Making a Custom Restore CD with ASR

Apple Software Restore (ASR) is a utility application that will **exactly** restore a hard drive, using a customized disk image that you create with Disk Copy. Using ASR is a very quick way to either: **1)** update a Mac to a later system version, or **2)** reinstall everything on the Mac as you originally had set it up (i.e. to avoid manual troubleshooting).

Assumptions: you have a lab/campus of Macs (with CD drives), where many of your computers have a similar baseline software and hardware configuration. You want each machine to resemble the next with system settings and applications installed. You also want to be able to repair these computers quickly and accurately.

Overview: You set-up an ideal Mac (Master) with the desired operating system, applications, utilities and settings. Arrange things exactly as you like. Using Disk Copy and ASR and AppleScripts, burn this image onto a **bootable** CD-R. (Make copies of this as needed.) Start up Macs in your lab/campus with this CD, and with one click the Mac will be exactly as your Master was set-up. Install time is about two minutes...

Caveat: Most of this procedure will be from an OS 9 perspective, but many items will apply to an OSX situation. For a worthwhile website that explains the OSX ASR method in detail, see <<www.bombich.com/mactips/asrx.html>>.

Installing ASR and Disk Copy —

You can **not** run Disk Copy from the same volume that you would like to create a disk image of. The bootable volume (with your desired applications, etc.) that you want to make an image of (i.e. to copy) we will call the **Master**. If you have a **bootable** external hard drive (which can have several bootable partitions), this is where you can set-up one or more Masters. (For most situations, the best choice is a FireWire external drive.)

If you do not have such a drive, one alternative is to partition the hard drive of a Mac into two ***bootable*** volumes: a Master, and the other with Disk Copy, ASR and misc ASR support files (as well as a blessed System Folder, etc.). You can do this with Drive Setup, which will need to reinitialize (erase) the hard drive to create partitions.

A third alternative is to set-up the hard drive of a FireWire Mac as the Master. Mounting this computer's drive *via* the Target Disk mode of FireWire on another Mac (and then using Disk Copy, ASR, etc) can accomplish the same results.

The tools required to prepare volumes and images for use with ASR and Disk Copy are AppleScript based. As such you must also have AppleScript installed on the volume you are using to create disk images. Apple Software Restore (two versions), plus some related files, plus Disk Copy 6.3.3 are attached.

You must create a folder named "Scripts" and place it into the same folder as the Disk Copy application. **The following files from the ASR distribution need to be placed into this "Scripts" folder.**

ImageScan (an AppleScript scripting addition)
Play Sound (an AppleScript scripting addition)
Scan Image for ASR (a complied AppleScript)

Lastly, the ASR package also includes a "Fix local Aliases" AppleScript that checks and resolves aliases to the local volume that is selected. For these to work, **you must copy the following FIVE scripting extensions into the Scripting Additions folder inside the Extensions folder of your System Folder, and then restart.**

1) Animate Cursor Commands 2) Status Dialog Commands
3) Choose FileSpec 4) Resolve 5) GetAliasPath

Preparing the Master (a Source Volume) —

1. Double-click Apple's "Drive Setup" (2.1) and select the drive or partition you will be Mastering, from the opening window. Under the "Functions" menu, choose "Initialization Options", and select "Low Level Format" (which insures that the boot tracks and drive sectors are unique and original). Under the "Functions" menu, choose "Volume Settings...", and select "Extended" (HFS+) format. (This is also where you would create a partition if you so desire.) Click "OK" and then click the "Initialize..." button.

2. On the Master, install the Mac operating system that you are licensed for, AND one that will work on your Target Macs. **Pay attention to Mac OS ROM version**. Go through the System Folder (esp. Control Panels, Extensions, and Fonts folders) and **throw away** all items that you don't need (to keep what you are going to install to a **minimum** size). Set-up all Control Panels as desired, paying particular attention to Extension Manager (deselect all remaining items not currently needed, but possible for the near future).
   [Note 1: do NOT set these CPs: TCP/IP (name server address), File Sharing (Mac Name/ Mac Owner's Name), and Color Sync (as every machine needs to be customized).]
   [Note 2: suggest disabling all automatic items, esp Sherlock index volumes, Software Update and Quicktime automatic updates.]
   [Note 3: According to reports, do <u>not</u> turn File Sharing on.]
   [Note 4: Create any desktop printers you want to have available.]

3. On the Master, install all needed applications and utilities that you are licensed for. Run each of these and set-up any preferences, window positions, etc. In short, make things look exactly as you want them to appear on your target Macs.

4. Make sure the name of your Master volume is what you want to be copied: i.e. "Mac Hard Drive"... Run Extensions Manager one last time... Empty the trash.

5. Start up the computer from the volume that has Disk Copy installed onto it.

6. When done, run these test utilities (in this sequence) to make sure everything is in **very** good shape: Disk First Aid, Disk Warrior, Norton Disk Doctor, Norton Speed Disk, Norton Wipe Disk (wiping unused space), TechTool (rebuild desktop). [*Note: the purpose of the last three tests is to allow you to get the maximum files onto your Restore CD.*]

7. Run the "Fix Local Aliases" AppleScript. Make changes as necessary.

8. Drop the Master volume's icon onto Disk Copy to create a disk image. Select Read-Only Compressed format. This will truncate any free space, resulting in a disk image the size of the data instead of the whole volume, and reduce the size of the disk image, depending on how much the data can be compressed. [Keep in mind that the ASR disk image must fit onto a 665± MB CD volume, which also needs a Mac OS System Folder, etc.. **As such the ASR disk image can be no larger than 620 MB.**]
   [Note 1: some users recommend creating a Read-Only image, and then using the "Convert..." command to change it in to a Read-Only Compressed. They feel that this is faster than creating it directly into a Read-Only Compressed image.]
   [Note 2: Turn off any Virus checking software on the Mac with Disk Copy.]
   [Note 3: Depending on your processing Mac, and the size of the image you are dealing with, it may take Disk Copy up to an hour to create the Master disk image.]

9. Select "Scan Image for ASR 2" from Disk Copy's Scripts menu. You will be asked to select a disk image. Once selected, the script will run for a number of minutes and you will not see any progress dialog. The "beach ball" cursor will go back to normal when it is finished. Your disk image is now ready for use with ASR.

Creating a Restore CD —

To create ASR restore CDs, you will need the following:

Mac with a hard drive with at least 700± MB of free space
CD Burner (internal or external)
CD Burner software capable of creating bootable CDs (suggest Toast).
A 665± MB image (made with Disk Copy), which has a minimum sized blessed System folder on it.
(Note 1: you should be able to get an OS 9 System Folder to be less than 30 MB.)
(Note 2: use the same OS version that is on your Master, so you can be sure that the computers to be repaired will start up with that OS.
In one folder on that image:
Apple Software Restore application
Standard ASR Prefs file in “Standard Preference Files” folder
A folder named "Configurations" where you place a copy of the disk image you created (above) inside.
You might also want to include a Read Me document on the image (with SimpleText).

To burn the bootable restore CD, follow the instructions for your CD burning software.

It is advisable to have a second CD of supplementary items (that are used or installed manually). An example of what might be on this second CD are firmware updates for all of the computers you are dealing with. (See Apple’s website or Versiontracker.com for these).

Using the Restore CD —

1 - Start up the Mac you are intending to upgrade or repair. [Note 1: verify that it has the minimum processor and RAM required by the OS you are about to install.] [Note 2: if you are trying to fix a Mac that won’t startup by itself, insert the CD and go to step #3.]

2 - Insert the Restore CD into the CD drive, and wait for its icon to be on the desktop.

3 - Restart your Mac and hold down the "C" key during the startup process.
(If you have done this correctly, the CD icon will then be the top item in the right hand corner of the desktop window.)

4 - This install procedure will **COMPLETELY ERASE EVERYTHING ON THE HARD DRIVE!** If anything personal is needed (e.g. documents created by a user), copy them off onto a pen drive or other removable storage medium *before* doing step #5.

5 - Double click on the Apple Restore application. The rest can be automatic, depending on the preferences file you include.

6 - After restarting, **install the latest firmware updates** required by the target Mac.
(Note 1: No harm will be done by trying an update, since if it is unnecessary, the installer will tell you so. If any are needed, a restart will be required for each.)
[Note 2: Firmware updates are needed only **once**, not every time the Restore CD is run on a specific computer — unless there is a later version of the firmware update.]

7 - After firmware updates are done, some quick fine-tuning will be necessary:
— “**Update Driver” with Apple’s “Drive Setup” 2.1. (Do NOT initialize!)**
— Copy any personal items saved in #4, back onto the computer.
— Run Control Panel "Color Sync" to adjust the computer's screen colors.
— Setup the File Sharing Control panel and turn it on (if so desired).
— Some system settings are stored in PARAMETER RAM and will not be preserved on the "restored" systems. You can make these settings manually.
— Make any other small refinements, as needed ...

Doing This Over A Network (brief explanation) —

* If you would rather not go the CD route, you can use ASR over your network. Follow the instructions above to create the Restoration Configurations. On your AppleShare file server, create a Shared Folder for Apple Software Restore. Put Apple Software Restore and your configurations folder into the Shared Folder. Share this folder. You are now ready to mount the Shared Folder from your target computer and perform a restore over the network.

* Note that there are reports that Novell does not like Disk Copy nor it's images.

* Another alternative to using CDs is to use NetBoot. This requires a 100 Mbps (minimum) Ethernet network, with an OSX server, and clients using OS 9.1 or later.

* Here is a good site that goes into a lot of details about Macintosh Manager setup: <<http://homepage.mac.com/brianjudd>>.

Notes about Restoration Options

ASR 1.3.2 can be configured to restore the files/folders in a source image in two different manners: 1) Restore in Place, or 2) Erase Disk. Later versions of ASR (e.g. 2.1.2) add a third option: Restore and Save Original Items,

-When Restoring in Place, all files being copied will overwrite any similarly labeled existing files/folders that are on the target disk, but will leave all other information intact.

When Restoring in Place a destination *folder* can be specified in addition to just a destination volume. This allows one to restore an image in place to a subfolder of a given volume. When restoring an image in place to a subfolder, the contents of the image are copied to the target folder (*vs.* a folder named for the image with the content copied to the folder).

-When Erasing the Disk, the target disk will be completely erased (in the chosen volume format), and the files/folders from the source image will be copied over to the target.

When erasing the target disk, ASR will copy all the information from the source image **exactly**, including volume level information. This means that applications and extensions that store information concerning the volume will continue to function once restored to a new drive.

When **not** erasing the target disk, ASR will perform a copy operation similar to copying files in the Finder. Applications whose preferences depend on specific volume information may not function without being reinstalled, and aliases may not resolve.

-In addition to these options, there are two additional selections that may be configured before restoring in any manner: 1) Restore System Folder, or 2) Restore Everything Else. By default they are both checked.

If System Folder is unchecked, everything from the source image will be restored **except** the blessed System Folder. If Everything Else is unchecked, **only** a blessed System Folder will be restored. If a blessed System Folder is not present, or is the only item present, unchecking these options may result in nothing to restore. In that case, the status area in the main selection dialog will reflect this, and the restore button will be disabled.

Additional Notes & Comments —

* For more information on ASR, see the “ASR 1.3.2 Quick Reference” (included).
* For more information on Disk Copy, please see Disk Copy 6.3.3: Quick Reference .
* A **volume** is either a full disk, or a section of a disk, partitioned into separate parts. If you partition a single drive, then each partition is considered a volume.

* A **bootable** volume is a volume that has a Mac OS properly installed onto it. You can use the Startup Disk Control Panel to pick a volume to boot from.
* Apple's System Installer takes precautions to ensure that the Mac you are working with can handle the version of MacOS you are installing onto it. For example, in order to install MacOS 9.1 on one of the original iMacs the iMac's firmware must be flashed to a newer version than what the Mac came with. The "normal" installer will check the firmware level of the iMac and not allow you to install the system until the firmware has been updated. ***When you use ASR, this system is completely bypassed***. What this means is that in some cases you must update firmware first.
* If you have Macs with different RAM, processor, etc. hardware in your lab/campus, then you may need to make several configurations. (Careful preplanning will help you keep this to a minimum.) Once you've done the first one, this is easy to do, but will require different versions of your Restore CD.
* If you place multiple ASR ready Disk Images in the "Configurations" folder, ASR will allow you to pick which one you want to use to restore a machine. Normally this wouldn't be applicable as having more than one image will exceed a CD's capacity.
* You can also place a "Read Me" for the image in the ASR Configurations folder, called <ImageName>."Read Me". For example, if you wanted to make a "Read Me" for "iMac.img", you would call the "Read Me" "iMac."Read Me"". This text is what appears as the description for the image in Apple Software Restore. This can be very helpful if your images reside on a file server, and you have several images in one folder.
* If you look at the documentation in the ASR 1.3.2 folder, you will see that it explains how to customize the preferences for ASR. By tweaking the preferences it is possible to make a restore CD that boots, runs ASR, selects the right image, rebuilds the hard drive, and shuts down the Mac without user intervention!
* Install an OS onto an external FireWire HD and restart the computer holding down the Option key. Choose the external FireWire HD and click the right arrow. If you are using the second FireWire Mac, boot using FireWire Target Disk mode

Disclaimers —
Some of this material was borrowed from Apple's website (<<http://developer.apple.com/testing/docs/TNasr.html>>), several other sources who posted suggestions on the Internet, and our own personal experience.

I have made a reasonable effort to be accurate here, however I cannot provide any guarantees. By running these programs, you assume all risk for any damage that may occur. If these scripts damage your files, it is **your** responsibility.

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