

Radified Guide to Norton Ghost

A Tutorial on How to Create & Restore Images



This guide is the site's single [most requested](#) feature [downloaded ~1K times each day]. Users of Ghost from all over the world have contributed to the insights it contains, and its popularity continues to grow.

When you realize how much time & misery Ghost's supernatural **disaster recovery** features can save you, you'll understand why this is one program you shouldn't be without.

Discover for yourself why so many people include Ghost on their list in response to the question: "*If you could only have 10 programs...?*"

Update: 26aug2002 - Symantec releases **Ghost 2003**. This new version offers a Windows-based interface. Prior to v2003, you had to boot to DOS in order to create or restore an image. Being able to configure Ghost from Windows makes the program much more user-friendly. The official Symantec press release is [posted here](#). **PCWorld** reviews Ghost 2003 [here](#). They still claim it's for "power users only" tho. See [here](#). In particular, notice where they say, "*The program is saddled with a confusing manual, lousy Web support, and phone support that costs \$30 per incident.*"

That's why this guide has become so popular. It teaches you everything you need to know .. with language that's easily understood. That's because it was written by someone who knows how confusing Ghost can be [me]. With v2003, Ghost adds support for DVD burners. It also supports both USB 2.0 & Firewire drives. Best of all, Ghost now allows you to save/write images directly to NTFS partitions. [See here](#).

This guide was designed for Ghost v2002, which is configured from DOS. The concepts presented here still apply for v2003, which is configured from Windows, making the program easier to use. If you know how to use v2002 [DOS based], you'll know how to use v2003 [Windows based]. The main differences between v2003 and earlier versions is that now you don't need a Ghost boot floppy in order to CREATE the image. You only need the Ghost boot floppy to RESTORE an image .. if your system won't boot, that is .. which is usually why you restore an image.

As mentioned earlier, you can also write images directly to NTFS partitions. Previous versions of Ghost would only write images to FAT32 partitions. This is because Ghost works from DOS, and DOS does not support the NT file system [NTFS]. For this reason, users of Ghost [prior to v2003] used to keep at least one FAT32 partition on their system, in order to store/receive their images. With v2003, this is no longer necessary. Yet I still recommend you dedicate at least one FAT32 partition to store/receive your Ghost images, since FAT32 is *natively* supported by DOS, and Ghost works from DOS.

After you configure Ghost 2003 in Windows, it will automatically reboot to DOS for you, and create or restore your image. Symantec somehow designed Ghost so it can now write to NTFS partitions from DOS [even tho DOS does not support the NT file system]. I have used Ghost 2003 with NTFS drives and it really works .. both writing images to, and restoring them from. For your hypertext convenience, this Ghost guide can be found at any of these fine Radified URLs:

- [\[http://ghost.radified.com/\]](http://ghost.radified.com/)
- [\[http://ghost.radified.com/ghost_1.htm\]](http://ghost.radified.com/ghost_1.htm)
- [\[http://radified.com/Ghost/ghost_1.htm\]](http://radified.com/Ghost/ghost_1.htm)

The guide contains **9** pages that are organized like so:

- **[Page 1] - Intro:** you are here.
- **[Page 2] - Quick start:** for the *ready-fire-aim* type of person, who wants to jump right in & begin imaging right away.

- [\[Page 3\]](#) - **Caveat**, You need a second hard drive, Bootable Ghost CDs, Dead drives, Data integrity, Imaging to NTFS drives.
- [\[Page 4\]](#) - **Get your copy** of Ghost, Ghost runs from (true) DOS, RAID arrays, Knowledge base, Switches & Error codes.
- [\[Page 5\]](#) - **Pre-imaging** info, Norton Ghost boot floppy.
- [\[Page 6\]](#) - **Create** a Ghost image.
- [\[Page 7\]](#) - **Restore** a Ghost image.
- [\[Page 8\]](#) - Disk & partition **cloning**, Creating automated batch files.
- [\[Network Addendum\]](#) - Imaging across a **network**.

Introduction

Let's get busy. Norton Ghost is a small yet mighty program. Weighing in at less than 1MB, the pint-sized executable [ghost.exe for v2003 or ghostpe.exe for v2002] fits easily on a floppy disk containing [bootable system files](#). **Norton Ghost** works its seemingly supernatural mojo by creating what's called an **image**. An image is nothing more than a techie term for a special **type of file** .. usually a rather *large* file .. depending on how much **data** is contained on your boot drive/partition (where Windows resides) .. or whatever drive/partition you select as the **source** for your image [\[screen shot\]](#).

Don't confuse a **Norton Ghost image** with a jpeg, gif, or other conventional type of graphic *image file*. The so-called 'image' that Ghost creates is similar to a 'snapshot' taken of the contents of **either your entire hard drive, or an individual partition** (you decide which) [\[screen shot\]](#).

The combination of the **small program** file (ghost.exe, which can be stored on a bootable floppy, or on a bootable CD) .. and the **large image** file [file_name.gho, stored on a drive/partition *other than* the one you plan to restore, or on a CD, or on a series of multiple "spanned" CDs if your image is larger than 650MB, or on a DVD] .. gives you the ability to restore your system to an earlier, working configuration .. **in minutes!** .. no matter how badly you screw things up. Sound rad? It is!

If for some reason (**any** reason), your system won't boot, and you can't figure out what in tarnation went wrong .. simply pop in a boot floppy [or bootable CD/DVD] and hit the reset button .. boot to Ghost [\[screen shot\]](#) .. tell Ghost (navigate to) where your back-up image is stored [\[screen shot\]](#) .. and tell it which drive/partition you want to restore [\[screen shot\]](#) (colloquially referred to as **point & shoot**). Then answer 'Yes' to the **overwrite** question [\[screen shot\]](#) that asks if you're really sure you know what the heck you're doing. About 5 or 10 minutes later, your system is returned to normal working order. **Works like magic.**

The more things you **do** with your PC .. the more new things you **try** .. the **longer** it takes to reinstall your operating system & programs (every last one) .. digging up & re-entering all those lengthy serial numbers .. finding & updating patch versions .. loading device drivers .. reconfiguring system settings .. (it makes my head hurt just *thinking* about all this) .. the more you'll appreciate the **industrial-strength back-up protection** that Ghost offers.

It takes me the better part of a week to install my operating system, all my [software programs](#), and configure system settings .. if I hustle. Personally, I don't have that kind of time to waste .. cuz something in Windows crapped out .. which is why I appreciate the **nuclear-grade back-up protection** that Ghost provides.

It gives you the ability to 'undo' (so to speak) any mistake/glitch/conflict .. no matter how nasty or gnarly .. even if you don't know what caused the problem. The ability to restore my system .. no matter what went wrong .. gave me the [moxie](#) to try things I'd previously found intimidating. Ghost neutralizes any trepidation you might encounter when experimenting with new software or hardware .. from attempting anything that might [generate quirky conflicts](#) .. or hose your system outright.

If you'd like to build your repertoire of [digital skills](#), Ghost is your best friend. It should be the first tool included in your expanding bag of digital tricks .. cuz it provides a safety net as you scale the [steeper slopes](#) of the digital learning curve .. to [new heights](#) .. previously attained by only the most determined & resilient technophiles.

Since learning what I share here, Ghost has **never let me down**. Once I learned how to create & restore an image of my boot drive/partition, I quickly came to the point where there's nothing I wouldn't try .. cuz I knew, if need be, I could always restore my image, and return to an earlier, working configuration .. and try again .. with the knowledge of what doesn't work .. of what *not* to do. I became fearless.

Given enough chances, *anyone* can get it right. Ghost gives you **as many chances as you need**. There's *no limit* to the number of times you can restore a particular image.

Norton Ghost has made a monster difference in [what I've been able to accomplish with my PC](#). It provides an option in otherwise hopeless situations. I wouldn't have taken the time to write this guide if it wasn't so rad. Want to know more about this pint-sized digital savior?

Quick Start

This guide is intended for Ghost **novices** .. for noobies with **no prior imaging experience**. Symantec states that Ghost is designed for the *technically savvy* .. and for the *technically proficient computer user*. This is probably cuz a seemingly innocent misstep can cause you to **lose** all your data. Their latest [warning](#) says: "*Caution: Norton Ghost 2003 is a powerful utility program that performs complex operations on your computer. Use this product carefully as some operations are data destructive.*"

Like most powerful things, Ghost can be dangerous in the wrong hands. But there's no need to fear. I'll show you where the **danger** lies, and steer you clear of the bottomless **overwrite** pit [\[screen shot\]](#). This guide makes it so easy to create & restore Ghost images that it's scary. The heart of this guide is contained in the [page addressing image creation](#), where I take a detailed approach. But if you're the *ready-fire-aim* type, who prefers a bare-bones, stripped-down version, and want to get busy imaging right away .. the way to use Ghost goes like this:

[Note: the following steps are designed for Ghost 2002, which is configured from DOS. If you're using Ghost 2003, which is configured from Windows, look them over. Once you understand them, it will become obvious how to apply them to v2003, which is easier to use. The concepts remain the same. Only the interface changes.

Note also, that the following steps are designed to use Ghost from **DOS** using a **Ghost boot floppy**. While it is now **possible** to configure Ghost from Windows, it is still **recommended** that you use the DOS-based method from a Ghost boot floppy, since it is a more reliable and sometime necessary (if Windows won't boot).]:

To **CREATE** an image:

Launch the program [\[screen shot\]](#) from (true) DOS.

Select your imaging **options** (this step is not necessary) [\[screen shot\]](#)

Select **Local -> Partition -> To Image** [\[screen shot\]](#)

Select your **source drive** [\[screen shot\]](#)

Select your **source partition** [\[screen shot\]](#)

Select your **image destination** [\[screen shot\]](#)

Name the image file [\[screen shot\]](#)

Select **compression** [\[screen shot\]](#) (*Fast* is good)

[For Ghost v2003, you find the Compression options in the *Advanced Settings*]

Begin **dumping** [\[screen shot\]](#)

After image dumping is complete [\[screen shot\]](#), you should get the message: *Dump Completed Successfully* [\[screen shot\]](#).

If successful, **Check** the image [\[screen shot\]](#) to verify its validity and integrity.

Quit [\[screen shot\]](#).

To **RESTORE** an image:

Select **Local -> Partition -> From Image** [[screen shot](#)]

Select the **drive** where the image is stored [[screen shot](#)]

Select **image file** (*.gho) [[screen shot](#)]

For Ghost v2002, you'll need to enter your **license number** to restore image [[screen shot](#)]

Select the **destination partition** to be restored/overwritten [[screen shot](#)] Confirm the dreaded **overwrite** question [**Make sure you know what the heck you're doing here!**] [[screen shot](#)] and let 'er rip!

The main difference between *Create* and *Restore* is the **To** and **From** selection. If you want to image to/from an **entire hard disk** instead of an individual partition, select '**Disk**' instead of 'Partition'.

You won't be able to tell the difference between your original system configuration (at the time of image creation), and one restored from a Ghost image - at least, I haven't been able to. And I've run systems that were based on images of systems based on images of...

An Important Limitation

This might be a good place to mention a particular **limitation** of Ghost. Ghost will not let you write an image to [destination] the **source** partition/disk. In other words, your source partition cannot be the same as your destination partition. Put yet another way, if you only have one physical hard drive in your system, you'll need at least two partitions on that single physical hard drive in order to use Ghost.

You can also write images to either a CD or DVD burner. But, if you have no burner, and you only have one physical hard drive, and you only have a single partition [usually labeled the C: drive] on that hard drive, you won't be able to use Ghost. See my [Guide to Partitioning Strategies](#) for more info along these lines.

If you think about it for a moment, you'll see why Ghost won't let you do this: as Ghost wrote to [destination] the source partition, the source partition would continue to fill up, even as Ghost was creating the image file. Sooner or later, you would run out of space on that drive/partition. If you don't understand this concept, don't worry about it. All you need to know is that your destination needs to be different from your source. For those of you who want **more imaging information**, let's take a closer look at the program.

GHOST is an acronym that stands for **General Hardware Oriented System Transfer**. This wonder program was developed by a company named [Binary Research](#) - based in [Auckland, New Zealand](#). Symantec bought BR in the summer of '98 for US\$27.5 mil. I read great things about BR. The purchase by Symantec was considered controversial, with some speculating the buy-out would ruin the small company. Speaking of which, the nice folks at [Binary Research](#) [who originally developed Ghost] asked me to mention their training course for the [Corporate version](#), which contains more bells & whistles than the average home user needs:

Rad, I'd like to compliment you on your Ghost guide. I can see how it would help the new or occasional user. However, I was surprised there weren't more contributions from users of the Network version. [[Corporate Edition v7.5](#)]

I'd like to mention that we offer a [training course for the Corporate Edition](#). As the original developers of the software, we also developed courseware. Since 1999, we've conducted **training workshops** at our Milwaukee location, as well as other locations in the US, Canada [and UK](#).

If you ever receive requests for info on Ghost training courses, we'd appreciate you passing along the details of our workshops. Heck, if you'd mention it on your site, we'd appreciate it even more! Thanks for the help you provide to users of Ghost.

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With a Ghost image, you have **everything you need** [in >>[compressed](#)<< format] to restore your system (either an individual partition or an entire hard drive) to its original, working condition .. should it ever fail .. for whatever reason. Just knowing that can help you sleep better at night.

You'll find that Ghost is particularly sweet if you've ever had to reinstall your system, while talking on the phone to some tech support guy .. especially if you get one who's having a bad hair day .. or someone who thinks you're a complete idiot .. cuz you can't find a certain floppy disk that Mr. Tech Support insists you must have stored somewhere. I've found that Ghost takes on an particularly supernatural glow after about the 3rd time you hear a tech support guy say, "Golly, I've never heard of *that* problem before .. looks like we're gonna have to reformat that hard drive again."

Once you realize how simple it is to restore your system, you'll become **bolder** with your PC. The dialogue box that asks, "*Are you really sure you wanna delete this file?*" no longer makes me sweat. Many guys who know how to use Ghost report that chicks find them irresistible, and that women want to bear their children. =) But before you start thinking this sounds too good to be true, I need to issue a **caveat**.

Caveat: Need Two Hard Drives

If you're thinking all this disaster-recovery mumbo-jumbo sounds too good to be true .. you're right! Here's what I mean: You'll **need a second hard drive** (or CD/DVD burner) to take **full advantage** of Ghost's supernatural back-up protection. Let me explain.

If you only have a **single** hard drive .. and that drive **dies** .. or develops serious **media problems** (begins to die) .. or is unusable in any way .. for whatever reason .. you'll be **unable to use that drive** to restore the image file that is stored on it. If you think about it for a moment, it will make sense. It's kind of like driving around with a flat spare tire: you won't be able to use it when you really need it. But .. with a Ghost image stored on a **second** (physical) hard drive, if your boot/system drive ever dies ([it will](#)), you simply replace the dead drive (usually under warranty) with a new one, and restore the image from the second drive.

I have done this a few times already. From the time the FedEx man hands you the new drive, you can be back up and running within **30** minutes (if you hustle). If you'd had been there the last time I did this, when it was all said and done, and the system was back up & running, you'd have heard me exclaim (in my best [Muhammad Ali](#) impression), "I'm a baaaaad man." =D If minimal downtime is important to you, you should keep a spare drive tucked away in a drawer, so you can use it to replace a dead drive on the spot, and deal with the warranty formalities later.

Bootable Ghost CD

A **CD** containing your Ghost image will *also* solve the dead drive problem. Recent versions of Ghost make it easy to burn your images to CD and create bootable CDs. You used to have to do it [this way](#) (SatCP) back in the day. I normally don't burn my images to CD-R, but I burned one, just so I could capture the screen shots to include in this guide. I'm reluctant to discuss things for which I have little practical experience, but many Ghost users have assured me that a bootable Ghost CD is reliable .. or, as one reader from Argentina puts it, "No problema, Señor." Symantec posted a long list of [supported burners here](#) (scroll down).

Some users report success with burners that *aren't* even included on the official Symantec list. Even if your burner is *not* included on the official Symantec 'approved' list, you can always create your images using the switch '**ghostpe.exe -split=640** -

auto' to dump your images to your hard drive in a size that is small enough to fit on a CD-R. You can later burn these images to CD-R using your favorite burning program (from Windows). You can even use [SatCP's guide](#) to make your CD(s) bootable, or find some more help at [bootdisk.com](#).

After you tell Ghost that you want to create an image [[screen shot](#)], you select your burner as the destination for the image [[screen shot](#)]. After you select compression [[screen shot](#)], **Ghost will ask you** if you want to copy a bootable floppy to the CD-R [[screen shot](#)]. Then it will ask you if the floppy disk is in the floppy drive, so you need to have your bootable floppy disk handy. Then it will ask you if you want to proceed with the backup to CD-R [[screen shot](#)]. Lewis Crowley from Long Island writes to say:

I use Ghost to create images of my system to CD for backup. It works well. Some observations. You need **two different boot floppies**: one to **write** the image (without the DOS CD drivers; I guess it works by 'magic') and another with the drivers, which are used to **restore** the image.

At first, I went crazy trying to use the same floppy for both. I found that Ghost won't grab the MS-DOS files from my floppy unless I use the DOS format command **a: /s** (if I use the control panel, it won't work). Either I'm crazy or the DOS command puts the files in a particular sector on the floppy.

Creating a boot CD is easy. When you create the CD, tell Ghost you want it to be bootable, put your boot floppy in the A drive and Ghost does all the work. The only thing you have to do is change your BIOS configuration (or use a function key, depending on your particular motherboard) so you boot from the CD. Your computer will boot with mouse support and the standard Ghost program appears.

Jason Silver from Nokia says Ghost detects the CD-R's media's size/capacity and adjusts automatically. When he changed from 650MB media to 700MB media, Ghost automatically used the extra 50MB. I read that Symantec instructs you **not to use** the -span or -split switches when imaging directly to a CD burner. The appropriate switch(es) will be used automatically.

If you have **a lot** of data on your boot drive (more than 3 or 4 gigs worth), burning your images to CD-R or CDR/W discs may take a lot **longer** than writing them directly to a hard disk, depending on the speed of your burner, of course (I still have an old **8X** dinosaur). For example, my system writes images from one [SCSI hard drive](#) to another at a rate of ~**1000MB/min**, whereas I can only **burn** images at a rate of ~**80MB/min**. Imaging to a hard disk goes **12** times faster for me. If you have **trouble writing your CDs**, I have three links that you might find helpful: [Link #1](#) (which boot discs) [Link #2](#) (how to replace DOS files), and [Link #3](#) (cannot see burner in Ghost).

If you have a laptop with **no floppy drive**, you will run into problems creating a bootable CD, because Ghost will ask "Do you want to make this CD bootable". And then it will ask you to put a bootable floppy disk in your floppy drive. If you run into this problem, [see HERE](#) for a possible solution. Also check out Bart's Bootable Ghost Restore CD-ROM: "[ELGHOST](#)" (link from Matt Reason). Also, this link might help: [Ultimate Boot CD](#). Update: check out [this thread](#), too. The next feature that Ghost needs, but does not yet have, is the ability to create bootable CDs on systems which do not have a floppy drive. Many laptops no longer ship with floppy drives. It can be a royal pain to create a bootable Ghost CD if your system does not have a floppy drive.

Update 05feb2004: I'm hearing [reports](#) that Ghost is *automatically* making CDs bootable if your laptop does not have a floppy disk drive. I suggest you try creating/burning an image to CD and see if the first disc will boot, before jumping through any digital hoops. .

Also, if you have SCSI optical drives [like me, I have a [Plextor](#) CD-ROM & burner], you will need to create a special boot diskette to be able to use your optical drives with Ghost. This is weird, because I have no problems using Ghost with my [SCSI hard drives](#). It's only the SCSI **optical** drives that I need the special boot diskette for. If you have a Tekram [DC-390U2W](#) or a [DC-390U3W](#) SCSI adpater, I have files that will work for you. I posted them on my [Downloadable Files page](#). [Special thanks to *Stan the Man* for whipping those up.]

CDR/W Discs Less Reliable?

I've heard that the media used in CD-R/W discs (crystals) is **less reliable** than that used in CD-Rs (dye). I have no hard evidence to support this, but if you have the option to use either, I suggest using CD-R discs. CD discs are [so cheap](#) these days that cost should not be an issue. For me, **image integrity** is the single **most important** consideration. I don't want *anything* to compromise the integrity of my images. Next in importance for me is the **time** it takes to create an image. Since I multi-boot, and have two PCs to image, I've become sensitive to how long it takes. Now that burners are so fast, this is probably less of an issue for most of you. Still, imaging to a hard drive goes **faster** than to a burner.

If you're [dual- or multi-booting](#) different operating systems, you may also become sensitive to the time factor, cuz you'll probably be creating more than one image each imaging session. Realize too, that larger images require more discs, and the more discs your image requires means you have a greater chance of losing your image due to disc corruption .. because you need **all** discs to restore an image. An image that needs 5 CDs [like mine] has a 5-times greater chance of going bad than an image that merely requires one disc. It only takes one bad apple [disc] to ruin your image. Still, I haven't heard of any problems with this.

Dead Drives

Putting the risk of a **dead hard drive** in perspective: of the **20** or **25** times that I've had to restore images of my boot partition, only **two** (or maybe three?) were **due to drive failure** (hardware related). Most of the time, problems were due to something **software** related, usually with **Windows**, such as bad drivers, or some new software that I loaded, or an installation gone bad.

Hard drives die more frequently than we'd like to believe. The worst part is that they always die at the **most inopportune time** (trust me, hombré) .. as [Murphy himself](#) will gladly attest. In fact, the reason that I began researching back-up solutions, and subsequently discovered Ghost, is because I had a hard drive die on me (and had squat for back-up). The back-up lesson can be a painful one to learn. It was for me.

It bears repeating: if you have only one hard drive, and that drive dies, your 'back-up' image will die with it. Putting it bluntly: **you're screwed**. Nothing but an image (on a separate physical drive, or CD/DVD) can restore your system if your boot drive dies. There are many other back-up options (e.g. a *registry* back-up, Windows own *Back-up* and the newer *System Restore*), but **none** of these alternatives are as comprehensive as an image.

With the [prices](#) of hard drives [so cheap](#) these days, it's a crying shame not to have a second hard drive. I've even posted a [guide on how to use FDISK to partition & format a new drive](#) (thanks to the Doc), and an article containing [Partitioning Strategies](#) that you might also find helpful. A second drive is an especially good idea if you **dual-boot**. Then you can put one operating system on each drive .. and image to the opposite drive. Imaging goes **twice as fast** with two (physically separate) hard drives. While one drive is reading, the other writes. With two separate physical drives, the [read/write heads](#) don't have to jump back & forth .. like they do when the image **source** and **destination** partitions are on the same (physical) drive. I never image one partition to another on the same physical drive. It goes too slow.

Note that people usually use the term **hard disk** to refer to a separate physical hard drive, and they use the term **drive** to refer to *both* a separate physical hard drive *and* a logical DOS drive (partition) on the same physical hard drive .. so the terms can become confusing. I'll try to make myself clear, as to which I'm referring to. Ghost refers to separate physical hard drives as '**Disks**', and to individual logical DOS drives as '**Partitions**'.

Data Integrity

This might be a good place to address data integrity factors, cuz that's what Ghost is all about: the integrity of your data ..

especially the data contained in you boot/system drive. Things to consider:

- The [NTFS](#) file system [which supports journaling & is fault tolerant] is generally more reliable than FAT32 (see note #1 below).
- [SCSI hard drives](#) are generally more reliable than IDE drives. They are designed to run 24x7.
- [Cooled hard drives](#) are generally more reliable than those with no active cooling (fans).
- Storage drives are generally more reliable than **boot/system** drives, which do more work.
- Hard drives subjected to **physical shock** are generally *less* reliable than those subjected to none.
- **Multiple** back-up images are *always* more reliable than (only) one.

So, if you want to **maximize** your system's data integrity, use a [SCSI boot drive](#) mounted in a [hard drive cooler](#), formatted with the **NTFS** file system. Keep **multiple** back-up images on hand, stored on a non-system hard drive (also mounted in a drive cooler), and put your case in a place where it won't be subject to physical shock (usually on the floor, away from feet). If this type of info interests you, you might enjoy my piece on [PC Stability Factors](#).

The NT File System (NTFS)

Note #1: Ghost 2003 now allows users to write images directly to NTFS partitions. [See here for details](#). Note that there are (at least) two different versions of NTFS. For example, the version that comes with Windows 2000 (v5.0) is different from the one that comes with Windows XP (v5.1). See [here](#) for more details. Different versions of Ghost support different versions of NTFS. Ghost 2001 supports Windows 2000. Ghost 2002 supports Windows XP. Ghost 2003 supports *writing* images to NTFS partitions.

Versions of Norton Ghost prior to 2003 do not allow you to image/write images *to* (destination) **NTFS** partitions, cuz Ghost works from DOS, and DOS does not support the NTFS file system. You *could* however image *from* (source) NTFS partitions without any problems, but [prior to v2003] your *destination* had to be a **FAT32** drive/partition.

You could always **restore** NTFS images *to* **NTFS** partitions, as long as the image file was stored on a FAT32 partition. You can also always [clone \(copy\)](#) one NTFS partition or disk to another (NTFS partition or disk) with versions of Ghost prior to 2003. You can [read more about this here](#).

For this reason, many Ghost users who preferred to use the NTFS file system, formatted one partition on their non-boot hard disk as FAT32, and dedicate that partition/drive as a storage location solely for Ghost images. But this is no longer necessary with Ghost 2003. Yet I still recommend dedicating at least one FAT32 partition to store your Ghost images, since FAT32 is *natively* supported by DOS, which Ghost uses (works from). I don't want to confuse you with the different versions of Ghost and their capabilities of dealing with the NTFS file system. You merely need to know that Ghost 2003 has no problem working with NTFS drives .. except in the case made by Mike Watts, where he writes to say:

USB / External Drives

Even though Ghost 2003 supports both **NTFS** and external **USB drives**, it cannot do so at the same time. The DOS driver that finds and mounts the external drive cannot read **NTFS**, even though once you get into Ghost, you *can* see NTFS drives. Therefore, if you plan to create Ghost images that involve external USB hard drives, they should be formatted as **FAT32**.

[updated 05feb2004] - Judd writes to say that it *is* possible to create images on USB drives formatted with/as NTFS (contradicting Mike). But "it depends" .. on which USB protocol you have, and which version of Windows XP (Pro or Home). See [here](#) for details. If you have a Laptop with a USB 2.0 PCMCIA card and a USB 2.0 external drive, see [here](#) for **njb's**

detailed step-by-step post on how to get this set-up to work with Ghost. Next, let's get you your very own of copy Norton Ghost. [You can purchase Ghost for less than what [Drive Image](#) will cost you.]

Getting Your Copy

Symantec does not offer a downloadable demo of the [Home user](#) version, You can however, download a trail version (30 day?) of their [Corporate version here](#) (~38MB). Remember that the Ghost executable itself [ghost.exe] is less than 1MB, so much of this download is a waste of bandwidth. The *Corporate* version contains many extra features the average home user doesn't need or want.

The best way to purchase Ghost is with the *Professional Edition* of [Norton System Works](#) (NSW). Note that you need/want the **Professional** version of NSW, as the non-Pro version does *not* include Ghost. NSW Pro comes with Norton AntiVirus, Norton Utilities and a few other programs. I only use NU, NAV & Ghost. Don't install the rest.

Your best option is to search [Pricewatch](#) for "Norton System Works 2003 Professional" or "Norton System Works 2004 Professional". I would provide you with a deep link into the Pricewatch site, but I forget how to do that. After you find a price you like, check the reputation of the reseller at [resellerratings](#). Note that NSW 2004 Pro comes with Ghost 2003. You can also try eBay.

You can [download the manual](#) [Symantec FTP: 2.56MB] for NSW Professional. Note that NSW 2004 = v7.0, 2003 = v6.0; NSW 2002 = v5.0.

Ghost runs from (true) DOS

This is where Ghost 2003 brings big changes. You can now configure Ghost from Windows [provided your system will boot to Windows]. This new feature makes Ghost much easier to use. Note that Ghost **still** reboots to DOS after you configure it in Windows. I caution you however, against relying too much on the Windows interface. The main reason for creating a back-up image is for the times when your system [Windows] won't boot. It's during these times when you'll need to pop in a Ghost boot floppy and boot to DOS. That's why you should be familiar with the concepts of how to use Ghost from DOS.

Later in this guide, I will walk you through the steps of creating a Ghost boot floppy. Newer versions of Ghost makes this easy. A wizard will walk you through it. For earlier versions of Ghost [pre-2003] I used to use this section to caution against using Ghost from Windows [a DOS window inside Windows]. Since Ghost 2003 now does all the dirty DOS work for you, this warning is no longer pertinent.

RAID

If you don't know what **RAID** is, skip this section. I've never used RAID myself. Altho **not officially supported**, Ghost **should work fine** with any RAID controller that allows you to access the drives **from DOS**. In other words, Ghost *should* work fine with **hardware** RAID, but *not* with **software** RAID (cuz the OS creates the stripe, and you don't have your OS in DOS). One reader says, "[Drive Image](#) hasn't worked for me with the **Promise** controller, but it works fine with the **High Point**. Ghost works fine with both."

One person had a problem with Ghost v7 imaging to a stripe created by a **3Ware Escalade** card. He has both NTFS and FAT32 partitions on the stripe. I also heard of problems trying to image with **Mylex** controllers (IBM bought Mylex). It seems that the '*DOS support*' which some cards claim, does not always mean **full** DOS support. DOS support is not something most RAID adapters claim in their list of features. You'll have to try it on a case-by-case basis. *Vorpal* reports success with 3 different RAID-based motherboards: two with HighPoint and one with a Promise controller. He says that he's done a lot of imaging with

both controllers without a problem.

But he **is** having a problem with his Epox AK7A+ (DDR-based AMD/Via hybrid). The Ghost Boot disk will not load. Other boot discs & bootable CD-ROM's work fine. He got around the problem by copying ghost.exe to a regular boot floppy. It works fine that way. Vorpai also said that a special (free) version of Norton Ghost came with his Epox motherboard. It contained **two separate .exe's**: one for **writing** images, the other for **reading** them. I've never heard of this before. Also, [this link](#) [Storagereview forums] might be helpful.

Effects of Image Restoration

Looking ahead to [image restoration](#) .. restoring an image can have "adverse" effects. This concerns your **personal data** which gets "rolled back" to the state your system was in when the image was created. [This tip comes from **Christer**.] To avoid this you can move **four folders** off your system partition:

- My Documents
- Favorites
- Address Book
- E-mail storage location

This is not necessary, but minimizes the adverse effects of restoring an image. Moving these folders is easy:

My Documents is moved by [in Windows Explorer] creating a new **My Documents** folder on a different drive. Right-click the desktop icon, choose "Properties" and then "Move". Point to the desired location. You will be asked if you want all sub-folders and contents to be moved also. The original folder can be deleted, but it can also be left as is. The registry is automatically edited to reflect the change. The **Favorites** folder is moved [in Windows Explorer] from C:\Documents and Settings\ "User name" \ by right-clicking and dragging-n-dropping to the new drive, and choosing "Move Here". The registry is automatically edited to reflect the change.

The **Address book** is moved by [in Windows Explorer] creating a new Address Book folder on a different drive. From: C:\Documents and Settings\ "User name" \Application Data\Microsoft\Address Book\ Right-click and drag-n-drop "User name".**wab** and "User name".**wa~** to the new folder and choose "Move Here".

You have to manually **edit the registry**. Click Start / Run and type "Regedit" in the run-dialog box and hit the <enter> key. Find the registry key: "HKEY_CURRENT_USER\Software\Microsoft\WAB\WAB4\Wab File Name" and change the path to the new location. Close regedit and restart the computer. If you don't, it will create a new "User name".wab and default back to the original location.

E-mail storage location is moved by [in Windows Explorer] creating a new E-mail folder on a different drive. [I use the folder name "Mail".] From within Outlook Express, click Tools / Options / Maintenance and the "Store Folder" button. Click "Change" and point to the new location. If this new location already contains an address book [from a different operating system, perhaps you are [multi-booting](#)] it will ask if you want to use the one already there, or the new one you are moving there. Take a moment to think and choose correctly .. or you will loose all your messages. Using this method, you can configure multiple operating sytems to use the same email directory. Restart Outlook Express for changes to take effect. The registry is automatically edited to reflect the change. These steps are valid in Windows XP Pro. Other operating systems may vary. It is still eccessary to backup the data in these folders.

Knowledge Base

Symantec's **Knowledge Base** is [posted here](#). You can find a list of all the [switches for Ghost posted here](#). **Error codes** are [posted here](#). Ghost support forums at Symantec are [posted here](#). Let's get ready to create our image.

Pre-imaging Info

We're almost ready to create an image. A few tidbits of info that you might find helpful before we get started:

- I create all my images **on the drive root**, never in a folder. It shouldn't matter, and admittedly, this is merely superstition on my part, but I've never had a problem doing it this way. I know people who bury their images several directories deep [e.g. X:\Images\WXP\April\..], and it works fine for them.
 - I always create images before upgrading [DirectX drivers](#), cuz they **can't be uninstalled** (Microsoft says so [here](#)) .. at least not with an official Microsoft uninstaller. There are **3rd party** utilities that might work, but a pre-upgrade image *ensures* you won't have to worry about whether or not they will work. [Here's a link](#) that you'll never need with a pre-upgrade Ghost image. An image for this purpose might be named '**pre_dx.gho**' for example.
 - Create an image before doing **anything that might hose your system**. This takes experience before you learn what kinds of things have a greater likelihood of hosing your system. But you can be assured that the one time that you *don't* create an image will be [the time it gets hosed](#).
 - I install **no games** to my boot partition. This makes images of my boot partitions **smaller** and the imaging go faster. Most games are several hundred megabytes each. Some are almost a gig, and digital media does not compress very much. Games are relatively easy to reinstall, if needed.
 - Create an image **before adding new hardware**. If you discover no problems after a week or two with the new system configuration, you can safely delete the old/pre-upgrade image. But make sure everything works correctly before deleting the old image. I once deleted an image too soon. Painful lesson.
 - I have a **partition dedicated** solely for Ghost images. And I **never defrag** this partition, regardless of what percent fragmentation might be reported. I don't want *anything* messing with my images. Again, this is merely superstition on my part, but I've *never* been unable to restore an image, and I've restored more than a few.
 - Don't use any type of **partitioning utilities** that install **proprietary driver overlays**. Ghost does not like them, and will give you problems if you use them. I once used one of these utilities (Ontrack) that came on a floppy with an IBM IDE hard drive. It caused me major head aches with Ghost. I can verify that you will be fine if you partition with [FDISK](#), [Partition Magic](#), or any utilities from **Microsoft** that comes with their operating systems. I've never tried *System Commander*.
 - If you're **dual-booting**, and you image *both* operating systems, **take care** that you **correctly label** which image is from which operating system. I've made the mistake of mislabeling an image once, and it can be a tragedy. Always **double check** that file names match operating systems, especially if you image when you're tired, in the wee morning hours, when your brain isn't working well.
 - I image **every two weeks** .. more frequently if I make a lot of changes to my system (*less* frequently if not). I keep **at least two images** on hand at all times. This way, I never lose more than **2** weeks worth of work, and I can always go back a month if need be.
- I also keep an **initial-install image** of my system, that I make right after installing the OS, hardware & basic apps, and after verifying that everything works right. So that makes (at least) 3 images of each OS (but one is very small).
- I always **defrag the source** partition before creating an image. Norton *SpeedDisk*, which comes with Norton Utilities (which comes with NSW) is fine. I've used it for years without a problem. I've since begun using [Diskeeper](#), which I like a lot.
 - Many Ghost users **clean out their systems** before creating an image. For example, they'll delete everything in their Recycle bin (empty the trash). They'll delete everything in their \temp folder. They'll delete temporary Internet files.

They might even uninstall programs that they no longer use.

- You cannot use Ghost Explorer to "restore" or "copy" Windows XP encrypted files from an image. You can restore a full Windows XP partition/disk image that contains encrypted files to the specific computer the image was made from, and the encrypted files are readable. See [here](#) for more.

To clarify once more, an image will restore your system to the exact state it was in **when the image was created**. So, you **still need to back-up individual files** you're working on (in the interim, between images). Typically, this will be files in the *My Documents* directory, which defaults to your boot drive. If you work your butt off on a certain project, make sure you save the associated file(s) somewhere other than on your boot drive. Most folks already know this (having learned it the hard way), but it bears mentioning. Kidney writes to say he had a problem with Ghost imaging going very slowly. He solved the problem by using two switches:

```
ghost.exe -fna -fnu
```

The -fna switch turns off Ghost ability to read from the source and write to the destination at the same time. So Ghost reads and then writes. The -fnu switch tells Ghost not to read through UDMA and instead will read through PIO.

Norton Ghost Boot Floppy

Newer versions of Ghost make it easy to create a Ghost boot floppy. While in Windows, simply launch the Ghost program by going to your Start button > then "Programs". Then click on "Ghost Utilities", and then "Norton Ghost Boot Wizard". Follow the on-screen instructions. The procedure is pretty straight forward. You should see something that looks like [this](#). Select the option that applies to you.

If you have problems with the Ghost boot floppy, I have posted alternative boot files [here](#). Simply load these files onto a freshly-formatted floppy disk, and copy **ghost.exe** to the floppy. (Also copy ghost.exe to at least one location on your hard disk .. just in case). After booting to DOS with the boot floppy, execute ghost.exe from either the floppy or the location on your hard disk. Hard disks are **more reliable** than floppy disks, so it would be **better** to execute Ghost **from your hard disk**. You will need some rudimentary DOS skills to navigate around in DOS.

For example, let's say that you copy **ghost.exe** to a folder named **ghost** on your C: drive. To execute Ghost from the folder using DOS commands, you would type the following **bold commands** at the command prompt (A:\>):

c: <enter>

the command prompt should change to: C:\>

cd ghost <enter>

the command prompt should change to: C:\ghost>

"cd" is the DOS command for "change directory"

ghost <enter>

note that some versions of ghost use "ghostpe.exe" as the executable

Ghost should launch

I suggest making **two** boot floppies .. in case one has problems (I actually made **3**). If you want to use **MS-DOS** [Microsoft's version of DOS] instead of the version that comes with Ghost: PC-DOS, you'll have to use a W98 [boot disk](#) [floppy]. This info comes from Christer. He says:

For Ghost 2003, **MS-DOS** must be supplied via a Win98 boot disk. WinME isn't accepted. I'm not sure why, but it refused my WinME startup disk. Can't recall the exact message, but something was invalid. I popped in a Win98 startup disk and it was accepted. This only applies to Ghost 2003. The previous version I used, Ghost 2001, accepted the WinME startup disk without complaint.

Floppy disk are notorious for becoming corrupted. Don't put your floppies near speakers or magnets (speakers contain magnets), which can erase/corrupt the data they contain. Label your floppy clearly. Include the date. When done, store it in a safe place. If you are having trouble with your boot floppy, you might be able to find help at Bootdisk.com and/or Polar Home. Also, if you have SCSI optical drives [like me, I have a Plextor CD-ROM & burner], you will need to create a special boot diskette to be able to use your optical drives with Ghost. This is weird, because I have no problems using Ghost with my SCSI hard drives. It's only the SCSI optical drives that I need the special boot diskette for. If you have a Tekram DC-390U2W or a DC-390U3W SCSI adapter, I have files that will work for you. I posted them on my Downloadable Files page.

Symantec periodically [updates](#) the **ghost.exe** executable. These updates are downloaded from the Symantec site using *Live Update*, and add features such as support for SATA drives. You need to create a **new Ghost boot floppy** after downloading these updates. I recommend creating a *new* Ghost boot floppy, and not simply overwriting/updating the old one .. for the rare case when you find that the old one works, but the new one does not. **Let's make an image!**

Create an Image with Norton Ghost

Here is the heart of the guide. This is where we **create our Ghost image**. Most users create an image of their **boot drive/partition**: where Windows resides [usually labeled as your **C:** drive]. But you can create an image of *any* partition/disk/drive. The only limitation is that your **destination** must be different from your **source**.

[Note: the following steps are designed for Ghost 2002, which is configured from DOS. If you're using Ghost 2003, which is configured from Windows, look them over. Once you understand them, it will become obvious how to apply them to v2003, which is easier to use. The concepts remain the same. Only the interface changes.

Note also, that the following steps are designed to use Ghost from **DOS** using a **Ghost boot floppy**. While it is now *possible* to configure Ghost from Windows, it is still *recommended* that you use the DOS-based method from a Ghost boot floppy, since it is a more reliable and sometime necessary (if Windows won't boot).] Let's get busy.

1. Ensure your **destination** partition [where you'll put/write/store the image] has **enough space** to receive the entire file(s). Calculate the size of the image by estimating ~60% [using [High](#) compression setting] to 70% [using [Fast](#) compression] of the amount of *data* contained on the partition [not the size of the partition itself. I use "Fast" myself.]

[See here](#) for detailed info about Ghost compression settings. Some types of files compress better than other, so "it depends" .. on a number of factors, such as on what kind of data is stored on your source partition. Operating system files [Windows] usually compress well. MP3s barely compress at all. Always give yourself plenty of room to work with.

If your image file exceeds 2GB, you'll be prompted to provide another **file name** for the part that exceeds 2GB. If you use the -auto switch, Ghost will automatically name the parts of your image that exceed 2GB. Ghost v2003 also does this for you automatically. Files that exceed the first 2GB are given a *.ghs extension.

The 2GB file size limitation is [based on DOS, not Ghost](#). It doesn't matter if you're using FAT32 or NTFS for either your source or destination; Ghost will automatically break your images up into 2GB sections. If you're using a version prior to Ghost 2003, without the -auto switch, Ghost will display a message that says *Insert New Media*.

If you hit the *Enter* key at this point, Ghost will **automatically assign** a new file name for you on the same partition .. **or** you can name it yourself. I recommend simply hitting the *Enter* key and allowing Ghost to name the file for you. This is easier, and Ghost will remember the name of the file, whereas you'll probably forget.

If you **run out of room** on the destination partition [because it fills up], you'll be prompted to **provide a path** to a *different* partition/drive [not just merely name a new file]. Try to avoid this by ensuring your destination partition/drive has plenty of available space. If you find you have less space than you thought you had, try emptying your trash and any "protected" files if you use Norton Utilities.

2. For versions prior to Ghost 2003, Insert the **boot floppy** in your **A:** drive and **Restart** your computer. If you made the

floppy with the Ghost Boot Disk Wizard, Ghost will automatically launch in true DOS, displaying its [gray screen](#) and your [license number](#) [if you use v2002. To create an image in v2003, you never have to touch a floppy.]

For v2002, write down the serial number and tape it to the side of your monitor, or store it in a safe place where you won't lose it.

If you use a standard [DOS boot floppy](#), you'll need to execute Ghost by typing either "ghost" or "ghostpe" (without the quotes) at the DOS prompt and hit the <enter> key. If you're DOS-illiterate, read the instructions posted near the bottom of [this page](#).

If you type "**ghostpe /?**" you'll see a list of [all available switches](#). Pay particular attention to **-auto**, **-autoname**, **-span** & **-split**. Symantec discusses the [difference between -span & -split here](#).

If you want your images to be small enough to later burn onto a CD, type "**ghostpe.exe -split=640 -auto**" to activate **spanning** at **640MB** and **auto-naming**. These switches are used less, since Ghost now supports burning images directly to CDs and DVDs. If you get an [error](#), you'll need to deal with that.

3. You can select both spanning and auto-naming in the [Options](#), but I never use any of the options here. [In Ghost 2003, you select **compression** settings in the "Advanced settings".]
4. Here we go: Select: **Local -> Partition -> To Image** [\[screen shot\]](#). Note that Ghost refers to physical hard drives as **Disks** and to logical DOS drives as **Partitions**. [Ghost 2003 first asks you to select your source and destination type on the same screen. Once you select either "file" or "CD/DVD", it will, on the next screen, ask you to select the burner or destination partition.]
5. Click on the hard drive you wish to select as the **source** for your image [\[screen shot\]](#). If you only have one drive, this will be easy, because you'll only see one. In my screen shot, you see six physical hard drives [piggy wiggly]. If you have multiple drives, you'll have to figure out which is which by looking at their sizes and order of listing.

Ghost should display your drives in the same way that [FDISK](#) does. It shouldn't be difficult to determine which is which, especially if they are all different-sized drives, and if you gave your volumes identifying names after formatting them [such as **C_drive**, [\[example screen shot\]](#) .. which brings us to our next screen...

6. Ghost will then display the **individual partitions** on the physical disk you selected [\[screen shot\]](#). Click on the **partition** you wish to select as the **source** for your image. If you have no mouse control, you can navigate around using your arrow and tab keys. Select options using the 'Enter' key.
7. Next, the window will change so you can select the **destination** for your image [\[screen shot\]](#). As mentioned earlier, make sure your destination has **enough room** to store/receive the entire image that will be created there.

At the top of the window, select the partition [logical DOS drive] where you want to put/create/store the image file. After doing so, Ghost will list both your source and destination partitions. **Double check** both of these, to make sure they're correct .. as you expect them to look. You will see this data displayed in the lower half of the screen.

8. Click in the rectangular-shaped box near the bottom, and **enter the name** you want to give the image file [\[screen shot\]](#). Ghost will **automatically** give this file a **.gho** extension. If I were going to create an image of my C drive on May 21st, I'd enter the file name **C_0521**.

This would identify the **source** partition and **when** the image was created .. two things you want to know should you ever need to restore the image. This naming system will also cause your images to be listed chronologically. Ghost would name this file **C_0521.gho**. You could also name it C_21may if you like. Use whatever naming scheme works best for you.

Try to limit the file name to no more than **8** characters.. to observe the 8.3 DOS file limit scheme. My naming system uses **6** characters. If you dual-boot, or multi-boot, pay extra attention during naming. It's not difficult to mis-label or mis-name images, such as C or D, etc. I have made this mistake myself. Bad, bad. You don't find out until it's too late. Pay extra attention if it's late at night and you're tired.

Certain types of naming schemes can cause [problems](#). If the first **5** characters of your original file names are the same for different images, and you images span larger than 2-GB, and you store all your images in the same directory, Ghost will automatically generate identical *.ghs files for the parts of your image(s) that exceed 2-GB. Nealtoo says:

"I have found the enemy and he is me. The naming convention I was using was identical for the first **8** characters of the *.gho file name. e.g. "Drive C 09-23-03". When Ghost named the spanned *.ghs files in DOS format (8.3), they all became DriveOO1.ghs, Drive002.ghs, etc. Ghost apparently truncates the original file names (*.gho) at **5 characters**, and adds 001.ghs, 002.ghs to the spanned file sections. So, when I would make a new image, with the first part of the filename being identical to the previous image, Ghost was overwriting previously written spanned files."

9. After naming the file, click on the **Save** button or press the **Enter** key [either will work fine].
10. A box will pop up asking about **compression** [\[screen shot\]](#). I typically use **Fast**, sometimes **High**. There are other, more aggressive settings available by using switches. I've never had a problem with either **High** or **Fast**.

High applies *more aggressive* compression. It makes a **smaller** image, but take **longer** to create them. The images created with High compression typically are only a little smaller, but take *much* longer to create. This is why I prefer Fast compression.

Some people view **higher** compression as a **bad** thing. I've never heard of any problems with either High or Fast.

11. Ghost will ask if you want to **Proceed with partition dump?** [\[screen shot\]](#) This is it, hoss. **Double check** both **source** and **destination** selections. Ghost will display all the selections you've made. Don't continue if you have any questions, or if something doesn't look right.

You should **not** see the word '**Overwrite**' listed anywhere during image dumping. If you do, you did **something wrong**. You only get the **Overwrite** dialogue when **Restoring** an image. If you see the word *Overwrite*, quit out.

With v2002, you will see the words: *Your License Number will be required to restore the image*. If everything looks the way you expect it to, click Yes & you're an imaging dude: [\[screen shot\]](#).

12. It takes anywhere from **10** minutes to an **hour** to create an image file, depending on a number of factors:

1. amount of **data** contained on your source partition [more data = longer]
2. type of **compression** selected [more compression = slower]
3. whether you're imaging to the **same or a separate** physical hard drive [imaging to a separate physical drive goes twice as fast]

So, the **fastest** imaging will be from a **source** partition with *little* data, *minimal* compression & a *separate* physical hard drive. Conversely, the **longest/slowest** imaging will be from a source partition with *lots* of data, *high* compression, & imaging to (a separate partition on) the *same* physical drive.

13. After the image is created, Ghost will display the message: **Dump Completed Successfully** [\[screen shot\]](#) (yeah!) .. [or some error]. Ghost 2003 automatically reboots your system back to Windows.
14. Now **Check** the image. This will verify that the image is valid, and that it has everything necessary to restore your system. Select: **Local -> Check -> Image file** [\[screen shot\]](#). Navigate to where your image is stored and select it. It will have a **.gho** extension [\[screen shot\]](#). Usually you'll have to scroll down to the bottom of the list of files.

After you've successfully created a few images, and you know that they're valid, you don't have to *Check* every one. If you get a new hard drive, or significantly change your system configuration, it would be a good idea to Check an image or two. I check mine randomly. Only on rare occasions do I find corrupted images.

15. At the end of this operation, Ghost will tell you whether the image is valid. The message you want to see is **Image File Passed Integrity Check** [\[screen shot\]](#). If so, **you're done** creating your first image. Time to break out the bubbly or a brewski.

Quit out of Ghost [[screen shot](#)] & reboot to Windows. You now have the ability to restore your system in minutes.. should anything go wrong. Image no less frequently than what you're comfortable with .. should your drive die unexpectedly .. or Windows becomes unable to boot.

[Murphy](#) will see to it that you'll encounter your worst problems when your least prepared. So always be prepared. Monthly is a good for most people. Don't forget to periodically back-up your individual documents and other work files between imaging sessions.

Managing Downloads

I have since moved this section to [its own page posted here](#). The theory is that you want to develop a system to keep track of the [programs](#) & drivers that you install & update *between* images. This way, should you ever need to restore you image, it will be a simple job to reinstall the drivers and programs that you loaded since the last time you created an image. This strategy might also help you identify the cause of your problem. I once had to restore a particular image 7 or 8 times before I found the culprit that was causing my problems. It only takes a minute to set up this system. The only thing you need to ensure is that you name your downloaded files with descriptive names, so that you know what they are. The people who make the files don't always do this.

Transfer Images Off-Site

One last thing to consider: About every 6 months, burn an image to CD and give them to a trusted friend to store for you. This is known as redundant back-up. You'll probably never need to use these files. But if so, you'll be prepared for [just about anything](#).

Restore a Ghost Image

This is where you *don't* want to be. It means something has gone awry with your system. But having a back-up Ghost image on hand will take the sting out of your predicament, no matter how hopeless it might appear right now. You will only lose whatever work you failed to back-up since the last time you created an image. This is why it's a good idea to image frequently [no less than monthly], and back-up regularly any work files between each new image. Always back-up to separate physical hard drive or CD .. in case your boot drive dies.

Note that you can do much **more damage** by **restoring** images, than by *creating* them .. if you make a mistake, that is. This is because *restoring* an image **overwrites** the data currently residing on your drive. If you overwrite *the wrong drive*, you're screwed. You **won't be able to recover data** stored on that drive. You might want to [read this first](#).

Overwriting has the same effect as reformatting a partition, except it leaves your drive with the data that is contained in the image [reformatting leaves you with a blank drive]. So **pay close attention** whenever **restoring** an image to target partitions/disks. It's *not difficult* to screw up, especially if you're tired or in a hurry. This is not the place to be in a hurry. If you're tired, go to bed and do it tomorrow, whe you're fresh. Put the beer away.

To **restore an image**, [usually because Windows won't boot, or because your boot drive died, or for one of a million other possible reasons] reset your computer and boot to (true) DOS with your [Ghost boot floppy](#). If Ghost doesn't launch automatically [[screen shot](#)], you'll have to launch the program manually. The bottom of [this page](#) gives instructions for those of you who are DOS-illiterate.

If you're using Ghost 2002, you will need to enter the License Number to restore your image [stupid requirement, only for v2002]. If you don't have mouse support, you can navigate around by using the **tab & arrow** keys.

1. Select (carefully) **Local -> Partition -> From Image** [\[screen shot\]](#). If you were going to restore an entire physical hard disk, you would replace '*Partition*' with '**Disk**'.
2. Navigate to the drive where your image file is stored [\[screen shot\]](#).
3. Select the image file you want to restore [\[screen shot\]](#); Obviously, you can't restore an image if you haven't [created](#) one.] It should have a **.gho** file extension. Soon as you select the image file, a dialogue box will pop up and asking for your license number [\[screen shot\]](#). If you enter the *wrong* License Number, you will get a [screen that looks like this](#). Again, this requirement is only for Ghost 2002.
4. Select the partition you want to restore [destination/target, [screen shot](#)]. This will most likely be your boot partition [C drive], because that's typically what gets screwed up & requires you to restore your image.
5. After selecting the target partition, Ghost will ask, **Proceed with partition load? Destination will be overwritten.** [\[screen shot\]](#) This is it, hoss. Right here is where you can make the biggest mistake with Ghost. Carefully review the info listed under both *Source Partition* and *Target Partition*. **Triple check** everything before pressing the 'Yes' button.

A mistake here can mean the **loss** of valuable data .. with no chance of recovery. If something doesn't look right, or if you have a question, [quit out of Ghost](#) & get an answer before restoring the image. **I am jumping up and down, shouting warnings at you!**

I know people who have blown it right here. They were in a hurry, or not paying attention. I have seen grown men cry. You need to be **absolutely certain** the partition you *think* you restoring is the one, in fact, you *are* restoring.

If you blow it anyway, despite my all my frantic warnings, some folks have reported success with programs listed under the heading: [Data Recovery](#). You will find them about halfway down the page [scroll down].

My PC is currently running a system based on a restored Ghost image .. that came from a system based upon a restored Ghost image .. which was itself restored .. ad infinitum. I've restored my system from back-up Ghost images ~**20** or **25** times. Since learning how to put the Ghost mojo to work for me [as presented in this guide], I've never had a problem with the program not being able to do its job .. either creating or restoring an image.

Ghost will assume the file system of the **source** image. In other words, if your image is from a **FAT32** partition, and you restore this image to an **NTFS** partition, the destination partition will become **FAT32** [from the source]. I have never done this myself [restore an image to a different file system], but Symantec says that's [how it works here](#). Again, your system will be restored to the exact state as *when you created the image*. Now let's take a look at **Cloning**.

Disk & Partition Cloning

Let me preface this section by saying that *I have never cloned anything*. I've only created & restored **images**. If I was going to clone either a disk or partition, I'd first want to talk to someone who has some real-life experience. Cloning is like **copying**. No image file is created during the cloning process. During cloning, Ghost copies files from the *source* partition (or disk) to the *destination* (target). The thing that makes Ghost's cloning features so powerful is that ALL the files are copied.

Many people ask why they can't simply use *Windows* to copy files from one drive to another. Try it, you'll discover why: Windows file-copy won't copy the **FAT** (File Allocation Table), **partition table**, or **boot files** .. all of which you need. You may hear about a utility called **Xcopy**. I've never used it, but have heard it mentioned & debated many times. Some insist that it works fine; others claim it's flawed. Here's a link called [Xcopy Xposed](#) that says it's flawed, and gives reasons why.

Another utility called [xxcopy](#) (no, not porn) supposedly works like xcopy, but without its (alleged) problems. I've never used it. You might also find helpful these links to disk utilities from several major hard drive manufacturers, including [Maxtor](#), [Seagate](#), and [Western Digital](#). These utilities do essentially the same thing that Ghost's cloning feature does.

Ghost's cloning feature is typically used to copy the contents of one disk/partition (usually older/smaller) to another (usually

newer/larger). Users have reported success with this method. Some caution that, if a boot drive is involved, you must set a partition on the new drive as the ACTIVE partition. You can do this with [FDISK](#).

I was under the impression that the destination drive must be at least as big as the source, but Dharma Singh writes to say this is not true. He says that you can clone a larger drive (36GB, for example) to a smaller one (18GB, for example) as long as the *contents* (data) of the source drive do not exceed the capacity of the destination (target). He says he has actually done this. He also notes that disk performance drops significantly after a disk is ~85% full, especially with NTFS. For this reason, he says it's best to buy a new drive with at least *double* the capacity you need.

Say, for example, you have an older/smaller drive that contains **3** partitions. If you clone one partition at a time, you'll first have to [create the partitions](#) on the new drive (destination/target). You'll have to repeat the cloning process for each partition. Doing each partition individually gives you more control over the cloning process. If you clone an entire physical hard disk, I don't think you have to partition it first .. but not sure.

Before we begin, you should be aware that the destination (target) partitions will be **overwritten!** [\[screen shot\]](#) If you make a mistake, and select the *wrong* disk/partition, you will **lose** valuable data. All the caveats from [the preceding page on Image Restoration](#) apply to cloning. If you have not yet read the preceding page, **go there now** and read about the hazards associated with **overwriting** either a partition or a disk.

To clone an entire (physical) **DISK**, select: **Local -> Disk -> To Disk** [\[screen shot\]](#).

To clone an individual **PARTITION**, select **Local -> Partition -> To Partition** [\[screen shot\]](#).

Notice that you cannot clone **Partition -> To Disk**, nor can you clone **Disk -> To Partition**. I don't have all the other steps listed here because I've never done this, and I don't want to give you the illusion that I have. But you will go through the steps or selecting the source and destination/target, just like you do with creating and restoring images. **Les Burns** writes to say:

Your section on *Cloning* makes no mention of **removing the newly created drive from the system**. Failure to do so before rebooting will **annihilate your registry**.

We were moving an OS to a second drive. When cloning, you must remove the cloned drive *before rebooting into Windows*. Windows will look at the system, scan the registry, realizes its duplicated and deems it's corrupt. Then it creates a new, blank registry, and carries on with that. I tried restoring the registry from the command prompt, but alas nothing. Live and learn.

In response to Les' comment above, Bob Davis writes to say:

This is true only with the NT-based OS's, not Win98SE and presumably similar OS's (Win95, Win98, ME). I always have a fully cloned drive in my system (D:), running Win98SE, and have never experienced adverse effects from doing so in about two years using Ghost.

To supplement my weekly ghosting of three rotated HD's mounted in mobil racks, I run a daily batch file with Windows Task Scheduler that updates important files to D:. This includes business databases, OE DBX's, WAB, etc. This system has been the best backup method I've found in 20 years of computing, and has bailed my butt out of trouble more than once.

Automated Batch File

The following info comes from [Dick Shogren](#). Personally, I have never made or used an automated batch file. But many readers have inquired about the best way to configure one. Read this ENTIRE section before creating a batch file. Here goes:

I run a shop where I work on almost all PCs except Macs. I see lots of customers who destroy their systems. It's usually faster to simply backup their critical data files and re-install Windows. WinME offered hope with *System Restore*, but I found it to be unreliable. I'm still doing very little with XP, so I don't know if it's any better.

I needed a simple way for customers to back up their C-drive. Ghost is hardly user friendly. What follows is a batch file that does exactly this. It is accessed via either a desktop icon or an item within the ghost menu. I typically add it as a menu item called "Easy Backup". It will run directly within windows without booting to a floppy.

Note that this routine assumes you have either a 2nd partition or a second drive and that it is setup as the D-drive or D-partition. You can easily modify the file to your own liking if you use other drive letter assignments. The resultant image file is created using high compression.

One advantage of this (batch) file is that it allows you to keep a total of (5) image files. This can also be modified as desired if hard drive space is a problem. This file is used with Ghost v6. I have not tested it with any other versions. As you may have discovered, you can't always restore an image created with a different version. There may be some glitches if the image is spanned (larger than 2 GB). If anyone has suggestions or comments, feel free to [let me know](#). Here's the routine for the batch file:

```
=====
rem - Ghost Backup Routine from c-partition to d-partition
rem - With image date rotation (from oldest to newest).
if exist d:\save5.gho goto full
if exist d:\save4.gho ren d:\save4.gho save5.gho
if exist d:\save3.gho ren d:\save3.gho save4.gho
if exist d:\save2.gho ren d:\save2.gho save3.gho
if exist d:\save1.gho ren d:\save1.gho save2.gho
:full
@echo "You have 5 Ghost backup files on your hard drive"
@echo "Would you like to remove the oldest one?"
choice
if errorlevel 1 goto del1
:del1
del d:\save1.gho
if exist d:\save5.gho ren d:\save5.gho save1.gho
if exist d:\save4.gho ren d:\save4.gho save5.gho
if exist d:\save3.gho ren d:\save3.gho save4.gho
if exist d:\save2.gho ren d:\save2.gho save3.gho
if exist d:\save1.gho ren d:\save1.gho save2.gho
C:\progra~1\norton~1.0\ghost.exe -clone,mode=pdump,src=1:1,dst=d:\Save1 -z2
=====
```

If one didn't want to be prompted prior to the final operation, I think you could add "-sure" to the final line. [Thanks Dick.]

Update 06feb2003 - Ron Kuper writes to say: Rad, Dick's batch file has a small **flaw** that will cause the program to proceed, even if the user presses '**N**' (for 'No'). The flaw:

```
# choice
# if errorlevel 1 goto del1
# :del1
```

When making a 'Choice' statement in Dos, the errorlevel check must go 'Backwards' - from top to bottom, since 'Choice' will issue all the errorlevels from **1** to the choice made. In this example we have 2 choices: **Y** or **N**. If user presses '**Y**' for 'Yes', choice will return with 'errorlevel 1' alone. However, if the user will press '**N**' for 'No' choice will return with **errorlevel 1 & 2!** So the statement: "if errorlevel 1 goto del1" will be 'True' in both cases. A correct form of the batch file (and all other batch files for that matter) will be - "if errorlevel 2 goto end". For our example (The batch with the correction):

```

rem - Ghost Backup Routine from c-partition to d-partition
rem - With image date rotation (from oldest to newest).
if exist d:\save5.gho goto full
if exist d:\save4.gho ren d:\save4.gho save5.gho
if exist d:\save3.gho ren d:\save3.gho save4.gho
if exist d:\save2.gho ren d:\save2.gho save3.gho
if exist d:\save1.gho ren d:\save1.gho save2.gho
:full
@echo "You have 5 Ghost backup files on your hard drive"
@echo "Would you like to remove the oldest one?"
choice
if errorlevel 2 goto end
:del1
del d:\save1.gho
if exist d:\save5.gho ren d:\save5.gho save1.gho
if exist d:\save4.gho ren d:\save4.gho save5.gho
if exist d:\save3.gho ren d:\save3.gho save4.gho
if exist d:\save2.gho ren d:\save2.gho save3.gho
if exist d:\save1.gho ren d:\save1.gho save2.gho
C:\progra~1\norton~1.0\ghost.exe -clone,mode=pdump,src=1:1,dst=d:\Save1
-z2
:end

```

Ron Kuper

Here is another batch file from [Maurice Taquino](#). He writes to say: I wrote my own batch file to image various partitions. I'm familiar with DOS batch files, but certainly no expert. So I was glad to have an example to start with. I especially like the file name rotation scheme. However, I don't think the one posted earlier works as intended. I did make the suggested change to the script regarding the errorlevel and also added an :abort step so I could more easily tell when/where things were ending. But essentially, my test batch file is the same as that posted earlier.

Substituting a DOS copy statement for the Ghost batch commands to copy a text file makes it easier to test the renaming logic. For any newbies reading this, you can run these tests easily from Windows by opening one folder view with your test.bat file, and another with a view of the target folder. You will see the results immediately. The are **2 main problems** with the earlier batch file:

1. there are two renaming blocks, and both are run every time until after file #5 is created.
2. the most recent archive (#1) is deleted rather than the oldest (#5).

I realize batch files are like system configurations: highly personal. For me, I don't care about the oldest archive. If the max is present, and I need to make room for a new Save1, then the oldest one should be deleted without asking me, and the batch should continue. My own version of this batch file is:

```

@echo off
cls
echo -----
echo Ghost Backup .....hit ctrl-c to abort; otherwise
echo
echo NOTE: GhostPE will PAUSE until you manually press "OK"
echo for each image dump!!
echo -----
pause

```

```
cls
:: Ghost Backup Routine from c-partition to d-partition
:: With image date rotation (from oldest to newest).
:: rename files
:: this step "ages" the filenames by increasing each by 1
:: check for max number...#5 is the oldest backup.
:: IF max # of backups reached...delete the file.
:: If max not reached, so what...continue
if exist h:\save_c5.gho del h:\save_c5.gho
if exist h:\save_c4.gho ren h:\save_c4.gho save_c5.gho
if exist h:\save_c3.gho ren h:\save_c3.gho save_c4.gho
if exist h:\save_c2.gho ren h:\save_c2.gho save_c3.gho
if exist h:\save_c1.gho ren h:\save_c1.gho save_c2.gho
if exist h:\venus_5.gho del h:\venus_5.gho
if exist h:\venus_4.gho ren h:\venus_4.gho venus_5.gho
if exist h:\venus_3.gho ren h:\venus_3.gho venus_4.gho
if exist h:\venus_2.gho ren h:\venus_2.gho venus_3.gho
if exist h:\venus_1.gho ren h:\venus_1.gho venus_2.gho
::Image Drive1, Partition1
a:\ghost\ghostpe.exe -clone,mode=pdump,src=1:1,dst=h:\save_c1.gho -z2 -fx
a:\ghost\ghostpe.exe -chkimg,h:\save_c1.gho -fx
::Image Drive1, Partition2
a:\ghost\ghostpe.exe -clone,mode=pdump,src=1:2,dst=h:\venus_1.gho -z2 -fx
a:\ghost\ghostpe.exe -chkimg,h:\venus_1.gho -fx
:end
echo Done. Please reboot now.
exit
```

Before closing, I want to take a minute to mention <shameless plug> a few other Radified guides that you might find helpful. For example:

- The [\[ASPI drivers guide\]](#) is currently the site's **second most requested** feature, and is [translated into](#) more languages than any other site guide.
- The [\[Guide to Ripping CD audio & MP3 Encoding\]](#) receives **more kudos** than any other.
- The [\[Guide to booting from a SCSI hard drive\]](#) is **my personal favorite**, espousing a hybrid approach to disk storage.
- I received more **reader input** for the [\[Asus CUSL2 Motherboard User's Guide\]](#) than any other.
- [\[Doc's Über FDISK Partitioning Guide\]](#) is referenced by **two Universities**.
- Doc's guide comes with a **companion** titled [\[Hard Drive Partitioning Strategies\]](#).
- The [\[Guide to the Best Software Programs & Applications\]](#) is **growing the fastest** (in popularity).
- The **newest** addition is an article on the [\[Intel Northwood Pentium 4 CPU\]](#), which takes a Radified look at the new 0.13-micron P4 processor from the boys at Intel.
- There's also a page containing a sample of [\[PC Benchmarks\]](#) for making comparisons, including links to benchmarking programs.
- And [\[several others\]](#). </shameless plug>

Ghosting Across a Network

Let me preface this section by saying that *I have never done this myself*. The following page comes compliments of **Patrick Glynn**. I hope you find it helpful. He used version **7.5**.

Create the Boot Disk

1. Select Start > Programs > Symantec Ghost > Ghost Boot Wizard
2. Choose "Drive Mapping Boot Disk".

This boot disk will allow you to map a network share from another system in the domain. Although I have been told that having a domain is not a requirement to use this method, I have not been able to get it to work without having a domain up and running.

3. Select the **Network Interface Card**.

Ghost seems to support a large number of NICs. However, I had a Netgear FA310TX and Ghost does not appear to have native support for this card. It is possible to point Ghost to the requisite DOS drivers for the card, but I had no luck with this method either. I swapped out the Netgear for a 3com 3C905C-TX for which Ghost had a native driver.

4. Choose the DOS Version

The default is PC DOS as you mention on your website, and I didn't change it.

5. Add the Network Client Configuration.

Here is where you will be prompted for the domain logon information:

Client Computer Name: {the system you will be imaging}
User Name: {your domain username}
Domain: {the domain you are in}
Drive Letter: {the drive letter the remote drive will be mapped to after booting}
Maps To: {the remote system drive to map}

In my case, the domain controller for my home network is my Linux box (RH 8.0 running Samba). The settings for me are:

Client Computer Name: **PORTHOS**
User Name: **root**
Domain: **WORKGROUP**
Drive Letter: **D**
Maps To: **\\ATHOS\root**

6. Configure the Network Client Address.

You have the choice of specifying the IP address and Netmask or using DHCP. I chose **DHCP** because my Linksys Cable/DSL router is setup as a DHCP server and it is one less thing I have to configure.

7. Select the Destination Drive, etc. to write the disk to.

The defaults worked for me: one copy of the boot disk written to the floppy drive which is formatted prior to writing.

8. Review and accept.

Once you accept the setup, you will be prompted to format the floppy. The boot disk is created after formatting is complete.

Creating (and restoring) an Image

To Create a Ghost Image: Boot from the disk you just created. After showing some interesting stuff on screen, you will be prompted for your **User ID**. You can simply hit ENTER if you plan to use the same one you specified when creating the boot disk. Afterwards, you will be prompted for your **Domain Password**. Assuming you have the required credentials, you will note that the system has successfully logged you in under the username provided above.

After some trial and error, I discovered that to make this work, *you have to have a copy of the Ghost executable on the destination machine!*

Once the drive is mapped, you change to that drive (D:\ in my case) and run the Ghost executable. When you have done that, the image creation proceeds exactly as you have documented for disk-disk image creation. Image restoration proceeds in exactly the same manner as you have documented. **The end.**