



## Building the two hundred dollars Osx86 Mac



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Tuesday, 25 October 2005

With the Osx86 (OSX Tiger for Intel chipsets) leak, hundreds of people have been attempting to install Osx86 on their home computers. Some are having great luck, while others are finding that their hardware is not compatible, and it just won't install. In the following article I will discuss how to build a Intel based computer that comes very closely to meeting the specs of the Osx86 Development machines. We will discuss exactly WHAT hardware you want, WHERE to find the software, and HOW to install it. Meaning that with a little magic, this complete walkthrough will have you installing Osx86 on a \$200 Intel machine using the OSX install disc, and have everything work great!

First off we need to pull together everything we will need. We will need some specific hardware (list coming in a bit) along with some specific software. This is where it gets tricky. Officially, Osx86 has not been released. As you may have heard, Apple has decided to move to intel architecture, which means that their base OS along with OSX applications will need to be ported to work on this new intel based chipset. On Tuesday April 19<sup>th</sup> 2005, a developer copy of OSX Tiger for Intel based chipsets was leaked to the major torrent sites. At the time there was not much you could do with this image, but since then there has been a lot of poking and hacking done on it, allowing us to install it.

There are several methods to install Osx86, but we will be discussing the best method (IMHO), using the Base Image (leaked DVD) along with adding some patches to make it bootable. There are other methods such as using VMWare, and DD'ing a disc image onto your hard drive, but I will not be discussing those as they are not as stable in my opinion.

Before I get into the meat of this, let me first say that downloading and using the leaked DVD is illegal. This

version of OSX is aimed only at developers, and should only be used on official development machines. We will be discussing the hardware and techniques needed to duplicate this just to share the knowledge. Most of this information has been obtained from some excellent sources such as the **Osx86 Project Wiki** and **win2osx.net forums**. These places are just a FEW that have a wealth of information, if you have any problems or questions I would suggest starting there.

Here are the base requirements:

- **CPU:** (SSE3 Compatible, With some hacking you can get SSE2 processors to work):
- **Motherboard chipsets:** This is still debated, but the consensus is that Intel chipsets work the best.
- **Video:** Basic VGA/SVGA works on most chipsets, however for accelerated graphics you will need the Intel GMA900 onboard graphics chip (the motherboard selected below uses this chipset)

Component	Make	Price
<b>Case</b>	<b>1-Bay ATX Case w/300W Power Supply</b>	\$18.00
<b>Motherboard</b>	<b>ASRock P4Dual-915GL Micro ATX Intel Motherboard</b>	\$51.99
<b>CPU</b>	<b>Intel Celeron D 340 2.93Ghz / 256K Cache / 533 FSB / Socket 478</b>	\$49.99*
<b>Memory</b>	<b>2x AllComponents 256MB 184-Pin DDR SDRAM DDR 266 (PC 2100)</b>	\$22.39 x 2
<b>Hard Drive</b>	<b>20 GB 7200RPM Hard Drive (Check Ebay, or your basement)</b>	\$19.99
<b>DVD Drive</b>	<b>BTC 16X DVDROM</b>	\$12.59

**Total: \$197.34**

- CPU price was after \$50 MIR. Apparently this deal might be over. I am currently looking for a replacement, if you know of a good deal on these, please let me know. However you should be able to find this processor for around this price using froogle.

I chose this hardware as best as I could use one vendor to save on shipping. (My favorite retailers geeks.com & Newegg.com) The case is from Geeks.com as it was the cheapest case I could find that included a Power supply. You can probably find a good deal on a case by visiting my local mom & pop computer store, that way you don't have to pay for shipping. The processor is being obtained through a TigerDirect deal. Before you go out and purchase exactly what I have linked to, I suggest you read the article on **Getting the best deal online** to possibly find these components cheaper. While we wait for our hardware to arrive, we need to obtain and prepare the software side...

## Obtaining the software

We will need the following:

The Leaked developer DVD disc image of the DVD. You can find this file on your favorite Torrent site usually marked as Apple.OS.X.x86.Developer.Kit.Install.DVD-pheNIX: (or deadmoo) . (hint: google for torrent and pheNIX)

The torrent should include either:

- **Marklar-Tiger.dmg with MD5: 6671b06db57db94bebfdd2cffc2c78e and the filesize is: 2,618,664,581 bytes -or-**
- **Marklar-Tiger.iso\* with MD5 of: e78fe52e30a1f8c5b29d4b7932a16c5e and the filesize is: 4,293,001,216 bytes** (*\*If you find the Marklar-Tiger.iso image with the correct MD5, you can skip the following step*)

It is absolutely ESSENTIAL that you are working with one of the following files, and have verified the MD5 hash. If you are windows user, I suggest you use **fastsum** to check MD5 hashes. Now let me explain what we are dealing with. You will notice that the first file is a .dmg. A .dmg is a Apple format "Disc Image" that we will need to convert to .ISO before we do anything. Download **UltraISO** (a utility that we will use to convert .dmg to .iso)

Once you have UltraISO installed, go to tools - convert. . Locate the .dmg file and choose ISO as the format, click Convert and wait a few minutes (typically) for the conversion to be done. UltraISO will alert you when it's finished, so click Return and close UltraISO. Now we need to verify the checksum of that .iso file you just created (yes more checksums). Using Fastsum (or any other MD5 Hasher) verify that your new file's (Marklar-Tiger.iso) MD5 matches the one above (e78fe52.....) Again, it is IMPERITIVE that it does. If it doesn't, please start over! You will save yourself a lot of time.

Once you have the Marklar-Tiger.iso with the correct MD5, you will need to do some patching in-order for it to boot properly. You will need to download

### Generic\_OSx86\_Install\_DVD\_Patcher\_Release1.rar

(please read the Readme included) This file contains a PPF Patcher that corrects some sections in the ISO allowing it to boot and install properly. Unpack everything, and run the PPF-O-Matic, pointing it to your Marklar-Tiger.iso file, along with the Marklar-Tiger-patch-release1.ppf and yup you guessed it— PATCH IT.

The md5 for your patched Marklar-Tiger.iso file should now be:

9a5270e693b2148ba685638f05ea76c2 and the filesize remains the same at: 4,293,001,216 bytes (*I would like to note that you CAN download already patched DVD ISO images, however unless they match this exact MD5, you have no idea what you are working with... That is why I prefer to do it myself*)

Using your favorite burning software, burn the patched Marklar-Tiger.iso to a blank DVD. Now that your DVD is ready, skip work and wait to ambush your UPS man.

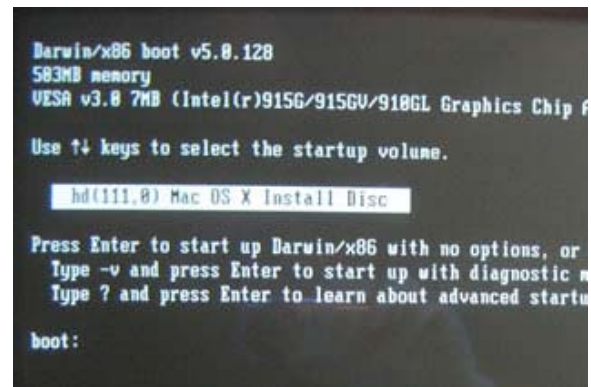
## Putting it all together

I will not get into the nitty gritty of building the machine, as it is very simple and a waste of both of our time. Put the motherboard into the case, connect the powersupply to the motherboard, install the harddrive and DVD drive into the case, and then connect them via a IDE cable to the motherboard. You will notice that if you used the ASRock P4Dual-915GL board, you only have one IDE channel. Set your Harddrive to master and your DVD drive to slave. One quick note, hopefully you purchased a DVD drive, and didn't skimp on a CD drive as we will need a DVD drive to boot our installation DVD. =)

After you have all the hardware installed into the case, do a test run by connecting the onboard video to a monitor and connect a USB KEYBOARD and mouse. You should see a normal bios boot, eventually ending in a boot failure. (because we didn't give it anything to boot from) You should now restart the computer and enter the BIOS (usually del or F2 buttons) and make sure that it is set to boot from CD first. Now put your patched Marklar-Tiger DVD into the dvd drive and restart.

It is worth mentioning at this point that we are going to discuss the method of installing OSx86 onto the entire harddrive. There are ways of dual-booting your system with your favorite other operating system, but we will not cover that. Check the Wiki for more info on doing that. For your first time I suggest you install it on a blank drive all by itself. It removes a lot of the problems you could face.

As your computer boots from the DVD, you will be presented with a boot menu. This menu will be pretty familiar to those of you who have used unix or linux in the past, but for those of you who have not seen this before:



### Darwin Boot Menu

This menu from now on will be referred to as the "Darwin Boot Menu" and it gives us the option of specifying specific boot options. Press your "F8" key to see the different boot options available. At this time I would not suggest using any of the options (you can just press enter) but it is very nice to know these options incase anything goes wrong. (The -v is a great switch allowing you to see any major errors such as kernel panics, etc) After you press enter you should be presented with the following familiar screen:



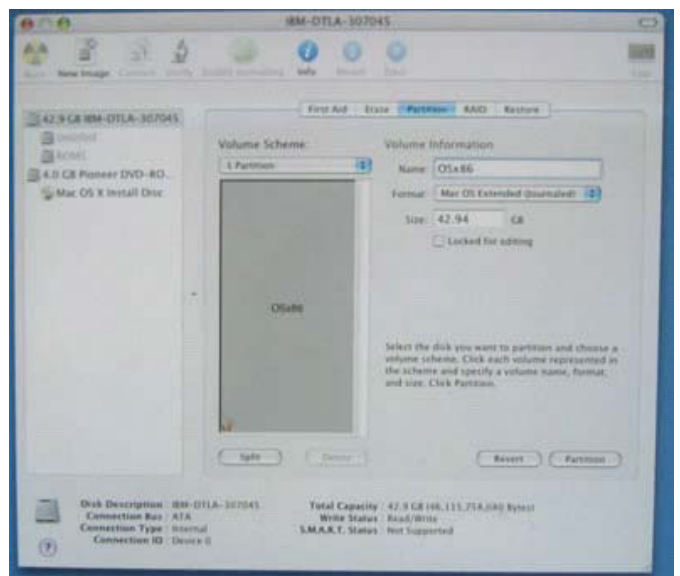
During this time, you will notice that the wheel spins, and your DVD-ROM thrashes. Don't pat yourself on the back yet though, we are not even close to being done. After all the pre-installation files are loaded, you will be presented with a nice installation GUI. However take your time here. For this installation, we don't want to do the windows "next, next, next, next, next" type install.



Before we begin, we need to partition the drive accordingly. If you purchased your drive from ebay, or had an old one laying around—chances are that the drive already contains partitions, and if you bought it new, it will not have any yet. You will want to go into the Disk Utility by clicking on Utilities-Disk Utility on the top menu.



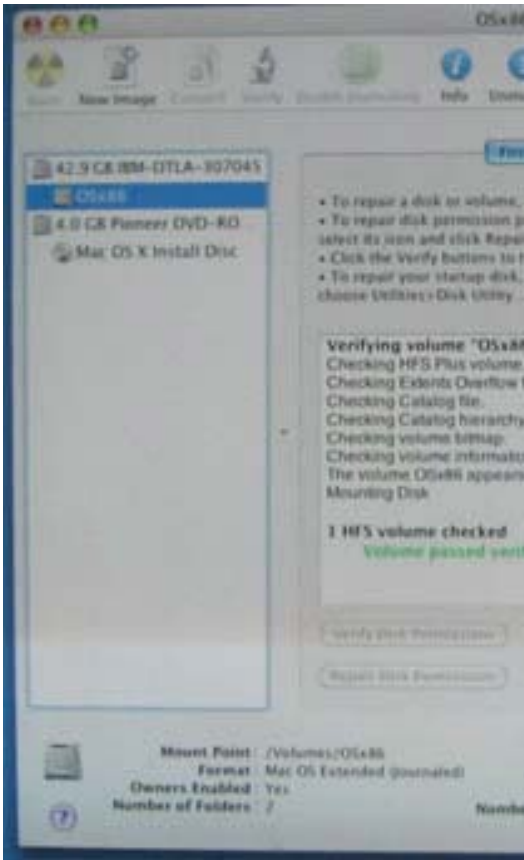
Once you are inside Disk Utility, make sure to delete ANY and ALL partitions on this drive. (This of course will destroy ALL data on this drive, so make sure you are ok with that). Once you have deleted all of the existing partitions (if there were any) you can now create a new partition that uses the entire drive. Highlight the hard drive you are going to install OSx86 on and click the Partition button. At this point a new dialogue window appears, asking your to decide on a partition scheme. Click the Volume Scheme drop down menu. It lists different schemes to choose from, so just select 1 Partition. By default the partition size will occupy the entire contents of the drive so, that amount will be reflected in the partition size box. If you wish to make a smaller partition just for the OS, say maybe 10-20GB, enter the appropriate amount in the box and press Enter. The volume scheme display on the left will change to reflect the size you've chosen. Give the partition a cool name like OSx86, and choose "Mac OS Extended (journaled)" as the format type. Then go ahead and hit the "Partition" button to set your changes.



Disk Utility will ask "Are you sure" before writing your new changes to disk. I can't stress this strong enough. IF YOU CONTINUE, YOU WILL LOOSE EVERYTHING ON THIS DRIVE. If you are following this tutorial, that is ok because we are using a spare drive to install to.



Once the partition has been written, I suggest you do a verify on the partition you created. You can do this by clicking on "First Aid", select your new partition (OSx86) and clicking the "Verify Disk" button. People have reported problems using the Disk Utility, consider this insurance that your partition is correct. Once it is verified, and you are happy with your new partition, you will need to exit the Disk Utility and return to the main OSX installer.



If you don't see a drive icon there (or any drives listed at all), then you have a problem and I suggest you start the installation process over. If you do see it, click on Continue. A quick note before we go any further. On the next screen you will see a little "Customize" button down. What kind of a hacker are you if you don't press it? In here you are given the option to change what we are going to install. Here is what I suggest you do: (You do not need to do any of this, it is fine as it was)

- Remove any printer drivers that you are not going to need. (no one needs 1.6GB of printer drivers)
- Remove the Xcode Tools. These are the developer tools for creating x86 code to run on OSx86 and for transcoding current PPC code and software to the x86 platform. If you're not a coder, hacker or programmer this stuff can be deselected to save a chunk of drive space. (Saving you 1.7GB of space)

Leave the rest as they are, and press Install. Are you ready for this thing to get installing? Well next OSX wants to check the media for any problems. SKIP THIS. You have done all kinds of error checking along the way (remember all that MD5 work you did?) to know that your DVD is probably ok.



Finally OSx86 Begins to install. Don't be fooled by the time estimates, it will take a lot longer than it says.



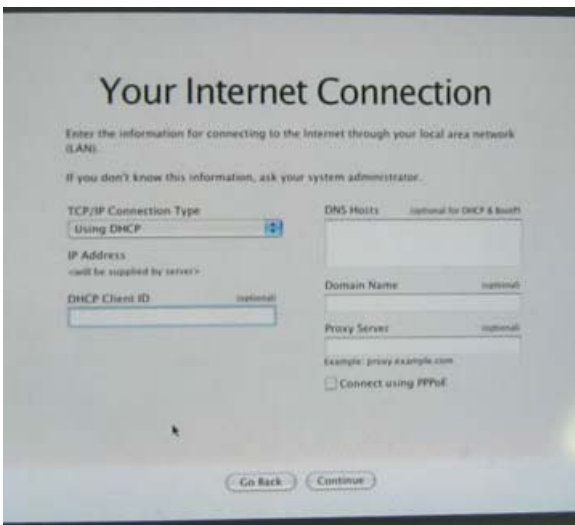
If everything goes as planned, after the install process is complete your OSx86 will give you a 30sec countdown and restart. Congrats your **ALMOST** done. As your computer restarts, remove the installation DVD. You will see that your computer now boots to the Darwin Boot Menu. Press Enter to continue into OSX. As OSX boots, you are presented



Ok, we now have our hard drive all setup, and waiting on a nice OSx86 load to be put on it. You can breathe a little now, as most of the hard work is completed. You will return to the main OSX Install screen, now we can start with our "next, next, next, next" campaign. Once you hit the "Continue" button you will be presented with a license agreement. Blindly agree and move on. => The next screen will ask you which drive you intend to install OSX on. Select the drive (partition) that we just created.



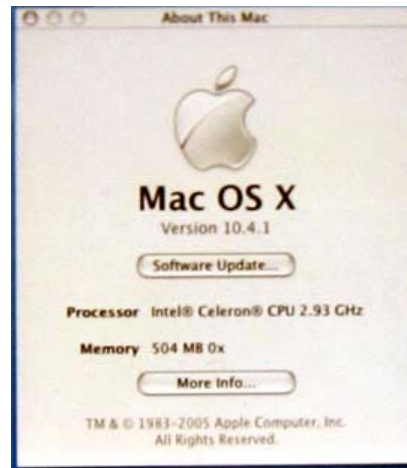
with a Welcome screen. You can probably handle it from here, all you will be doing is creating User accounts, and configuring network items.



A trick that I learned from the README file of the Release1 Patch, when you get to the Registration screen, press Alt+Q to skip the Registration process. Saves a lot and trouble. After you are finished here, your machine will finish booting into OSX. Before you start doing ANYTHING, I suggest you restart the machine one more time.



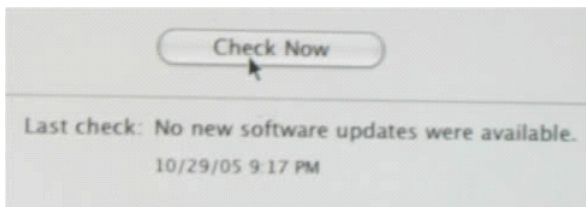
Now that you have Osx86 installed, lets do some clean-up. Click Go on the menu bar at the top of the screen, click Utilities. On the window that appears, double click Disk Utility. Select your Osx86 partition on the left hand pane then click Repair Permissions. This relatively simple step can resolve a lot of hassles, especially related to kexts that have incorrect permissions.



Congrats, you now have a working OSX installation running on Intel Hardware. I would like to add that this installation is not "final" or "legit" meaning that you WILL find bugs, and probably will have problems down the road. I suggest you read the forums mentioned earlier for help with any problems that may arise.

Also, since this install is a hack, and not legit, you will miss out on patches and fixes. For example, I checked for updates, and it told me that there were none available (although there are several patches to OSX 10.4.1) Running an unpatched machine is an invitation for trouble, so consider this your warning.





However, the hackers that brought you this install disc are also working on patches, If you check the torrent sites, you can find a patch that will update "OSx86 Update - 10.4.1 to 10.4.3"

This tutorial used hardware that was very similar to the hardware used in the development machines, however there is a LOT of room for improvement. I chose hardware that was very cheap to keep the project as close as possible to the \$200 limit. You can build your system according to your budget, just make sure that you check the **HCL** before buying any hardware. Upgrades you should consider would be more ram, better processor (make sure it supports SSE3), and of course a sweet **G5 Case** to install it in, but you will of course go way over the \$200 budget that was set for this article.

**\*\*UPDATE\*\*** The folks over at **AllMac** are willing to give I-Hacked readers a discount on G5 Cases. If you use the coupon code "I-Hacked" you can get the entire G5 Case enclosure for \$129.99. (Normally \$159.99) This includes The Enclosure, Optical drive Brackets, Optical Drive plate, HDD Fan & Brackets, Air Baffle and the Front panel!

But that didn't stop me from putting this machine through its paces, with some SURPRISING results!

I downloaded **Xbench** (a OSX Benchmarking Utility) and put my new OSx86 up against my Mac Mini. I wanted to see how this \$200 machine faired against my \$500 mini. As you can **see from the results**, (compare to my **Mac Mini results** the "IH-" boxes are mine) the OSx86 machine put a pretty good hurting on the Mini. Although the Mini held its own in several categories (it did after all have twice as much ram), I say the conclusion is that I am glad Apple is moving to Intel Architecture.

Now, do you need to buy all new equipment to get OSx86 running? Of course not. May of you may already be running hardware that is compatible. To check your Processor to ensure that it supports SSE3 (or SSE2) you can download and run the windows application **CPU-Z**. The hardware that we chose for this article was done so on purpose, the Processor, Motherboard Chipset, Video Chipset, and network chipset matched fairly close to the development machines. This guide does not cover installing OSx86 on systems that do not meet this criteria. However you can find tons of information at the sites listed below.

I would like to thank everyone from the **win2osx.net** and **osx86project.org** forums for all the help and information. I would also like to especially thank Mashugly, Mage66, br0adband, and Bender for the work and documentation they have done. (Not to mention Deadmoo and countless others who have contributed to the project)

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<http://www.i-hacked.com/content/view/202/42/1/1/>

Last Updated ( Tuesday, 01 November 2005 )