RAMDISK WITH WINDOWS SERVER 2016 CORE MODE

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Install Windows Server 2016 on a Virtual Disk

The first mention that I think important to do is the more obvious, though not useless: this method is recommended by the most experienced audiophiles in the world and consists of sending the entire Windows partition to RAM (including applications). Thus, the only activity (without exception) that occurs on the SSD during playback is to read music files (and only if music files are stored on a SSD inside the computer). There aren't reading besides this, because Windows (and the entire C:\) runs directly from RAM. In my experience, the fewer internal PC controllers are used, the better, and the more internal PC controllers can be unique, the better the performance. Therefore, if the SATA controller could be used exclusively to play music, the better. If it's not used and can be turned off directly in BIOS, better yet.

In my computer, I don't use onboard USB controllers, onboard VGA/HDMI controllers, onboard SATA controllers, onboard audio controllers and nothing that isn't strictly necessary to play music. I just keep the built-in USB controllers because I use a USB stick to send Windows to RAM, as I'll explain below.

The consequency of all of this is important: the Windows loaded to RAM is totally functional and costumizable, but, being in RAM, is volatile. Once turned the computer off, everything made is lost and, or will need to be made again, or will need to be changed directly where the operating system is stored.

After having seen many vídeos and read many manuals, nothing worked for me, with only one exception: create a virtual disk, that is bootable and loadable to RAM, in addition to allowing futures changes and updates, if necessary. I think the difference is not in the process itself, but in the fact that we will install Windows Server 2016 in Core mode. This is where I found differences that required adaptions.

As the intention is to create a relatively complete instruction manual, with at least the essence for the instalation of applications and drivers, I'll leave here the method to create a virtual disk (vdisk) through DiskPart, which may facilitate in the future, though, from now on, I do the caveat that, by the most accurate method I've used, this first step won't be necessary. However, it's not disposable.

Creating vdisk by using Windows

The way that I found easier and the only one that worked for me was do a vdisk formatting directly through a previosly installed Windows (can be in another machine, like a notebook; I'm writing here already presupposing the existence of a Windows already installed on a computer). Well, the first step is to enter the CMD as an Administrator and type "diskpart". Then, is just follow the following commands:

- create vdisk file=X:\nameofvdisk.vhd maximum=Y, where "X" refers to the destination drive where you want to create the virtual disk (drive C, D); "nameofvdisk" is the name that you prefer to assign to the virtual disk, e; "Y" is the maximum size, in megabytes, you want to assign to vdisk (2000, for example, will correspond to a vdisk of 1,95GB). You should take care for the size not to be too small, so that it fits the operating system, and not too big, to the point of not fit in the RAM.

- select vdisk file=X:\nameofvdisk.vhd, being that here the drive letter and the name of the vdisk must correspond to those effectively attributed.

- attach vdisk
- create partition primary
- active
- format fs=ntfs quick
- assign

Once did it, we already have where to install our Windows.

For all intents and purposes, read the chapter below before anything.

Installing Windows Server 2016 on the vdisk

To succeed, four applications will be needed, which I recommend you to download beforehand, so that everything is in hand when you run the process. These are: WinNTSetup, FiraDisk 0.0.1.30, Grub4Dos and Bootice.

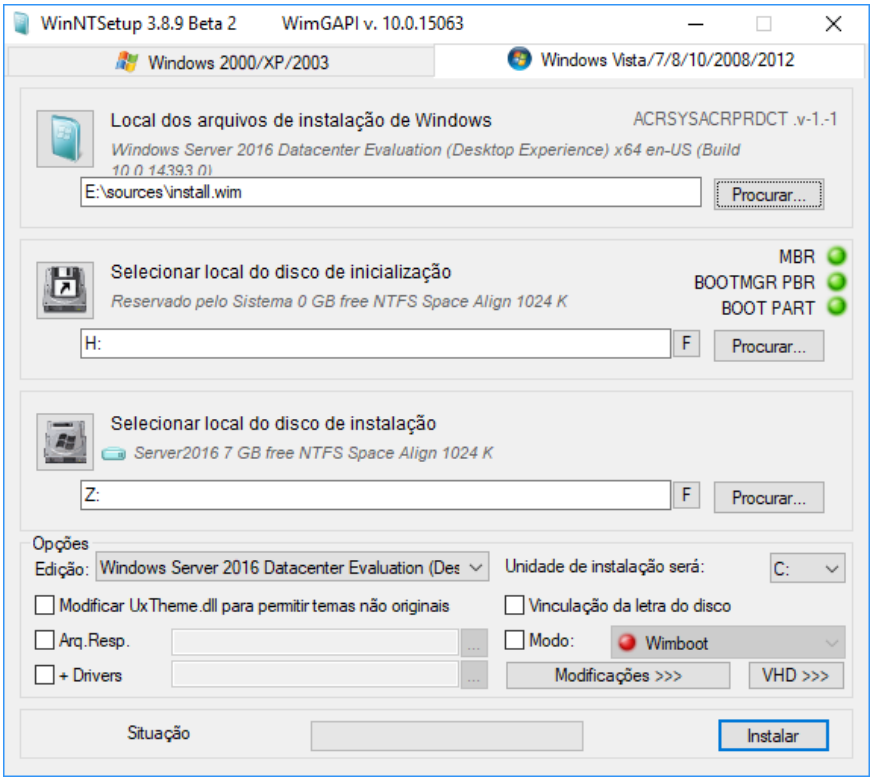
The WinNTSetup will help us install Windows without efetively launching it from install disk and customize it prior to first use. The FiraDisk is a driver that makes Windows understand that is running from RAM. The Grub4Dos will select partitions for boot and define the method (mount disk, send to RAM, etc.). The Bootice will allow edit Windows initialization parameters.

I recommend that you pay close attention in this part, because the steps are fundamental for Windows to work without vdisk and in RAMdisk.

a. run WinNTSetup as Adminsitrator (select x86 or x64 depending the operation system on which it will run);

b. once the WinNTSetup is open, we can create a vdisk, in case it not been previosly created. It's just click in "VHD" and then select "create a partitioned VHD and ready to install". You must set the location where vdisk will be created, the size (for Server 2016 in Core mode, I recommend to create a vdisk of 8GB) and nothing else. You mustn't touch anything else. The application will do everything by itself, will set the drive Z:\ as a destinantion and insert automatically this info;

c. insert Windows installation disc or mount the image with the installation, whichever method you prefer to adopt and, after that, in the first option of WinNTSetup, select install.win file on the installation disk. At this point, the second and the third fields should be filled in automatically. It must be like this:



d. open Notepad, save a registry file called FiradiskEnum.reg and, after this, paste the following text:

```
Windows Registry Editor Version 5.00
[HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Enum\Root\FiraDisk]
[HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Enum\Root\FiraDisk\0000]
```

```
"ConfigFlags"=dword:00000000
“Service”=”FiraDisk”
"HardwareID"=hex(7):72,00,6f,00,6f,00,74,00,5c,00,66,00,69,00,72,00,61,00,64,\
00,69,00,73,00,6b,00,00,00,00,00
"CompatibleIDs"=hex(7):44,00,45,00,54,00,45,00,43,00,54,00,45,00,44,00,49,00,\
6e,00,74,00,65,00,72,00,6e,00,61,00,6c,00,5c,00,46,00,69,00,72,00,61,00,44,\
00,69,00,73,00,6b,00,00,00,44,00,45,00,54,00,45,00,43,00,54,00,45,00,44,00,\
5c,00,46,00,69,00,72,00,61,00,44,00,69,00,73,00,6b,00,00,00,00,00
"ContainerID"="{00000000-0000-0000-FFFF-FFFFFFFFFFFF}"
"Capabilities"=dword:00000000
"ClassGUID"="{4d36e97b-e325-11ce-bfc1-08002be10318}"
"Class"="SCSIAdapter"
[HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Enum\Root\FiraDisk\0000\LogConf]
[HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\Enum\Root\FiraDisk\0000\Control]
"ActiveService"="FiraDisk"
```

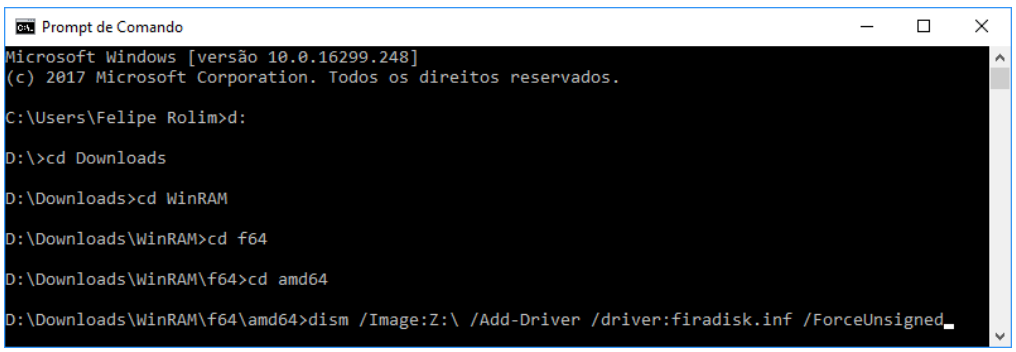
e. back to WinNTSetup, click in “Modifications” and, in “Registry settings”, search for the .reg file that has just been created. It’s also possible to make several modifications, which are at the discretion of the user;

f. once done this, click the reverse button on VHD and uncheck the only existing option: “VHD native bootable scan”;

g. click “Install” and wait for the conclusion. Here, something is important: **when ask to restart the computer, cancel and don’t allow the reboot**;

h. as the FiraDisk driver, it’s assumed, is already downloaded, open the command promt, navigate to the folder where FiraDisk .inf file is and type “dism /Image:Z:\ /Add-Driver /driver:firadisk.inf /ForceUnsigned”, where “Z:” must be equivalent to the mounted virtual disk (as a rule, it should be Z:). Remembering that to navigate between MS-DOS, just type cd nameoffolder to enter a folder and cd .. to exit the folder. The “dir” command shows everyting that exists withing the current folder.

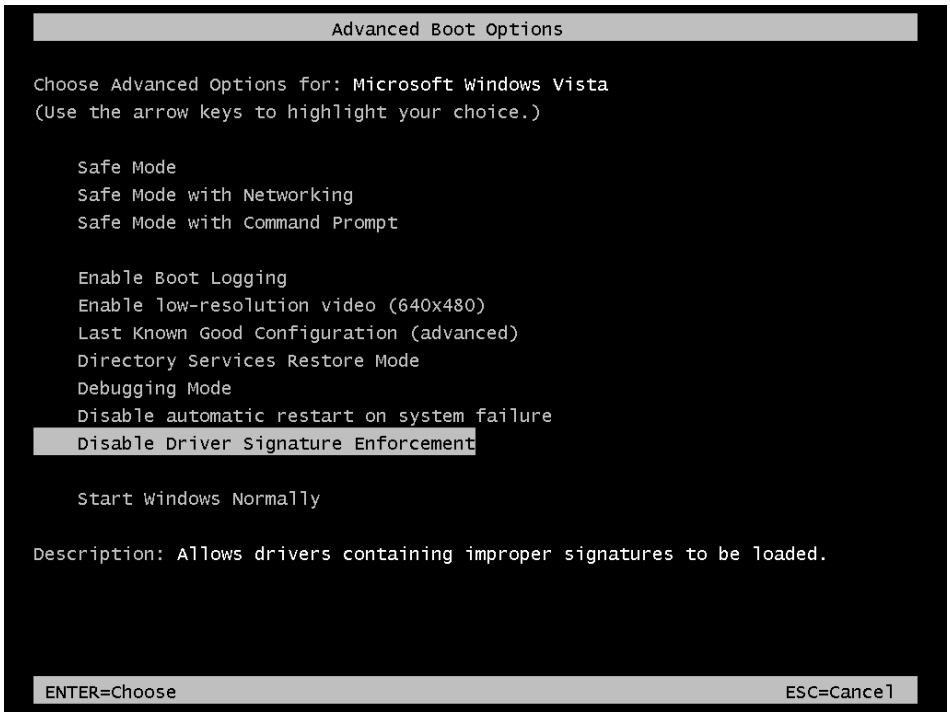
Here it looks like this:



i. enter Bootice and follow these stpes: a) BCD; b) Other BCD File (enter Z:\Boot and select BCD); c) Easy Mode; d) select the options “Test Mode (testsigning)” and “No integrity checks”; e) Save current system;

j. restart computer. Here, the Windows Server 2016 should already appear in the operating system selection menu with the “vdisk” indication on the front. Select to start from vdisk;

k. Done all this, Windows should start normally from vdisk for first time, without intercurrences. However, it’s common that appears an error saying that FiraDisk couldn’t have its signature checked. If this occurs, you should go back to the previous screen, stop the indicator on the vdisk and press F8 key, then, selection the option “Disable Driver Signature Enforcement”. With this, Windows should start normally.



Now, it’s time to install all your applications and drivers, such as Audiophile Optimizer, JPLAY, DAC driver and more. I don’t recommend installing any driver that’s not strictly necessary to play music and to the perfect functioning of Windows.

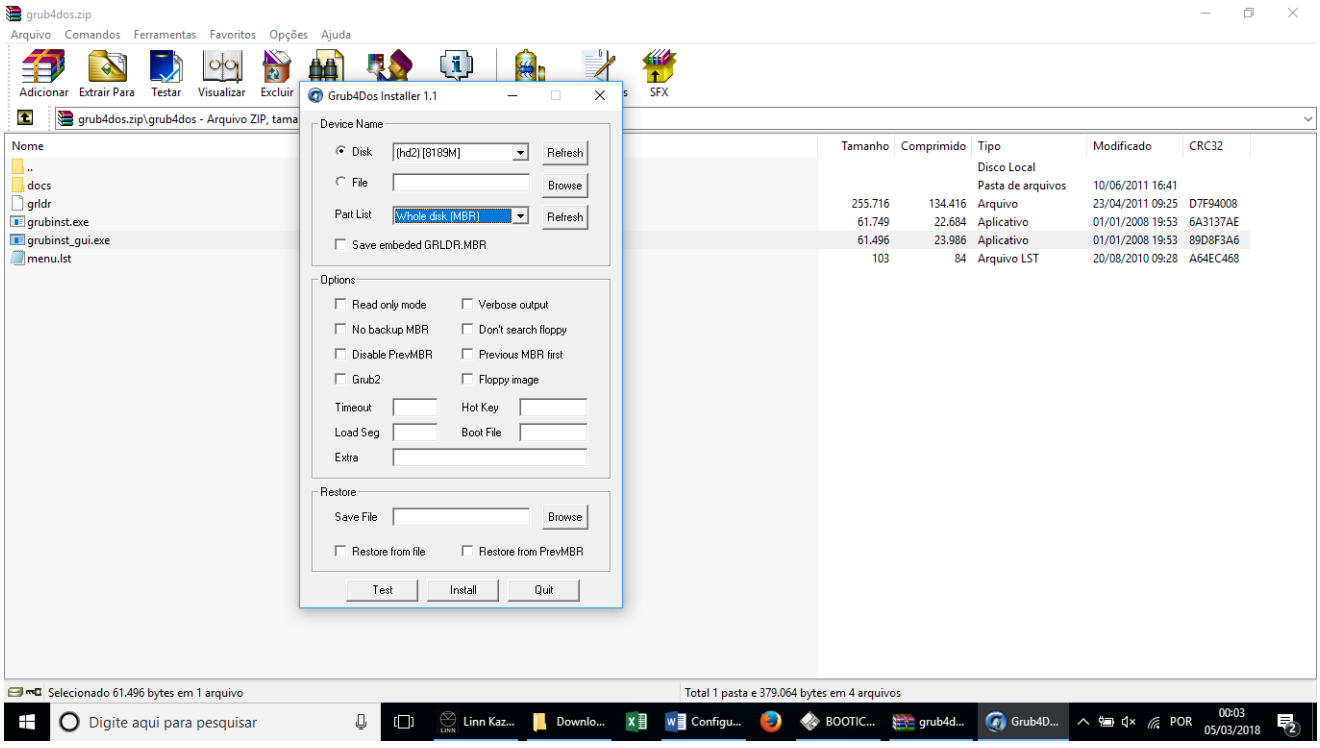
Configure loading of vdisk to RAM

From the moment everything is up and running, RAMdisk can be configured. Here, is valid an explanation: to RAMdisk be possible, it’s necessary to replace that “initial screen” of operating system selection by Grub4Dos. This is an irreversible

change that, to be undone, will require that ALL SSD/HDD be formatted, including deleting the partition in where it be (that 500MB partition that Windows separes before installing, and where we'll place Grub4Dos). To "bypass" this, what I did was install Grub4Dos directly on a USB stick and configure BIOS to boot directly from it. Once the USB stick has 16GB, I also copied the whole .vhd file into it and removed the internal SSD, disabling SATA connections on BIOS setup. It's more practical, cheaper (doesn't requires a SSD and a "audiophile" SATA cable), and allows to remove the pendrive after boot, in observance of my initial comments (use as few onboard controllers as possible). In any case, I'll explain the two possibilities:

To install on the USB stick is quite simple. It's necessary only open the install file "grubinst_gui.exe", select the pendrive as destination and the MBR partition as the installation location. So, by simply entering the BIOS and configuring the USB stick as first boot option, Grub4Dos will be opened at startup. Once done, you should copy the files called glrdr and menu.lse into pendrive. In addition, is fundamental to transfer the file called ntboot.iso (http://c-dl.qiniudn.com/dl/NTBOOT.rar), so that access to the virtual disk is enabled regardless of whether RAMdisk is made.

The process takes place as follows:



In case you prefer to replace the original Windows OS selection, the easier way is by using Bootice. Open it, go to “Physical Disk”, select the SSD, click in “Process MBR”, select the Grub4Dos and install. In this case, the two files mentioned above must the pasted in C:\. I didn’t thoroughly test this method and don’t know exactly how it works. I still recommend the USB stick, because SATA connection, although is often essential (especially in Control-PC, in the case of JPLAY, for storing music files), it’s not beneficial to the audio quality. Therefore, as the pendrive can be removed after boot, tends to be better (no USB connection other than the DAC), and this without counting all the benefits brought by the fact that Windows runs directly from RAM (speed, latency and others). You’ll can test and verify for yourself.

The last thing that remains is configure the menu.lst file. You should open it with Notepad and paste the following text:

```
color blue/green yellow/red white/magenta white/magenta
timeout 10
default /default

title Windows SERVER 2016 AUDIOPHILE SSD TO RAM
find --set-root --ignore-floppies /Server2016.vhd
map --mem /Server2016.vhd (hd0)
map --hook
root (hd0,0)
chainloader /bootmgr

title Windows SERVER 2016 AUDIOPHILE SSD
map --mem /ntboot.iso (0xff)
map --hook
(0xff)/NTBOOT NT6=()/Server2016.vhd
boot

title commandline
commandline

title quit
quit

title reboot
reboot
```

```
title halt
halt
```

Here, one adjustment is indispensable: every place of the text where Server2016.vhd is written must be substituted by the name of the.vhd file that was created at the beginning, so that Grub4Dos can locate it and mount a virtual device. If this is not done, there is no loss. It just won't work.

Not that other parameters can be changed, such as background color and the title of the options to select. I named my options using "Windows SERVER 2016 AUDIOPHILE SSD TO RAM" and "Windows SERVER 2016 AUDIOPHILE SSD". The first one is configured to load everything into RAM and the second is configured to boot normally from vdisk. The latter is very important, because it will be used to carry out updates, edits and any other changes in Windows that will be loaded into RAM.

Other things that can be changed are the "timeout", which I set up in 10 seconds, and the menu order. If I want that the "rule" is a boot from vdisk, I need to put the vdisk parameters (Windows SERVER 2016 AUDIOPHILE SSD) above those of RAMdisk. The configuration is simple and I have already inserted everything that is necessary.

Particular notes

- With the RAMdisk, I can obtain 700Hz/0.01s (JPLAY v. 6.2) or 1000Hz (v. 7.0) even with an Asrock J1900-ITX motherboard, and even in the single-PC configuration.

- Miscellaneous commands applicable in Windows Server Core Mode: taskmgr; devmgmt; regedit; sconfig.cmd; net view; ipconfig.

- Fix the IP number: netsh interface ipv4 set address name="Ethernet" source=static addr=192.169.0.2 mask=255.255.255.252, or other values.

- (Re)enable DHCP, netsh interface ipv4 set address name="Ethernet" dhcp

- If using JPLAY, to disable JPLAYfemto service on Audio-PC, type these commands: (i) sc stop "JPLAYfemto" e (ii) sc config "JPLAYfemto" start= disabled