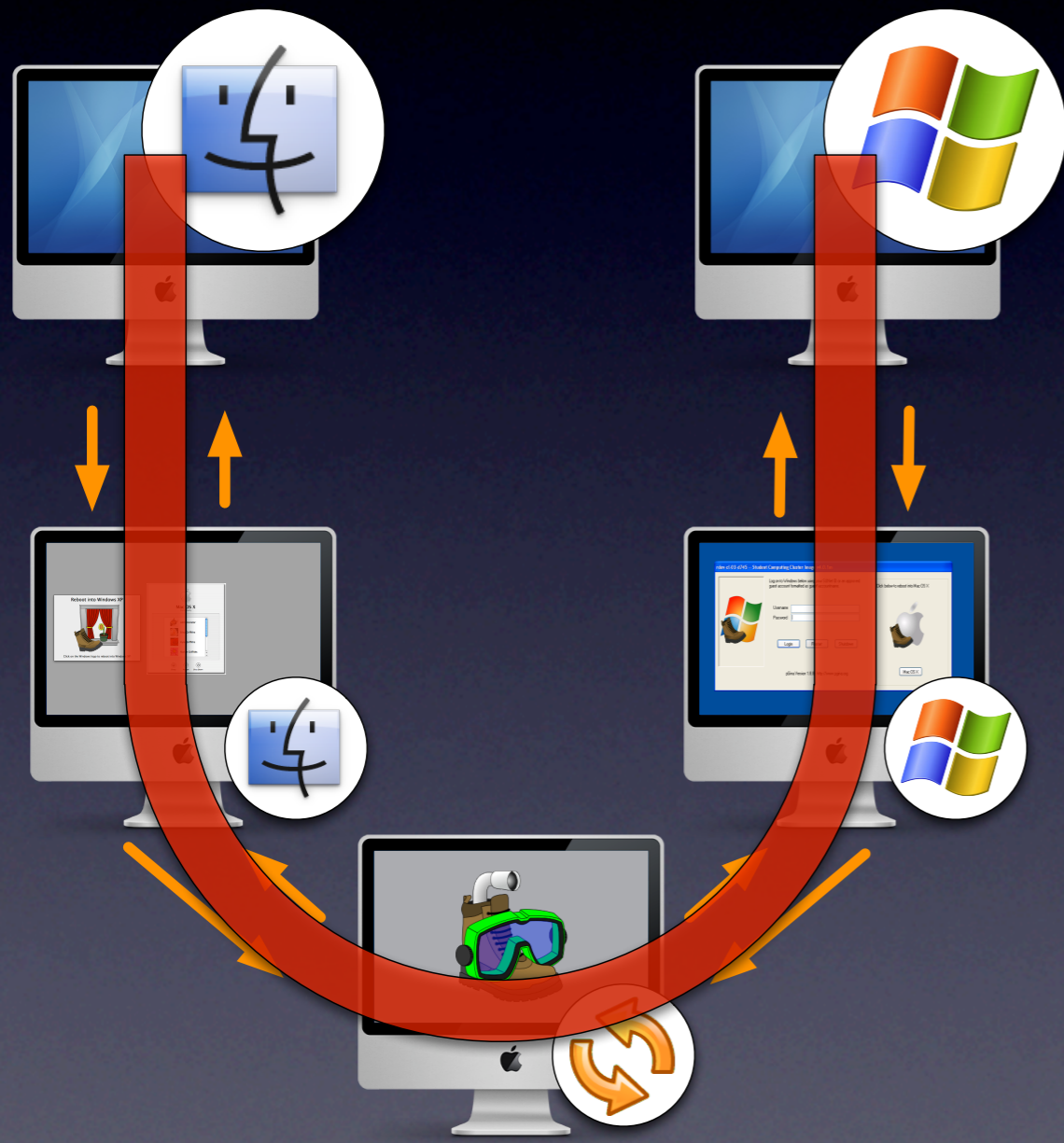## SCUBA

- Easily discoverable

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Booting Methods
SCUBA
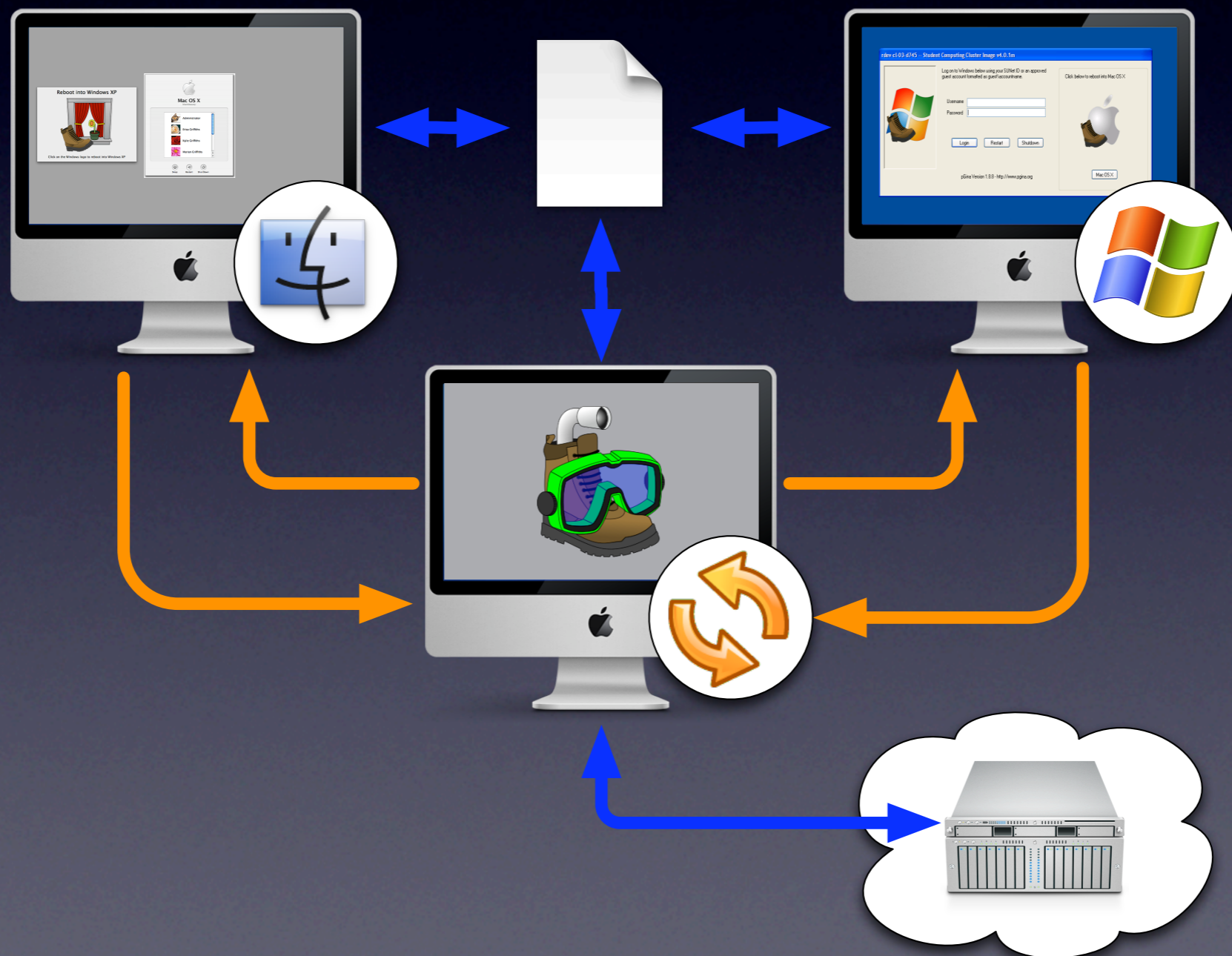### StuComp User Boot Assistant

Booting Methods
SCUBA - EFI

- Computer always boots from the EFI partition
- EFI flags file
- 32bit and 64bit EFI versions
- Eventually open source (Code from TianoCore)
- Reverse engineered EFI boot structures

Booting Methods
SCUBA - Mac

- Runs next to the Login Window
- Checks in with server and reboots into Windows
- Has modes for both boot-once and the flags file
- http://www.stanford.edu/~larkost/SCUBA/

Booting Methods
SCUBA - Mac

- Replaces the Login Screen on XP

  - Based on pGina (http://www.pgina.org/)

- Sets a flag for the EFI layer to request a Mac boot

- Configuration file to turn off Apple booting

Partitioning

Partitioning
Background

- Windows uses the "Master Boot Record" *

- MBR only has room for 4 "Primary" partitions

  - One of these reserved for EFI boot partition

- Windows can only see 3 partitions

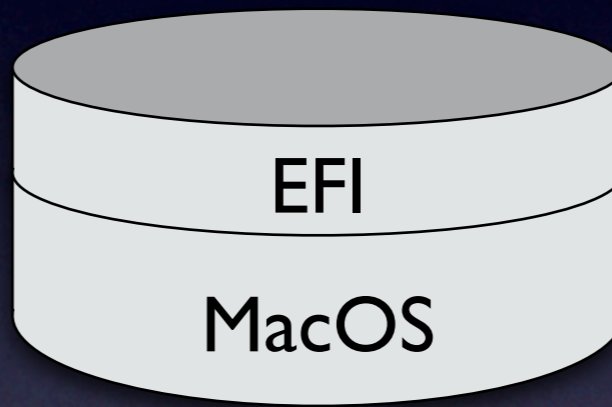- Windows should be the final MBR partition

*Vista 64bit on 64bit EFI may be different

Partitioning

EFI/Unix listing

/dev/disk0s1

/dev/disk0s2

EFI

MacOS
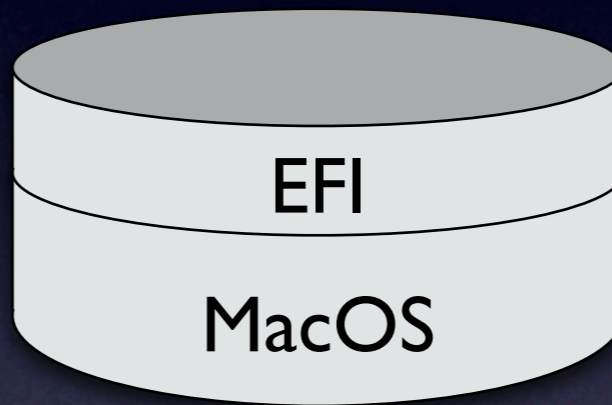
MBR

1 (invalid)

2

Partitioning

EFI/Unix listing		MBR
/dev/disk0s1	EFI	1 (invalid)
/dev/disk0s2	MacOS	2
/dev/disk0s3	Windows	3 (active)
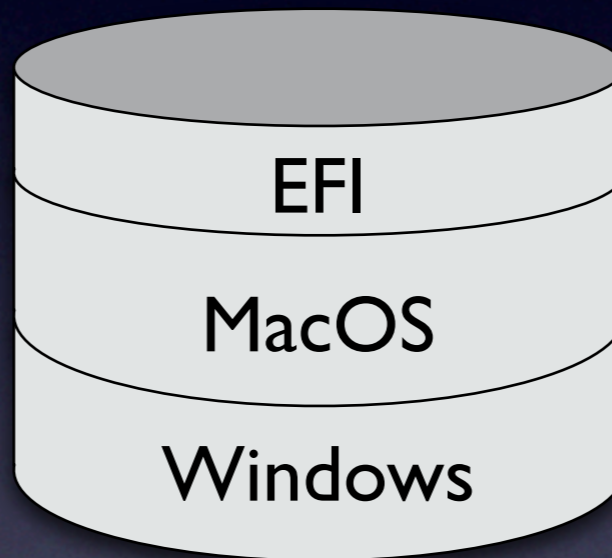
Partitioning
BootCamp Layout

EFI/Unix listing

MBR

/dev/disk0s1

EFI

1 (invalid)

/dev/disk0s2

MacOS

2

/dev/disk0s3

Windows

3 (active)

Partitioning

EFI/Unix listing   MBR

/dev/disk0s1   EFI   1 (invalid)

/dev/disk0s2   MacOS   2

/dev/disk0s3   Shared   3
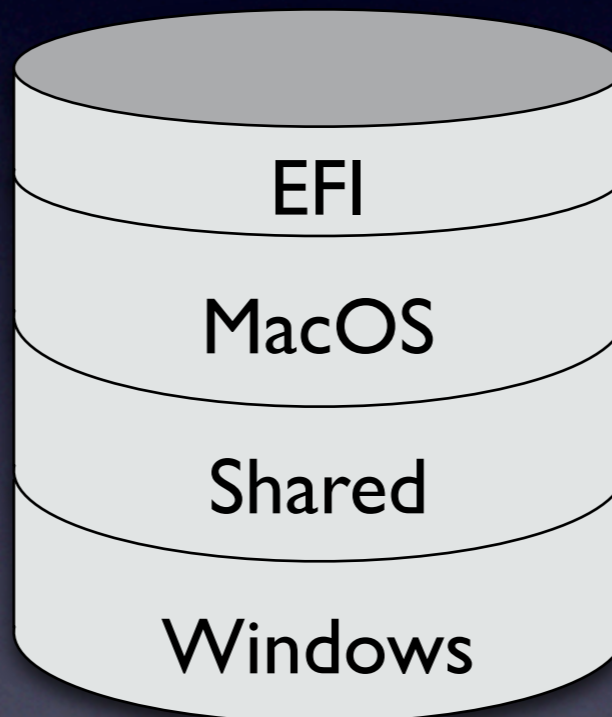
/dev/disk0s4   Windows   4 (active)

Partitioning
Simple Deployment

EFI/Unix listing   MBR

/dev/disk0s1   EFI   1 (invalid)

/dev/disk0s2   MacOS   2

/dev/disk0s3   Shared   3

/dev/disk0s4   Windows   4 (active)

Partitioning

Partitioning
Complex Example

EFI/Unix listing   MBR

/dev/disk0s1   EFI   1 (invalid)

/dev/disk0s2   Image Storage   2

/dev/disk0s3   Shared   3

/dev/disk0s4   Windows   4 (active)

/dev/disk0s5   SCUBA

/dev/disk0s6   MacOS

Filesystems

Filesystems

- Convenient to have a shared place for files
- MacOS X can't save to NTFS

  Windows can't read HFS
- Need a filesystem they can share
-

Filesystems

	MacOS	Windows	Large File	Unicode	Permissions	Resource Forks
HFS+	✓	∅	✓	✓	✓	✓
NTFS	Read only	✓	✓	✓	✓	∅
FAT 32	✓	✓	∅	-	∅	-

Filesystems
Native Drivers

	MacOS	Windows	Large File	Unicode	Permissions	Resource Forks
HFS+	✓	∅	✓	✓	✓	✓
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Filesystems

	Platform	License	Large File	Unicode	Permissions	Resource Forks
NTFS 3G	MacOS	Open source	✓	∅	∅	∅
Paragon NTFS	MacOS	Commercial	✓	✓	-	✓
Mac Drive	Windows	Commercial	✓	✓	-	-

Filesystems
Third Party

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Mac Drive	Windows	Commercial	✓	✓	-	-

Partitioning
Untried Ideas

- Unknown if "legacy boot" will go to the "active" partition, or the last one

- Use fdisk to play with the MBR

  - set start locations and end locations jumping over partitions

  - re-order partitions to make any the last one

Partitioning
Untried Ideas

WARNING WARNING

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On-Image Concerns

On-Image Concerns
General

- Use standard "best practices" to create the images on both sides

  - Use SysPrep on Windows

- Don't image a "bound" computer

On-Image Concerns
Windows Drivers

- Knowledge os SysPrep (or Vista version) required

- Found on the installer disks

- Download updates from Apple (BootCamp)

- Universal iMac/MacPro/Dell/etc.. setup is possible

- Had some problems with the touch pad drivers

- Some drivers might not be wanted:

  - Airport Drivers and Boot Camp Control Panel

On-Image Concerns
Windows Time Zone

- Windows sets clock to "local" time

- MacOS uses UTC (unix standard)

- Windows can be told to use UTC:

  - HKEY_LOCAL_MACHINE : SYSTEM : CurrentControlSet : Control : TimeZoneInformation : RealTimeIsUniversal (XP)

- May be in fixed in newer versions of BootCamp

Deploying the Image

Deploying the Image
Legacy Booting

- Behind-the-Scenes steps to boot Windows:

  - Install NTFS (FAT-32) image

    - Resize the image to fit the partition

  - Reset the boot.ini (XP) or BCD file (Vista)

  - Adjust the MBR file and mark volume bootable

  - Add in the MBR bootstrap code

Deploying the Image
Legacy Booting

- Tools

  - ntfresize from NTFS 3G

  - gptrefresh from WinClone

  - gptsync from rEFIt

  - fdisk

Deploying the Image
Why not Ghost

- Norton Ghost the standard on Windows

- Does not understand GUID (EFI disk layout)

    - If MBR is setup it can run off boot CDs

        - Reports of both failure and sucess

- No way of PXE booting

- To get a Ghost image on a Mac:

    - Restore onto an external drive, then re-image

Deploying the Image
NetRestore

❏ Handles HFS
❏ NTFS Support
❏ NetBoot
❏ Remote Config
❏ Configure MBR
❏ Multi-Volume
❏ Selective

Deploying the Image
NetRestore

- Well used, good community support

- End-of-Life'd

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Deploying the Image
WinClone

- Open source

- Self-extracting package

- Maybe no further development

- Good source of tools and information

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Deploying the Image
BLUR

- Created to fit our need

- HFS, NTFS, FAT

- Multiple Disks (buggy)

- Python with Cocoa GUI

- Will be open source

- BLUR wrapper

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Deploying the Image

BLUR

- No user interaction

- Uses DMG and gziped dd files

- In theory cross-platform

- Watch MacEnterprise for announcements

Image Maintenance

Image Maintenance
Possible Goals

- Both OS's needs periodic maintence

  - Keep up with OS and security updates

  - Update or add Applications

  - Reverse unwanted changes to the images

- Trigger maintentce from a server

- A choice:

Image Maintenance
Strategies

- Manually update both sides

- Periodically Update the volumes as a whole disk

- Use products such as DeepFreeze to reverse changes

- Script automatic update processes

  - Need maintenance systems on both sides

An Example Solution

Stanford University - Student Computing

An Example Solution
The Environment

- Stanford University Libraries

- Approximately 500 iMacs for student use

  - Over 80 locations across campus

    - Library Locations and Student Residences

  - A Mac and a Windows developer, a small group of student techs

- Moving from 50/50 mix to all-Apple-hardware

An Example Solution
The Philosophy

- Both platforms are treated equally

  - Neither OS can depend on the other for anything

- As much automation as possible

- Mac image updated nightly, Windows quarterly

An Example Solution

Resources

- A RedHat Linux Server
  - HTTP: NetBoot (BLUR) and system images
  - PHP: BLUR configuration file
  - CGI: PXE boot control and SCUBA control
  - NFS: PXE boot volumes
  - TFTP: NetBoot and PXE bootstraps
- USB sticks with two EFI partitions to NetBoot the computers

An Example Solution
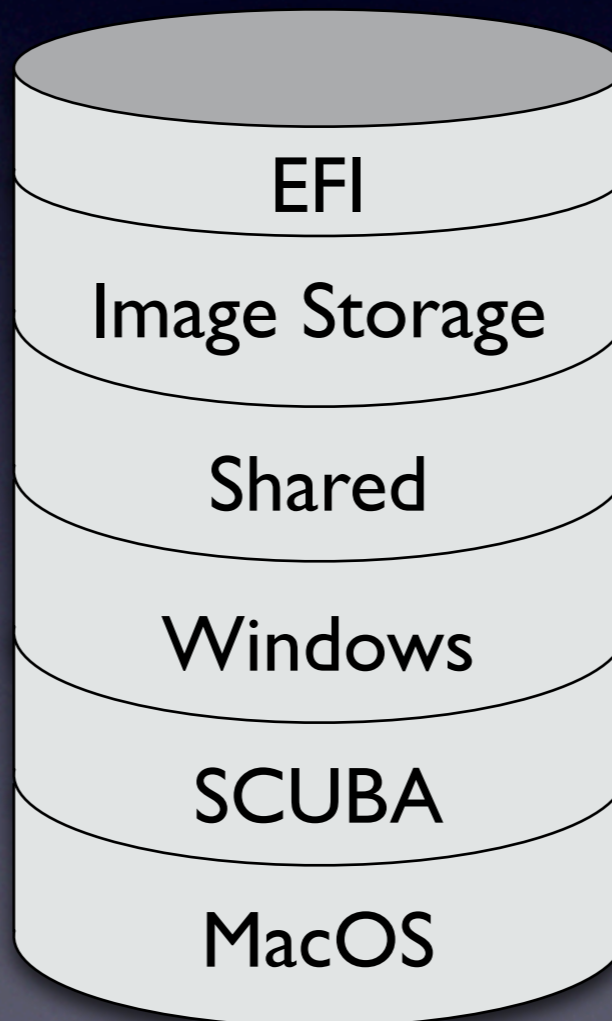## Partition Scheme

EFI/Unix listing

MBR

/dev/disk0s1 — EFI — 1 (invalid)

/dev/disk0s2 — Image Storage — 2

/dev/disk0s3 — Shared — 3

/dev/disk0s4 — Windows — 4 (active)

/dev/disk0s5 — SCUBA

/dev/disk0s6 — MacOS

An Example Solution
Partition Scheme

- Using Paragon NTFS for shared space

- Windows is now read/write without control

- Partitions that need to be hidden are mounted behind a folder with restrictive permissions

  - Script run at boot and at any mount event

- Things are written out to /etc/fstab for speedup

- MacDrive necessitates similar steps on Windows

An Example Solution
Deployment

- InstaDMG used to create the Mac base image

- Windows image captured using PXE boot

- BLUR to partition drives and distribute images

  - PXE boot to distribute Windows to Dells

- Radmind fills in the complete image

An Example Solution
Maintenance

- Server can command a computer to re-image at any time

- Every morning at 3 the computers wake up and run maintenance

- Scripts set a maintenance flag and start work

- On the Mac side Radmind runs every night

  - A python script launched via launchd

An Example Solution
Maintenance

- On the Windows side

  - Custom domain scripts at login

  - Windows Update for critical updates

  - Once-a-quarter re-imaging

  - aria2c as a background downloader

    - Currently only using http, bittorrent next

An Example Solution
Image Notes

- We use AFS (not Apple's AFS) for home directories

  - Home-grown folder redirection on Mac

  - Single profile on Windows with Documents, etc redirected in

- Users come from LDAP or Active Directory

- Local MCX on the Mac side

- Some AD Policy on Windows

Lessons Learned

Lessons Learned

- This takes time, pitfalls abound

- Sysprep removes the Time Zone setting

- iMovie '06 does not like hidden volumes

- Public Relations

  - Communicating that these boot Windows

  - Some people really like PC hardware

  - Mighty Mice confuse people

Windows Depoyment on MacOS X

Q & A

http://tinyurl.com/macworld09-windows-qa

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