

WinRE
(Windows Recovery Environment)
Your Life Preserver and Safety Net
Sean Kearney

Part 1

Well we're going to be going into what the Windows Recovery Environment is. I learned a lot about this ONE feature, and I'm going to spend my days and postings sharing this information with you. If you're a tech or not, it won't matter. This ONE feature within Windows 7 ALONE makes it worth the purchase. It does something that presently no operating system today does.

It can fix itself.

Or more correctly it can perform many automated features that can lend to recovering from many situations independent to the operating systems. Bad drives, Power issues, flaky ram, software or drivers not up to the specs of the operating system or just simply our old friend, "Murphy".

The Nemesis of MANY an IT Professional, Developer, Manager, Mom, Dad or even little Joey or Adam; Murphy S Law.

The Windows Recovery Environment can be added to Vista but is not presently enabled by default. It *IS* built into both Windows 7 and Server 2008R2 by default. The automatic repair is more powerful with Windows 7 and Vista because of it's ability to leverage System Restore but in Server 2008R2 you CAN leverage the "Repair Booting" issue if you're stuck dead in the water. But because when you're planning a Server infrastructure you' really don't want to plan on having the ability to let somebody boot up and access your console, I consider it "nice to have" as an option on a Server, but something I personally for security reasons might disable. And that is VERY easy to do in Windows 7 and Server 2008R2.

But it is a small and incredibly powerful Environment. And being a technician I FULLY understand about alternate options such as "Windows Ultimate Boot CD" and various other outside repair environments. WinRE does not quash or negate those.

What it DOES do is be a built in, useful, repair / recovery environment that is READILY there no matter what.

So *IF* you don't have other methods to repair it's there in Windows 7, always ready to help.

It can automatically repair boot issues, It can run a System Restore OUTSIDE of Windows (negating a Dead O/S problem where a System Restore would be able to bring you back). You can check memory for issues. Combined with the backup features WITHIN the operating system, you can restore a full image of the operating system into a NEW machine if the old one falls off DEAD!

With the Power of Windows PE tied in, you can use REGEDIT, Manipulate disk partitions and EVEN add drivers and connect to the NETWORK! Yes! You'll even have the ability to access a RAID5 controller to move data from a crippled environment as a result!

It's Beautiful!

Now to avoid confusion, in Windows 7 you'll notice a partition split on the hard drive. The first "hidden" partition is NOT the O/S .

No, you're now looking at the Operating system INSTALLING and USING Best Practices OUT of the box! That little 100meg space, is your "SYSTEM" partition (which is the actual drive BOOTING up).

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Your stock Windows Recovery Environment DOES share space with the O/S drive. But again, you can change and extend that easily. You can add drivers to it, you can add custom applications to it, you disable it or enable it, you can place it elsewhere. You can even setup a way to access it via PXE over the lan (using WDS in Server 2008). Why you can EVEN put it on a 256 mb USB flash drive. :).

So pardon the passion flying through my fingers. The Energized Tech is about to rip through and launch a technical barrage of information. And you're about to benefit.

So let's start off with something simple with WinRE.

Part 2

Where Is It?!

I had to prepare for a Demo at Techdays_CA and really got DEEP DEEP DEEP into WinRE. I truly learned and appreciated the finer differences between the Windows 7 and Windows Vista Versions for deployment.

Let's touch on some basic questions I got asked first.

Do you have to have a different version of Window Recovery Environment for X64 vs X32 ?

Yes. The Recovery Environment (As far as I can see) tuned for it's own O/S . So for example you CANNOT fix a Vista 32 with a Windows 7 WinRE. That's on the "automatic Repair" side of things.

Now I DO NOT think (and I will play with this) you are unable to control System Restore. But I would think since there seems to be an issue out of the box with the different Winre's wanting to TRY to fix a different O/S I personally wouldn't recommend trying that option.

Can you use the Windows Recovery Environment to Fix a Windows XP Machine?

Well let's look at this. YES and NO. (Yes we ALL hate that answer).

From an "Automatic Fix" ... Nope. But I would suggest this. (And this is where customization comes into play) . Since it's based on Windows PE, if you were to remove WINPESHL.INI or better yet, give it a DIFFERENT thing to launch on auto startup, you would be able to launch into a PE system and at least have a SOLID ability to manipulate issues with the files system.

You'd have Regedit to fix issues with Malware in Winlogon. And if you NEEDED to fix your source O/S (whether it was Window 7 or Windows Vista, you could STILL manually run RECENV.EXE and use the features). This would also I BELIEVE not be a "supported solution" if you called Microsoft support, but if you're a Tech, it's a tool you could have handy. And sometimes, especially when you're in the trenches, you need every tool you can get.

Can I legally make a custom Winre environment and pass it out to my friends?

Ahem. I hate licensing questions. So do you. *NARF!* ""Allo Brain! If I used Jello to start my Car would the tree sing in the key of F#?"

"Shut up Pinky."

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I'll stay away from legality but I would surmise it SHOULD be reasonable to say you could provide instructions to modify the environment to meet their needs. That is reasonable. You might even be able to help them. But "Rogue" copies of Windows RE floating free will probably have a team of vicious angry (but probably very nice at home, and excellent Xbox360 players) Lawyers chasing you down.

Will WinRE Solve World Peace?

No but it will solve your inner peace. And I think the more people that have inner peace resolved on some level, well that could lend to World Peace. Or perhaps slightly higher quality hamburgers at McDonalds. Maybe even vending machines with Good Kosher (sp?) Hot Dogs at Major Conventions that don't Vanish Magically When Really Cool Nerds Try To Taste Test Them. Things like that. All fun aside, We'll look into a little more of the Windows Recovery Environment (WinRE) next time.

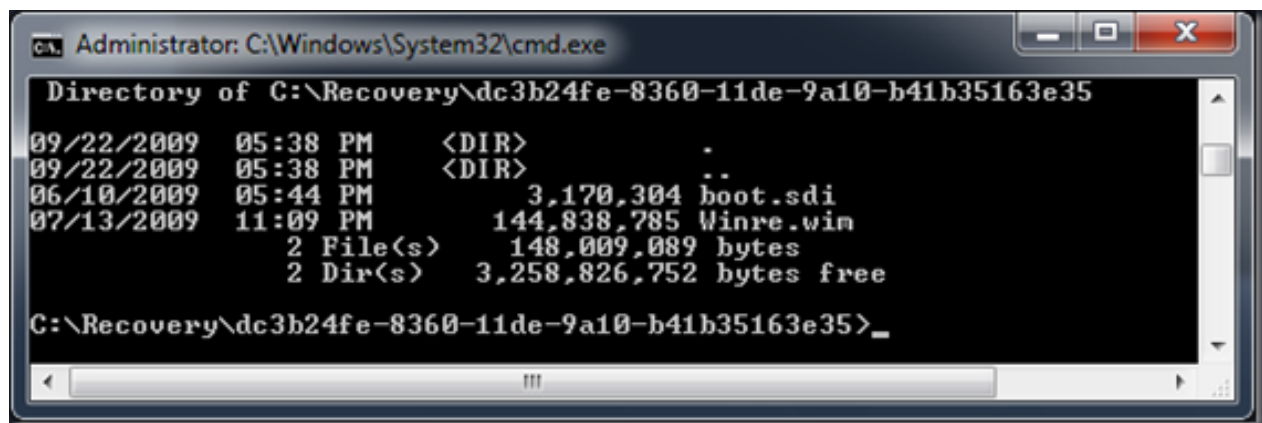
Part 3

So back to Windows Recovery Environment. **Where is it mysteriously hiding?**

Nothing mysterious about it. On the root of your hard drive in Windows 7 and Server 2008R2 is a folder called "Recovery". If you're curious you'll have to Run with Administrative credentials to get in there. I don't recommend playing with the NTFS permissions.

But if you look inside (and view HIDDEN FILES and HIDDEN FOLDERS) you'll see two little innocent files. Boot.SDI and Winre.WIM

That's it. Again it doesn't sit on that 100 meg partition, that's where the operating system boots from (which follow proper best practices in separating the Boot from the Operating system).



Accessing it is incredibly EASY!

- You can manually run it by hitting "F8" on startup and hopefully not being beaten by your super fast computer.
- Or you can boot from the Windows 7 DVD and go to "Repair My Computer".
- Or in Windows 7 you can execute a "**REAGENTC.EXE /BOOTTORE**" in a Command prompt with Administrative Credentials. That will force WinRE to start up on next boot.

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- Or you can do something foolish, like BREAK something! That trip off WinRE and have it try to fix things. Usually quite effectively!

But next time we'll take a quick look at how you can have your own personal Windows Recovery Environment on CDrom or USB key.

Part 4

So this is wonderful. We have this cool "end all fix all" environment. **So how do we GET it?**

My first instructions download the Windows AIK for Windows 7 (if you're Working with Server 2008R2 and Windows 7) or the Windows AIK for Vista (If dealing with Vista or Server 2008).

Now the newer one still works for making and editing the Vista AIK but it does not have **SETFAILOVER.CMD** (which is needed in Vista but not in Windows 7) to allow the Recovery Environment to "kick over".

You'll find the WinRE is sitting inside the **BOOT.WIM** file on your install Media. And yes, they are different. They FUNCTION the same but the Vista one is for Vista, Server is for Server, 7 is for 7, 64bit for 64bit O/S.

And that's not to say you can't play with it, and try using one for some work on another, they're all based on Windows PE. The difference will be in the Automatic repairs or System restore features. So for best results, DON'T mix and match.

- So Start up the Windows AIK by going to "Deployment Tools Command Prompt" and make sure you "Run as Administrator" and the build the folder structure for Windows PE. Run the COPYPE command

```
COPYPE X86 C:\WINRE
```

- So look in your install media, find a file called BOOT.WIM under the SOURCES folder on the root of the DVD.
- Copy the Boot.WIM file locally to C:\WINRE

```
COPY D:\SOURCES\BOOT.WIM C:\WINRE\
```

- Then extract the Windows Recovery Environment from Index 2 from BOOT.WIM using the IMAGEX command from Windows AIK

```
IMAGEX /EXPORT C:\WINRE\BOOT.WIM 2 C:\WINRE\WINRE.WIM "Windows Recovery Environment"
```

Now we have the Windows Recovery Environment, but we need to reprogram the extracted version to trip over into the Recovery Environment on startup. This requires Two steps.

ONE

Mount the Windows Recovery Environment. If you're using The Windows 7 AIK the Command is:

```
DISM /MOUNT-WIM /WIMFILE:C:\WINRE\WINRE.WIM /INDEX:2 /MOUNTDIR:C:\WINRE\MOUNT
```

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If you're using the Windows Vista AIK the Command is:

```
IMAGEX /MOUNTRW C:\WINRE\WINRE.WIM 1 C:\WINRE\MOUNT
```

In both cases it will EXTRACT and bring the drive structure of the WINRE.WIM file into the C:\WINRE\MOUNT folder.

TWO

Once it is within that folder you need to copy a file called **WINPESHL.INI** into the SYSTEM32 of the WINRE environment. The contents of WINPESHL.INI are:

```
[LaunchApp]
AppPath=x:\sources\recovery\recenv.exe
```

It is a very simple text file that when the WINPE environment boots up, it launches that as it's Operating Shell.

So copy it into SYSTEM32 of the WINRE Environment by running:

```
COPY WINPESHL.INI C:\WINRE\MOUNT\WINDOWS\SYSTEM32
```

Then once that is done, close up the Environment. Different if you are using again the Windows AIK for 7 or Vista.

Windows AIK for 7 run a:

```
DISM /UNMOUNT-WIM /MOUNTDIR:C:\WINRE\MOUNT /COMMIT
```

Windows AIK for Vista run a:

```
IMAGEX /UNMOUNT /COMMIT C:\WINRE\MOUNT
```

And that's the basics.

Next time we'll go into how to actually make this USEFUL and Bootable in Both Vista AND Windows 7.

Part 5

So last time we found out how to at least pull out and make the Winre.WIM file which is your recovery environment. It can be customized with drivers and additional applications but we'll get into that later.

Right now, **how do you USE that customized environment?**

Well you have a few options to work with:

- It can be turned into an ISO image on CD rom.
- You can make a UFD (USB Flash Drive) that is bootable and drop it on there.

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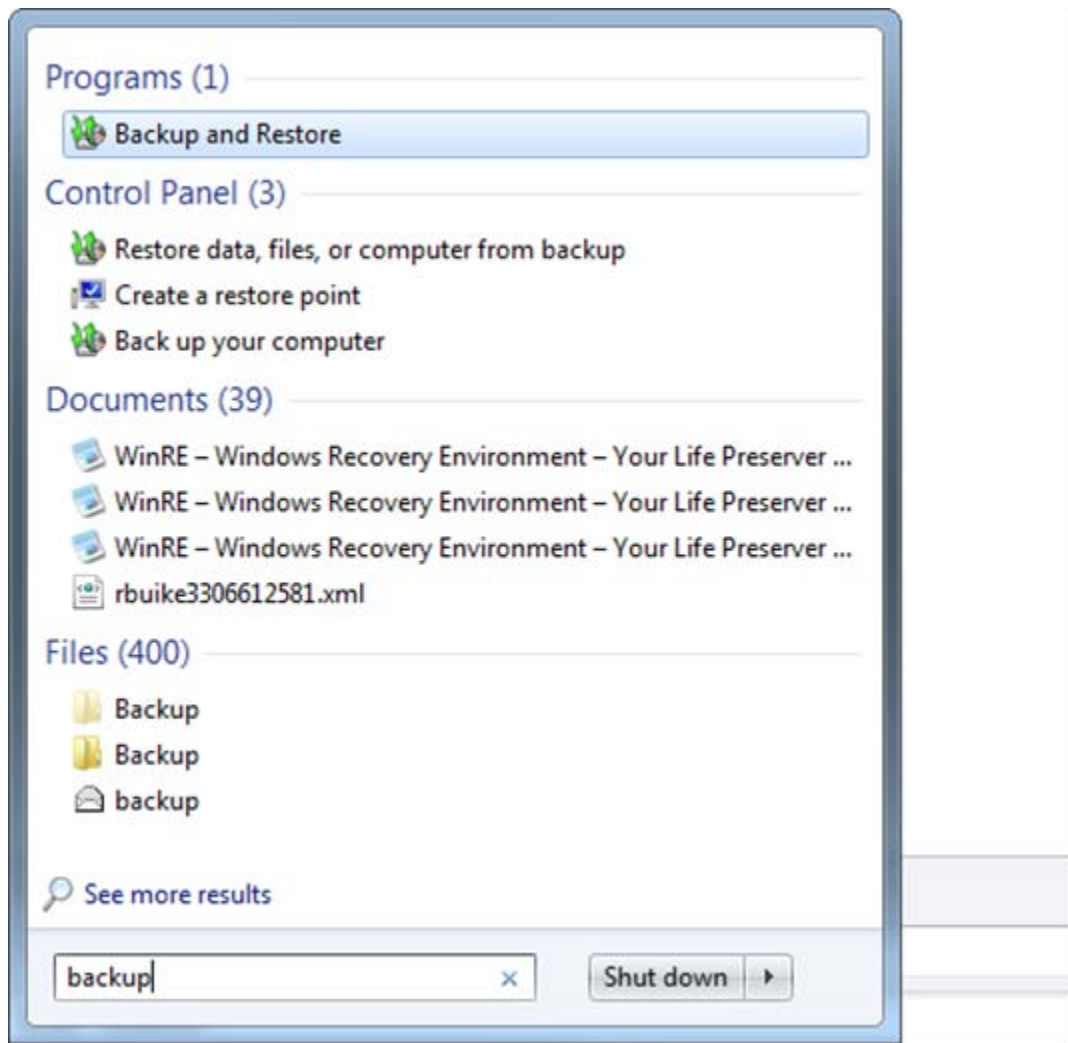
- If you have Windows Deployment Services running in your environment you can drop that into the repository.
- Or you can drop it into a new partition (or shrunken, spare partition) to have it on a spot SEPARATE completely from the operating system (This could even lend to building a full image recovery partition, without the need for expensive 3rd party vendor solutions).

So just where do we start?

Well let's start with a bootable CDROM. You have two ways of doing that. One prepares a CDROM from the presently active and running WinRE environment, and the other builds an ISO file you can burn to CD from your freshly customized environment.

To make a Bootable CD from within Windows 7 just go to the BACKUP AND RESTORE, Which is under Control Panel / System Security / Backup and Restore.

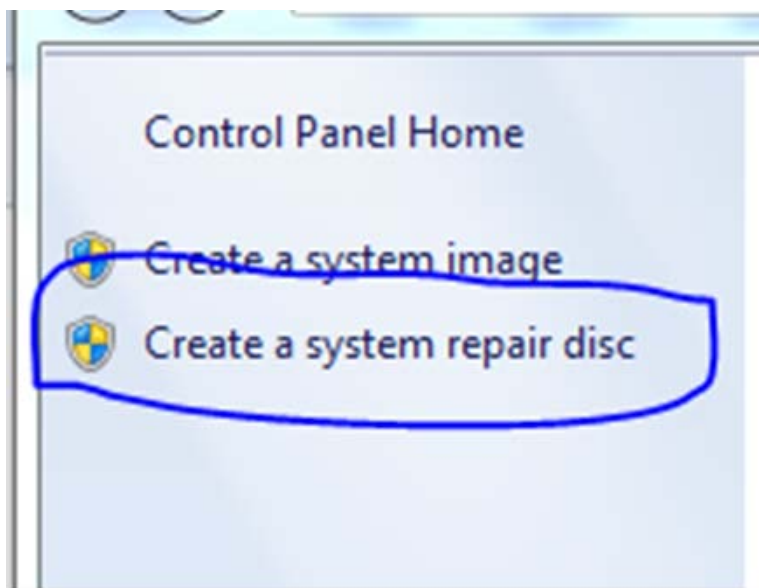
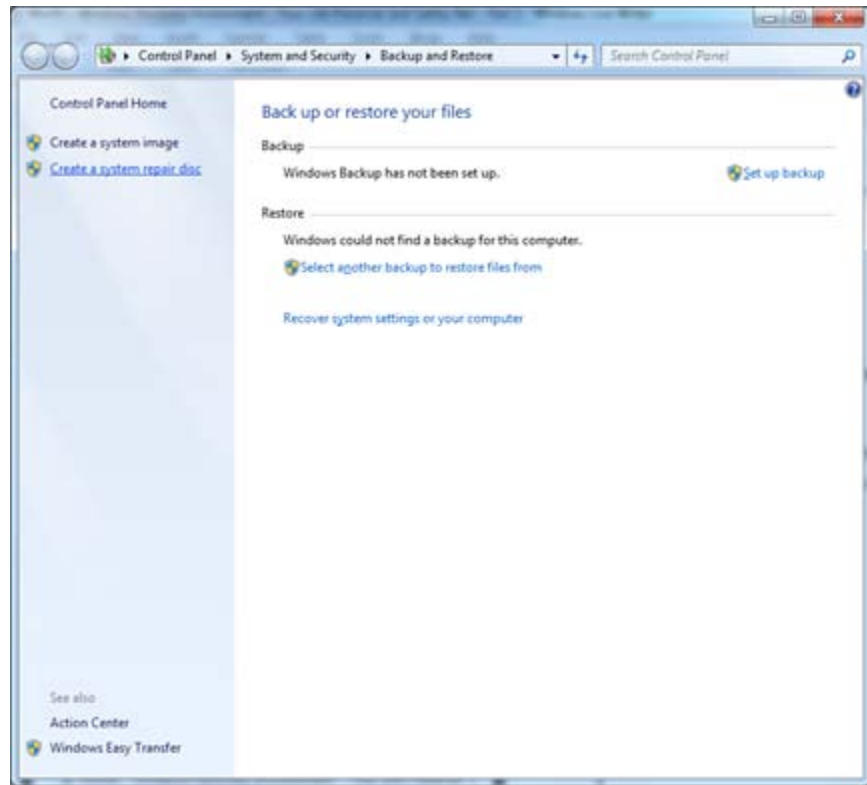
Or you just type "**BACKUP**" in the Search bar off your Start Menu to have it automatically populate it for you :)



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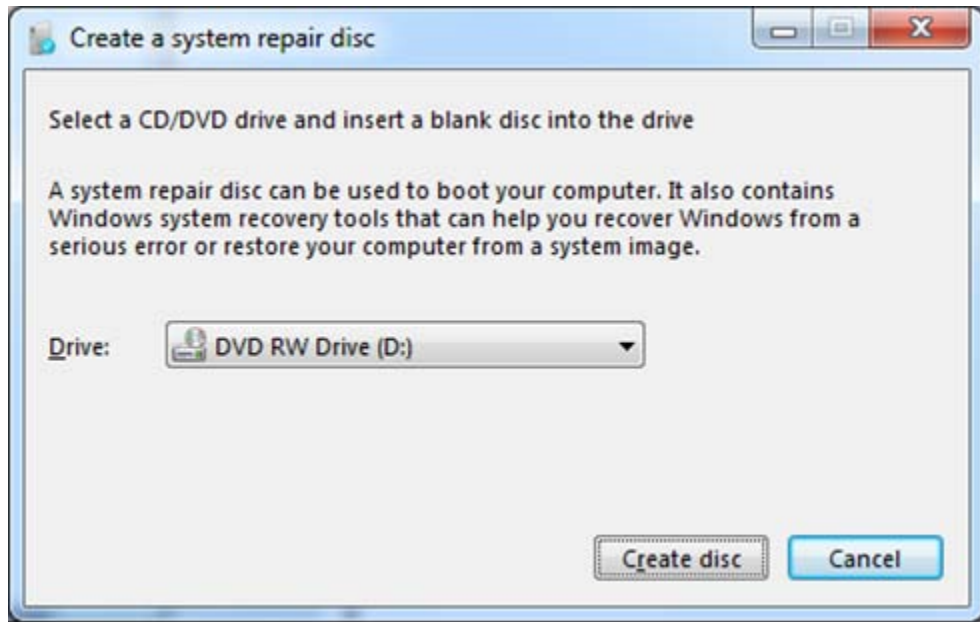
So Select Backup and Restore and you'll see the following screen. In particular we're interested in THIS option in the upper left hand side **"Create a system repair disc"**.

Now of course this does require you have a CD burner and a blank CD, and Administrative credentials (Note the little shield at the left).

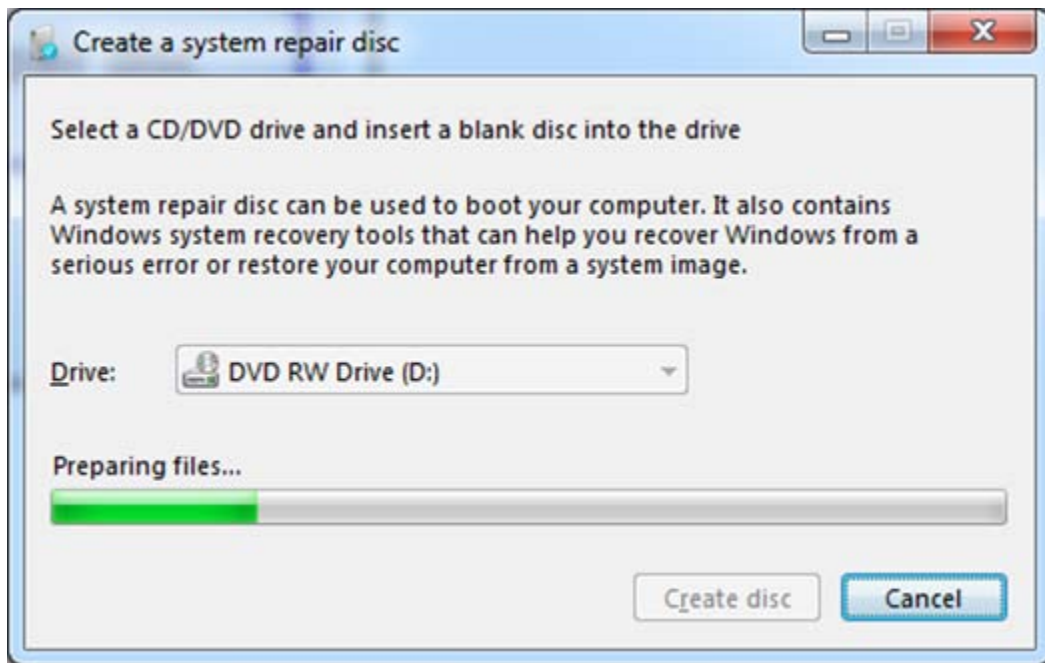


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But nothing could be simpler to do, just click “**Create a system repair disc**” and you’ll see this



Choose “**Create Disc**”, soon it will be preparing files and burning your Windows Recovery Environment onto CD.



And that’s it! You’re done! You now have an Extra copy of the Windows Recovery Environment handy to store in your drawer. This is Especially handy if the seller of your computer did NOT provide you with restore media (Yes some of them are Still shaving a nickel doing that deplorable practice!).

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Next time we'll show you how to make that newly customized environment into an ISO file you can burn to CD.

Part 6

So last time we looked into making a Bootable Recovery environment from within Windows 7. This time we're going to see how to make one from our customized environment we created in Part 5.

So if you remember last time, with the Windows AIK installed we had created a folder structure using:

```
COPYPE X86 C:\WINRE
```

In this structure there is a folder called "ISO", this is the base structure for your ISO file. You'll see a SOURCES, EFI and BOOT folder. This is just like your standard Windows 7 install media but stripped right down.

And yes, if you just copy a program or a folder to the root of this structure, it will be there when we create the ISO file.

To make this a useful bootable structure with Window Recovery Environment we just have to throw the image into the SOURCES folder in the ISO structure and call it BOOT.WIM instead of WINRE.WIM.

So from Part 4, we had extracted **WINRE.WIM** and placed it under **C:\WINRE**; That file is what we copy to our **C:\WINRE\ISO\SOURCES** folder:

```
COPY C:\WINRE\WINRE.WIM C:\WINRE\ISO\SOURCES\BOOT.WIM
```

Now if you're wondering? If you just wanted to make a strictly Windows PE bootable disc? Same procedure but copy the **WINPE.WIM** file from the same folder (COPYPE places it there by default) and put it into the **ISO\SOURCES** folder as **BOOT.WIM**.

Once you have this structure under the ISO folder, with Windows AIK you can build a bootable ISO file for 32bit Windows 7 using:

```
OSCDIMG -n -bC:\WINRE\ETFSBOOT.COM C:\WINRE\ISO C:\WINRE\WINRE.ISO
```

This will take that structure, inject the boot code from **ETFSBOOT.COM** and create an ISO file you can burn to disc with any of your preferred burning software. Personally I've been using IMGBURN which is free to download and contains no "catch-22" in it's operations (but you can make donations to the author via PayPal, and I encourage you to do so) and works well in just about every burning of Windows I've used it in (including Windows 7 *AND* Server 2008R2). It can burn ISO files for both CD and DVD as well as file structures.

Next time we'll take a few minutes and show you how to make THAT into a Bootable USB Flash Drive.

Part 7

Continuing on without step by step into Windows Recovery Environment, the previous times we created a CDrom version of the Windows Recovery Environment (WinRE). Once produced directly

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from the Windows 7 Backup / Restore environment (which a click of a button) and an ISO image created from scratch.

I should also mention that same procedure that was used to create the ISO image can be used to customize it and expand to that environment, but we'll deal with a bit of that next time.

This time we're going to show you how to put that environment on a UFD (USB Flash Drive) or memory key.

Now because it's all based on the same core as Windows 7, the procedure is identical to putting Windows 7 or Server 2008R2 media on a bootable key.

- Go into a Command prompt (CMD.EXE) with Administrative rights.
- Once there plug in your MEMORY KEY.

```
*** WARNING *** THIS PROCEDURE WILL ERASE YOUR KEY ***
***** IF THERE IS IMPORTANT DATA, BACK IT UP FIRST *****
***** NOTE THE BIG FLASHING WARNING SIGNS BEFORE *****
***** PROCEEDING FURTHER! THIS MEANS YOU *****
```

- Start up **DISKPART** from within that Command prompt. This is your command line based partitioning software:

DISKPART

- You'll need to execute a **LIST DISK** to see which drives are attached, and more importantly which number has been assigned to yours. Typically your removable is probably "Disk 1" or "Disk 2", You can usually tell by the physical size. That's odd. What's a 16MB Compact Flash doing here?



```
Administrator: C:\Windows\System32\cmd.exe - DISKPART
DISKPART> list disk

Disk ###  Status   Size     Free     Dyn  Gpt
-----  -
Disk 0    Online   55 GB    1024 KB
Disk 1    Online   15 MB    0 B
Disk 2    Online   7858 MB  0 B

DISKPART>
```

So ignoring the plight of my useless 16mb Flash, we need to change the focus of the Disk Partitioning software to that particular drive, in my case "Disk 2" the 8gb memory key



```
Administrator: C:\Windows\System32\cmd.exe - DISKPART
DISKPART> SELECT DISK 2

Disk 2 is now the selected disk.

DISKPART>
```

- Now that we're looking at Disk 2 we need to **ERASE IT** with the **CLEAN** command:

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CLEAN

- Then Create a Paritition:

CREATE PARTITION PRIMARY

- Once done, we need to format it:

FORMAT FS=FAT32 QUICK

- Then set it as Active:

ACTIVE

- and of course, once done, Assign a drive letter to it:

ASSIGN

Good! Now here is the bit you're going to love.

Take that Windows Recovery Environment that you've burned to CD, Select the Contents and copy it to the USB key.

That's right. This is the exact same process as you use to make a Windows 7 Bootable disc. It also applies if you have the "Desktop Application Recovery Environment" handy on disc or even Windows PE.

There you go! A free Christmas Present