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# A Little Known Fact About Windows 95 Shortcuts

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*'One of Windows 95's most powerful features is the shortcut. Considering the hundreds of shortcuts on the average users Windows 95 system, this wasted space can total several megabytes of hard drive space.'*

There IS a little known fact about Windows 95 shortcuts that you might be amazed to learn. Despite their small file size, Windows 95 shortcuts end up being tremendous space wasters on your hard drive, due to the limitations of Windows antiquated file system. Considering the hundreds of shortcuts on the average users Windows 95 system, this wasted space can total several megabytes of hard drive space.

One of Windows 95's most powerful features is the shortcut. A shortcut is an icon that is linked to, and represents, a file on your computer. A file is a collection of data that can be a shortcut, application, word processing document, graphics file, or any other type of information stored on your computer. Shortcuts allow you to place links to your documents or applications in convenient locations, such as the Desktop, so that you don't have to search around for them in Windows Explorer or My Computer. By double-clicking on a shortcut, you can launch or open any application or file that the shortcut is linked to. Shortcuts are usually about 200-500 bytes in size (we'll say an average of 350 bytes) and must be stored on your hard drive like every other file you have. A byte is the smallest amount of information that can represent a letter, number, or other character.

Shortcuts populate the average Windows 95 system by the hundreds. For example, in the "Start", "Programs" menu, all of the program icons listed are actually shortcuts. If you use Internet Explorer or Netscape Navigator to surf the web, the websites you add to your "Favorite Places" are actually shortcuts to those sites. With a few exceptions, shortcuts are normally identified to the user by a small, curving arrow in the bottom, left hand of an icon. If you see this arrow, the icon represents a shortcut. If you are not sure, simply right-click on any icon, and select "Properties" from the pop-up menu. On the "General" tab, you'll find the "Type: Shortcut" description.

To see how many shortcuts you have on your system, click on "Start", "Find", "File and Folders". The "Find: All Files" window opens. In the "Name & Location" tab, type in the "Named:" field "\*.lnk", without the quotation marks. In the "Look in:" box, make sure that your hard drive is selected and that the "Include subfolders" checkbox is checked. Next, click on the "Find Now" button. Within a few moments, Windows will display all of the shortcuts on your system. When the search is done, click on "Edit" on the menu bar near

the top of the window, then click on "Select All". After all of the shortcut files become highlighted, click on "File" on the menu bar, then "Properties". The "Properties" sheet that pops up will tell you the number of shortcuts on your system and how much hard drive space they occupy in total. The amount of occupied hard drive space is the quantity of shortcuts on your system multiplied by their file size. Make sure to close the "Find" window when you are done.

Recently, I decided to reformat my PC's hard drive, reinstall Windows 95, and my applications and files. After all this, my computer ended up with 250 shortcuts, occupying about 87 kilobytes (abbreviated KB, meaning thousand bytes) of hard drive space. Actually, these shortcuts were occupying over 8 megabytes (abbreviated MB, meaning a million bytes) of hard drive space. Quite a difference! Shortcuts, being small icons, are typically about 200-500 bytes (or half a kilobyte) in size. So, with only 250 shortcuts on my system, each averaging 350 bytes in size, thus equaling roughly 87KB, how could they actually occupy over 8MB of hard drive space? It has to do with how Windows 95 organizes all of the information on your hard drive.

In order to understand how shortcuts consume large amounts of space, I'll need to teach you a little bit about how Windows 95 organizes the information on your hard drive. Since we are only interested in the basics, I'm not going to use exact numbers or technical terms. Technical people will hate this, but it really is easier to get the concepts across by using rounded numbers. Now...push your glasses up your nose, 'cause this is where things get really interesting.

Figure 1 illustrates the relationship between bytes, kilobytes, megabytes, and gigabytes, which are the units of capacity that your computer and hard drive use for storing information. This is important information to know.

1,000 bytes	=	1KB (kilobyte) or 1 thousand bytes
1,000 KB	=	1MB (megabyte) or 1 million bytes
1,000 MB	=	1GB (gigabyte) or 1 billion bytes

**Figure 1**

Windows file system, called FAT (File Allocation Table), also known as VFAT, was developed in 1977 during the days when hard drives were much smaller in capacity than they are today. Like the index in the back of a book, FAT is used to organize a hard drive and to keep track of where all your files and applications are located. As time went on and the capacity of hard drives increased, the FAT system was simply carried over on to them, with little modification.

The smallest unit of storage on a hard drive is called a cluster. Let's continue to use the book analogy. If the hard drive is the book, then clusters would be the pages in the book. Each cluster, like a page, is storage space for information. Just as the page of a book can hold only a certain amount of text, a cluster can hold only a certain amount of data.

No matter how small a file is, even 1 byte (which is the smallest amount of information that can represent a letter, number, or other character), it must occupy a cluster. If the file size is larger than the cluster can hold, the file will simply fill more than one cluster. Also, a cluster can hold no more than one file, no matter how small the file is. It cannot hold two different files. For example, if you have two word processing documents on your computer, they cannot occupy the same cluster. Each individual file on your system is stored in its own cluster, or clusters. (Although two files cannot occupy a single cluster, this sometimes happens and is considered an error.)

The FAT file system was designed to support no more than 65,536 individual clusters on a hard drive, no matter the capacity of the hard drive. Think of this as a book that can hold no more than 65,536 pages. Regardless of whether you have a 500MB hard drive or a 2 Gigabyte (abbreviated GB, meaning a billion bytes) hard drive, they can only contain a maximum of 65,536 clusters. The main difference is the cluster size. The two hard drives

used in this example would be analogous to two books, each having 65,536 pages, the only difference is that one book has larger pages, thus more space to store information. What determines cluster size is your hard drive's storage capacity. Figure 2 illustrates the ratio of hard drive capacity to cluster capacity:

HARD DRIVE CAPACITY	CLUSTER SIZE
Less than 128MB	2KB
128MB to 256MB	4KB
256MB to 512MB	8KB
512MB to 1GB	16KB
1GB to 2GB	32KB

**Figure 2**

As you can see, the larger the hard drive, the larger the capacity of each cluster. As cluster capacity grows, so does the wasted space on your hard drive.

To see how all this works, let's use a 1.6GB hard drive as an example. Since the drive's capacity is above 1GB, the cluster size will be about 32KB, or 32,000 bytes (using Figure 2 as a reference). Remember that this particular cluster can hold only one file, no matter the size, up to 32KB. No other file can occupy a cluster occupied by another file. Even a 1 byte file, the smallest file size possible, must be stored in a cluster all by itself. This means that a 1 byte file would occupy a 32KB cluster, all by itself, even though it was only 1/32,000 of that cluster. On the other hand, if you had a file that was 32KB in size, it would occupy the total storage space of a cluster, which would be very efficient storage, indeed.

Now...where do shortcuts and enormous hard drive space waste come into this, you ask? When you or Windows 95 creates a shortcut file, it is stored on your computer's hard drive in a cluster. All by itself. With no other file. About 350 bytes occupying a storage unit capable of storing up to 32KB. Do you see the horrendous tragedy here? Almost the entire storage capacity of the cluster is going to waste.

Using my computer system as an example, as we did earlier, let's figure out how much actual wasted space there is on the hard drive, due to shortcuts alone. Remember...I'm not using exact numbers here, since we are only interested in a rough figure. My computer's hard drive capacity is 1.6GB, which means that each cluster is about 32KB. I also have 250 shortcuts, each one occupying a 32KB cluster. To figure out how much wasted space these shortcuts cause, we multiply the number of shortcuts by the cluster capacity on my hard drive. In other words,  $250 \times 32,000$ , which equals 8,000,000. Divide 8,000,000 by 1,000,000 (roughly the size of a megabyte), and we get the number, in megabytes, of wasted space on my hard drive, due to shortcuts. In other words, we calculate about 8MB (8 million bytes) of space being allocated just to these 250 shortcuts. Earlier, we found that Windows reports that these shortcuts only take up about 87KB (87,000 bytes), but we see that the actual value is about 8MB. This is approximately 100 times more than what Windows reports.

Why does Windows report a different value, you ask? Windows looks only at the actual size of a given file, like a shortcut, and reports that value. So if a file size is only 350 bytes, then it will report only 350 bytes, not the value of the cluster that is taken up by the file.

When you consider this in the vast scope of how many sub-32KB files exist on your computer system, such as the hundreds of shortcuts, this adds up to an enormous amount of wasted storage space. It's been estimated that the amount of wasted space on a 1-2GB hard drive is approximately 500MB, which could be 25-50% of a drive's capacity. A solution to all this is on the way. Future versions of Windows will contain a new version of FAT that is completely updated for today's larger hard drives, reducing the capacity of clusters and

the amount of wasted space.

Is there anything that you can do about this right now, you ask? Yes. One option is to partition your hard drive using partitioning software. Basically, partitioning your hard drive divides its storage area into two, or more, smaller segments, which results in a smaller cluster size. For example, you can partition a 1GB hard drive into two 500MB hard drives, which would reduce the cluster size to about 8KB. It's still the same, physical hard drive you had before, but now your computer thinks it's two different hard drives. Partitioning your hard drive is considered a drastic measure, and should only be done by people very familiar with computers.

Another option is to hunt your system for "dead" shortcuts that point to files or applications that are no longer on your system. This won't yield great savings, but you will pick up a little extra space on your hard drive. You can also hunt your system for applications and files that you no longer need. Why have stuff on your computer that you no longer need or use? It's just taking up space. Unless you are very familiar with computers, I would recommend purchasing a good software uninstalling utility to do this. This type of utility hunts your system for applications and files that are no longer used, or that you want to delete, and with your permission, will delete them, therefore freeing up hard drive space.

Well...there you have it. A little known secret about Windows 95 shortcuts, as well as any other small file that turns out to be big on hard drive space. It's not really the shortcut's fault. It's just the outdated design of Windows' file system. A better, more efficient version will be released with the successor to Windows 95. In the meantime, don't worry about the number of shortcuts on your system. They make life alot easier...and isn't that the point of owning a computer?