Using Bootit Bare Metal With OS X
(*undocumented feature*)

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[Background]

I've always been fascinated by how boot loaders and boot managers work, and as such I've tried to learn, over the years, how PC systems are able to boot different operating systems (OS). Sure everyone knows a PC will run Windows, and we Hackintoshers can get it to boot OS X, but it can also boot up in a number of other OSes as well. So long ago, when I began to explore the possibilities of just what was available to aid in this quest, I stumbled upon a product which at the time was simply called Bootit.

After testing it, I quickly learned it was just what I was looking for. Not only did it allow me to boot any OS that would run on the PC, but it also allows a person to have more than just the 4 primary partitions that are normally available on hard drives which use the MBR partition scheme. While not unlimited, the number which could be created far outnumbered the different operating systems available at the time.

Improvements were constantly made with the software and before too long, a new improved version called Bootit Next Generation (BING) was available. I was able to be grandfathered in under my Bootit license and so I happily continued my experimentation with the new boot manager. At the height of my experiments, I had 17 different operating systems booting on one system using BING.

This was about the time that the OSx86 movement was picking up steam and having spent a lot of time with Apple Mac G3 and G4 systems, I was very anxious to run OS X on an ordinary Intel based PC. Once I was able to get my first Hackintosh up and running, it didn't take long to see if I could boot it with BING.

While the answer was yes, it was not exactly easy to do. At the time Bootit NG wasn't able to see GPT partitioned hard drives, so I had to use Carbon Copy Cloner to copy the partition containing OS X on the GPT drive to an MBR partitioned hard drive. Once that was done, it could then be copied to the drive which was running BING and it could be booted directly from the BING OS menu. While interesting, I thought it was just too much work to be of any practical use.

[Current]

Fast forward to the present and Bootit has once again been updated, this time to Bootit Bare Metal, or Bootit BM. Not crazy about the name, but I can tell you that the product performs much better than the name implies. For one thing, Bootit BM is now able to view and copy to/from GPT partitioned hard drives, so putting OS X on a multi-OS system is much, much easier. Having Bootit BM directly boot the GPT partition would be even better, but presently that is not possible.

One of the best features of Bootit BM is it's ability to copy entire partitions from one place on a hard drive to another location, or even to another hard drive. I'm sure this led to TeraByte developing and marketing *Image for DOS, WIndows and Linux* also as it is a very handy feature. And this feature works with drives which have already been set up using Bootit BM or normal hard drives as well. This feature is one of the ways a person can add OS X to a multi-OS system, but there are now other and better ways.

[How To Do It]

Before we begin, let's take a look at a few things we will need:

- MBR partitioned hard drive (Will not work with GPT drives)
- Utility and means to copy OS X from GPT drive to MBR drive. (SuperDuper or Bootit BM will do this)
- [Bootit Bare Metal](#) by TeraByte Unlimited. (Free to use for 30 days - $39.95 after that)
- A little practice.

Below we will take a quick look at a few of the methods which can be used to accomplish this with detailed explanations of each method to follow.

The Easy Way

By far the easiest way to do this is just to install OS X the same as you would any other operating system directly on to a Bootit BM hard drive. This requires a special installation utility which allows one to install a retail copy of OS X onto an MBR partitioned hard drive. While we are at it, we will also take a look at installing a popular OS X distro onto a bare MBR partitioned hard drive and then installing Bootit BM afterwards.

The Almost Easy Way

The next best thing to having it already installed is being able to access the GPT partitioned hard drive which contains the OS X partition which you want to use with your multi-OS system. In other words, having both the multi-OS MBR partitioned drive and the GPT partitioned drive connected to your multi-OS system via SATA ports. Then it's just a matter of using the copy and paste function of Bootit BM to install OS X onto your Bootit BM hard drive.

The Other Almost Easy Way

If you don't have means to use the method above, fear not. It is possible to use an externally connected (USB or Firewire) drive to accomplish this feat. While not as quick as copying from a directly connected hard drive, the time isn't bad if you do it right. Another way to speed this process up greatly would be to use an external eSATA drive. I don't have one so I could not test this, but it should work. I also plan to experiment a bit using SuperDuper to copy instead of Bootit BM. Great care has to be taken so as not to screw up the Bootit BM drive if this method is used. More below in the details when this section is discussed.

After the detailed explanations below of each method used, I will list some tips as well as the tools I use in my daily computing hobby. Some of them are very inexpensive when compared to the convenience they provide.

[Think About It]

Some planning will be necessary before you tackle any of the methods listed below. Here are just a few things to consider:

- Choose the size and type of hard drive to be used for your Bootit BM hard drive wisely. Obviously the bigger the better as the size of the drive you use will determine how many operating systems you can have on it. The size of each partition is also very important as well. Most people will be fine with a 1 Gb space for a DOS partition, but for OS X or Windows, much more space is needed for the OS as well as

programs you may want to use. As for the type of drive, systems which run OS X all have SATA ports and it's best to use those for your OS drive. If you have an older IDE drive connected, it can be used as a common FAT-32 partitioned data drive to be shared by the different operating systems.

● Choose the layout of partitions on your Bootit Bm hard drive carefully. Not all operating systems will boot from just anyplace on the hard drive. Most Linux and BSD distros will, but DOS and Windows are very picky when it comes to location. Bootit BM will usually issue a warning about what types of OSes can be booted by the partition you are currently creating. It's also a good idea to read the Bootit BM manual before you start.

● Be sure you can access your OS installation source. Whether you use an optical drive or USB flash drive, be sure you can boot from it when installing an operating system on a partition. And don't forget, for some operating systems, a floppy disk drive may be necessary, so if you don't have one installed on your system a USB floppy drive can usually be found fairly reasonable on Ebay as well as other sources.

● You will notice when OS X is installed or copied to a Bootit BM hard drive, the file system type when examined in Properties is listed as 175/AFh: OS X. There are a number of other undocumented or unlisted file system types if you move the scroll bar up or down. I believe these file system types are recognized by Bootit BM, but since the program does not have the ability to format the partition for that type, they are not included when given the choices for the creation of a new partition. For this reason, it is important to use the FAT 32 type for OS X installations. That way the partition can be properly formatted once in the OS X installer using Disk Utility.

● Over time I have developed a procedure for installing Bootit BM onto a blank hard drive. This came about from many, many failed attempts to create and install certain operating system boot loaders that do not conform to normal convention. Using this method will place the critical EMBRM partition at the end of the drive, where it is safe from misguided boot loaders. I also include a small buffer zone between the true master boot record located at the very beginning of the hard drive and the first OS. I'm not really sure this step is all that necessary, but it doesn't hurt to be safe.

What follows is a quick outline of the steps I use. Consult the Bootit BM manual if more information is desired.

● start with a clean blank hard drive
● boot with the install media (CD, floppy disk, USB flash drive)
● press cancel to go into maintenance mode
● goto into Partition Work
● create a 100 mb BeOS partition (buffer zone)
● close and choose resume
● at the popup menu choose OK
● Choose Yes at the next popup (Use more than 4 primary partitions)
● Choose Yes at the next popup (Let setup choose install partition)
● Choose Yes at the next popup (Install Bootit BM to it's own dedicated partition)
● Choose OK at the next popup
● Setup will commence
● Choose OK from the next popup (Setup complete)
● Click Close on the News menu
● Remove install media and click OK (The system will reboot into Bootit BM)

[The Easy Way]

Please note that I will be using a couple of different methods to install OS X onto an MBR partitioned hard drive. The first method involves a drive which *does not* have Bootit BM installed yet, but on the second method, Booit BM has already been installed. Be sure to pay close attention as to how Bootit BM is installed.

Note: If you plan to use either of these methods, be sure to plan ahead as far as where to put your OS X partition as certain operating systems will only boot from certain areas of the hard drive. For example, if you plan to have DOS and/or WIndows installed as well, it's best to leave space for those towards the beginning of the drive.

For the first method, I will be installing OS X somewhere in the middle of a blank bare hard drive so that I have room at the beginning and end for other operating systems. I will be using the iAtKOS L2 distro which supports installing OS X to an MBR partitioned hard drive. The system used is a GA-P35-DS3L computer with 4 Gb of RAM. As my copy of this distro is on a DVD, I will be using the installed DVD drive to install the OS.

Step 1. Insert the iAtKOS L2 DVD into the DVD drive and boot the system. Be sure the BIOS is set to boot from the DVD drive.

Step 2. After menu selection and you find yourself at the iAtKOS installer desktop, choose Disk Utility from the Utilities menu.

Step 3. Click on the partition menu to set up the hard drive. Select 3 partitions, size them as desired. (The one in the middle will be your OS X partition.) Make sure the partition scheme is set to MBR under the options button.

Step 4. Choose Mac OS Extended (Journaled) as the format for the 2nd (middle) partition, select either free space or MS-DOS as the format type for partitions 1 and 3.

Step 5. Install OS X on the 2nd partition. Be sure to set any necessary options under the customize button.

Step 6. Reboot after the installation and set up OS X. Make sure the system boots as it should before proceeding.

Step 7. Install Bootit BM using whatever install media and options you chose. Be sure to read my notes on the safest way to install Bootit BM to reduce the chances of losing the EMBRM partition which would result in a lot of problems. A proper installation will go a long way towards making sure you don't lose the ability to boot all of your operating systems as the EMBRM is essential for keeping track of all the partitions.

Step 8. Use the Bootit BM Boot Edit menu to set up a menu selection for newly installed OS X. Test to be sure it boots.

For this example, I named my OS X partition Lion, so if you choose Partition Work from the Maintenance menu, you should now see a similar view when compared to Figure 1 below:
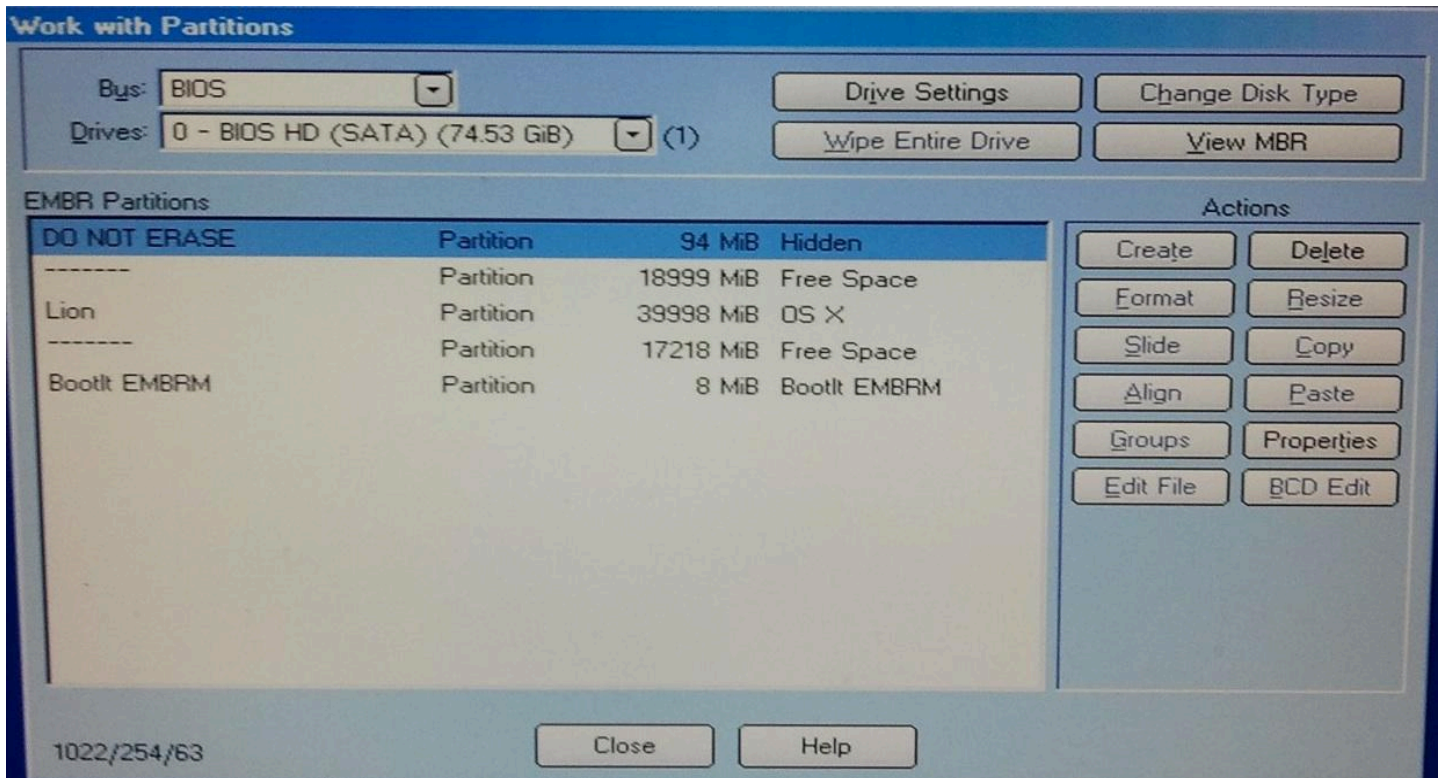
Figure 1.

Notice the EMBRM at the end of the drive and there should be a free space between it and the OS X partition, as well as free space before the OS X partition. You can now install more operating systems until you are satisfied or run out of room!

For the second method, OS X will be installed *after* the Bootit BM hard drive has been created. This method also introduces a way to install a retail copy of Snow Leopard, Lion or Mountain Lion via a USB flash drive created by the MyHack utility. In addition, the MyHack utility also allows retail OS X installation onto an MBR partitioned hard drive. Just what we need for this tutorial. This method assumes you have created the USB installer flash drive using the MyHack method for your preferred OS X version.

Also on the system I used (GA-P35-DS3L), I had to first insert the flash drive into a USB port, boot up the system to the BIOS selection screen and configure the BIOS to make the flash drive bootable. Once this was done and the system was restarted, I had to use the F12 boot menu to make sure the system started from the hard drive instead of the flash drive. Depending on the system you use, you may have to experiment to find the right combination of settings in order for the computer to boot the flash drive when using Bootit BM to install OS X. It is also helpful to consult the Bootit BM manual regarding this procedure.

Step 1. Boot up the system, it should come up to the Bootit BM Boot Menu. Click the Maintenance button.

Step 2. Select Partition Work from the Maintenance menu and select the free space where you wish to install OS X.

Step 3. Select Create from the Actions menu at the right and fill in the name for your partition. Click on the selection arrow for the file system type and select 11/Bh: FAT-32. (This will be changed once the OS X installer has been started.)

Step 3. Select the size you wish to use for this partition and click OK.

Step 4. Click OK at the Format menu box. You may optionally select Skip when the Checking for surface defects box appears. Click OK at the Format Summary box.

Step 5. Click Close on the Work with Partitions box and select Boot Edit from the Maintenance menu.

Step 6. Select Add from the Boot Menu box, and fill in the necessary dialog boxes for the Add Menu Item box. (In addition to the Identity, boot partition and other items you might choose, be sure to select either Next BIOS Device or BIOS Sequence under the One TIme Option section. Your choice will depend on how your BIOS is configured, see the Bootit manual for more information.) Click OK when finished.

Step 7. Click OK at the Boot Menu box. Click Resume at the Maintenance menu. Select the partition you just created at the Boot Menu and click Boot.

At this point, the OS X installation should start. After choosing your language, select Disk Utility under the Utilities menu. Select the partition you wish to use, there should only be the one FAT-32 partition you created unless other options were chosen during the creation of the Boot Menu item. For more info on this, consult the Bootit BM manual.

Step 8. Select Erase from the menu at the right and select Mac OS Extended (Journaled) as the format. You may optionally change the name if you wish. Click Erase.

Step 9. Once finished, exit the Disk Utility app and click Continue. Click Agree at the license agreement prompt and next select which disk to install to. (There should only be the one.)

Step 10. Click Install. Sit back and relax as the installation take place. You may notice that MyHack prompts may pop up during the install, this is normal.

Step 11. Once finished the system will restart. As Chameleon was installed as part of the MyHack utility, you will notice that it DOES NOT boot up into the Bootit BM menu. This is normal and we will fix it later on. For now, set up OS X and use whatever means you normally use to get video, sound, networking and any other items you wish to set up working. Once you are satisfied with your OS X installation, you can proceed to once again have Bootit BM be the boot manager.

Step 12. Boot up the system using whatever media you used originally to install Bootit BM. At the menu box which appears, Re-activate Bootit BM should be selected. If not, select it and choose OK. You will be prompted to remove the installation media and press OK to reboot the system.

At this time, the procedure is complete. Your OS X install should now be bootable from the Bootit BM Boot Menu as well as any other operating systems you have installed. Enjoy.

[The Almost Easy Way]

This method uses Bootit BM to directly copy your OS X partition from the GPT drive it is currently installed on to a free space on the MBR drive you have set up for use with Bootit BM. This method assumes that Bootit BM has been installed and that both it and your GPT drive are connected natively to your Multi-OS computer.

Special note: The OS X partition chosen for this operation must be bootable prior to the Bootit BM copy and paste procedure. If it isn't, be sure to install a boot loader of your choice (Chameleon, Chimera, etc.) to the partition before proceeding. It is extremely difficult (if not impossible) to be installed after you copy it to the Bootit BM hard drive and OS X will not boot.

Step 1. Boot up the system, it should come up to the Bootit BM Boot Menu. Click the Maintenance button.

Step 2. Select Partition Work from the Maintenance menu and locate the OS X partition you wish to copy. As you are booted up on your MBR multi-OS drive, you will need to click on the Drives down arrow to show your GPT drive.

Step 3. Highlight the OS X partition and select Copy from the Actions menu to the right.

Step 4. Click the Drives arrow again and select your MBR drive.

Step 5. Highlight the free space where you wish to place your OS X partition and click Paste under the Actions menu. You will need to provide a name for the partition.

Step 6. A progress window indicates the percentage copied and it should take about the same amount of time as a SuperDuper or CCC copy takes.

Step 7. Once finished, use the Boot menu to create a selection for OS X and that should do it.

[The Other Almost Easy Way]

This method uses Bootit BM to directly copy your OS X partition from an external USB or Firewire connected GPT hard drive to a free space on the MBR drive you have set up for use with Bootit BM. This method assumes that Bootit BM has been installed and you have the external hard drive connected as well.

Special note: The OS X partition chosen for this operation must be bootable prior to the Bootit BM copy and paste procedure. If it isn't, be sure to install a boot loader of your choice (Chameleon, Chimera, etc.) to the partition before proceeding. It is extremely difficult (if not impossible) to be installed after you copy it to the Bootit BM hard drive and OS X will not boot.

Step 1. Boot up the system, it should come up to the Bootit BM Boot Menu. Click the Maintenance button.

Step 2. Select Partition Work from the main menu. Click on the Bus selection arrow and choose USB or Firewire depending on how your external drive is connected. Use the Drives selection arrow to navigate to the partition you wish to copy.

Step 3. Highlight the OS X partition you wish to copy and select Copy from the Actions menu to the right.

Step 4. Click the Bios arrow again to display your Bootit BM drive layout.

Step 5. Highlight the free space where you wish to place your OS X partition and click Paste under the Actions menu. You will need to provide a name for the partition.

Step 6. A progress window indicates the percentage copied. Once finished, use the Boot Edit menu to create a

selection for OS X so it will be available to boot on the Boot Menu.

[Tips & Tools]

Common sense is a wonderful thing. All of the time I was using BING and even when I started using Bootit BM, I always let the installer choose where to install the EMBRM. But in order to avoid certain problems I had, I developed a better way to install Bootit BM. Be sure you have read that before you install Bootit BM.

- After using Bootit BM for a while, certain short cuts and tricks you can use will become apparent. These are too numerous to list here, but an example is the first time I tried *The Other Almost Easy Way* method above, I used BIOS as the Bus and the copy was taking forever. I mean major time like only 20% complete after 2 hours for a 40 Gb partition. After about 4 hours (39%), I decided to cancel the operation and try it using the proper Bus (USB or Firewire). Once I selected the proper Bus (USB in this case) I restarted the copy/paste operation again. The results were much, much better, pretty much what one would expect from a USB transfer.

- Both boot managers and boot loaders have been mentioned here. While similar in function, they are different. Boot loaders are generally thought of as the code necessary to boot a particular operating system while boot managers (like Bootit BM) can be used to set up a menu of different operating systems and then boot from the one you choose. Some, like Chameleon and Grub, perform both tasks by providing the necessary boot code and presenting a choice of operating systems to boot from.

- SuperDuper or CCC can be used to copy the partition over to an external hard drive if desired. Please note that if a boot loader had been installed on the partition before it was copied, it should still be present when copied to the external hard drive, but I cannot confirm this. It's best to make sure it is bootable by installing the boot loader of your choice onto the partition you are planning to copy over to the Bootit BM hard drive.

- Partitions can ONLY be copied to a free space which is larger than the partition to be copied. You can carefully use Disk Utility in OS X to resize the partition prior to copying it. Also, partitions within Bootit BM can also be resized. Be certain that no data or programs will be lost before using this feature.

- Not all options within Bootit BM work as expected. For example, I tried the Slide function to move a partition to an adjacent free space. This DID NOT work. The partition was no longer bootable. Lesson learned, always have a backup of the partition you choose to experiment with. FYI the Copy/Paste function seemed to work very well, but the same rule applies, always have a backup of the partition before you perform this function. In this case, DO NOT erase or alter the partition you are copying until you are satisfied that the copy you pasted performs as expected.

- If you have an operating system which you think may alter your Bootit BM installation in such a way as to render it unusable, it is best to Capture the MBR from the Installation menu before you attempt the OS install. This way the original MBR can be restored when/if problems occur. This will save a lot of headaches associated with having to re-install Bootit BM to recover all your partitions. Read more about this option in the Bootit BM manual before using it, or better yet, just use the tip described next.

- Bootit BM is a very powerful utility and should be treated with respect. I use a scratch hard drive to test all of the procedures I am not familiar with. That way when/if problems come up, no important data or OS installs are lost. It can be a wonderful solution for your multi-OS experience, just be safe rather than

sorry.

The tools I use here daily at Hackintosh central are many, but the thing I use the most are my [SATA mobile racks](#) which I install at least 2 of into each new system I build. These have been by far the most handy computer hardware item I have ever bought.

Something new I'm adding is one of the racks mentioned above installed into an external 5.25" drive enclosure [here](#). This will add the same flexibility to those systems which are unable to have the racks mounted into the computer case like the HP DC7800.

I also have a Vantec NexStar hard drive dock for use in a similar fashion. The ability is similar to the item above, but I can also use the dock with 2.5" drives as well. Plus it has an eSATA interface as well as USB.

I also have numerous fixed external hard drives which I can use for more permanent storage. I use these primarily for system backups, especially on new installs.

Of course a good selection of USB flash drives can be very helpful when you experiment as much as I do. I have most every size up to a 32 Gb, with duplicates of some that I use a lot. Most are SanDisk Cruzer micro drives, but I have a few others as well.

[What's Next?]

In the near future, I hope to explore some GPT boot managers to see what is out there. A quick Google search didn't reveal much, but I am aware and use rEFIt on my Mac mini, and it is billed primarily as an EFI system boot menu and maintenance toolkit. Perhaps more will appear soon given the new systems which are coming out now. If you have some suggestions on ones I missed, please let me know. Thanks!