

## = BootX ( Apple ) =

BootX is a software @-@ based bootloader designed and developed by Apple Inc. for use on the company 's Macintosh computer range . BootX is used to prepare the computer for use by loading all required device drivers and then starting @-@ up Mac OS X by booting the kernel on all PowerPC Macintoshes running the Mac OS X 10 @.@ 2 operating system or later versions . Using BootROM , a read @-@ only memory ( ROM ) computer chip containing OpenFirmware , a graphical boot splash is shown briefly on all compatible Macintosh computers as a grey Apple logo with a spinning cursor that appears during the startup sequence . The program is freely available as part of the Darwin operating system under the open source Apple Public Source License . BootX was superseded by another nearly identical bootloader named boot.efi and an Extensible Firmware Interface ROM on the release of the Intel @-@ based Mac .

## = = History = =

Older Macintoshes dating from 1983 until 1998 utilized a basic bootloader ; the bootloader was solely a ROM chip varying in sizes up to 4 megabytes ( MB ) , which contained both the computer code to boot the computer and to run the Mac OS operating system . This was known as the Macintosh Toolbox , or the Old World ROM , and differs greatly from design the modern Macintosh which generally use a hard drive of large capacity to store the operating system . This bootloader was used in all Macintosh computers until mid @-@ 1998 .

With the advent of the iMac series of Macintoshes , the firmware was updated . The ROM was reduced in size to 1 MB , called BootROM , and the remainder of the ROM was moved to the file Mac OS ROM in the Mac OS System Folder ; stored on the hard drive . This ROM used a full implementation of the OpenFirmware standard ( contained in BootROM ) and was named the New World ROM .

In 2001 , with the release of Mac OS X , the Mac OS ROM file was replaced with the BootX bootloader file , . In 2002 , with the release of Mac OS X 10 @.@ 2 , the historical " Happy Mac " start @-@ up picture was replaced with a grey apple logo . By introducing the Intel Mac in 2006 , BootROM was replaced by the near identical Extensible Firmware Interface ROM ( although Apple still calls it BootROM ) and the boot.efi file .

## = = Features = =

To make the boot loader appealing to other operating system developers , Apple added features to allow flexibility in the booting process such as network boot using TFTP and load Mach @-@ O and ELF formatted kernels . BootX can also boot from HFS , HFS + , UFS and ext2 formatted volumes . The boot loader can be manipulated at startup by holding down various key combinations to alter the booting process . Such functions include Verbose Mode , achieved by holding down the Command and V key at startup , which replaces the default Apple logo with text @-@ based information on the boot process and Single User Mode , achieved by holding down the Command and S , which , depending on the operating system , may boot into a more basic command @-@ line or text @-@ based version of the operating system , to facilitate maintenance and recovery action . The ROM can also be set to require a password to access these technical functions using the OpenFirmware interface .

## = = Boot process = =

In PowerPC @-@ based Macintoshes , the boot process starts with the activation of BootROM , the basic Macintosh ROM , which performs a Power On Self Test to test hardware essential to startup . On the passing of this test , the startup chime is played and control of the computer is passed to OpenFirmware . OpenFirmware initializes the Random Access Memory , Memory Management Unit and hardware necessary for the ROM 's operation . The OpenFirmware then checks settings ,

stored in NVRAM , and builds a list of all devices on a device tree by gathering their stored FCode information .

On the completion of this task , BootX takes over the startup process configuring the keyboard and display , claiming and reserving memory for various purposes and checking to see if various key combinations are being pressed . After this process has been completed BootX displays the grey Apple logo , spins the spinning wait cursor , and proceeds to load the kernel and some kernel extensions and start the kernel .