

SAN Boot Windows (iSCSI)

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Synopsis

So I built this PXE server to eliminate my need for CD/DVD base installation media. That got me to thinking about SAN boot and how I could eliminate the need for a physical hard drive on some of my physical computers. I knew of 2 SAN boot options, Fiber Channel and iSCSI. I definitely can't afford the equipment necessary for Fiber Channel, so iSCSI was my choice. Here is how I installed and boot Windows using an iSCSI target disk.

In this tutorial I will be showing how to install Windows to an iSCSI target disk and how to boot to the iSCSI target disk via a PXE server.

Prerequisites

- PXE Server
- Samba/CIFS File Server
- iSCSI Target Server (I will be using Ubuntu in this example)
- iPXE Image (instructions below)
- A working Windows 7, 8, or 10 operating system
- Use the latest [WADK](#). In my tests it is backwards compatible with Windows 7, Windows 8, and Windows 10.
- Windows installation media for the version you are installing
- Possibly a physical hard drive (For Windows 7 setup I needed a physical disk to proceed)

Build the iSCSI Target Server

First make a virtual disk. I am putting my iscsi disk images in /tftpboot/iscsi. The command below will make a 20GB virtual disk image:

```
sudo dd if=/dev/zero of=/tftpboot/iscsi/windows7.img bs=1M count=20000
```

Next, install and enable the iSCSI target software:

```
sudo apt-get install iscsitarget  
sudo nano /etc/default/iscsitarget
```

make the following change

```
Change  
ISCSITARGET_ENABLE=false  
To  
ISCSITARGET_ENABLE=true
```

Next we will define our iSCSI target. Everything in this file should be commented out. If for some reason it isn't, comment everything and put your own information using the following template. You

can include more than one target, just duplicate the entry with a different IQN and virtual disk

```
sudo nano nano /etc/iet/ietd.conf
```

```
Target iqn.2014-07.com.it-joe:windows
  IncomingUser <username> <password> ##Leave blank if you want no
authentication
  OutgoingUser
  Lun 0 Path=/tftpboot/iscsi/windows.img,Type=fileio
  Alias Windows
```

Now you should be ready to start the iSCSI Target Server:

```
sudo /etc/init.d/iscsitarget start
```

Windows Preinstallation Environment

Next we need to build a Windows Preinstallation Environment(WinPE) boot image. Assuming you have either WAIK or WADK installed on your Windows machine, here are the steps to create your WinPE boot image

Open the Deployment and Imaging Tools Environment

Clicking Start, and type deployment. Right-click Deployment and Imaging Tools Environment and select run as administrator. Then Create a working copy of the WinPE files based on the architecture you need.

32-bit

```
C:\> copyype x86 C:\WinPE_x86
```

64-bit

```
C:\> copyype amd64 C:\Winpe_amd64
```

Make a bootable iso for the architecture you are using

```
C:\> MakeWinPEMedia /ISO C:\WinPE_amd64 C:\WinPE_amd64\winpe4_amd64.iso
```

iPXE Setup

Now we will use iPXE to connect to the iSCSI target and boot to our Windows Preinstallation Environment(winpe). Begin by going to rom-o-matic.eu to generate an iPXE image.

- Select: “Advanced, for experienced users”
- Choose an output format: “Linux kernel (SYSLINUX/GRUB/LILO) loadable image (.lkrn)”
- Choose a NIC type: “all-drivers”

Then keep all the default options checked and add the following config options plus any others you think would be useful.

- PXE_STACK, PXE stack in iPXE - you want this
- DOWNLOAD_PROTO_NFS, Network File System Protocol
- SANBOOT_PROTO_ISCSI, iSCSI protocol

Copy the ipxe.lkrn file that is generated to the / of your tftp server. If you followed my previous tutorials than that would be /tftpboot/. Now that our ipxe.lkrn file is in place we just need to make an entry into our PXE menu and create an ipxe script. First lets make our ipxe script.

Windows iPXE Script

```
sudo nano win.ipxe
```

```
#!ipxe
dhcp
set keep-san 1
sanhook iscsi:192.168.0.50:::iqn.2014-07.com.it-joe:windows
set boot-url tftp://192.168.0.50
initrd ${boot-url}/distros/windows/winpe_amd64.iso
kernel ${boot-url}/memdisk iso raw
boot
```

PXE Menu

```
sudo nano /tftpboot/prelinux.cfg/default
```

```
LABEL Windows Install
MENU LABEL Windows Install
KERNEL ipxe.lkrn
INITRD win.ipxe
```

Samba Server Configuration

Our final step before installing Windows to our iSCSI disk is to server up the Windows installation files via Samba/CIFS. If you need more information on how to setup a Samba server see my [Network File Server tutorial](#).

First I will make a directory to mount my Windows installation media.

```
sudo mkdir /mnt/cdrom
```

Then I will mount the installation media. I am using iso files. If you have an installation DVD rather than ISO you will just need to know the mount point for the next step.

```
sudo mount -o loop WindowsInstallationMedia.iso /mnt/cdrom
```

Now we will copy the installation files to a permanent directory on our Samba server

```
sudo cp -R /mnt/cdrom/* /tftpboot/distros/windows/win7
```

Last but not least, edit the /etc/samba/smb.conf file. Here is what I have added:

```
sudo nano /etc/samba/smb.conf
```

```
[win7]
path = /tftpboot/distros/windows/win7
comment = Windows 7 Installation DVD
valid users = "username" (User must have a samba password "smbpasswd -a
'Username'")
writeable = no
browseable = yes
read only = yes

[win8]
path = /tftpboot/distros/windows/win8
comment = Windows 8 Installation DVD
valid users = "username" (User must have a samba password "smbpasswd -a
'Username'")
writeable = no
browseable = yes
read only = yes

[win10]
path = /tftpboot/distros/windows/win10
comment = Windows 10 Installation DVD
valid users = "username" (User must have a samba password "smbpasswd -a
'Username'")
writeable = no
browseable = yes
read only = yes
```

Restart the samba service

```
sudo service smb restart
```

Installing an OS on iSCSI target disk

Choose your operating system by clicking on the tab

- Windows 10
- Windows 8
- Windows 7

This has been tested using VMware Virtual Machines. I have not tried on physical hardware.

Windows 10

PXE Setup

Before we start the install I am going to setup the post install pxe entry and ipxe script so we can reboot and finish the installation with out having to shutdown the system. Do not boot to this pxe entry for the first part of the installation.

```
sudo nano /tftpboot/iscsi/win.iscsi
```

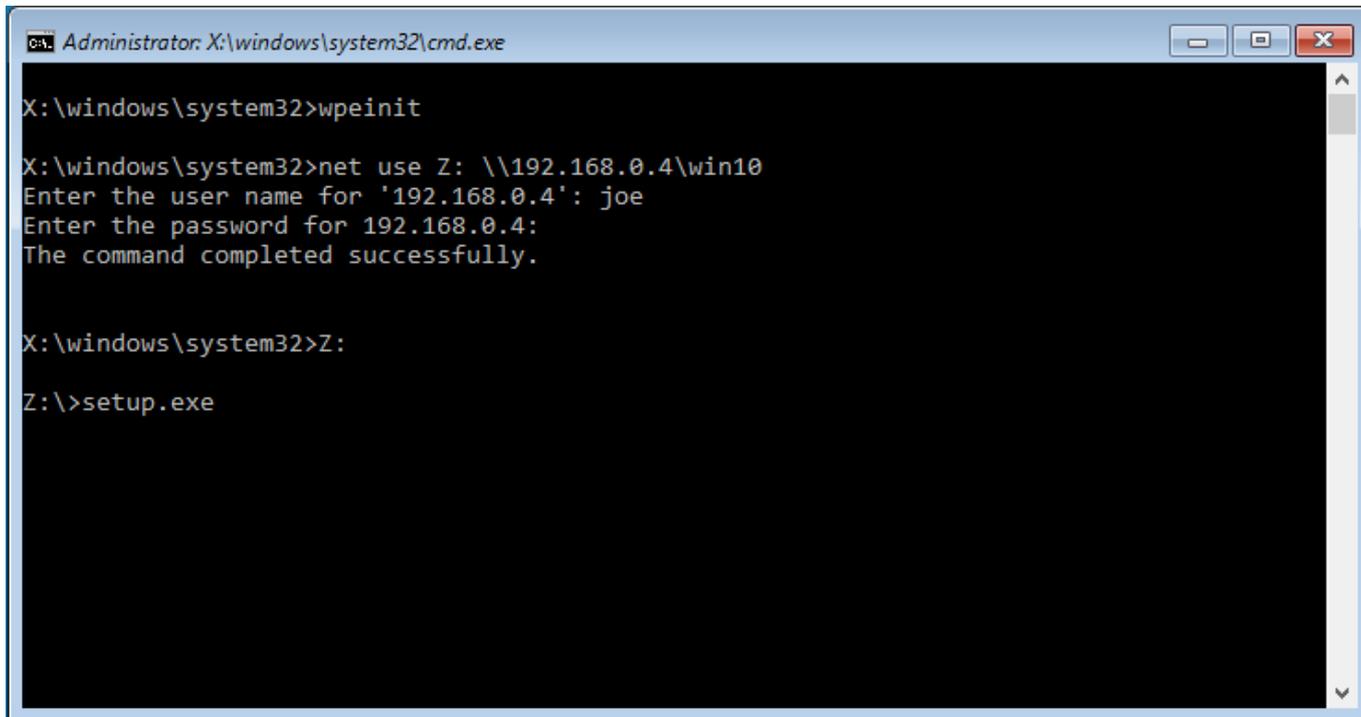
```
#!ipxe
dhcp
set gateway 0.0.0.0
set keep-san 1
sanboot iscsi:192.168.0.50::::iqn.2014-07.com.it-joe:windows
boot
```

```
sudo nano /tftpboot/prelinux.cfg/default
```

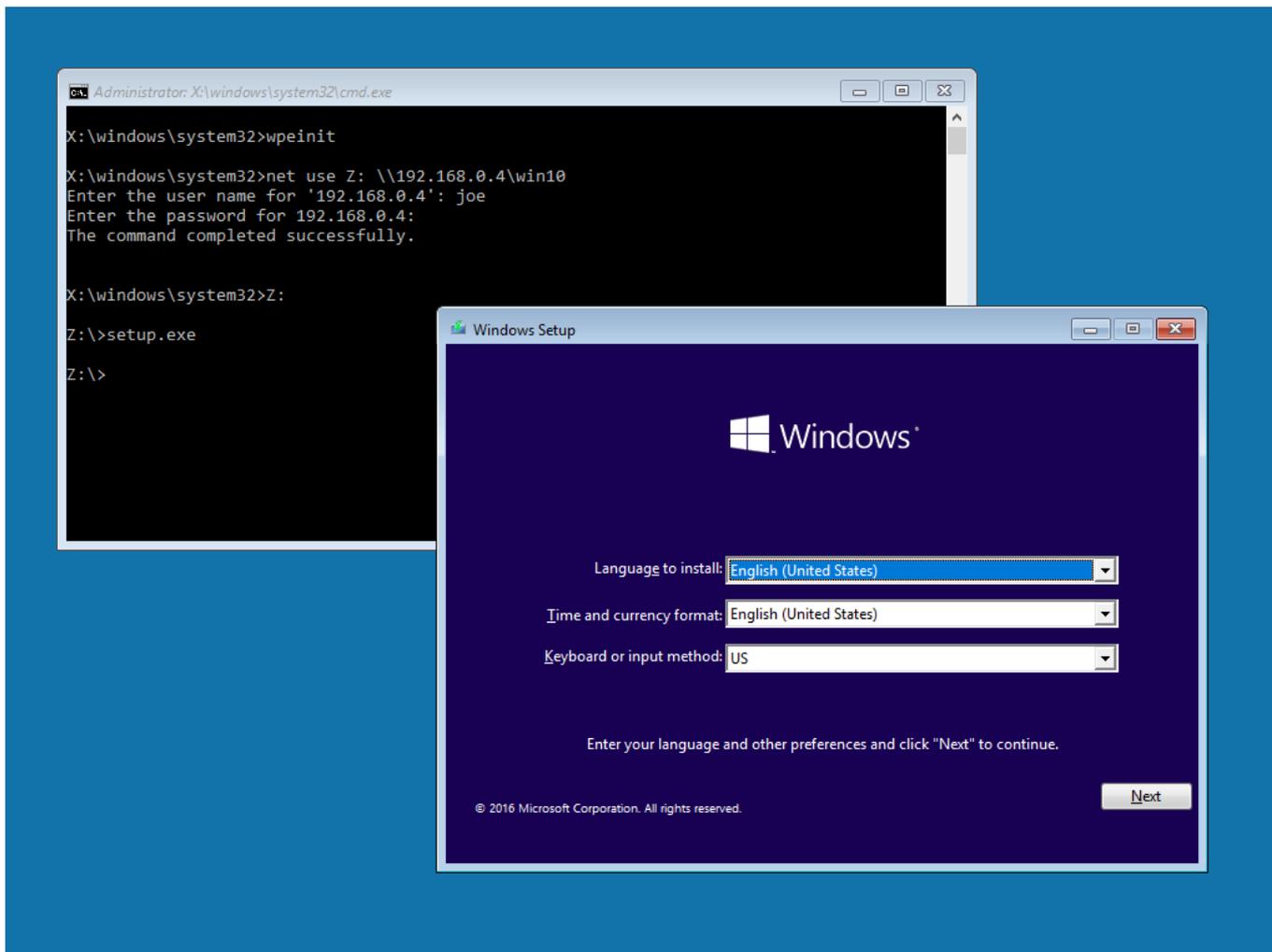
```
LABEL Windows 10
MENU LABEL Windows 10
KERNEL ipxe.lkern
INITRD iscsi/win10.iscsi
```

Installation

Now, go ahead and boot to the "Windows Install" PXE boot option you created. This will boot to WinPE where you will proceed to mount you samba share and execute the setup.exe on the share. I noticed the physical hard drive requirement for Windows 10 was hit or miss. When installing to a virtual machine I didn't need to have a physical(virtual) hard drive. However, when installing on a physical machine, I needed the physical drive or winpe would boot loop.



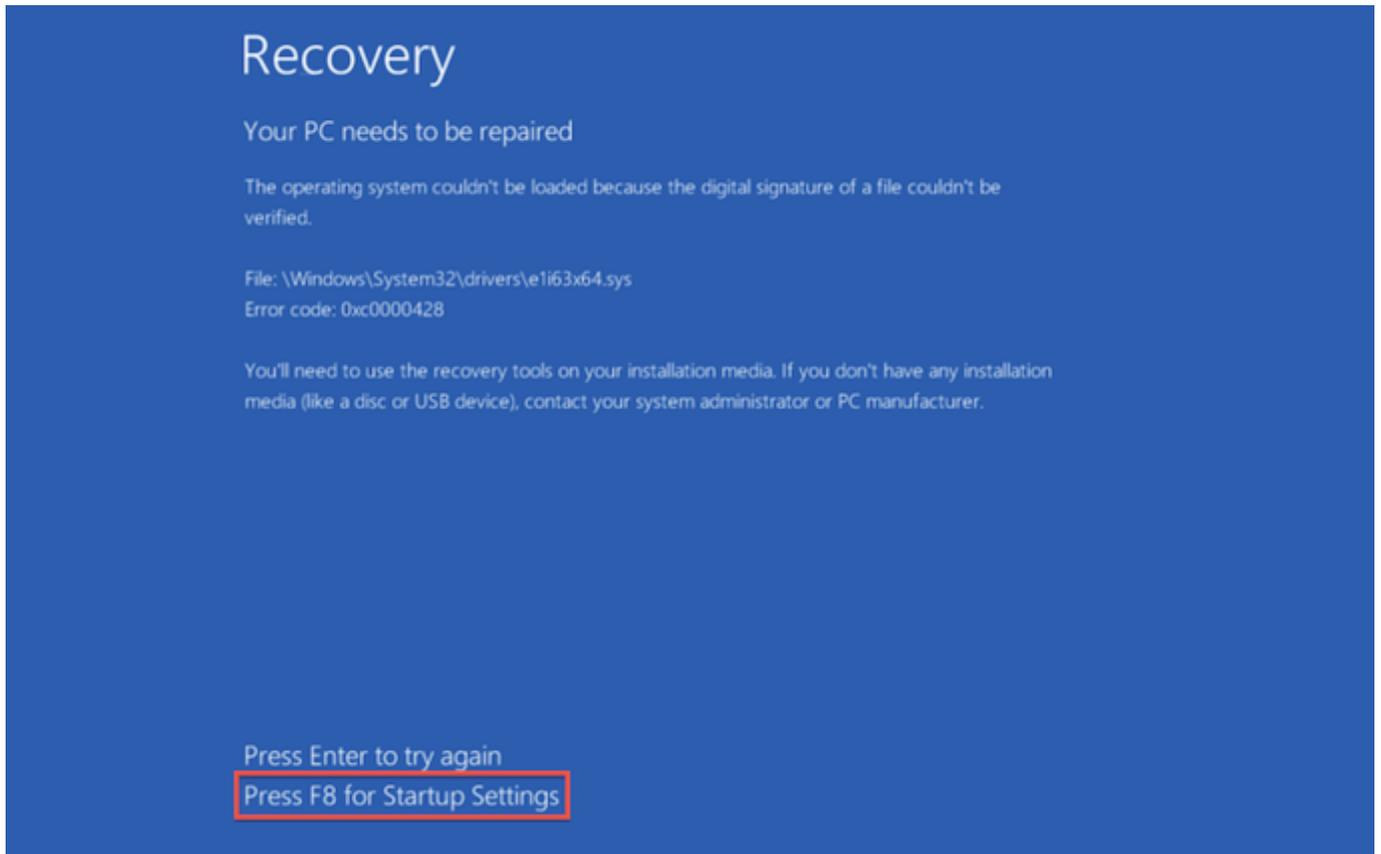
After navigating to Z: and executing setup.exe, continue with the Windows installation as normal. As long as you have a physical drive present, you should have no issues installing to the iSCSI drive. The Physical drive can be removed after the installation is complete.



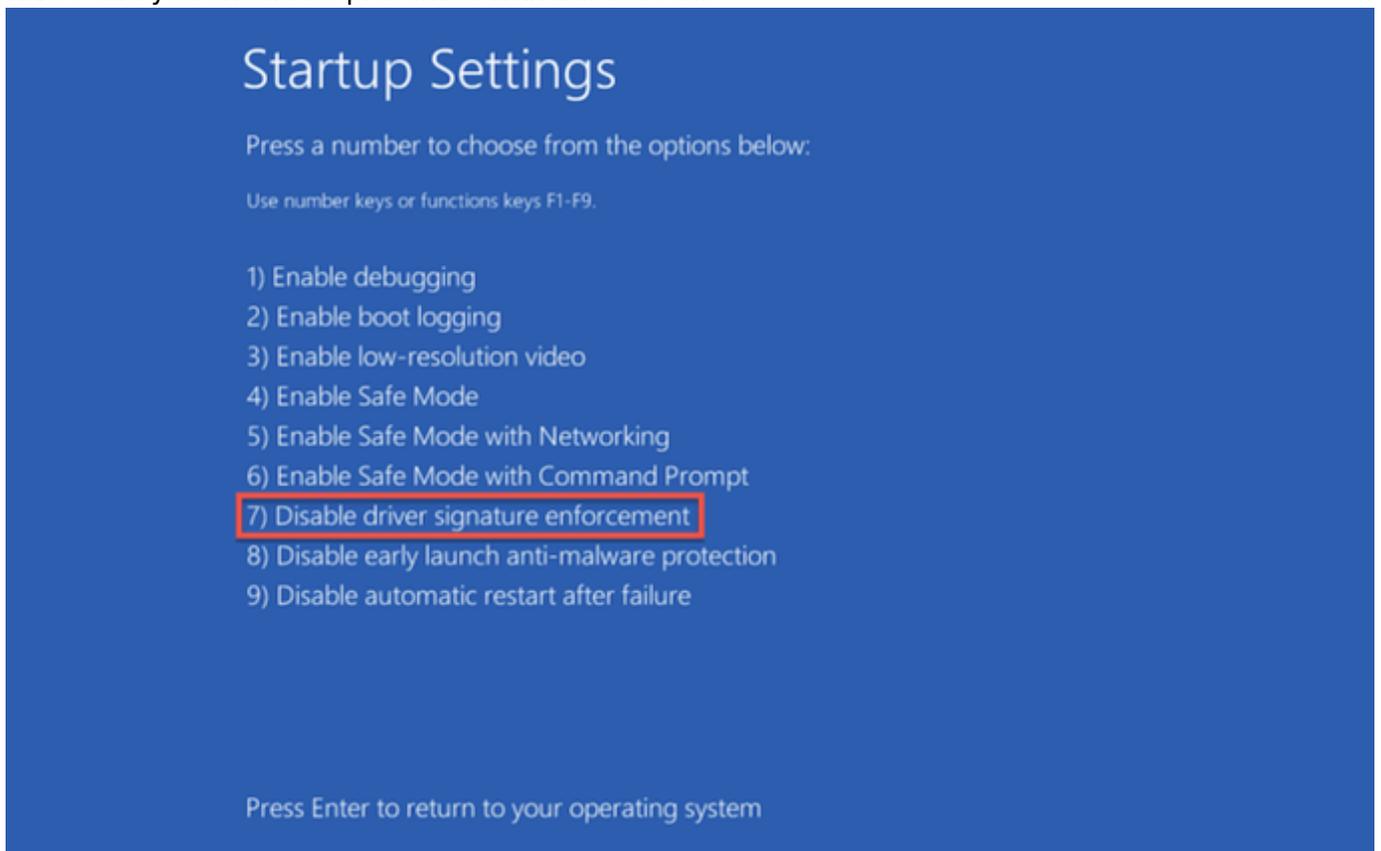
After the installation is complete your system will reboot and you will want to choose the "Windows

10" boot entry we created above.

I did not see this screen during my testing with Windows 10. However, if you do get to this point I assume these steps will still apply:



Hit F8 and you should be presented with this screen:



Hit F7 to disable driver signature enforcement.

Windows 8

PXE Setup

Before we start the install I am going to setup the post install pxe entry and ipxe script so we can reboot and finish the installation with out having to shutdown the system. Do not boot to this pxe entry for the first part of the installation.

```
sudo nano /tftpboot/iscsi/win.iscsi
```

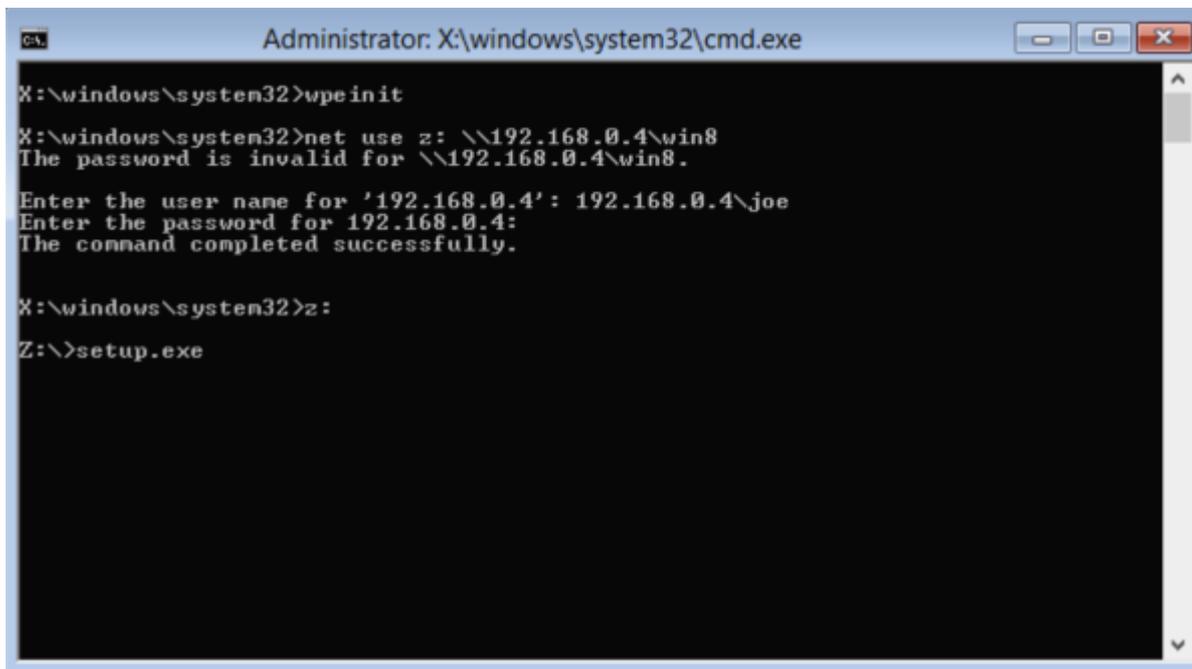
```
#!ipxe
dhcp
set gateway 0.0.0.0
set keep-san 1
sanboot iscsi:192.168.0.50::::iqn.2014-07.com.it-joe:windows
boot
```

```
sudo nano /tftpboot/prelinux.cfg/default
```

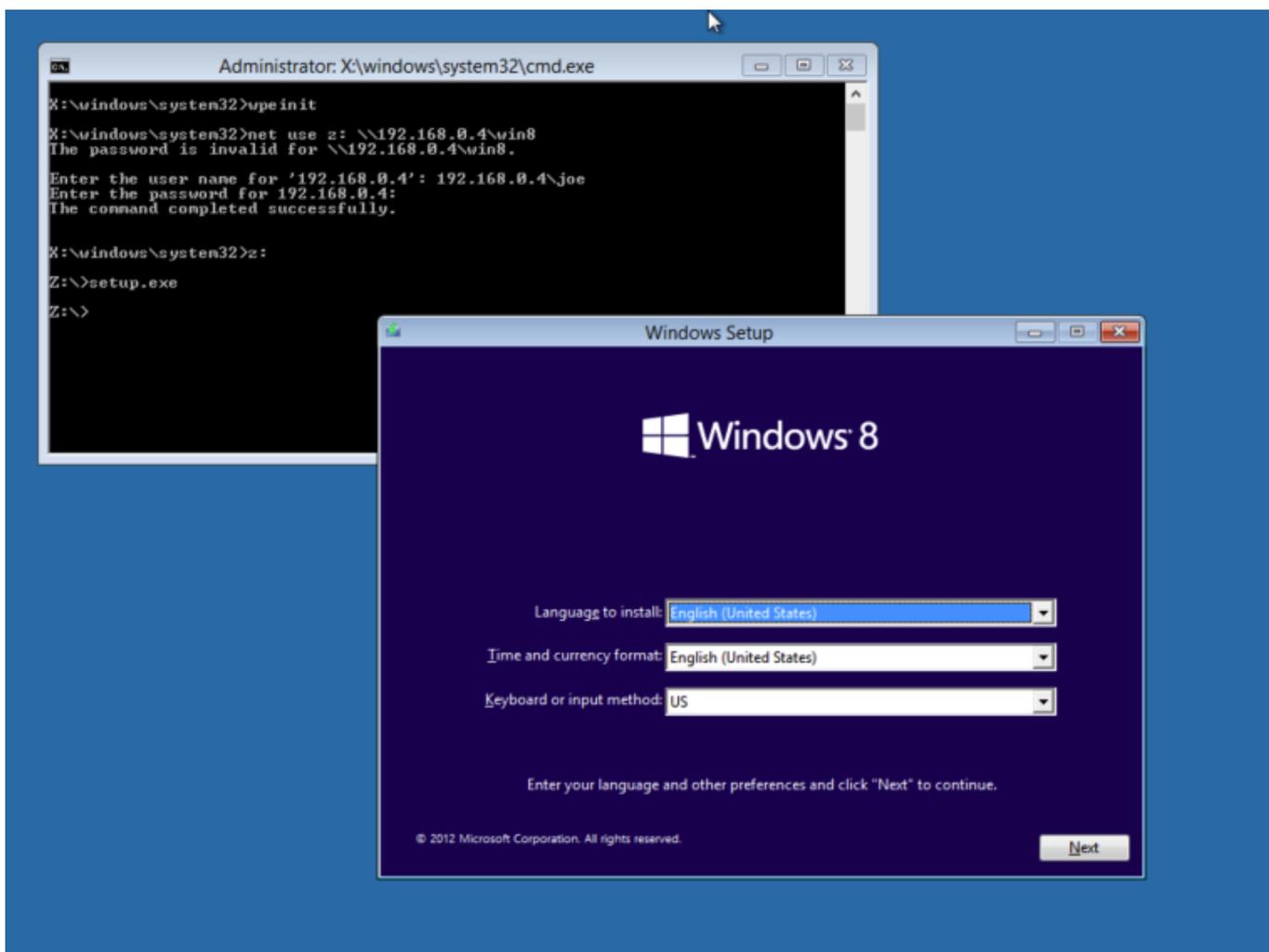
```
LABEL Windows 8
MENU LABEL Windows 8
KERNEL ipxe.lkrn
INITRD iscsi/win8.iscsi
```

Installation

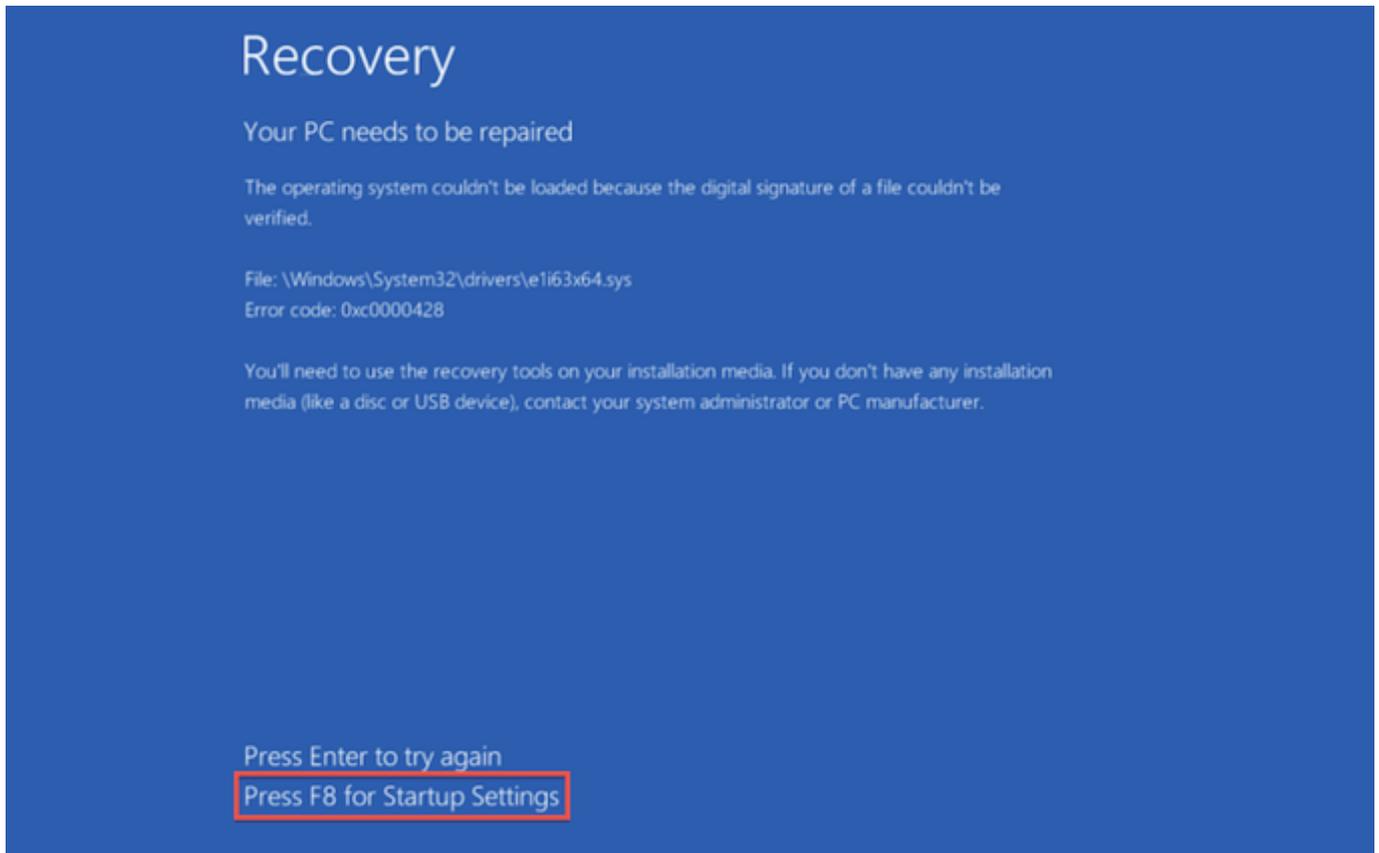
Now, go ahead and boot to the "Windows Install" PXE boot option you created. This will boot to WinPE where you will proceed to mount you samba share and execute the setup.exe on the share. I noticed the physical hard drive requirement for Windows 8 was hit or miss. When installing to a virtual machine I didn't need to have a physical(virtual) hard drive. However, when installing on a physical machine, I needed the physical drive or winpe would boot loop.



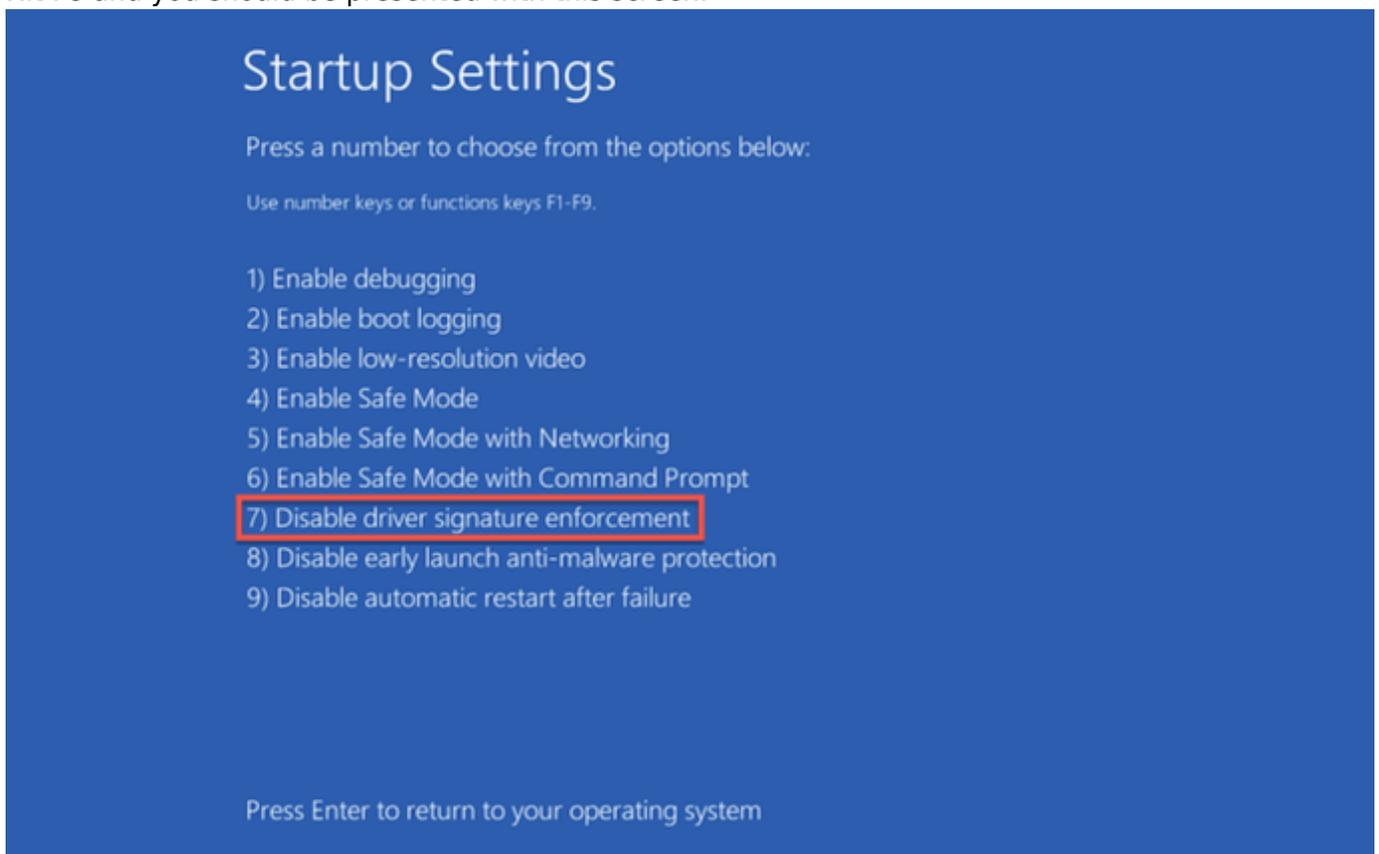
After navigating to Z: and executing setup.exe, continue with the Windows installation as normal. As long as you have a physical drive present, you should have no issues installing to the iSCSI drive. The Physical drive can be removed after the installation is complete.



After the installation is complete your system will reboot. At this point you will want to choose the "Windows 8" boot entry we created above. If your system boots to a recovery screen like this:



Hit F8 and you should be presented with this screen:



Hit F7 to disable driver signature enforcement. Now Windows will ask you a few questions and finish setting up Windows 8 for first use.

Windows 7

PXE Setup

Before we start the install I am going to setup the post install pxe entry and ipxe script so we can reboot and finish the installation with out having to shutdown the system. Do not boot to this pxe entry for the first part of the installation.

```
sudo nano /tftpboot/iscsi/win.iscsi
```

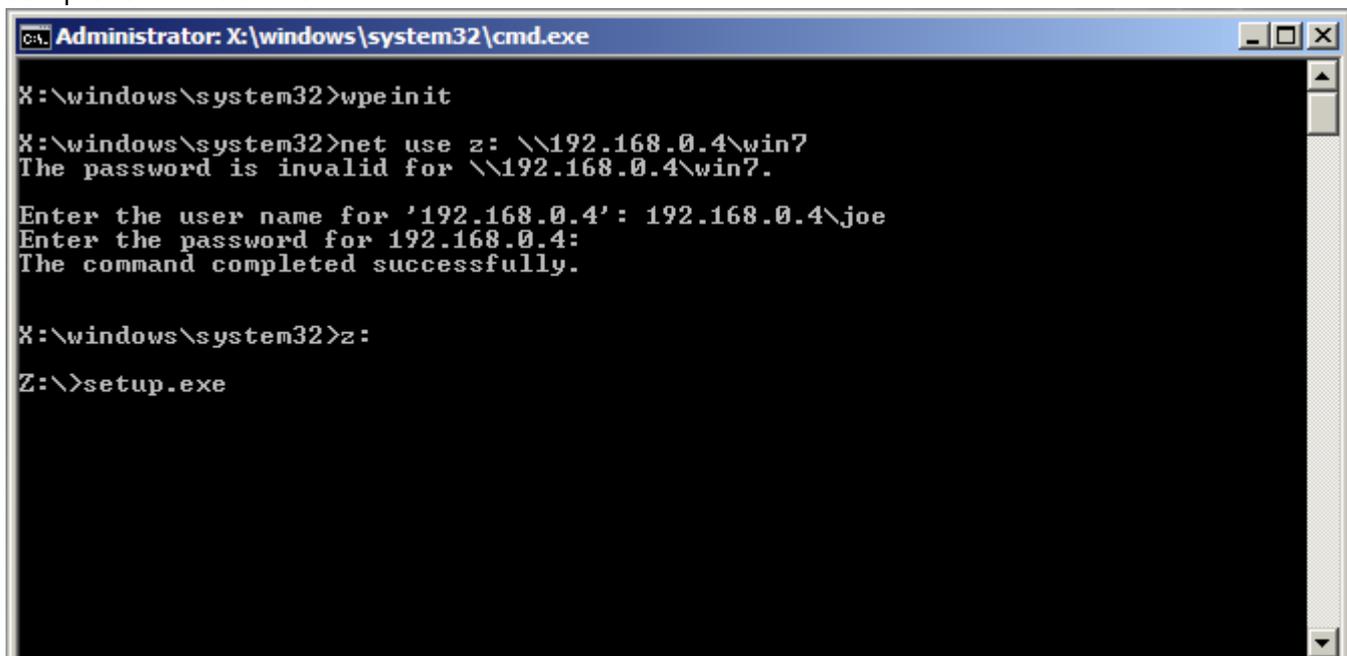
```
#!ipxe
dhcp
set gateway 0.0.0.0
set keep-san 1
sanboot iscsi:192.168.0.50:::iqn.2014-07.com.it-joe:windows
boot
```

```
sudo nano /tftpboot/prelinux.cfg/default
```

```
LABEL Windows 7
MENU LABEL Windows 7
KERNEL ipxe.lkrn
INITRD iscsi/win7.iscsi
```

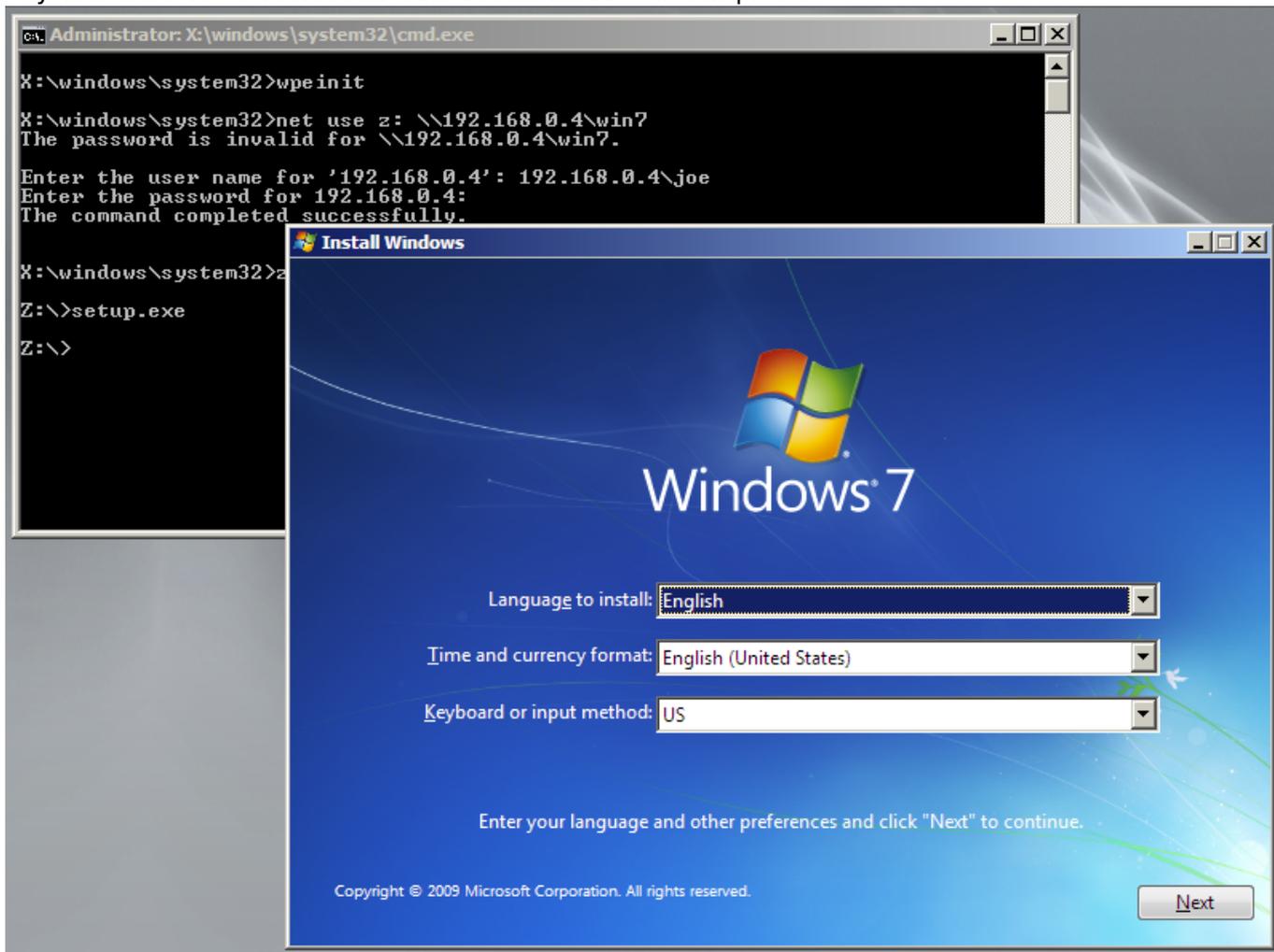
Installation

To start the installation process, go ahead and boot to the “Windows Install” PXE boot option you created. This will boot to WinPE where you will proceed to mount you samba share and execute the setup.exe on the share.

A screenshot of a Windows command prompt window titled "Administrator: X:\windows\system32\cmd.exe". The window shows the following commands and output:

```
X:\windows\system32>wpeinit
X:\windows\system32>net use z: \\192.168.0.4\win7
The password is invalid for \\192.168.0.4\win7.
Enter the user name for '192.168.0.4': 192.168.0.4\joe
Enter the password for 192.168.0.4:
The command completed successfully.
X:\windows\system32>z:
Z:\>setup.exe
```

After navigating to Z: and executing setup.exe, continue with the Windows installation as normal. As long as you have a physical drive present, you should have no issues installing to the iSCSI drive. The Physical drive can be removed after the installation is complete.



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