ENJOY A FASTER WINDOWS PC!

Ultimate**DEFRAG** ⁶

USER**GUIDE**

DISKTRIX

CONTENTS

WHAT'S NEW IN VERSION 6

We're proud to be able to state that UltimateDefrag Version 6 is a revolutionary defragmentation software product that continues to evolve in terms of power and flexibility for defragmenting and optimizing your hard drive. In this build we have pulled all stops out and implemented every function a user could ever want or need for the purpose of defragmenting and, importantly, optimizing file placement in order to maximize hard drive performance.

- **NTFS file compression functions.** This version adds a whole new dimension of utility relating to NTFS file compression which will give you both increase in hard drive performance, which can be significant in traditional platter based hard drives, and for space saving with still relatively high cost per megabyte solid state drives. NTFS compression options have been added throughout the program which we will cover in this manual.

- **New defragmentation methods.** We've added new defragmentation methods such as being able to divide your drive into virtual zones as well as compression and simultaneous defragmentation of all or selected files on your hard drive.

- **Enhancements and added features for existing defragmentation methods.** Many of the defragmentation methods have been enhanced with added options. For example the Fragmented Files Only option has a number of advanced options for prioritizing which files are defragmented first during a fragmentation run. We've also added a sorting strictness option to methods that sort files for faster completion which can be achieved by relaxing the strictness of the sorting.

- **Fragmented Files Explorer.** This feature enables you to view all fragmented files on a drive and sort those files via a number of different criteria. You can then simply select those files and with a right click perform both defragmentation and compression operations on selected files. This is a very handy and powerful feature for selective file and folder defragmentation.

- **Expanded Command Line Support.** We've further enhanced command line support. For example you will be able to defragment particular directories by simply navigating to

the directory and entering a simple command to defragment, recursively, the files in that directory. The command line feature also enables file compression operations that give you more capability for selecting and compressing files and folders than the Command Prompt Compact command.

- **Additional functionality for selecting files for High Performance and Archive zones.** We've added additional selection criteria for files selected for HP and archive including the ability to exclude files. For example in HP you might only want to select all files used in the last 30 days except for zip files. You can add wildcard *.zip to the exclude section and zip files will be excluded. These sections also now include compression functionality. For example you may wish to compress files that are moved to archive zone to save space on files that are rarely used. You can also compress and decompress High Performance files. On mechanical hard drives, NTFS compressed files give you faster performance than if the file is uncompressed. This is because modern processors can decompress files faster than hard drives can access files. File access speed increase correlates with the degree of compression. So a file that compresses 2 to 1 will read about twice as fast. This speed improvement does not exist in SSDs but you can benefit from the increased available space that file compression gives you.

- **Many additional tweaks and improvements and fixes.** There's too many tweaks and additional minor features to list here. We will mention them when they are relevant throughout the body of the manual. We have not changed the User Interface at all. We believe that once an optimal user interface has been developed that it should not change significantly.

We trust that you will enjoy the new version 6 of UltimateDefrag and be able to leverage its new features to continue to maintain the fastest hard drive performance possible for your PC.

Enjoy UltimateDefrag Version 6!

INTRODUCTION

UltimateDefrag is revolutionary hard drive defragmentation software that not only lets you defragment your hard drive, but also enables you to overcome the limitations caused by the mechanics of regular mechanical hard drives that ultimately affect the performance of those drives. By identifying and understanding the few specific reasons for latency (slow down/delays) in hard drive file access namely seek times, access times and transfer rates, you can minimize the latency and maximize the data transfer rates by simply re-arranging the relative and absolute location of the files on the physical platters of your hard drive in order to minimize seek times and maximize transfer rates.

You experience the effect as a faster and more responsive Windows PC!

With UltimateDefrag you can place the files you want the best performance from onto the faster areas of your hard drive and also place your rarely used data out of the way and repositioned onto the slower areas of your hard drive in order to make way for the data that you want to place in the faster areas of your hard drive where performance is greatest.

UltimateDefrag lets you specify defragmentation and file placement routines right down to the individual file and folder level to achieve a performance up to 400% that of quoted factory average performance. Before UltimateDefrag, no other defragmentation software has enabled you to be able to do this with your file system.

UltimateDefrag maintains a database that tracks usage statistics of all the files on your hard drive and uses this file usage data to determine your most frequently and least frequently used files and then enables you to place your frequently used files into the High Performance file category, along with other files, folders and programs that you optionally choose. You get the best possible performance out the programs you want the best performance from, whether it's a particular game, program or data file. You can move these programs and files ahead of other files and folders to the area of your drive that gives you the best performance.

You choose the files that you want performance from and those that you don't or let UltimateDefrag do it for you – automatically based on file use.

UltimateDefrag is very powerful yet very easy and intuitive to use. Once you understand the basic concepts and the issues that slow your hard drive and principles that result in increased performance, you can use UltimateDefrag as a powerful tool to give you hard drive file access that will perform significantly faster than what hard drive manufacturers quote for their hard drive's performance.

When done right – these principles of hard drive performance enhancement, that UltimateDefrag enables you to manipulate, all compound (greater than the sum of the parts) to give you performance that you have not previously experienced from your hard drive. After defragmenting your files and optimizing their placement with UltimateDefrag – your whole PC

will respond with the speed and sprite as when it was new. You'll see the performance results instantly!

If you decide that you do not want to use all of the advanced options and simply want a fast reliable defragmentation that gives you the absolute best performance possible from your hard drive, then you can also use UltimateDefrag for that purpose only. Select Simple Mode and all you will need to do is press start and you'll be enjoying what is probably the fastest and cleverest defragmentation engine on the market even with its approach to standard defragmentation which uses efficient "in-place" defragmentation algorithms for fast, reliable and complete defragmentation runs that leave your files arranged to give you the fastest possible performance from your hard drive.

UltimateDefrag is a totally unique approach to defragmentation and offers all the power you need to manipulate defragmentation and file placement on the hard drive to significantly improve the performance of your Windows based PC.

The new generation of hard drives known as Solid State Drives are not affected by the mechanical issues that result in reduced hard drive performance of regular mechanical hard drives and as a result most features of UltimateDefrag are not required for defragmenting the file system on your SSD hard drive. SSDs are however, still affected by certain aspects of file fragmentation which does reduce their relative performance and UltimateDefrag is designed to defragment SSDs using methods that are optimized for SSDs.

System Requirements

• Windows 10, 8, 7, Vista, XP, Windows Server 2003 or 2008.

• All features of UltimateDefrag will work with both 32 bit and 64 bit versions of these above operating systems. 32 bit Windows may be subject to a 2 Gb memory limitation which is very rarely reached. 64 bit Windows versions do not have this 2 Gb memory limitation.

• Any hard drive media with NTFS or FAT32 file system. Works best with NTFS which is the standard for Windows hard drive formatting.

• 10 Mb Free Hard Disk Space (and around 5 Mb per 100,000 files for the File Usage Database)

• 3D Graphics card for best performance of GUI Disk Display

• There are no limits on volume size, RAID configurations or types of volumes. All modes are supported since UltimateDefrag sees your drives as volumes specified by the Windows operating system. Also works with volumes in Virtual Machines.

• Drives can be internal, external, traditional mechanical or Solid State Drive (SSD). Drives connected by USB can be defragmented although we only recommend USB 3 if you are defragmenting larger hard drives. USB 2 is significantly slower but speeds are acceptable for smaller USB flash drives.

INSTALLATION & LICENSE ACTIVATION

Installing The CD-ROM Version
If you purchased the CD-ROM version of UltimateDefrag – insert the CD into your CD or DVD drive. The installer should start automatically. Simply follow the installation prompts.

If the installation routine doesn't automatically start – the use Windows Explorer to browse the drive, then locate and run UltimateDefragSetup.exe.

Installing The Download Version
Simply double-click on the installer file – UltimateDefrag6Setup.exe. Follow the prompts to complete the install.

Running UltimateDefrag
Select the Windows Start Menu, Locate the DiskTrix - UltimateDefrag program group and then simply select the UltimateDefrag icon. The program will then start.

Product Activation
The first time you run UltimateDefrag you will be presented with a product activation screen. At this opening screen you can purchase the program (if you are trying the program), you can unlock the program (either online or in offline mode) or you can continue running in simulation mode. The trial version runs in simulation mode only and does not make any changes to your hard drive. You can explore all the features of the program for as long as you like. The simulation trial mode never expires.

To purchase the program simply select purchase online and you will be taken to the DiskTrix web site where you can purchase a license online.

Activating Online
If you are installing UltimateDefrag on a PC that is connected to the internet, then select Unlock UltimateDefrag online. You will need to enter a valid e-mail address and the license number you were issued when you purchased UltimateDefrag. The activation system will check for validity and activate your copy of UltimateDefrag. Upon activation, you will receive an e-mail confirming your successful activation of UltimateDefrag.

Activating Offline
If you are installing on a PC that will not be connected to the internet, or if the online activation is having difficulty communicating with our licensing server through your fire wall, you can use offline activation mode. The PC or device you are using to complete the activation process will need to have internet access to access our license server.

To activate offline, simply select Unlock UltimateDefrag offline and follow steps 1 to 8 in the

offline activation screen. You will copy the activation token to your clipboard, visit our licensing server, enter the activation token and our server will send you an activation code via e-mail for you to enter in the activation code field.

With these long encrypted strings of characters it is much easier to copy <CTRL-C> and paste <CTRL-V>these lines into the appropriate fields. In the case of the activation token in step 3 above, there is a clipboard icon you can click in order to copy the long code to your clipboard for pasting into the appropriate field on our activation server.

UltimateDefrag will only run in Simulation mode until activated/unlocked. Simulation mode enables you to use all of the features in the program but it will not make changes to your hard drive. It will only simulate what it would otherwise do if it was making changes to your hard drive. With this system you can test the full power of this software while deciding whether it is a piece of software you wish to invest in.

If you have any difficulties with activating your copy, please contact us at support@disktrix.com or visit the support pages at www.disktrix.com for activation troubleshooting.

Retrieving a misplaced license number
You can retrieve a license number for UltimateDefrag that you have already purchased via our licensing server. Simply go to www.diskTrix.com/licensing and enter your e-mail address into the appropriate field. Your license number(s) will be e-mail to the address you entered.

A Word Of Caution Against Running Illegal and Illegitimate Copies
The only version of UltimateDefrag that can trust is one that bears the DiskTrix digital signature. If you obtained UltimateDefrag from anywhere besides DiskTrix or one of our resellers, you should not trust its integrity. To check for the authenticity of your copy of UltimateDefrag go to C:\Program Files\Disktrix\UltimateDefrag folder. Locate UltimateDefrag.exe, right click and select the Digital Signatures tab. It will show you whether your copy was digitally signed by DiskTrix Inc. If it is not digitally signed by DiskTrix Inc, then you should not trust it to not be laced with malware that could destroy your precious data. We highly recommend that you only use official copies of any publisher's software in this modern age of viruses, trojans, malware and ransomware.

HARD DRIVE PERFORMANCE THEORY

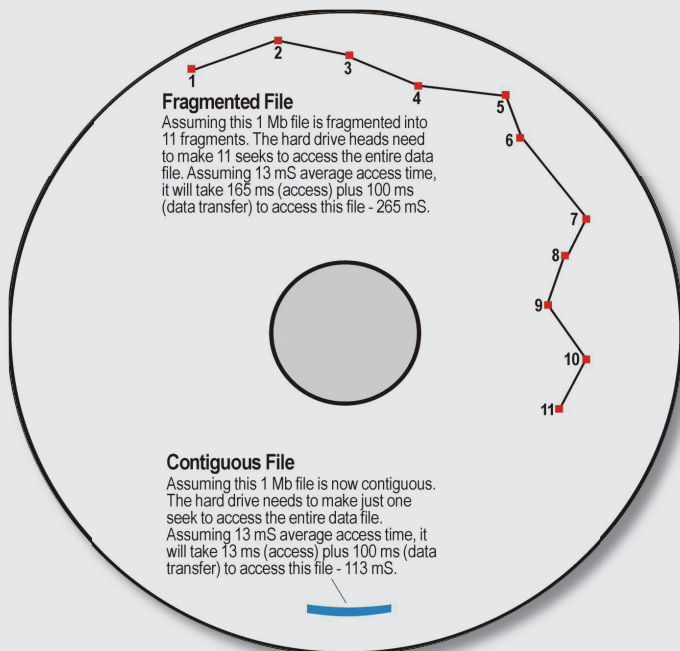## TRADITIONAL MECHANICAL ROTATING PLATTER HARD DRIVES

Please read on to see how fragmentation and two other, even more important factors act to slow your hard drive's performance. All of the information presented here relates to traditional mechanical rotating hard drives, as opposed to Solid State Drives (SSDs). Mechanical hard drives have performance limitations caused by the fact that they do have moving parts and the entire purpose of UltimateDefrag is to minimize the slowdown caused by these limitations. For a discussion on SSDs that are not subject to the factors that slow mechanical hard drives but it is still recommended that they are defragmented in a limited way, please refer to page 23.
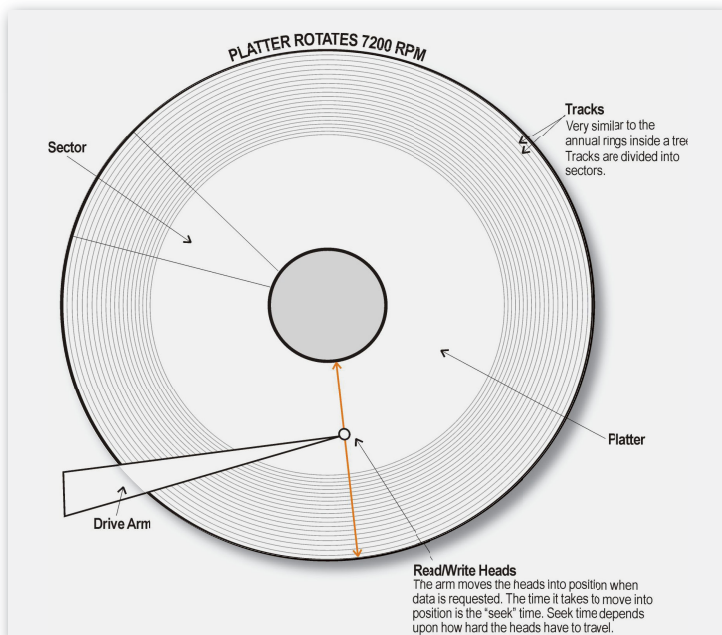
How Your Hard Drive Works

Your hard drive is the only "data handling" peripheral in your computer with moving parts. This makes it the slowest performing peripheral, when compared to the CPU and memory. As a result it is the performance rate limiting device on your computer. Most of the time, the CPU and memory has done its work and is waiting on the hard drive to provide or save data.

In the most simplistic of descriptions, your hard drive consists of spinning platters and read/write heads. The platters contain data bits that consist of magnetic patterns of data. The

Fragmented File
Assuming this 1 Mb file is fragmented into
11 fragments. The hard drive heads need
to make 11 seeks to access the entire data
file. Assuming 13 mS average access time,
it will take 165 ms (access) plus 100 ms
(data transfer) to access this file - 265 mS.

Contiguous File
Assuming this 1 Mb file is now contiguous.
The hard drive needs to make just one
seek to access the entire data file.
Assuming 13 mS average access time, it
will take 13 ms (access) plus 100 ms (data
transfer) to access this file - 113 mS.

File Fragmentation
File fragmentation drive performance is a function of file size, fragment count and fragment size. To
access a fragmented file the hard drive heads have to perform a discrete seek for each fragment. So 11
fragments results in 11 seeks. To access a contiguous file is loaded with just one seek.

platters spin at a rate of anywhere between 4,200 and 15,000 RPM, depending upon your
drive specifications. This rapid rotation of the platters results in a cushion of air that makes
the read/write heads float only a few micrometers above the surface of the platters - just like a
hovercraft floats a few inches above the water. When a request for a file is sent from the main
CPU the read/write heads move across your drive to locate the file, they then read that file and
send the data back to the CPU.

A file may be 512 bytes in size or it may be many Gigabytes in size.

If you do not run any kind of defragmentation or file ordering process, generally speaking,
files are randomly scattered across your drive. Files may also become fragmented. Both these
phenomena are a leading cause of reduced or non-optimized hard drive performance with the
former being a more significant contributor to reduced performance than the latter.

Randomly Scattered Files

Ordered Files
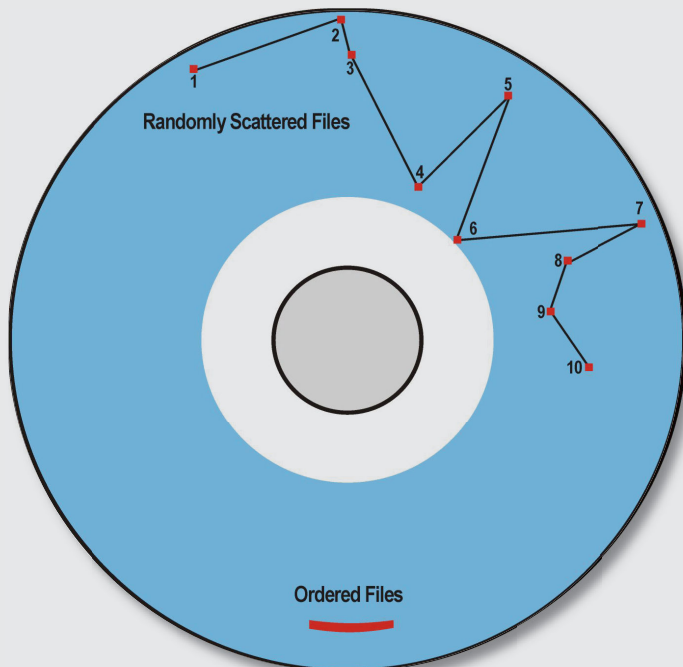
File Scattering Example

Let's assume that the files above are file for a particular program that you are loading. Let's assume that file 1 is the .EXE file and 2 to 10 are .DLL files that are also loaded when the program is launched. You'll see that it is not too different a scenario from loading a fragmented file. The hard drive still has to make 10 seeks to load the files required when launching that particular program. Since the above drive is almost full there are a lot of "long" seeks required to find the files. A good estimate here is 10 accesses of around 20 mS or around 200 mS just to access and locate the files.

Now look at the bottom of the disk when the files are "ordered" alphabetically. They are considered to be in adjacent sectors. When files are in adjacent sectors or tracks - seek times change to what are known as instantaneous seeks and track-to-track seeks. Track-to-track seeks are typically around 1.5 to 2 mS. So the worst case scenario for the 10 accesses is around 25 mS.

A logical order to file placement can result in vastly improved access and seek times.

About Hard Drive Fragmentation

Fragmentation of your computer's hard drive is a natural phenomenon that occurs when deleted files leave empty spaces amongst your drive's data. When the operating system needs to write another file back to the hard drive it generally looks for the first available free space and writes the data to that free space. If the data to be written does not fit in that space it will fill the space with data and then move onto the next free space and continue to write the data until the file is completely written – the result is parts of a file scattered in a fragmented (non-
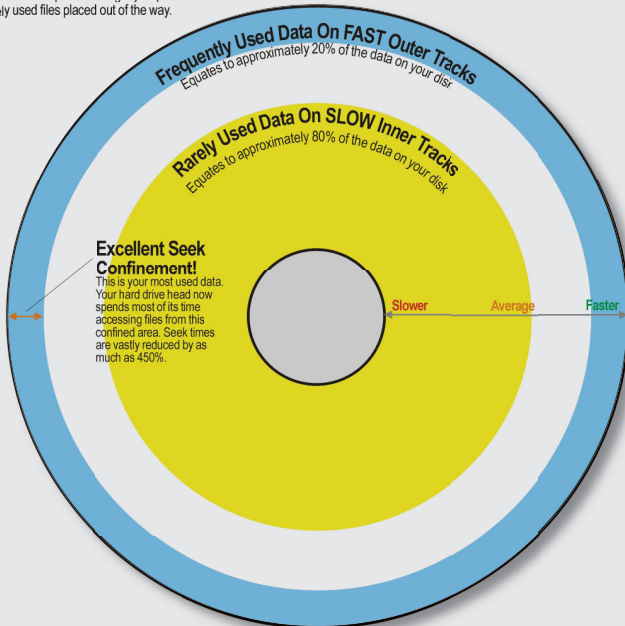
contiguous) manner.

Another way that fragmentation occurs is when you have a file that might slowly grow in size over time. A great example is an outlook.pst e-mail file. The file may not be fragmented but as it grows due to new e-mail being saved to the file, it looks for the next free available space to add the new clusters that the file occupies and it is this new data that becomes fragmented and the file as a whole is fragmented. In files such as this, UltimateDefrag generally uses its in-place defragmentation and doesn't need to move and defragment the entire file. It only defragments and appends the fragmented data to the non-fragmented data making the entire file contiguous in a fraction of the time that other defragmenters would.

When the operating system requests that fragmented file from the hard drive the hard drive read-write heads need to move around the drive to collect all the pieces of that file. The result is vastly reduced performance since the hard drive head has to make many movements to collect all the pieces of the file rather than pick it all up in one smooth motion from consecutive clusters. This increases the number of I/O (input/output) operations that the hard drive has to perform to gather the requested data.

The more fragments a file has, the more I/O required, hence the longer it takes to load that

Ideal Hard Drive Scenario
1. Your files are defragmented
2. Most used files placed towards outer tracks
3. Most used files packed as tightly as possible to maximize seek confinement
4. Rarely used files placed out of the way.

Frequently Used Data On FAST Outer Tracks
Equates to approximately 20% of the data on your disk

Rarely Used Data On SLOW Inner Tracks
Equates to approximately 80% of the data on your disk

Excellent Seek Confinement!
This is your most used data. Your hard drive head now spends most of its time accessing files from this confined area. Seek times are vastly reduced by as much as 450%.

Slower   Average   Faster

particular file. The result is that your hard drive performs far slower than it is capable of in the process of loading that file.

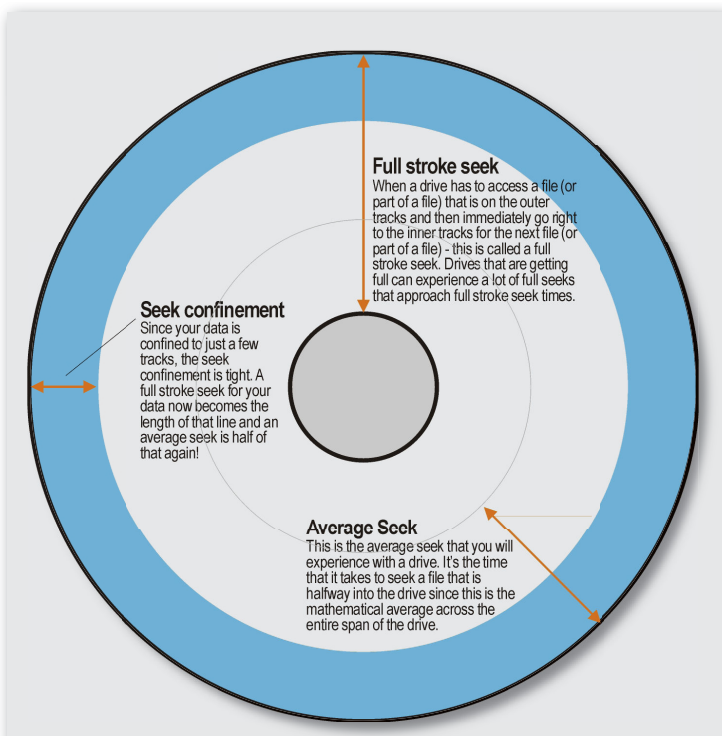This is, in a nutshell, the phenomenon of file fragmentation.

Fragmentation and Optimization

File fragmentation is only part of the equation in the cause of reduced hard drive performance. UltimateDefrag addresses this and the other, more significant contributor to reduced hard drive performance and, that is, the placement and ordering of files on your hard drive.

File Placement - A More Important Issue

Most defragmenters that are out there have pretty much ignored this much more important aspect of hard drive performance – the placement of files on your hard drive.
Loading one file that is fragmented is a discreet issue at the individual file level. However, the way in which the Windows operating system and NTFS file system function results in an almost constant dialog between the computer and the hard drive as hundreds of files

Full stroke seek
When a drive has to access a file (or part of a file) that is on the outer tracks and then immediately go right to the inner tracks for the next file (or part of a file) - this is called a full stroke seek. Drives that are getting full can experience a lot of full seeks that approach full stroke seek times.

Seek confinement
Since your data is confined to just a few tracks, the seek confinement is tight. A full stroke seek for your data now becomes the length of that line and an average seek is half of that again!

Average Seek
This is the average seek that you will experience with a drive. It's the time that it takes to seek a file that is halfway into the drive since this is the mathematical average across the entire span of the drive.

are accessed during system boot time and during regular operation of the computer.

What is more important here is the work the hard drive read-write heads need to do to read all of these files that are both fragmented and scattered all around the drive. If they are not fragmented they are still scattered all around the drive and loading these files requires extensive movement of the hard drive read-write heads to pick up these files from wherever they may be on the drive – from the outer tracks to the inner tracks. Reading a file from the outer tracks and then having to go all the way to the very inner tracks takes the amount of time that is actually twice as slow as your drive's rated seek speed. If your hard drive has an average access speed of 13 mS then reading a cluster from the outer and then the inner track takes about 23 mS.

Hard Drive File Location

Another important item to note is the location of the data on your hard drive. It is a fact that data transfer from the outer tracks of your hard drive platter is about 180 to 240% that of your inner tracks. This is due to the phenomenon of zoned bit recording and angular velocity. Please consult the Basic Hard Drive Theory section for more information on this.

The Ideal Scenario

Your hard drive is capable of performing around 4 times of what manufacturers specify as average performance for your hard drive. This is what UltimateDefrag strives to achieve. In order to have your hard drive perform as fast as it is capable of and even faster than the average rated speed, four elements need to be considered.

1. Your files need to be defragmented in order to minimize drive head movement while reading a file.

2. Your files need to be placed as far as possible towards the outer tracks of your hard drive in order to be accessed from the fastest part of the hard drive.

3. Your files need to be placed or consolidated as closely together as possible to minimize head movement while loading different files – also known as "seek confinement" or "short stroking".

4. Files that are rarely used should be placed out of the way so that your most used files are clustered as closely together as possible.

UltimateDefrag achieves all this with the end result being hard drive performance that is theoretically increased by 300+% of your drive's current manufacturer rated performance.

Basic Hard Drive Theory

We will now focus a little more closely on how your hard drive works from the viewpoint of data access. When you understand this you will understand how UltimateDefrag, which is more than just a defragmenter, does what it does to vastly improve your drive's performance.

Some Important Terms:

Seek Time: The amount of time a drive head takes to move to the correct position to access data. Usually measured in milliseconds (mS)

Latency: Also know as rotational delay. The amount of time it takes for the desired data to rotate under the disk heads. Usually the amount of time it takes for the drive to perform a half revolution. Usually measured in milliseconds (mS)

Access Time: The amount of time a drive head takes to access data after the request has been made by the operating system. Usually measured in milliseconds (mS). Other minor factors taken out of the equation it is approximate to: Access Time = Seek Time + Latency.

When data is being requested from the drive the hard drive head moves into position (seek), waits for the data/sector to move into position under the head (latency) and then accesses the data. The time taken for these 2 steps is the access time.

Full Stroke Seek: The amount of time it takes for the drive head to move from the outermost track to the inner most track.

Track-To-Track Seek (Adjacent Track Seek): The amount of time it takes for the drive head to move from one track to the very next track

Data Transfer Rate: The speed at which data can be read from the hard drive. Measured in Megabits per second

Zoned-Bit Recording: A method of optimizing a hard drive (at the factory) by placing more sectors in the outer tracks of a hard drive than on the inner tracks. Standard practice for all modern hard drives.

Sectors: The smallest individually addressable unit of data stored on a hard drive. In a typical formatted NTFS hard drive it is usually 512 bytes.

Tracks: Tightly packed concentric circles (like the annual rings inside a tree) where sectors are actually laid out.
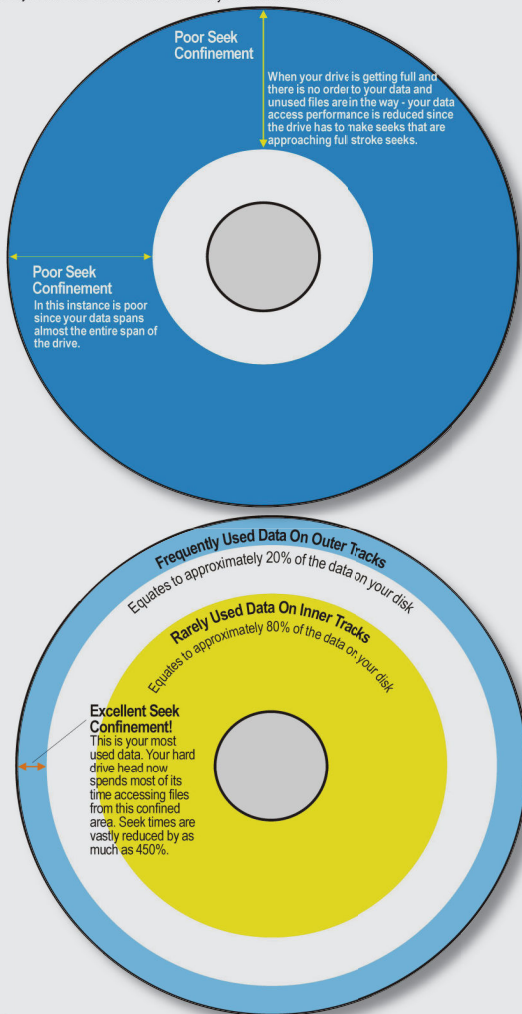
Rotational Speed: The speed at which a drive platter rotates in revolutions per minute.

With all these terms now outlined, let's look at the numbers in a typical 2 Terabyte SATA hard drive.

Read Seek Time:	8.5 mS
Latency:	4.2 mS
Full Stroke Seek:	23.0 mS
Track-To-Track Seek:	2.0 mS
Transfer Rate:	150 Mb/S

Seek Confinement

When your data is spanned randomly across the drive you experience seek times that approach full stroke seek times. When your data is consolidated on the outer tracks (blue band) you increase the seek confinement and seek and access times are dramatically reduced to a fraction of that when your data is scattered.

Poor Seek Confinement

When your drive is getting full and there is no order to your data and unused files are in the way - your data access performance is reduced since the drive has to make seeks that are approaching full stroke seeks.

Poor Seek Confinement

In this instance is poor since your data spans almost the entire span of the drive.

Frequently Used Data On Outer Tracks
Equates to approximately 20% of the data on your disk

Rarely Used Data On Inner Tracks
Equates to approximately 80% of the data on your disk

Excellent Seek Confinement!
This is your most used data. Your hard drive head now spends most of its time accessing files from this confined area. Seek times are vastly reduced by as much as 450%.

Pareto's Rule

80% of the time you only use 20% of your data. So let's put this data on the outer tracks and compact it. And let's put the other 80% of the data on the inside tracks.
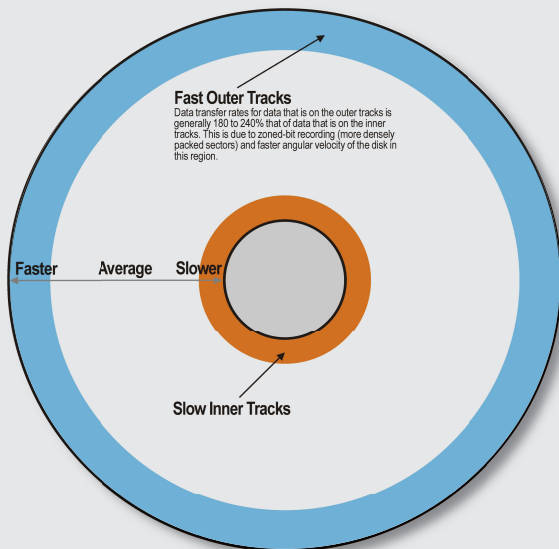
HARD DRIVE PERFORMANCE EXPLAINED

Let's look at how these factors work to affect hard drive performance

Firstly let us say that internal workings of hard drives include scheduling algorithms that attempt to optimally schedule concurrent requests for data. The examples we give you below is a single access one time request to give you an indication of how one unique access would work. Multiple concurrent access requests are handled such that the drive firmware determines the optimal order in which is services those requests. This is what is known as Native Command Queueing where the hard drive controller optimizes the order in which it will seek and access files at the fastest rate possible. UltimateDefrag, by improving seek confinement of data, further enhances the efficiency of these algorithms by ultimately reducing the amount of

Hard Drive Data Transfer Performance

The illustration shows the data transfer rates for data depending upon where it lies on your hard disk. The aim is to get the data you require performance from on the outer tracks and the data that you don't use out of the way and onto the inner tracks.

Fast Outer Tracks
Data transfer rates for data that is on the outer tracks is generally 180 to 240% that of data that is on the inner tracks. This is due to zoned-bit recording (more densely packed sectors) and faster angular velocity of the disk in this region.

Faster   Average   Slower

Slow Inner Tracks

UltimateDefrag moves your High Performance files to the outer tracks and your archive and unused data to the slower inner tracks. This is the essence of what you are trying to achieve with UltimateDefrag.

work they have to do and/or facilitating the native algorithms that ultimately aim to minimize seek and access times.

Data Access

When the CPU submits a request for a file from the hard drive – this is what happens in a simplified manner.

1. CPU sends request to the hard drive

2. The read/write head moves into position above the track where the data is. This is the seek and the amount of time taken is the seek time.

3. The read/write head waits until the data that is requested spins underneath the head. It then reads the data. The time taken for the data to move beneath the head is the latency and is usually the time it takes for the platter to rotate a half revolution.

4. Data is accessed and transferred back to the CPU.

When multiple files are requested simultaneously, the hard drive uses algorithms that try to minimize total seek and access time by determining the most efficient order in which to re-trieve the data. It basically tries to achieve the shortest path.

Back to the one file example, the time it took for the initial request, the seek and the latency is approximately equal to the access time.

Having the numbers from the previous page available now enables further explanation of data performance to be put into comprehendible perspective.

The average Access Time for this hard drive is $8.5 + 4.2 = 12.7$ mS.
The minimum access time is $2.0 + 4.2 = 6.2$ mS and the maximum access time is $23.0 + 4.2 = 27.2$ mS.

Full Drive
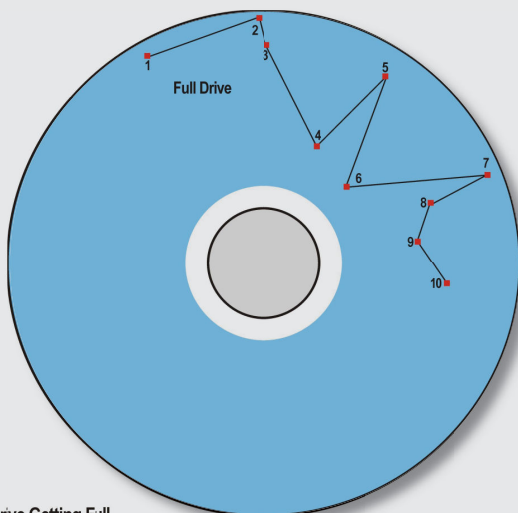
Hard Drive Getting Full
As your hard drive begins to fil, the read/write heads have to do a lot more travelling to access files. This s a major cause of drive fatigue and helps explains why your drive gets slower over time as it fills up with data.

When complete data files or parts of a data file are scattered all around the hard drive you will get a performance that is the average rated access time – in this case 12.7 mS – some accesses are as little as 6.2 mS but some are as great as (or approaching) 27.2 mS. So there is a 450% performance difference between fastest and slowest access time.

Often, hard drive scheduling algorithms and operating system intelligence result in a lot of instantaneous track-to-track seeks i.e. without the latency due to file layout patterns and relative location of data. On top of this, the "seek confinement" of the data also promotes vastly increased probabilities of instantaneous, zero-latency, seeks due to the "compaction" of the data. This increases the probability that the data requested will already be under the drive read/write heads. This actually increases the theoretical 450% figure in the above paragraph to a greater number however it is not accurately quantifiable but can be as high as 1000%.

In a typical fragmented and hard drive not optimized with UltimateDefrag, you will only achieve the average rated performance as average access time with some accesses faster and some slower.

Data Transfer

Another important part of the hard drive performance equation is Data Transfer Rates. Due to a combination of Zoned-Bit Recording (more densely packed sectors) and angular velocity i.e. the outer tracks of the hard drive have a greater angular velocity – data transfer at the outer tracks of the drive is typically 180 to 240 % that of the inner tracks. So when a drive is quoting a maximum of 75 Mb/second – the minimum is about 30 and the average about 58 Mb per second.

Again – if you're operating a full, fragmented and non-optimized hard drive, performance is more around the average of 58 Mb per second.

Why Your Hard Drive Performance Appears To Slow Over Time

When it comes to hard drives, entropy (the tendency towards a state of disorder) is alive and well.

If you've had your computer for a while you will notice that, when compared to when it was brand new, it feels a whole lot slower. Also, as your hard drive gets fuller you'll notice the same phenomenon.

This is due to several factors with the main one being that with the hard drive filling up and files being fragmented and scattered all over the drive in no particular order, your drive is performing more like the "average" factory quoted performance as opposed to when the drive was new and mostly empty and performing better than quoted.

Depending upon where your mostly accessed files are located, it could actually be performing much less than quoted averages.

UltimateDefrag Does Its Magic

Please refer to the ideal scenario at the beginning of this help file. There are four main factors that contribute to reduced hard drive performance and subsequently four main factors that can be addressed to improve your hard drive performance. These incremental improvements all compound each other so the result is greater than the sum of parts. The improvement is not just an improvement to average performance, instead it's improved by a factor of 3 to 4 times your drive's quoted average performance!

Most defragmenters only deal with "fragmented" files – they quote performance improvements by up to 100%. But all they are referring to is the performance of accessing those fragmented files. Which you may only rarely access anyway! They might add only milliseconds of performance improvement. No consideration is taken into placement of files and other items that need to be considered to improve the performance of your drive.

As a result – an everyday "defragmenter" only brings your hard drive and fragmented files back up to average quoted performance.

This is where UltimateDefrag does its magic! UltimateDefrag brings your hard drive up to performance that exceeds average drive manufacturer quoted performance by a factor of 3 to 4.

Pareto's Rule – The 80/20 rule

Pareto's rule pervades our world. 80% of the wealth is distributed amongst 20% of the population. 20% of a company's customers contribute to 80% of its revenue.

Pareto's rule also applies to PC file access. 80% of the time you only access 20% of your files. You can extrapolate that to 90% of the time you only access 10% of your files.

UltimateDefrag Applies Pareto's Rule To Give a Boost To Your Hard Drive's Performance

If you apply Pareto's Rule to 100 Gb of data, generally speaking, 80% of the time you only access about 20% of that data, so why not…

1. Place your least accessed data out of the way of the high performing areas of your drive and move it to the slowest part.

2. Get the data that you access the most and place it to where you get the best performance.

These two single most important aspects of file placement are what UltimateDefrag addresses – and it gives you almost no limit of power as to what you can do as far as manipulating what goes where on your hard drive – right down to the individual file level. This is why UltimateDefrag is a revolutionary defragmentation and disk optimization product.

Prove It Yourself With HD Tune

At this point we'd like to recommend that you download and install a copy of HD Tune to prove

to yourself the theory we have discussed above. You can obtain a free trial at www.hdtune.com.

Run the benchmark on your drive and note the Transfer Rates and Access Times. Then use the "Short stroke" option to reduce the stroke length to say 10% or 20% of your hard drive. So if you have a 500 Gb hard drive run the tests at 50 Gb and 100 Gb short stroke setting. Note the increased average transfer rates and the reduced access times. This "Short Stroke" setting emulates what we are discussing here by placing your most often used files to the outer tracks of your hard drive and least used files to the inner tracks.

Is UltimateDefrag (and Defragmenting) Safe?

This is one question that a lot of people ask. In the pre-NTFS days there was risk to defragmenting. If there was a power outage in the midst of a defragmentation run – you could have lost important data. That has all changed now and defragmenting with NTFS is 100% safe. The actual defragmentation APIs are APIs created by Microsoft themselves for NTFS and all defragmenters use these APIs. In general with these APIs – data is not erased from its original location until it is verified as being correctly written. A product such as UltimateDefrag simply uses those APIs to place files where it wants them to go. API means Application Programming Interface which is another phrase for commands "native" to the operating system.

What About Partitioning?

There are many arguments for partitioning. Proponents of partitioning argue that it helps organize your data, keeps your hard drive "less" complex etc. They advise to put your operating system on one partition, archive on another, program files on another, data on another and it seems a sound argument.

The main problem with partitioning however is that actually creates drives that are slower and slower as more partitions are created. Partitions are created in cylinders (group of tracks) working their way inwards as more are created. So when you create say 5 partitions of 100 Gb on a 500 Gb drive. The very inner partition – the highest drive letter is actually also created at the inner tracks. So it actually performs twice as slow as the primary partition. Remember our discussion of data transfer above. Each partition is about 10% slower than the previous one. C: drive gives you fastest performance; D would be approximately 10% slower; E: approximately 20% slower; F: 30% Slower; and so on. You may be putting the games or software that you want highest performance from on a partition that results in slower performance of that software in terms of file access performance.

UltimateDefrag eliminates any requirement for partitioning for the purpose of data organization and totally dispels the requirement for partitioning from a performance point of view.

UltimateDefrag lets you take the hotchpotch of files that are on your system – put the least used and unused files to the inner tracks and keep the most often used files to your outer tracks where you require performance regardless of which files they may be. It's like partitioning on the fly without the "mental" decisions of needing to constantly think about what goes to which drive when you are saving data and installing programs. Simply do it all on the one physical drive. Partitioning overhead is eliminated. Use folders for what they were intended

for and then use UltimateDefrag to keep what you need where you need it on your drive. No partitioning required!
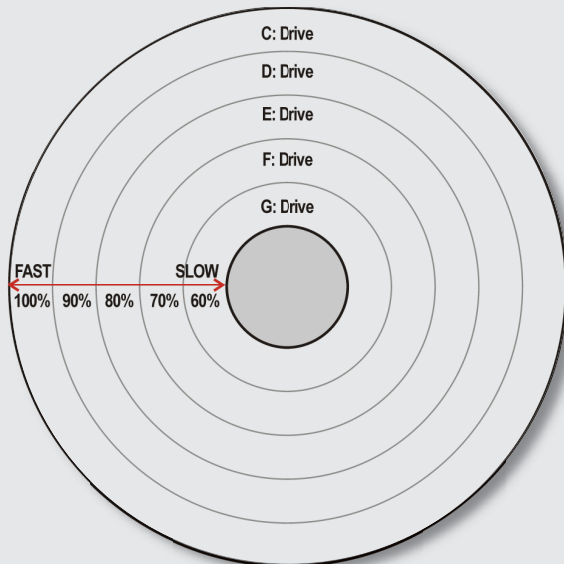
Partitioning Creates Slower Drives
When you create partitions, the partitions are created as cylinders working their way towards the center (slower inner tracks) of the drive. In this example above, C: drive is the fastest performing drive. Performance drops by about 10% with each subsequent partiton. G: drive only performs at approximately 60% of that of C: drive. There is no sound reason to partition your drives when you are running UltimateDefrag since it keeps your high performing data away from the slower inner tracks.

ABOUT SOLID STATE DRIVES

Solid state drives are an entirely different class of drive that have no moving parts and are essentially banks of flash memory cells formatted as a volume. They have no moving parts and are therefore not subject to the issues that reduce mechanical hard drive performance. They have an infinitesimally small seek and access time and their data transfer rates are limited only by the limitations of the drive and/or bus of your PC.

The main limitation of SSDs is that the memory cells have a limitation of the number of times that data can be written to them. As a result SSDs need to have a system in place to minimize the probability of cells "wearing out". This is done by a feature known as wear leveling. Wear leveling, along with most other operations that occur on your SSD are controlled by the controller for the drive. When data is saved to the hard drive, even though the command comes from the Operating System, it is the controller that decides where the data is physically stored on the SSD.

Another limitation of SSDs is that data on SSDs cannot be directly overwritten. The data in the memory cell first needs to be erased and only then is the replacement data written to those cells. This is another feature primarily handled by the SSD controller but in this instance with some help from the operating system.

As a result of the wear leveling that needs to be considered, the operating system has no control over whether the data on the SSD hard drive is physically fragmented. It may well be and will most likely be due to the constant search for the least used cells when new data is saved to the drive.

Do SSD's Need To Be Defragmented?

We will start by saying that the general consensus is that they should not be defragmented since it wears them out. As a result, we shouldn't unnecessarily move files that don't need to be moved or defragmented.

However, although the Operating System (O/S) has no control over where on the drive the data is stored, the virtual file system as the O/S sees it, can become fragmented. In fact it can build up to many hundreds of thousands or millions of fragments if not defragmented. Each fragment means an I/O operation for the operating system when a file is requested. So a file that has 10,000 fragments (not uncommon) will require 10,000 I/O requests from the operating system. Yes, SSDs operate on the millisecond/microsecond level but multiplying that by 10,000 can result in a perceivable performance difference even on the fastest of SSDs.

So the consensus here at our company is that yes, SSDs should be defragmented to minimize the fragmentation of the virtual file system as seen by the operating system. It results in much less disk I/O than a fragmented file system regardless of the degree of fragmentation on the actual disk/memory bank itself.

However, a specific technique should be applied to the defragmentation process for SSDs where:

1. The virtual file system is defragmented .

2. The minimal amount of data is moved/relocated during defragmentation in order to minimize wear.

3. The rate of refragmentation during subsequent computer use is minimized.

UltimateDefrag's unique algorithm for specifically defragmenting an SSD achieves all 3 objectives just outlined.

Later on we will cover UltimateDefrag's options for defragmenting SSDs. You can limit defragmentation algorithms to only those optimized for SSDs or you can treat it like a normal mechanical drive for those users who like to tinker.

Again we do recommend that SSDs are defragmented but using a defragmenting technique that achieves all three goals we specified above. UltimateDefrag does achieve all three goals with its defragmentation methods that are optimized for SSDs.

USING ULTIMATEDEFRAG

UltimateDefrag is very simple to use yet very powerful in its defragmentation and file placement options. The following discussion refers to traditional mechanical hard drives. SSDs are discussed in a separate section however UltimateDefrag allows you to treat SSDs just like mechanical hard drives via a setting in the Options screen if you wish to. Alternatively you can let UltimateDefrag defragment your SSDs with algorithms specifically optimized for SSDs.

Even though it's more about file placement and relocation (as well as defragmenting), we will refer to each option as a "Defragmentation Method". With UltimateDefrag there is a Defragmentation Method for virtually every computer or hard drive application – from gaming machines to servers, from empty drives to full drives.

UltimateDefrag lets you customize your hard drive layout right down to where individual files are placed on your hard drive relative to the other files.

If you have a specific game or application that you want best performance from – you can move its files to the very outer tracks of your drive. If you want all your programs to load as fast as possible when you execute them – put all your EXEs and DLLs to the outer tracks. If you want Windows to boot as fast as possible – put all your Windows boot files to the outer tracks. If you want best performance from your digitized photo album browsing – put all these to the outer tracks.

Conversely, if you have ZIP files of archived data that you rarely use – put them to the inner tracks where performance is slowest since you will never need them. All those Windows update files that never get used again – put them to the inner tracks and out of the way. Windows actually only regularly uses about 20% of the files in the Windows folder – the ones that aren't can be placed right out of the way and to the slower performing inner tracks since you never use them. In UltimateDefrag, we call putting these files to the inner tracks "archiving".

You can choose individual files or file types for both high performance and archiving or you can let UltimateDefrag do it automatically based on usage data compiled by the True File Usage database.

UltimateDefrag Mind Set Goals

Please refer to the Ideal Scenario diagram on page 12. When you are using UltimateDefrag – the mind set you should have when performing your defragmentation scenarios is to aim towards:

1. Defragmenting Files

2. Getting your rarely used data out of the way – ZIP files, unused system files, etc.

3. Getting your most often used data to

i. The outer tracks

ii. As close together and compacted as possible to optimize "seek confinement" or "short stroke"

4. Maintaining optimum performance

5. Making subsequent defragmentation runs complete as fast as possible.

Option 3 in this list is the most critical in getting the performance increase. You are placing your most used and, statistically, most likely to use, files to the outer tracks.

At the outer tracks the transfer performance is double that of the inner tracks and 150% of the average you would normally achieve with a non-optimized drive where files are scattered all around the drive.

You have compacted your most used files to only spread over a smaller percentage of your hard drive area (seek confinement/short stroking) – so you are confining most of the seeks to being adjacent track seeks of 1 to 2 mS and probably no more than 3 or so mS. You are also promoting the probability of instantaneous seeks where expected requested data is already there under the heads thus completely eliminating latency in a vast percentage of your hard drive data accesses.

Hard drive file access is generally random and with UltimateDefrag we are minimizing the randomness of the placement of files on your hard drive volume.

LET'S START USING ULTIMATEDEFRAG

Running UltimateDefrag In Simple Mode

To run UltimateDefrag in Simple Mode:

1. **Click On Your Windows Start Menu**
2. **Locate The DiskTrix Program Group**
3. **Locate The UltimateDefrag Program Group**
4. **Click On the UltimateDefrag Shortcut**
5. **When UltimateDefrag Launches Go To View In The Top Menu and Select Simple Mode**

Simple Mode has been implemented for use by the average end user who does not want to take advantage of all the advanced features of UltimateDefrag but who, at the same time, wants the most optimal file placement for best hard drive performance possible.
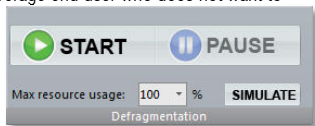
When you select Simple Mode, most features of UltimateDefrag disappear or are not selectable. All advanced defragmentation methods also disappear and all you are left with is a START/STOP button.

When you press START in Simple Mode, UltimateDefrag will, as well as defragment all your files, intelligently give you the most highly optimized file placement for your hard drive and file usage patterns.

Using Simple Mode defragmentation will place your files and give you an overall performance factor of around 400% that of factory averages.

Note: Your first defragmentation run could take a number of hours. We advise you run a simulation first by pressing the simulate button and then pressing START to get an estimate of the time it will take. The simulation itself will only take a few moments.

Scheduling Jobs In Simple Mode

If you want to use simple mode and defragment your drive on a schedule, simply select Schedule and the dialog box for scheduling Simple Mode defragmentation jobs lets you easily schedule your defragmentation runs. You can choose daily, weekly or monthly. Simply select the drive, time and frequency and UltimateDefrag will automatically keep your hard drive truly optimized for the fastest performance possible.

That's All There Is To Simple Mode

There's not much else to running UltimateDefrag in Simple Mode so this is all the space we will dedicate to it. The rest of the manual involves running UltimateDefrag in Expert Mode where you can take advantage of and manipulate all the advanced features of UltimateDefrag.

Running UltimateDefrag In Expert Mode

To run UltimateDefrag:

1. **Click On Your Windows Start Menu**
2. **Locate The DiskTrix Program Group**
3. **Locate The UltimateDefrag Program Group**
4. **Click On the UltimateDefrag Shortcut**
5. **When UltimateDefrag Launches Go To View In The Top Menu and Select Expert Mode**

The Main GUI

The main graphical user interface is where it all happens. Almost everything you need to operate UltimateDefrag is just one or two mouse-clicks away. Most functions and options are on the main GUI under the Control and Settings panel.

At the bottom of the Control and Settings panel you will find the Settings button. This is where most of the power of UltimateDefrag is since this is where you select your high performance and archiving options. We will look at this later.

The Disk Display

The first thing you'll notice with UltimateDefrag when you first load the program is our unique disk metaphor. It displays the NTFS virtual clusters.

Technically it is not exactly true in the case of multi-platter drives however since the virtual clusters map cylindrically it closely correlates with the location of the virtual cluster on the actual physical platter. Clusters shown on the outer tracks correlate with the outer tracks of the platter that the virtual cluster may be on.
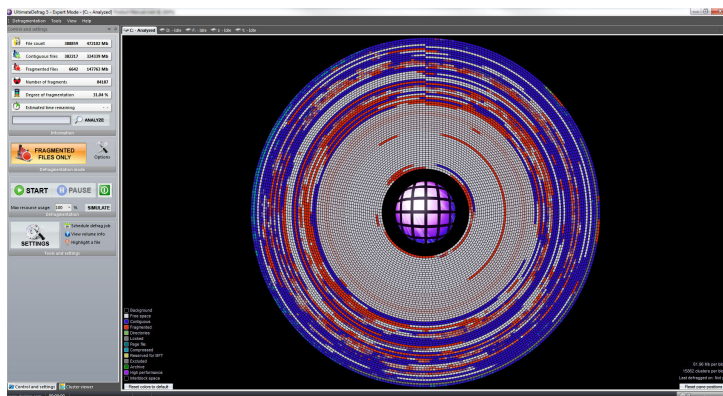
This disk metaphor helps you to more accurately see what is happening with your drive – where your files are and where they are not. It also gives you a very good look at the location of your system files (also called metafiles) such as MFT and Page File. The placement of system files is also very important to the performance of your hard drive and should be considered when you are establishing your seek confinement and that is why our boot time module (discussed later) enables you to specifically manipulate placement of your system files.

The disk metaphor certainly does not apply to SSD drives. A future version will have a different metaphor to display SSD data.

The legend at the bottom left of the screen shows you the different file categories that the disk is displaying.

When you first load the program it will default to your C Drive being selected - most of the file space is green. This is a brief snapshot of the disk usage bitmap. When you hit the Analyze button it will analyze your drive and you will see the colors of the blocks change according to their use. The red blocks contain fragmented files.

The disk is divided up into rectangular blocks. Each block comprises of a group of clusters. When you click your mouse on a cluster block the Cluster Viewer will show the full path and filenames of the files that occupy that cluster. Clicking on a filename in Cluster Viewer brings up a fly out box that shows you more information about the file, including the number of fragments and options for other operations you can perform on the file such as defragmenting

the file there and then. If the file is not fragmented it will show the word contiguous.

Using the up or down arrows when you have selected a file will display information on the next highlighted file.

Top Tabs – Local Drives

This will display all local drives on your computer. By default removable drives are not shown but you can activate the option to defragment removable drives under **Settings=>Options=>More.**

You can only defragment local drives. This includes removable drives. You cannot defragment network drives.

Control And Settings Panel

This is the heart of UltimateDefrag operations.

It is divided up into information, defragmentation mode, defragmentation control, and Tools and Settings.

Control And Settings - Information

This section displays drive and file fragmentation information after analyzing the drive and it updates dynamically during a defragmentation run.

To Analyze a Drive:

1. **Select The Drive You Wish To Analyze**
2. **Press the Analyze Button**

UltimateDefrag has a very fast drive analysis feature and on a typical drive with 300,000 files in around 20 seconds. The more files on your drive or the more fragmented the drive the longer it will take to analyze.

Analysis will display the file count and space occupied by these files and will then also breakdown into contiguous files, fragmented files, number of fragments and degree of fragmentation.

To find a list of which files are fragmented and how many fragments they have:

1. **Select View From The Top Menu**
2. **Select Volume Info.**
3. **Select The Fragmented Files Tab**

You can sort the list by Start Cluster, Fragment Count or Path by clicking on the top of one of the columns.
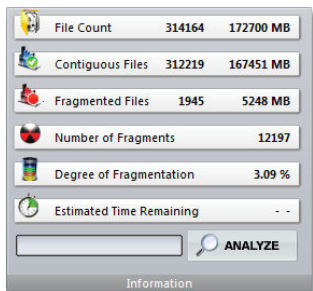
When you right click on one of the files on that list, you are presented with a small menu that enables you to defragment that particular file or to defragment all fragmented files is the entire folder.

This way you can take a quick look at which are your most and least fragmented files. Contiguous files are not displayed in this list.

The General tab will show you basic information on your drive including File System, Cluster Size and other information.

The Locked Files tab will show you the system files and fragmentation information for these files. These files can only be defragmented using the boot time defragmentation module.

Control And Settings - Defragmentation Mode

This is where you select your defragmentation mode from a list of 5 methods. These methods will be discussed in greater detail later in this manual.

- Fragmented Files Only
- Consolidate
- Folder/Filename
- Recency
- Size
- Auto
- Zones
- Space

When a mode is selected, pressing the Options button to the right presents a different set of options that are available for that particular mode. The top two modes, Fragmented Files Only and Consolidate are the most commonly used and fastest methods. The next 6 methods are for those who want fine control over sorting and are much slower methods. Auto is a very clever method that will automatically optimize your drive performance and where you can control exactly the performance you want compared with factory settings. While the space method does defragment drives, it's main purpose is that of performing mass NTFS compression on the files on your hard drive. You can compress files using the Compact command in command prompt however, file selection options are limited. UltimateDefrag's space method lets you specifically select many combinations of files.

About NTFS File Compression

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Because the discussions to follow in the upcoming pages will refer to file compression as an option in some of the methods, now would be a good time to give you a primer on NTFS compression.

NTFS compression is a feature built into the NTFS file system that performs on-the-fly compression and decompression and stores files on your hard drive in compressed-format.

This saves hard drive space which is especially useful if your hard drive is getting full and it would be easier to simply compress files rather than add hard drives or have to replace your hard drive which would then require a reinstallation of your entire PC setup.

On average, data across a drive compresses at a ratio of about 1.5 to 1. This means that 1.5 Terabytes of data would compress down to 1 Tb. Some files such as .txt files compress at ratios of up to 20 to 1 while already compressed .jpg files do not compress at all. The average tends to be around 1.5 to 1.

With the speed of modern processors there is a huge additional benefit realized by file compression with mechanical hard drives. Read speeds on these files are faster than uncompressed files. This is because the processor can uncompress files faster than they can be read from the hard drive. So for example if you had a 5 Mb txt file that was compressed at a ratio of 5 to 1, your hard drive would only need to read 1 Mb of data from your hard drive while the processor uncompresses what is actually 5 Mb of data uncompressed. So while seek times remain the same, the actual amount of time spent accessing the 1 Mb of data is, in this case, 1/5 of the time.

So you do get two significant benefits with file compression; faster file access and disk space savings.

The faster file access is not realized on SSDs. This is because file access is actually faster than, or around the same speed, as the processor's ability to uncompress. So while you will enjoy more drive space on your SSD with file compression you will experience a slight loss in read and write performance. In this situation it's your decision as to what is more important to you, speed or available space.

One big drawback with file compression is that it actually more susceptible to fragmentation so if you compress then you should definitely defragment. UltimateDefrag is the only solution available that does both and can perform both operations on a file, not simultaneously but immediately sequentially.

In some of the dialogs you will find option to compress, uncompress, leave as is and Smart Compress. Smart Compress is a proprietary feature that quickly analyzes the file for compressibility and will not try to unnecessarily compress the file if the file cannot be compressed. This is a feature that is not available in the Command Prompt Compact command.

Compression is always only a selectable option throughout UltimateDefrag and it will never compel you to compress files but always give you the option to compress files.

Control And Settings - Defragmentation Control

This is where you start, stop or pause your defragmentation.

Maximum resource usage determines the maximum amount of resources dedicated to the defragmentation process. Settings are from 20 to 100% and also include an auto option which automatically detects if you are using the computer and cuts back on resources that

UltimateDefrag uses. If you stop using your PC then UltimateDefrag resumes using more resources. You can change the resource using at any time, including during a defragmentation run.

Simulate Option is the first ever, and only, implementation of a defragmentation simulation in a defragmentation program. UltimateDefrag can do some pretty intensive file rearranging and instead of running a complicated defragmentation routine that wasn't what you wanted, you can run the simulation by selecting SIMULATE. When you press start, UltimateDefrag will analyze the drive and run a simulation of the defragmentation and file movements but it will not make any changes to any data on your hard drive. The simulation will run much faster than the actual defragmentation run since no actual files are moved and you are just seeing in-memory simulated operations. You will find this feature handy, interesting and fun to *play* with!

Control And Settings - Tools And Settings

This section lets you control all the settings of UltimateDefrag. The larger Settings button is where you select all of your file operations such as High Performance files and Archive files and access the boot time module. Here you can schedule a defragmentation job, view volume information that shows fragmented files and you can also launch the file highlighter.

Settings - Options

This is the section where you set critical high performance and archiving options. While elegantly simple it is extremely powerful with you being able to select which files you require high performance from, which files are to be archived and which files are excluded.

To select the Options menu simply press the Settings button in this section or from the pull down menus at the top of the screen:

1. **Select Tools From The Top Menu**
2. **Then Select Settings**

Some important terms to understand:

High Performance Files are moved to the outer tracks where the transfer rates for data from the hard drive are fastest - around twice as fast as data on the very inner tracks.

Archive files are moved to the inner tracks or after any data that is not selected by archive options – these files are files that you would consider not used or rarely used and can be moved to the slower inner tracks and out of the way.

Excluded Files are completely ignored by the defragmentation and file moving process. They are left in place unmoved and are not defragmented when the defragmentation is performed.

Please note that the Excluded Files feature has two additional check boxes. One option is to not Exclude Fragmented files. This will defragment any files that meet the criteria to be excluded but it will ignore and exclude them the next time you defragment since those files are now defragmented.

The second check box is to not exclude files that are in the High Performance zone. This feature behaves as follows:

If a file is set to be excluded and it is in the zone where High Performance files will be placed, the file will be moved out of that zone. It will then be ignored and excluded in future as long as it does not return to the High Performance zone.

These settings are set for each individual drive since you may want a completely different set of rules for each drive.

To change options for a drive:

1. **Highlight the drive you wish to set options for**
2. **Then select the options you wish to set for that particular drive.**

IMPORTANT: Any parameters specified under High Performance or Archive are ignored unless the "Respect High Performance" or "Respect Archive" is selected in the defragmentation method options when you perform an actual defragmentation run.

Selecting High Performance files

This option is very powerful and this is where you can achieve the high levels of performance we described previously.

High Performance files are moved to the very outer tracks of the drive – this is where data transfer rates are the highest – about double that of the inner tracks. Also putting these files closer together towards the outer tracks – you're improving "seek confinement" thus reducing access times again by about double the magnitude.

Overall, by doubling transfer rates and halving access times of your most frequently used files you are improving raw performance by a theoretical factor of 400%.

By default files selected for High Performance files are shown in purple on the disk display but only when the defragmentation process is running. If you simply analyze the drive these files will not show in purple. If you have selected Respect High Performance, after the analysis phase and your defragmentation has commenced you will see a number of blocks in the color that you have selected to display High Performance files. You will see the outermost tracks in the disk display begin to be populated with the blocks of that color. All files and blocks shown in that color will take up position on the outer tracks of your drive display based upon sorting options.

Let's look at the way you can select files for High Performance.

It is important to note that the logic in each of the selected option is OR. So if you have more than one High Performance criteria selected it will include files that meet one option OR the second option.

Automatic Option
The automatic option, uses data on your file usage patterns that is collected in the True File

Usage database or if you have selected in the UltimateDefrag's global options, to not use the TFU database then it will simply use the current date stamps on the files.

If you use your computer for general computing use – you may want to simply automatically put all files that you normally use on a day to day basis to the very outer tracks of the drive. You can specify how you want to select files based upon the frequency of use based upon the following parameters:

Most Frequently Used Data - Percentage Based Upon Data relates to the frequency of use of the data relative to the magnitude of all other data. So if you want to automatically place your 20% most used data to the outer tracks then simply select 20%.

Most Frequently Used Data - Percentage Based Upon File Count relates to the frequency of use of the files relative to the number of all other files. So if you want to automatically place your 20% most used files to the outer tracks then simply select 20%.

Most Frequently Used Data - Percentage Of The Disk allows you to enter a specific outer ring percentage of the disk that your most frequently used (high performance) data will occupy. If you have a 2 Tb drive and you select 10% then the first 200 Gb of the drive will be filled with the most frequently used files up to 200 Gb. 5% will be 100 Gb. etc.

Most Frequently Used Data - Gigabytes allows you to enter a specific number of Gigabytes as your most frequently used data cut off point. e.g. 25 Gb. This will place the most

33
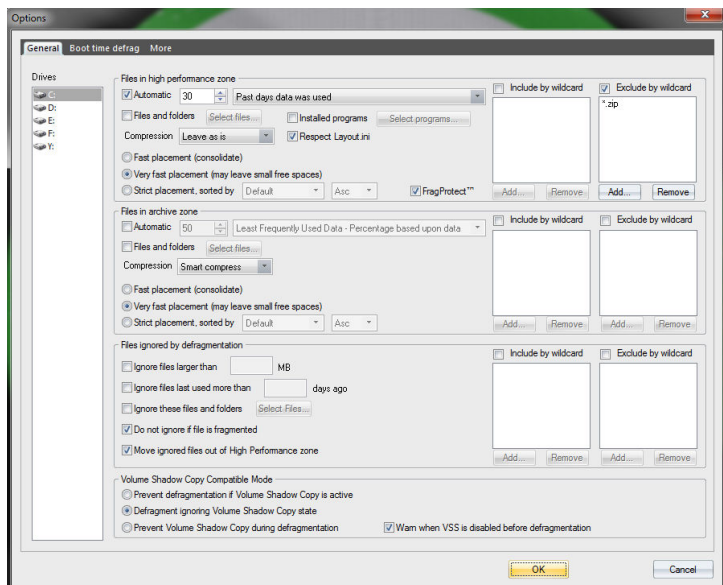
often used 25 Gigabytes into the High Performance zone outer tracks.

Most Frequently Used Data - Number of Files allows you to enter a specific number of files as your most frequently used data cut off point. e.g. 25,000 files. This will place the most often used 25,000 files into the High Performance zone outer tracks.

Past Days Data Was Used. You may just wish to keep all files used in the past 30 days (or whatever period you specify) to the outer tracks.

File usage patterns are statistically determined and it is most likely that the most of the files that were accessed yesterday will also be accessed today. Often, even if you change this from 3 days to 7 days to 30 days, you will not see that much difference in the number of files that go to the High Performance band. Remember 80% of the time only 20% of your files get accessed in your day to day use.

Automatically Determine Optimum Data Size. Selecting this option engages our OptiSeek technology that places the appropriate amount of data into the high performance zone in order to achieve no less than 1 to 2 millisecond seek times and no less than 10% transfer rate degradation from the maximum possible for your hard drive.

Please see page 37 for more discussion on OptiSeek.

File Types Based On Wild Cards

If you want to make all programs load as fast as possible regardless of when you last used them then, under "Include files by Wildcard" add the appropriate Wildcard expression. In this example you would add *.EXE and *.DLL

This will place ALL files with the extension .EXE and .DLL to the outer tracks.

Wild cards are very powerful and let you specify virtually any file you want.

Examples of use include:

*.EXE, *.MP?, MS*.EXE

And so on. The asterisk * will replace any number of characters and question mark ? will replace individual characters.

Selecting 30 Days and adding .EXE to the Include option will place all files you used in the past 30 days (and statistically most likely to use today) AND all .EXE files to the outer tracks of the disk. You can also add .DLL files since these are used a lot in launching and operation of most programs.

Files And Folders

If you want much more customization you can go click on the Files and Folders option and select folders and even individual files and then you can specify the order of these files and folders.

To select a folder or file simply place a check next to the folder names/or files and then click them across to the High Performance list. If you wish to change the order of the folders or files

in the High Performance list, simply select the file or folder on the left hand column and drag it up and down to the position you want it.

If you then have Strict Sorting by Default, the folders and the files within them will be placed in that exact order when the disk is being defragmented.

In this instance you may have a particular game that you want to achieve highest performance for – drag that to the top of the list – or if you want fastest boot performance and general Windows and Program performance – put Windows to the top of the list and Program Files below it.

Installed Programs

UltimateDefrag will scan your system for all installed applications and allow you to manually select the applications you want to accelerate by placing them in the High Performance zone. When you select Select Programs a list of all installed applications will appear. Simply place a check next to the applications you wish to accelerate and the corresponding files and folders for the application will be placed in the High Performance zone.

Please note that the Installed Programs feature takes a best guess as to the installed location of files by scanning registry and other methods. It is not perfect and very occasionally misidentifies installed folders. If you see such behavior, please contact support@disktrix.com and we will attempt to further refine our algorithm for identifying installed directories for the occasional program that isn't properly identified.

Sorting And Placement Options

The sorting option you select make a big difference in the time taken to complete the High performance file placement.
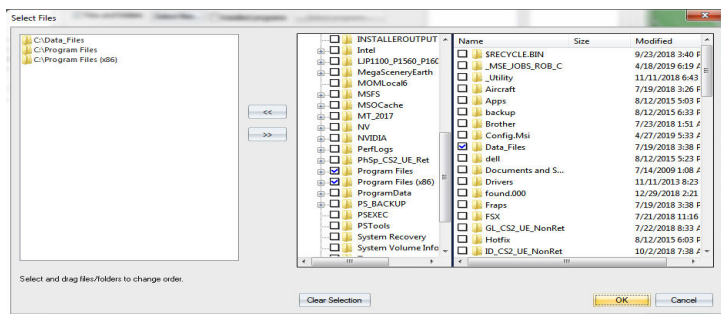
The following sorting options apply:

Fast Placement (consolidate): This method will completely eliminate all spaces between files and sort them in no particular order.

Very Fast Placement: This method will place files in no particular order but will occasionally leave a space between files for the sake of completing the defragmentation faster. This is the

fastest method.

Strict Placement Sorted By: This method will strictly sort files according to a variety of methods. Default, Folder/Filename, Last Accesses, Last Modified and either Ascending or Descending order. This is the slowest method of placing High Performance Files and really only required in rare circumstances.

Overall we recommend the middle option - Very Fast Placement. This gives you the fastest defragmentation runs and placement of HP files for very little reduction in performance compared to the strictest Folder/Filename sort.

FragProtect: If you select fast placement or very fast placement, you have the option to apply FragProtect to your high performance files. See page 37 for more information on FragProtect.

Compression Options
These are selected by the "As moving" pull down and have the following effect:

Leave as is will not perform any compression or decompression options on the files as they are placed into the High Performance zone. Files that are compressed will be left compressed and files that are not compressed will be left uncompressed.

Always Compress will compress all files that are to go into the High Performance zone. If they are already compressed it won't waste resources recompressing them. If a file is not compressed and is slated for the High Performance zone, it will be compressed.

Note that on traditional platter based hard drives, this can further double your read performance on top of the performance gains achieved by placing the files in the High Performance zone due to the faster read performance of compressed files as discussed on page 30.

Uncompress will uncompress all files that are to go into the High Performance zone. If they are already uncompressed it won't waste resources re-uncompressing them. If a file is compressed and is slated for the High Performance zone, it will be uncompressed.

Smart Compress will save you time and resources by quickly assessing the compressibility of each file slated for compression. If a file is not compressible, such as a zip file or a .jpg file or even video file, Smart Compress will quickly establish that and not attempt to compress the file. On the other hand, if a file is compressible, it will be compressed before it is moved to the High Performance zone.

It is important to note that when any compression operations besides Leave as is selected, it can take some time to perform the compression operations before placing the files. For fastest placement of High Performance files, select Leave as is. For a faster performing hard drive, select Always Compress.

Exclude By Wildcard
This newly added option adds an added level of power to your file selection options that enables you to exclude files that meet the criteria selected by High Performance that you may not want to go into the High Performance zone. A good example may be a zip file that you have recently created that you know you won't use again and therefore don't want in the High

Performance zone. In this case you will add *.zip into the Exclude by wildcard list and no zip files will go into the High Performance zone.

Now you're beginning to see why the slogan for UltimateDefrag is "defragment and optimize – any way you want to!"

Selecting Archive Files

If there are files that you are simply not using – or not using often at all – this is the way to get them out of the way and move them to the slowest part of the disk, the inner tracks, since they are rarely required (if at all). In this version you can also choose to not move Archive data to inner tracks but instead to place these files after files that do not meet archive criteria.

This option is as powerful and as flexible as the High Performance option. Archive files by default are shown as green on the disk display.

Files that may fall into this category are ZIP files, or folders with collections of pictures that you don't ever view. You may want to put other least used files into archive. Remember the 80/20 rule – 80% of the time you only use 20% of the files, so here you can put your 80% least used files into archive or files not used in the past 90 days. If a files does get used once – then in the next defragmentation run it may or may not be moved out of the archive area. If you are showing a pattern of not using a particular file more and more then it will move out of the archive area.

Selecting files/folders, wild cards or frequency of use works just like the High Performance only in reverse – they get put into the inner tracks.

In this instance you may want to archive some of those extraneous Windows update files that will never be used again. Finally you can get them out of the way!

The sorting options mentioned at the top of this page also apply to Archive files. Strict sorting is rarely needed and we highly recommend you either select Fast or Very Fast Placement.

Sorting And Placement Options

The sorting option you select make a big difference in the time taken to complete the Archive file placement.

The following sorting options apply:

Fast Placement (consolidate): This method will completely eliminate all spaces between files and sort them in no particular order.

Very Fast Placement: This method will place files in no particular order but will occasionally leave a space between files for the sake of completing the defragmentation faster. This is the fastest method.

Strict Placement Sorted By: This method will strictly sort files according to a variety of methods. Default, Folder/Filename, Last Accesses, Last Modified and either Ascending or Descending order.

Overall, for fastest performance of Archive process we recommend the option - Strict Placement sorted by default. This simply moves files out of archive if they don't belong and simply moves files into the gaps that will fit them.

Compression Options

These are selected by the "As moving" pull down and have the following effect:

Leave as is will not perform any compression or decompression options on the files as they are placed into the Archive zone. Files that are compressed will be left compressed and files that are not compressed will be left uncompressed.

Always Compress will compress all files that are to go into the Archive zone. If they are already compressed it won't waste resources recompressing them. If a file is not compressed and is slated for the Archive zone, it will be compressed.

Uncompress will uncompress all files that are to go into the Archive zone. If they are already uncompressed it won't waste resources re-uncompressing them. If a file is compressed and is slated for the Archive, it will be uncompressed.

Smart Compress is the best option to choose for Archive zone if you want to save space by rarely used files. It will save you time and resources by quickly assessing the compressibility of each file slated for compression. If a file is not compressible, such as a zip file or a .jpg file or even video file, Smart Compress will quickly establish that and not attempt to compress the file. On the other hand, if a file is compressible, it will be compressed before it is moved to the Archive zone and will save you disk space.

It is important to note that when any compression operations besides Leave as is selected, it can take some time to perform the compression operations before placing the files. For fastest placement of Archive files, select Leave as is. For saving space and the fastest placement of files use Smart Compress.

Exclude By Wildcard

This newly added option adds an added level of power to your file selection options that enables you to exclude files that meet the criteria selected by Archive that you may not want to go into the High Performance zone. A good example may be a .exe file since you always want fastest read performance whenever you launch a program. In this case you will add *.exe into the Exclude by wildcard list and no exe files will go into the Archive zone.

Some Advice On Using High Performance and Archive

Archive can take a lot of time and cause unnecessary wear and tear on your drive and is not absolutely necessary to get the maximum performance out of your hard drive. The feature is there however if you want to use it.

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We recommend that you focus more on using the High Performance option. If, when you run a defrag method, you select Complete High Performance Then Stop, you will have achieved 95% of the goal of optimizing your hard dive for speed and performance at only a total fraction of the time of a complete disk rearrangement. You can always use the Simulate function to estimate just how long a complete rearrangement of your drive will take.

By effectively using the Complete High Performance Then Stop option you can achieve daily in around 3 to 5 minutes what you need to in order to have your hard drive performing as fast as it absolutely can. You do, after all, use mostly the same relatively few files on a day to day basis and these are the files you mainly need to be concerned about defragmenting and keeping on the High Performance zones. We therefore advise you to learn to use the High Performance features effectively and you will be 95% of the way towards 4 times factory averages in terms of performance.

Ignored Files

You may want to leave certain files or folders completely untouched and ignored by the defragmentation process. e.g. You may have a folder with 20 Gb of data comprising of very large files – you never use them – they are defragmented. Simply select them as **Ignored files** – they will be ignored and untouched by the defragmentation methods.

You can also select files to be ignored based on size and by wildcard. You may have some big 20 Gb files that can take a long time to move or defragment. Simply add 20,000 (Mb) to the ignore based on size field.

If you want ignored files moved to the inner tracks first, you can make them the only files in the archive. Run a defragment with Respect Archive selected to move them to the inner tracks. Then remove them from the Archived file list and then add them to the exclude list. They will be out of the way and completely ignored in subsequent defragmentation runs.

You also have other ways to select ignored files including files that you have not accessed in a long time and therefore unlikely to need to access, or by folder and filename and wildcard. You can also exclude particular files from being ignored if other selection criteria select them to be ignored.

Respect Layout.ini

The Windows operating system is constantly adjusting itself for best performance and in doing so creates a file called layout.ini which contains an optimal file layout for your drive as far as fastest program launching and fastest boot performance.

Layout.ini exists in the Prefetch Folder in Windows.

Every 3 days Windows performs a boot optimize and uses elements of the Layout.ini file to layout the files. This however is only a partial attempt. Not all files in the layout.ini are optimized and they are not placed in the fastest section of your hard drive. UltimateDefrag has the option to read the layout.ini file and exhaustively layout files according to optimal file layout.

When you have this option checked, the optimal file layout is laid out at the very beginning of your drive but is sorted according to the sort options of High performance file selection. If you want your layout.ini files sorted according to the layout.ini order then select Strict Sorting by Default under High performance. File access for your most commonly used files will be the absolute fastest that it can be for your system since all sequential file access patterns when launching a program and booting your system are taken into account.

An Example Scenario of Selecting High Performance and Archive Files

One example of a scenario that will give you a very fast system would be to do as follows:

1. Under Archive select Automatic and select files not used in past 91 days. You can also select any other file types such as ZIP files since they are unlikely to be used.

2. Under High Performance select "Select Files" option – go in and select some of the critical folders that you know you will use a lot e.g. Windows, Documents and Settings, Program Files.

When you run one of the defragmentation methods with Respect High Performance and Respect Archive checked – this High Performance and Archive setting will result in all of the files that meet the criteria of not being used in the past 91 days going to the inner tracks. The Windows operating system uses about 15 to 20% of the files in the 20,000 or so files in the Windows directory. The rest are just unused and in the way. You don't even have to think about which files these are. If they are rarely used they are most likely to be obsolete and not required for your system use. They go to the inner tracks.

What this then does is to compact together the important Windows files only and puts them right to the outer tracks. The result is much faster boot times and overall Windows and desktop performance – as sequential file access and zero seek access is promoted during boot and system operation.

The same applies with your Documents and Setting folder – there are a lot of temporary unused files there. These are moved out of the way and only those recently used including desktop related files, icon files and other related files are compacted together and right at the outer tracks. The same will apply to the Program Files folder and their associated files, EXEs and DLLs. Only those you are likely to use are consolidated and placed on the outer, faster, tracks.

If you do not change these settings in all future defragmentation runs – all important files as per the High Performance settings are kept at the outer tracks and files will be added and removed from the archive section as they fall under last usage criteria.

The High Performance and Archive selections are handled as a priority before any other file placement stipulated by the defragmentation method in the next section. Archive files have a precedence over High Performance Files.

Please refer back to the Archive section on page 37 about using the archive feature sparingly. You can complete the example scenario we just described with Respect High Performance and Complete High Performance then stop.

DEFRAGMENTATION **METHODS**

Auto Defragmentation & OptiSeek

If you are not a power user and simply want the most efficient, hands-off, yet intelligent, defragmentation method then choose the AUTO method. The Auto method uses our proprietary OptiSeek technology to automatically tune the performance of your hard drive to achieve absolute optimum performance for most file accesses and data transfer rates.

OptiSeek aims to achieve file access performance that is closely equal to the minimum seek time for your hard drive (also known as track-to-track) seek. For most hard drives this is around 1 to 2 milliseconds. For faster drives it is less however we have arbitrarily cut this off at 2 milliseconds. The same goes for transfer rates. OptiSeek tries to maintain transfer rate degradation of no less than 10% of the fastest possible transfer rate for your drive.

When you select options for the Auto Method, UltimateDefrag automatically defaults to and displays the estimated performance for the current data on your drive and the performance compared to factory averages. As you slide the slider to the right, you will see the percentage values for Most and Least frequently used data change. As less data goes to the very outermost tracks so to does your seek confinement for your most frequently used data improve. As a result your estimated performance values increase. The drive in the above image is around 80% full. You can see performance increase factors of over 500% and 280% for current drive data and factory averages respectively. The less full your hard drive, the less dramatic the performance increases.

The cost of having the performance set to Optimum is slightly longer defragmentation times due to a little more flux between files that may get exchanged between archive and high performance zones due to regular PC use. Dragging the slider downwards for slightly slower performance will give you slightly faster defragmentation runs but with slightly slower than optimal performance.

If you are unsure simply leave it at the default settings where the slider is set to Optimum.

We also suggest that you do select Place Directories Next To MFT since this will give you fastest file access performance.

You can also specify whether your Least Frequently Used Data goes to inner tracks or just inside Most Frequently Used Data.

Sending the Least Frequently Used Data to the inner tracks will result in longer defragmentation times but will give you better write performance when saving new files to your hard drive.

Placing The Least Frequently Used Data after most frequently used data will result in faster defragmentation times
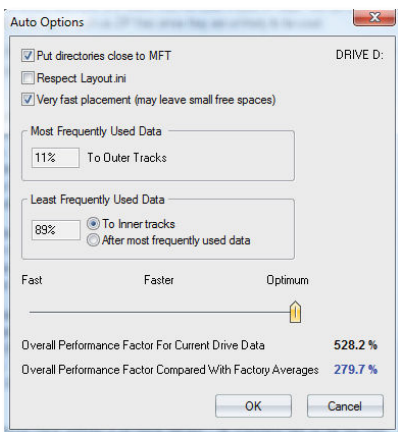
but result in slightly slower write performance when saving new files to your hard drive.

In general we recommend that you use Placing The Least Frequently Used Data After Most Frequently Used Data for less wear and tear on your hard drive.

Please note that as your hard drive fills over time, the percentage of files to High Performance and Archive zones changes. This is because OptiSeek always aims to optimize your seek times to achieve that minimum seek time of 1 to 2 mS and transfer rates at the top 90% that your hard drive is capable of.

The AUTO method performs a simple Consolidate defragmentation which only moves the files necessary to defragment all files and pack all the files without any free space between files to the outer tracks. A full consolidate is also done on Least Frequently Used Data, whether it is to the inner tracks or after most used files.

For fastest completion of this method, we recommend that you check "Very Fast Placement".

Other Defragmentation Methods

UltimateDefrag's defragmentation methods, coupled with the powerful High Performance and Archive Options give you ultimate flexibility and enable you to defragment your drive – any way you want to or by whatever method your computer use dictates.

Five main defragmentation methods exist. All have further customizable options. With the further customizable options a total of hundreds of different combinations for defragmenting are available.

In each of these methods (except for Fragmented Files Only) you will find 3 options that recur:

1. Respect High Performance
   a. Complete High Performance Then Stop

2. Respect Archive
   a. Complete Archive Then Stop

3. Put Directories adjacent to the MFT

What they do is self explanatory – to "respect" (conform) to the High Performance and Archive settings you set – then select the "respect" option otherwise the defragmentation method will ignore the High Performance or Archive settings. It will never ignore the Exclude settings if there are files to be excluded.

With regard to the respect options – we suggest that you always respect the archive otherwise there is no point in the archive option. We make this an option however in the event that you want your entire drive to be defragmented according to the defragmentation method.

If you have say just one program or folder that you wish to have high performance with then respecting High Performance will move the files identified by this selection to the outer tracks first and then perform the optimization outlined by the particular method on the remainder of

the files.

When Respect High Performance and Respect Archive is selected for any defragmentation method – these will always be performed first followed by the algorithm of each method.

Option 3 – put directories close to MFT significantly improves hard drive performance since there is often a lot of dialog between the MFT (Master File Table) and the Directories regarding information on the files, including location, on your drive before they are fetched. Having these adjacent to each other vastly reduces seek times for these transactions.

Complete High Performance Then Stop
Use this option if you are only concerned with processing your high performance files. When you are using this option, deselect 2 and 3 and UltimateDefrag will simply process High Performance options and then stop.

You can really use this feature to your advantage and vastly reduce defragmentation times. If you are only concerned with all files you have used in the past 30 days or 20% of your data then could can simply run a defragmentation that will only defragment this data and not unnecessarily defragment the rest of the drive.

Consolidate

Use this method the most for faster defragmentation runs. This is what most defragmenters already do. They pack all of your data towards the outer tracks of your drive but it's usually an all inclusive affair so that a drive that is almost full still experiences reduced performance since there is no "order" to the files and no preferential placement of frequently accessed files. They do not improve seek confinement.

However, with UltimateDefrag you have the option of the Archive and High Performance so that you still can get your High Performance Files to the outside tracks and Archive to the inner tracks. When your most and least important files are where you want them then what happens with the remaining files is not as important and they can just be consolidated.

If you have your High Performance requirements and Archive requirements in place then you can use this method to take care of the remainder of your files. Files are sorted in no particular method but are defragmented and consolidated – after the High Performance files. Defragmentation runs are quick and performance is excellent.

If you just want to defragment without all of the extra file placement and are happy with having a less than optimum file ordering then you can happily use UltimateDefrag to just do a Consolidate on a regular basis. The result is about the same as Windows native defragmenter.

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If you just wish to Consolidate - then the Archive option used in conjunction with this method vastly improves performance since about 80% of your files are archived. This then only leaves the drive to have to work through about 20% of your data when loading files. So you vastly improve your seek confinement regardless. Defragmentation runs with Consolidate and Archive and Fast Archive are fast and usually completed within minutes.

If you prefer to not use the archive and high performance feature then this method will give you a fast defragmentation and also consolidate free space. Only files that need to be moved or defragmented will be touched. The other files will stay in place.

You can also make the consolidate defragmentation work faster by selecting Very Fast Placement within the Consolidate Options.

Recommend Use Of Consolidate Option. A great way to use Consolidate is to use High Performance file selection with No Sorting i.e. Fast or Very Fast Placement. The program will ALWAYS place HP files to the outer tracks but will do so fast since you are not strictly sorting the HP files. If you select Complete High Performance then stop, your defragmentation will complete usually in just moments and your drive will perform as fast as possible.
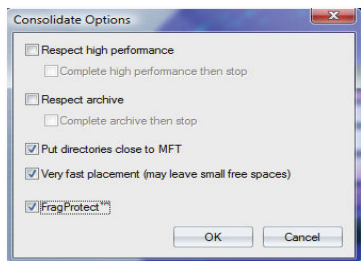
FragProtect™

This is a good time to discuss FragProtect™. FragProtect is a way of laying out files that achieves 2 main objectives. 1. Subsequent defragmentation passes are very fast - often just 2 or 3 minutes - even on the fullest of hard drives and 2. The rate of refragmentation of your data files is minimized to the lowest rate possible as determined by the physics of the principle of entropy.

We pioneered this method of laying out files using a simple consolidate routine in our other product DefragExpress - now discontinued.

You can emulate the DefragExpress algorithm with UltimateDefrag by setting your consolidate options as per the screenshot at the top of the previous page.

While the first defragmentation run might take a while about 97% of all subsequent defragmentation runs are completed in 2 to 3 minutes.

Fragmented Files Only

While this method will leave gaps between data files, if all you require is a quick defragmentation of fragmented files, simply use this option. UltimateDefrag will move and defragment only the fragmented files that it finds - with rapidity and ease. There are advanced options that give priority based upon certain fragmentation characteristics and you can prioritize which files it prioritizes. The recommended default method is Prioritize by minimum cluster. This will search the lowest clusters first for any traces of fragmented files and will defragment them first. By doing this it actually partially packs the files similar to consolidate so leaves less gaps between files. You might use the advanced options when you have a substantially fragmented hard drive and don't want to defragment the entire drive but perhaps want to make sure that you defragment your most

frequently used files. In this situation use Prioritize by frequency of use.

You have the option to place directories next to MFT.

Fragmented Files Only uses an intelligent decision making process on fragmented files that result in very fast defragmentation passes since it performs a quick calculation on each fragmented file it encounters that results in performing the fragmentation while moving the least amount of data required to fragment the file. If it decides that it optimal to move the file, it will place the next file it defragments into the first available gap on the drive that will fit the file.
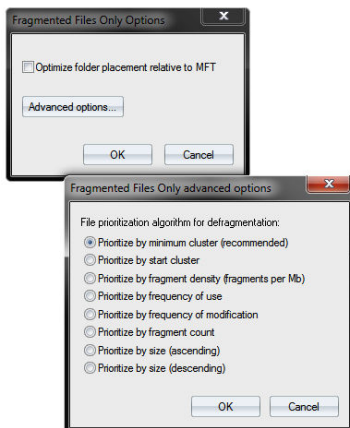
Advanced Sorting Methods

We suggest that you use the next 3 sorting methods (Folder/Filename, Recency and Size) with discretion since they can take a very long time to complete. They are much more efficient and complete much faster when used in conjunction with High Performance and Archive options. You normally wouldn't use them but we have included them for power users.

Folder/Filename Method

This will layout files on your hard drive according to Folder Name Order and then within each folder the files are sorted based upon name order.

If you want to override and manually determine the folder order – you can do this in the High Performance options where you can manually drag and drop folders into the order you want and then select Strict Placement, sorted by Default/Ascending. You then need to respect High Performance for this manual sort to take effect.

Files and/or Folders that qualify for archive will be moved to inner tracks when you select respect Archive – the files that are not moved to the inner tracks will then be sorted.

This method of ordering files on your hard drive will promote performance since files are sorted in strict order and directory look ups are faster when in alphabetical order. Adjacent track seeks and instantaneous seeks are often achieved since often, but not always, .DLL and other data files are called upon by programs in alphabetical order.

Recency

This option gives you extensive flexibility in ordering files based upon last access dates, modify dates or file creation dates and then extensive flexibility in placement of these files. This method is suited perfectly for drives that may consist exclusively of data files as in a

file server situation. This method is also perfect for situations where a hard drive is getting full and you want and need performance for particular files with room to grow and with fast subsequent defragmentation runs.

If you require it, this method gives you the ability to place all of the files on your hard drive starting at the inner tracks and working outwards. This is ideal for data drives that are getting full but contain data that is rarely accessed or modified.

Align to end options start from the inner tracks and work outwards – align to beginning options start at the outer tracks and work inwards.

You can then decide the order – oldest to most recent and vice versa.

If you have an 80% full, mostly (or only) data, drive – you can put your oldest files to the inner tracks and then order to most recent – so the most recent files will be around 20% in from the outer tracks. Your most often required data will be about 20% in from the outer tracks and the space on the outer side of this will be empty. Disk reads and writes will be very fast and importantly subsequent defragmentation runs will be faster since older data is in the inner tracks.

You might **not** need to respect Archive and High Performance with this method but the option is there if you require it.

Note that this method can take a long time to complete and is rarely warranted.

Size

You can now sort your files by size - largest to smallest or smallest to largest. We cannot think of any specific situation in which this is to any specific advantage, however it is there as an option for power users to play with.

Strictness of Sorting

We have implemented a feature with any of the sorting methods called Strictness of sorting. By dragging the slider you can relax the strictness of sorting and UltimateDefrag will group files in discrete blocks. For example a strictness of sorting of 10 will divide the data into 10 discrete but adjacent blocks and perform a consolidate within each of the 10 blocks. This makes it much faster and achieves an approximation of the sorting that is sought.

Several Ways To Defragment Individual Files Only

This is another very powerful feature and function of UltimateDefrag. There may often be instances where you want to defragment an individual file only. There are several ways that you can do that.

Firstly, within the cluster viewer pane. After you perform an analysis and the disk display is updated locate a fragmented file by clicking on a red block. In the cluster analysis list on the left the file(s) will be displayed. If you click on the file in the list a fly-out box will open and you will be presented with several options.

You will first be presented with information about the file, it's location on the disk, it's size and its

degree of fragmentation.

Below that are a number of self explanatory options you can select:

• Open containing folder will open the folder in Windows Explorer and will also select that file in the opened folder

• Defragment now will quickly defragment the file

• Defragment all the fragmented files in this folder will defragment all the files in the folder that the file is in that are fragmented.

• Smart Compress and defragment now will quickly assess the file for compressibility and if it is compressible it will be compressed and then defragmented.

• Compress and defragment now will compress the file with NTFS compression regardless of its compressibility and then defragment the file
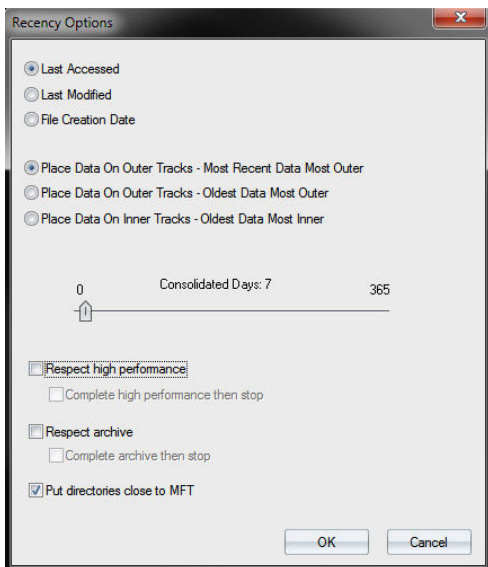
When you select one of the defragment options, the file may disappear from the cluster viewer for the clusters you have selected because it will have moved to another cluster on the disk.

If the file is compressed and stays in the same cluster block you have selected it will turn blue indicating that it is compressed.

A second way to do it is using the File Highlighter feature. Tools => Highlight a file. By right clicking on any file in the file highlighter tree you will have the option to defragment this file. Simply select that and the file will be defragmented.

A third way is in the Fragmented Files list under the option View => Volume Info. We will describe many of the powerful features in the fragmented files list later in this manual.

Defragmenting All Files In A Particular Folder.

There may be instances where you want to defragment all files in a particular folder. You may wish to do this after you have just installed a new program. After you perform an analysis and the disk display is updated locate a fragmented file by clicking on a red block. In the cluster analysis list on the left the file(s) will be displayed. If you click on the file in the list a fly-out box will open

and the option to **Defragment All Files In This Folder**. Simply click on the option and the entire folder will be defragmented. This is discussed in detail in the previous section. Depending upon the number of fragmented files in the folder it will take as little as a fraction of a second to a minute or two.
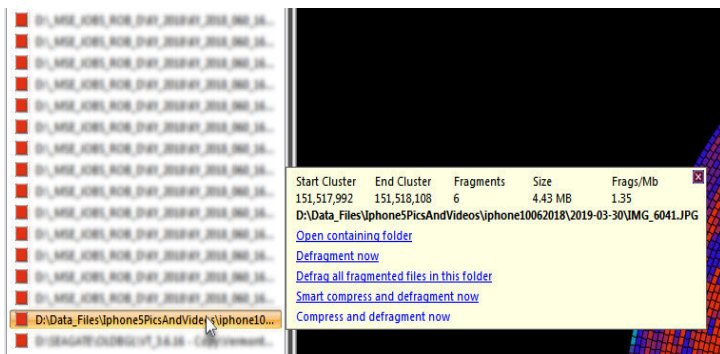
To access this feature via the File Highlighter, simply select Highlight a File. Use the folder tree to locate the folder you want to defragment. Right Click on the folder and select Defragment All Fragmented Files In This Folder.

To access this feature via the Fragmented Files list, select View Volume Info, locate a fragmented file from the Fragmented Files list and right click on that file. Select the option to Defragment All Fragmented Files In This Folder.

File Drag And Drop To Specific Location

UltimateDefrag has a powerful feature that if you didn't read about it, you wouldn't know about it. It's an exciting feature that lets you place a file or complete contents of a folder into a specific location on your drive using simple drag and drop with your mouse by dragging from the cluster viewer onto the disk display. When you select a file and drag it across a blue box will appear attached to your mouse pointer. Simply hold the left mouse button over the cluster block you want to drag the file to and release the mouse.

When you release the mouse you are presented with several options.

The single file or folder and contents will be moved upon pressing Move and you have the option of excluding the file from all subsequent defragmentation runs so the file or folder will stay in place.

An example of when you might use this is if you work with a large outlook.pst file that you want to keep out of the way of your main data and close to, but not amongst, the HP area of files to keep performance as high as possible without slowing down future defragmentation runs.

To use this feature on a single file, click on a known file in the Cluster Viewer or File

Highlighter. Hold down your mouse and drag the file onto a block on your drive display. A transparent blue box appears as you are dragging the file. When you release your mouse the following dialog box will appear.

The slider lets you fine tune the position. To exclude the file from all subsequent defragmentation runs select the check box.

Press Move and the file will be moved to the new location.

If at a later stage you want to move the file again or no longer require it to be excluded, remove it from the Excluded File list in the Options screen.

In the event that you wish to move an entire folder and its contents to a specific location, simply select a folder and drag it across. When the above dialog box appears the option to Move All Files in the above image will be selectable.

If You Don't Want To Use The Archive Option

You may just not want to, for whatever reason, use the archive option. And this is fine too because you can still enjoy the Highest Performance but with slightly longer defragmentation runs.

In this instance simply do not use the Archive function – select High Performance and select all files used in the past 30 days.

Select the Consolidate Method, Respect High performance – all files used in the last 30 days will be placed on the outer tracks sorted by dates of last use. Files that have not been accessed beyond this are then simply consolidated i.e. placed in no particular order inside the High performance data. The High Performance Data will always be on the outer tracks. Your system will still enjoy very close to optimum performance.

If you just want to put ZIP files in the archive and certain folders then add these to the archive, perform the method in the above paragraph this time selecting "Respect Archive" and all the ZIP files will be placed out of the way and the rest of the procedure in the above paragraph will proceed.

As you can see, you have the power and the flexibility beyond your wildest dreams when it comes to defragmenting and file placement.

The more you use and understand the power that you have at your disposal the sooner you will begin to enjoy and settle on a method that suits you most. Whatever you want to do – you can!
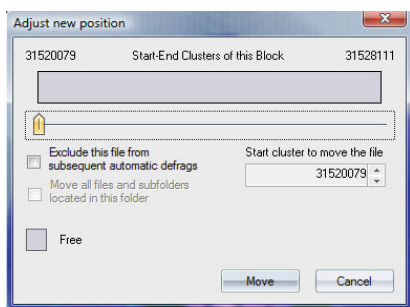
If You Don't Want To Use All The Advanced Features

If you just want to use UltimateDefrag as a regular defragmenter and not use all of the advanced features, you can do that too. You will enjoy what is probably the fastest and most efficient defragmentation engine available today.

For simplest use, use the Consolidate option with Respect HP and Respect Archive both deselected and use Very Fast Placement, Move directories close to MFT and FragProtect.

If you want defragmentation and consolidation (which will reduce re-fragmentation) with performance improvements, then use the AUTO (OptiSeek) method. All files will be defragmented and consolidated in one fast and efficient pass using our "in-place" defragmentation algorithm.

If you simply want your fragmented files defragmented without consolidation then simply use Fragmented Files Only - defragmentation runs will complete very fast and only your fragmented files will be defragmented and moved into the first available space that each file will fit into.

Volume Shadow Copy Compatible Mode

Volume Shadow Copy is a feature of Windows that became part of the system restore feature from Windows Vista onwards. Volume Shadow Copy preserves changes made to the disk in the event that you need to restore a previous version of a file or to do a system restore. Volume Shadow Copy can cause defragmentation to not behave properly or the other way around defragmentation can cause VSC to not behave as desired in instances where your
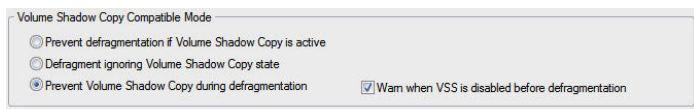
hard drive is formatted for clusters less than 16 Kb (which is most PCs'). The problem that occurs is that the changes made to the hard drive during defragmentation are logged by the VSC service and as that fills it causes VSC copies of files to be removed from the VSC container files.

There are several options for dealing with VSC when active on a drive. Usually the best option, if you wish to defragment your drive that has VSC active is the third option, Prevent Volume Shadow Copy during fragmentation. This temporarily suspends the VSC service and preserves your previous versions of files.

The SPACE Method

While the space saver method does perform defragmentation operations, it's main function is that of file compression and applying NTFS file compression to the files on your hard drive. On regular mechanical hard drives it will save space and also give you an increase in file read performance. On Solid State drives it will actually give you slightly slower

performance but offer the advantage of enabling you to fit more data on your hard drive since on average files compress at a ratio of 1.5 to 1 meaning that you can fir around 1.5 Tb of files onto a 1 Tb hard drive.

There is one drawback that offsets the benefits of file compression and that is that compressed files are more prone to fragment when they are written to your hard drive or saved. Of course you have UltimateDefrag to defragment those files with.

It is up to you to weight up the benefits of file compression versus the drawback of tendency to create more fragmentation when files are saved.

The options provided by the Space method give you the flexibility to select all or only some of the files via powerful filtering logic for choosing files. You then also have full flexibility in choosing to compress, smart compress, not compress, defragment and to not defragment.

File compression operations can take some time to perform and you can use your PC while compressing files in the background. UltimateDefrag will not was time compressing a file that is already compressed. The option always compress means to compress the file if not compressed but don't compress if already compressed. Smart Compress as described earlier performs a quick analysis of the file for compressibility and will not waste resources compressing a file that is not compressible.

You may wish to reread the section on NTFS file compression on page 30.

To the left is the options screen for the space method and for selecting the files for compression and defragmentation.

We do highly recommend that you defragment after compressing as the act of compressing the files results in a moderate to high degree of fragmentation.

There are four logic steps in selecting the files for compression. The first logic step uses timestamps. You will select files by either last accessed, last modified, or created. You will usually select the last accessed as these will usually be the files you will want to compress. e.g. you may want to compress files that you have not used in over a year in order to save space.

The compression options pull down lets you choose leave as is, always compress, uncompress and smart compress.

Leave as is will not change the compression state of the file and will leave it in the compression state it is already in, either compressed or uncompressed.

Always compress will ensure that file is compressed so that if it is uncompressed it will be compressed and if compressed it will be left alone.

Uncompress is the exact opposite of always compress and will uncompress the file if compressed and will leave alone if not compressed.

Smart compress will quickly analyze the file for compressibility and will compress if it is compressible. If the file is not compressible it will leave it alone and move to the next file.

You then have to option on the defragmentation pull down to either defragment the file after the compression operation or not to.

If you want this date selection option to not perform compression and/or defragmentation operations on files selected by date just select Leave as is and Don't defragment and it will ignore the not accessed/modified/created and time frame.

The next logic step lets you select files by filename either from a folder tree or using wild cards. The same operations as described above can be performed - compression and defragmentation.

If no files are selected then no operations are performed on any files.

The third option lets you select a different group of files and perform a different set of compression/defragmentation operations. Again if no file is selected nothing will be done.

The fourth logic step will enable you to ignore and don't perform any operations on the remaining files that don't meet any of the first three selection criteria logic steps. If you select Leave as is and don't defragment then it will ignore all the remaining files.

Using these logic steps to select your files enables you to select and ignore the entire gamut of files on your hard drive so you can compress and defragment very selectively.

It can take quite a long time to compress and defragment a lot of files however you can still use your computer while these operations are being performed in the background or you can set it to run overnight. Or you can chip away at compressing your hard dive files a little at a time.

Please note that during the compression phase of a Space run, you will see your fragment count increase. This is normal as fragmentation is created as files are compressed. These will be defragmented if you select the option to defragment the files.

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USING ULTIMATEDEFRAG WITH SOLID STATE DRIVES

As we have previously mentioned Solid State Drives (SSDs), since they have no moving parts, are not subject to slowdown due to the mechanical aspects of traditional rotating platter hard drives. Retrieving data from an SSD is similar to retrieving data from memory

and therefore has no significant seek and access time. This does not mean that SSDs are not affected by file system fragmentation, because they are but the effect is much smaller than the effect on mechanical hard drives. The file system nevertheless does become fragmented and relatively speaking file access can be slowed due to much more I/O needed to retrieve a highly fragmented file.

Therefore we do conclude that SSDs do need defragmenting but using a different approach and by moving minimal amount of data. UltimateDefrag's approach to SSD defragmentation is optimal.

Options For Handling SSDs

Under Tools=>Settings=>More you can specify how you want UltimateDefrag to handle SSDs. You can choose for it to not allow any defragmentation of your SSD, to only allow SSD optimized algorithms, or to allow all defragmentation modes, where it will allow all the same options as for a regular hard drive. This is allowed since many users like to experiment.

Generally we recommend that you select Only Allow SSD optimized algorithms. When you select this option and when the active drive in the drives tab is an SSD, your defragmentation options will be limited to only 2 methods, Fragmented Files Only and Consolidate and within those methods all options are greyed out and unselectable since UltimateDefrag will use specific techniques to defragment your SSD moving only the minimal amount of data needed while zeroing the fragmentation level and also positioning files to minimize both the refragmentation rate and moving less data in future defragmentation runs.

Limits For SSDs

While you are only limited to those defragmentation methods if you select the option to only allow SSD optimized algorithms, all other aspects of the GUI are functional such as highlighting files, viewing clusters, etc.

The simulate function also works so you can actually see what changes will be made to the drive before you do any moving of data at all.

Again, you can allow UltimateDefrag to treat your SSD like a regular hard drive and make all methods and features available with the SSD.

For convenience and uniformity, we maintain the same circular GUI when you have an SSD selected. In future we will be modifying the disk display when an SSD is selected to highlight that it is a different drive type.

FLASH DRIVES AND OTHER REMOVABLE DRIVES

You can also defragment removable hard drives and USB flash drives. USB 2 drives can be defragmented albeit quite slowly due to the slower speed of USB 2. On the other hand USB 3 drives can, and should be, defragmented and are generally just as fast as internal hard drives to defragment.

FILE USAGE DATABASE

UltimateDefrag maintains a file usage database that is updated each time that UltimateDefrag analyzes your hard drive. The database keeps a moving average of file use and fragmentation statistics. Information kept in this database is used to determine "true" file use frequency over time rather than an instantaneous snapshot. This results in files being better classified for archive and/or high performance if you use those options. The moving average is from the time the database is first used. You can reset the database at any time by using the purge file usage database option. All file use data for the drive selected will be erased and the data will begin to rebuild again next time you analyze the drive.

If you choose the option to Not Use The TFU database, UltimateDefrag will select time and date stamps on files for creation, modify and last access dates and times. These are considered instantaneous values. The File Usage database gives you a more true long term moving average of your file use patterns by taking snapshots of these instantaneous values each time you analyze your drive.

OTHER OPTIONS

Customizing Colors In Your Disk Display

You can customize the colors of the blocks in the disk display to suit your preferences. Simply click on the color and then change the color to suit. When you select OK the colors in the disk GUI will change for the particular file class you selected. You will also find this feature under Tools=>Options=>Advanced.

Maximum Resource Usage

You can use UltimateDefrag to defragment while you are working and barely noticing that it is defragmenting in the background. Simply reduce the resource usage from anywhere between 20% to 100% and UltimateDefrag will not use more than the resources specified. You can safely work while defragmentation is in progress. Selecting AUTO will automatically allocate system resources to the defragmentation process according to other demands and processes running on your system. This is the ideal setting if you wish to defragment while you are using your PC. Please be aware that if other processes are using significant CPU and system resources this could vastly slow the defragmentation process.

Navigating The Disk Display

You can navigate the disk display any time during a defragmentation with your arrow keys. Simply select any block and then use the arrow keys to move to the next or previous block (left and right arrows) or to the next or previous ring (up and down arrows).

Zooming The Disk Display

Simply right-click your mouse on the disk display and you can zoom in or out making the blocks smaller or larger. Plus (+) and minus (-) keys on your number pad will zoom the disk display in and out.

You can also use the zoom slider at the bottom right hand corner of the screen.

Logging

On occasion you may be asked by tech support to activate logging of your defragmentation in the event that your defragmentation runs are stalling. To toggle logging simply press the keys CTRL-SHIFT-F12 simultaneously. Logging will create a file called _Defrag.log in the root directory of your system drive. You may be asked to send this file to our tech support team. Please note that this file grows very fast so we only recommend running logging for around 60 seconds and no more than 2 minutes.

Scheduler

UltimateDefrag also includes a schedule which enables you to schedule your defragmentation and optimization jobs to run whenever you want to and whatever schedule you want to.

Any schedules you set are actually transferred to the Windows Task Scheduler so requires that you set the password in the schedule in order for Windows to activate the scheduler.

There is virtually unlimited flexibility in the schedules you can create.

To add a scheduled defragmentation, simply Select schedule from the main GUI select Add Job

Then select your drive and the defragmentation method along with options you wish to configure for that job. The default is a single scheduled run, however select advanced to set up recurring defragmentation runs. You can add as many schedules as you like to run when you like.

Note: It is important that you also enter your Windows log-in password when setting up a scheduled job otherwise the job will not be scheduled and will not run.

Tools - Actions After Defragmentation

You may want to manually start a defragmentation and leave your computer or go to bed. You

can select the following actions after defragmentation is complete.

1. Do nothing. The program will remain open

2. Shut down your PC after the defragmentation is complete

3. Exit UltimateDefrag, Your normal power management settings will then take effect after the appropriate amount of idle time.

Tools - Highlight A File

A useful feature for power users is the File Highlighter feature which you will find in the Options Menu. The File Highlighter enables you to see where on the disk a specific file is located. When you select the File Highlighter the program will perform an analysis (if it has not already done so) and then display the file tree structure. Simply select a file or folder and press highlight and the clusters containing the file will flash 5 times. Files that are less than 1 Kb will usually show that they are in the MFT. This is because NTFS stores files 1 Kb or smaller in the actual MFT itself.

If you right-click your mouse on any selected file in the File Highlighter - you are presented with an option to defragment the individual file or all fragmented files in the containing older or you can drag the file or folder onto the disk display for specific placement.

Tools - Test Hard Drive Speed

This is used for defragmentation time estimates used by the simulation feature. You can run this manually or if you have not run this feature then UltimateDefrag will automatically test and update your hard drive speed.

Tools - File Usage Database Auto Update

UltimateDefrag's File Usage database works best when updated at least once daily. It is automatically run each time you perform a defragmentation run, however if you do not plan on performing a defragmentation run each day then you can use this feature to automatically update the file usage database. It only takes a few moments to update each day and it is best to schedule it at a time you are not using your computer.

Tools - Purge File Usage Database

This latest version of UltimateDefrag keeps file use statistics from either the time the program was first run or since the last time you reset the TFU database. You can reset and purge your file usage database at anytime if you wish to start with a fresh database or if you have made changes to your volumes e.g. removed a drive and wish to reduce memory usage. Simply select the drive letter you wish to purge and select purge and that file usage data for that drive will be erased from the TFU database. We recommend that you don't purge or reset the database too frequently. The longer the database collects data, the more intelligent it becomes as far as frequency of access, modification, and refragmentation of the files on your hard drive.

Working With Windows

UltimateDefrag enables you to manipulate pane positions so you can make better use of your screen real-estate and customize your views.

Simply right click on the tab for the Control and settings pane and Cluster Viewer and you can set the panes to Floating, Docked or Auto hide and the panes will reposition accordingly. Floating lets you move the panes wherever you want. If you are running a multi-monitor display you can drag the panes to a second or third display. At any time you can easily restore panes to default by clicking on Reset Pane Positions in the bottom right hand corner of the main screen.

Application Color Set

You can also change the application color set to any one of four sets we have provided.

View Volume Info - A very powerful tool

The View Volume Info windows, as well as providing information and fragmentation information statistics also provides you with a very powerful Defragmentation Explorer type function under the Fragmented Files tab.

The Fragmented Files tab enables you to view comprehensive information on all fragmented files on the volume such as Start Cluster, number of fragments, size and full file path, fragment density, date stamps, and extension. You can then also sort the list simply by clicking on the column header for each of the 10 columns.

After sorting by your desired method you can then select an individual file or using <Shift>-<Click> or even <Control>-<Click>, you can select multiple files.

When you right click on one file you are presented with a number of operations you can perform on the file including options to compress and defragment.

If you select multiple files and then right click you can defragment all of the selected files or even all the files in their respective folders.

If, for example you only wanted to defragment the files that are fragmented and modified in the past 7 days, simply sort by last modified date, select the top file and then scroll down and using <Shift>-<Click> on the last file you want to select and all the files will be backlit in blue. Then simply right click and select Defragment Now and it will defragment only the selected files.

COMMAND LINE INTERFACE

UltimateDefrag now features a command line interface that enables you to use the program in a command prompt session. There are instances where a user or system administrator will want to run a defragmentation routine via a batch file command without any need for the GUI. For example, running a defragmentation run overnight with the batch file command run at a time

specified in the Windows scheduler.

UltimateDefrag's command line interface (CLI) is extremely powerful and enables you to use almost all options available in the GUI version.

A list of commands is to follow on the next page. This same output of commands, options and switches can be retrieved at any time by going into the UltimateDefrag folder in a command prompt and issuing the command UltimateDefrag /?.

UltimateDefrag Command Line Interface List of Commands


```
UltimateDefrag [action] [volume] [/M:method] [/O:options] [/D:display]

UltimateDefrag [action] [volume] [/M:method] [/O:options] [/D:display]


action      One of:

            help      Show this help screen

            query     Show volume information

            analyze   Analyze volume

            defrag    Defragment volume

            simulate  Simulate volume defragmentation

            If not specified defrag is used.

volume      Specifies the drive letter (followed by a colon). The volume
            must be specified except when the action is help.

/M:method   Defragmentation method. One of:
```

F Fragmented files only   C Consolidate

N Folder/Filename   R Recency

S Size   A Auto

P Space saver   Z Zones

If no method is specified the one in UltimateDefrag configuration is used. This parameter is valid when the action is defrag or simulate.

/O:options Defragmentation options. Combination of:

B   Borrows options from UltimateDefrag configuration. If used must be the only option. This is the default if no options are specified.

M   Optimize folder placement relative to MFT.

H   Respect high performance.

HO   Respect high performance then stop.

A   Respect archive.

AO   Respect archive then stop.

V   Very fast placement.

F   Use FragProtect.

TM   Use last modified as time stamp criteria (default).

TA   Use last accessed as time stamp criteria.

TC   Use last creation time as time stamp criteria.

PO   Place oldest tracks most outer (default).

PM   Place recent tracks most outer.

PD   Place oldest tracks most inner.

C<D>   Space saver days. For instance, C30 indicates 30 days.

R<P>   Consolidate strictness (percent). For instance, R80 indicates 80 percent.

SA   Sort ascending (default).

SD   Sort descending.

SFL   Sort files by minimum cluster (default).

SFC   Sort files by start cluster.

SFD   Sort files by fragment density (fragments per Mb).

SFU   Sort files by frequency of use.

SFM   Sort files by frequency of modification.

SFF   Sort files by number of fragments.

SFA   Sort files by size (ascending).

SFS   Sort files by size (descending).

Y   Respect Layout.ini.

D<P>   Percentage of data to outer tracks. <P> indicates percent.

       For instance, D75 indicates 75 percent.

LI   Least frequently used data to inner tracks (default).

LA   Least frequently used data after most frequently used data.

N1   Defragment files (default).

N2   Don't defragment files.

NS1   Defragment selected files (default).

NS2   Don't defragment selected files.

NA1   Defragment additional selected files (default).

NA2   Don't defragment additional selected files.

NO1   Defragment other files (default).

NO2   Don't defragment other files.

Z0   Do not compress or uncompress files.

Z1   Smart compress files (default).

Z2   Always compress files.

Z3   Uncompress files.

ZS0   Do not compress or uncompress selected files.

ZS1   Smart compress selected files (default).

ZS2   Always compress selected files (default).

ZS3   Uncompress selected files.

ZA0   Do not compress or uncompress additional selected files.

ZA1   Smart compress additional selected files.

ZA2   Always compress additional selected files.

ZA3   Uncompress additional selected files (default).

ZO0   Do not compress or uncompress other files (default).

ZO1   Smart compress other files.

ZO2   Always compress other files.

ZO3   Uncompress other files.

The options are method specific. If an invalid option is used for a method no action will be executed. See the documentation or GUI to check what options are available for each method.

This parameter is ignored if the action is not defrag or simulate.

```
   /D:display Display options. One of:

                +M  Show GUI maximized       -M Show GUI minimized

                +N  CLI with verbose output  -N CLI with minimal output

             If no display options are specified the default is +N.

Examples:

  UltimateDefrag help

  UltimateDefrag query C:

  UltimateDefrag analyze C:

  UltimateDefrag simulate C: /M:A

  UltimateDefag defrag C: /M:C /O:HMV

  UltimateDefag C: /M:R /O:MTMPOC30

  UltimateDefag C: /M:A /O:MYVD75LA

UltimateDefrag [volume] <file|folder> [/D:display]


   volume    Specifies the drive letter (followed by a colon).

             If not specified the volume on the current directory will be
used.

   file      A file path to defragment. The path may include wild cards.

             If the file does not start with \ it will be searched in
the current directory.

             If the file ends with \ the files with the same name in
subfolders will also be defragmented.

   folder    A folder path to defragment. The path may include wild cards.

             If the folder does not start with \ it will be searched in
the current directory.

             If the folder ends with \ the content of subfolders will also
be defragmented.

   /D:display Display options. One of:

                +M  Show GUI maximized       -M Show GUI minimized

                +N  CLI with verbose output  -N CLI with minimal output

             If no display options are specified the default is +N.

Examples:

  UltimateDefrag *.*

  UltimateDefrag C: \*.exe

  UltimateDefrag C: \*.ex?

  UltimateDefrag C: \*.exe\

  UltimateDefrag C: \Windows\note???.exe

  UltimateDefrag C: \Windows\notepad.exe
```

```
UltimateDefrag C: \Windows\System*

UltimateDefrag C: \Windows\System*\r

UltimateDefrag C: \Windows\System32

UltimateDefrag C: \Windows\System??

UltimateDefrag C: \Windows\System32\

UltimateDefrag C: "\folder with spaces\\"
```

If you wish to create a schedule or will be repeating the same commands in a future run then we suggest you create a batch file to make it easier to run again in the future with the same parameters and switches.

You can name your batch file anything except for UltimateDefrag.bat.

A new feature introduced in this build is the single easiest way ever to defragment a directory. Simply go into the Command Prompt and navigate to the folder you wish to defragment. Then simply enter the command UltimateDefrag *.* and all files in the directory will be defragmented. If you enter UltimateDefrag *.*\ - then it will defragment files in sub folders also. This command accepts wild cards so if you enter UltimateDefrag *.jpg then it will simply defragment all of the jpg files in the directory.

WINDOWS SHELL INTEGRATION

We have integrated UltimateDefrag with Windows Explorer to give you UltimateDefrag defragmentation operations right there in Windows Explorer with a Right Click on any file or folder.

When you right-click your mouse on a file or folder from within Windows Explorer you will see an UltimateDefrag icon that gives you a number of options. You can select one of the options that fly out when you hover over the UltimateDefrag icon or you can select Properties for the file and within properties you will find more UltimateDefrag options.

Fly out menu options

When you right click on a file or folder and hover over the icon, you can select the option to either:

1. Defragment the individual file or folder right there and then without needing to launch UltimateDefrag at all.

2. Add the file or folder to the group of files that UltimateDefrag moves to the HP zone of your hard drive

3. Add the file or folder to the Archive group of files

4. Add the file to the group of files that are selected to be excluded or ignored by UltimateDefrag

5. Or you can launch UltimateDefrag from there.

File Properties Options

When you scroll to the bottom of the menu brought up with a right click on the file or folder you will find the Properties option. This is where you can see and edit other properties of the file or folder. In the list of tabs you will find a tab called UltimateDefrag. Select the tab and you can then perform further operations on that file including analyzing for the number of fragments and then to also defragment that particular file or folder (and all files within the folder) right there and then.

We trust that you find this integration with Windows Explorer a convenient feature.
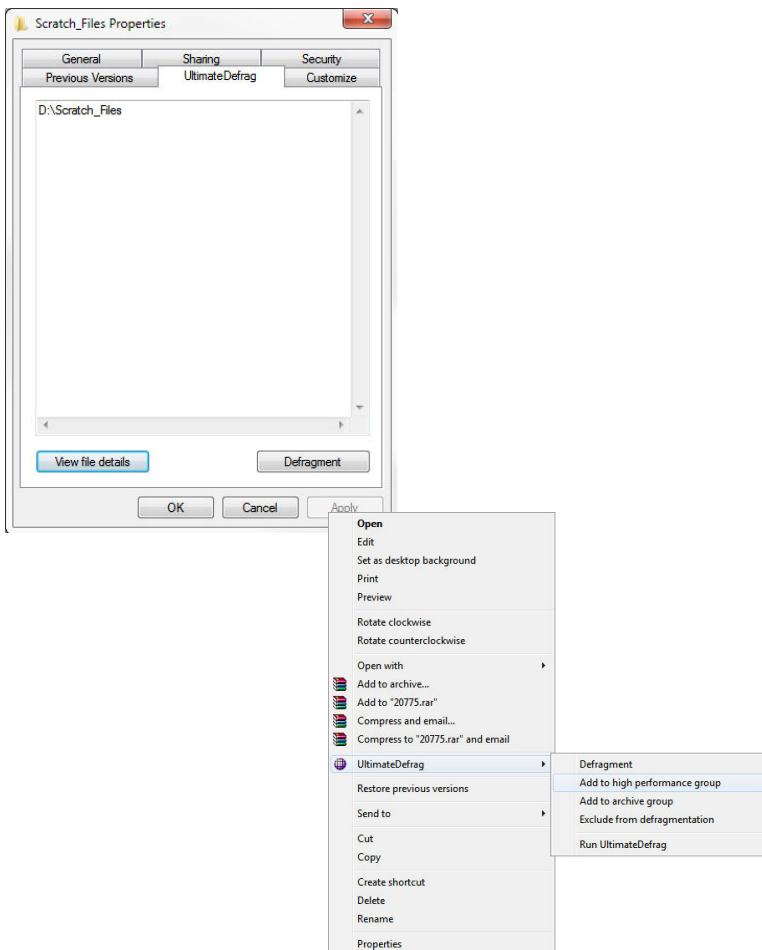
BOOT TIME SYSTEM FILE DEFRAGMENTATION

Certain system files and meta files within Windows and the NTFS file system are locked and protected when in normal operating mode and cannot be defragmented in normal operating mode. As a result they need to be defragmented at boot time before the operating system starts up.

UltimateDefrag's boot time module is unprecedented in its capabilities in this area. It gives you full power and flexibility over the defragmentation and placement of these system files, the relative position of which can be significant in determining the performance of your hard drive.

The placement of the MFT and page file relative to your most frequently accessed data can has significant effects on the performance of your hard drive file access. In short, the closer these are placed to your most frequently used data or the bulk of your data the better the performance since it minimizes seek times for these files which are frequently accessed during file access.

An enlarged image of the boot time screen is on the next page. Please refer to it as we discuss its use.

Using The Boot Time Defragmentation Module

To access the boot time feature, select Settings=>Options => Boot Time Defrag. You will find the very powerful interface shown on the next page in that window.

The default settings that appear are the default settings for a regular non-optimized drive where the system file group is placed 30% in for the outer tracks of the drive. This is a generally accepted position for hard drives that have not been optimized where high performance files are taken into consideration.

The beauty of UltimateDefrag is that you can manipulate the placement of these files to your heart's content.

If, in your defragmentation routines, you do not use the archive or HP features and most of your files are towards the outer tracks of your drive, then place the system file group right in the middle of your data. Not your drive, but your data. You can establish this visually.

If you do consider High Performance and archive file placement in your defragmentation routines, the default location of your system file group is far from optimal and you need to consider where the bulk of your most frequently accessed data is and place your system files as close to this concentration of files as possible.

You can place the files either just inside the inner ring of your outermost data or you can place them right in the middle of the outer most data. OR you can place the MFT right in the middle of the data and your page file just inside the inner ring.

This is the beauty of the UltimateDefrag boot time module. You have unprecedented and unlimited power and flexibility in placing your system files.

Refer to the diagram on the previous pages as you read the following description.

A Quick MFT (Master File Table) Lesson

The Master File Table (MFT) is a database in which information about all files and folders on the NTFS volume is stored. The operating system constantly refers to the MFT when a file needs to be accessed or written. For this reason, a fragmented MFT can negatively affect file access performance.

The main thing you need to know about the MFT as it relates to defragmentation is that it cannot shrink. It only grows as the number of files on a hard drive increases. If you delete files, the MFT will make space available within it for new files but as the number of files grows beyond the previous maximum number of files that were on your hard drive, then it will grow to accomodate the new files. Normally as the number of files on a hard drive grows, when the MFT growth fills up the reserved zone then the MFT will fragment as it grows if there is no contiguous free space after the reserved zone. The function of the reserved zone is to mitigate fragmentation as the MFT grows as the reserved zone is attached to the end of the MFT.

Back to Using The Boot Time Module

UltimateDefrag boot time system file defrag uses the MFT as the main file upon which the block of system files is placed around. The MFT indicated size is the actual MFT that is in use and designated as MFT. The MFT reserved zone is a reserved section that allows growth of MFT without fragmentation. You will see this MFT Reserved zone as the yellow zone on your main drive display. Windows XP dedicates too much space for the MFT reserved zone (default 12.5% of your hard drive size). Windows Vista and Windows 7, 8 & 10 do not dedicate enough and it is not uncommon to see MFT fragmentation on a Windows 7, 8, 10 or Vista machine. Ideally, the MFT reserved zone size should be two or three times the MFT size.

CAUTION

When running boot time defragmentation files are being accessed at a low level. It is not uncommon for your file system to have pre-existing minor corruption that is not even detectable and correctable by Windows CHKDSK. In this instance, the likelihood of any boot time routine causing further corruption is extremely low but not entirely impossible. **We highly recommend you have a backup of your important data before running any boot time module, especially the first time.**

On top of that, many drives have minor corruptions that are not apparent during normal use but are correctable with CHKDSK. Since the boot time analysis is very sensitive to such corruptions, if the boot time module gives an error stating that there is a pre-existing MFT corruption or disk error and that does not enable it to proceed you can usually correct such corruptions with the Windows CHKDSK feature. Please consult the Windows Help file for more information on CHKDSK in the event that you need to run it.

Options

General | Boot time defrag | More

Advanced settings for ~~This number will change as you~~

This number will change as you drag the position slider OR you can directly input a number.

Files to be placed in b~~y~~

Drives

starting cluster: `32066882`

Drive
C:
D:
E:
F:
Y:

File	Size	
$MFT	741 MB	
$LogFile	64 MB	
$Bitmap	28 MB	
$AttrDef	4 KB	
$UpCase	128 KB	
$MFTMirr	4 KB	
$Secure	1 MB	
$Reparse	4 KB	
$Tops	4 KB	
$Obild	40 KB	

You can determine the order of the files here by selecting a file moving it up or down OR you can drag it to the lower window to specifically place at its own defined position outside of the

Files to be placed at sp~~main cluster~~s. Drag from/to above.

File	Size	Position	

When you drag a file to this window, you can change its position by dragging the slider that appears to the left here.

[Reset defaults] ← **Default settings place the system file group 30% in from the outer tracks of drive.**

☐ Run the next time the system starts

You must check this box for boot time defrag to run at next boot.

stem files and metafil... ... ...file settings

This is the place to manipulate MFT settings to prevent fragmentation of MFT as it grows

MFT size:	**405**	MB
Current MFT reserved zone size:	**136**	MB
Reserved zone percent of MFT:	**33.58**	%
Free space after the reserved zone:	200	MB
MFT plus reserved/free zone size:	**741**	MB
Reserved/free zone percent of MFT:	**82.96**	%

Percentage that NTFS reserves for the MFT. 1 corresponds to the minimum MFT zone size and 4 corresponds to the maximum. 0 allows to use the default. See MS document "How NTFS reserves space for its Master File Table".

NtfsMftZoneReservation registry key value: 1

Light purple color on indicator strip show space occupied by regular files. White space is free space.
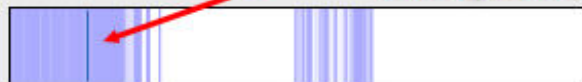
Block surrounding $MFT at cluster 32066882

POSITION SLIDER
Select and Drag with mouse to change position of system file cluster. The starting cluster number will change.

OK   Cancel

UltimateDefrag partially solves the MFT reserved zone problem and while it is not able to authoritatively set the MFT reserved size, only the operating system can do this, it does enable you to specify free space after the reserved zone that the operating system *should* then use that space for the MFT to grow into. As a rule of thumb, set your free space to at least two times the MFT size. This will give you ample room for contiguous MFT growth. If you click up on the spinner for free space after reserved zone it will increase in 200 Mb increments.

 The NtfsMftReservation registry key value is a multiplier of 200 Mb. So if you set this to 2, the operating system will reserve space in 400 Mb segments. If you set it to 4 then it will reserve space in 800 Mb segments. Try to make this number match the value set in your free space after reserved zone. So if you set 800 Mb as your free space, set this number to 4. The MFT reserved zone will grow into this 800 Mb of free space.

After you have set your MFT Zone size, note the file list on the left. You can change the order of the files by simply dragging the files or highlighting a file and selecting Move Up or Move Down. When the boot time defragmentation is run it will keep the order that you specified.

The slider on the bottom of the screen lets you determine the position of the system file cluster on your drive. The light blue shading on the drive strip is space occupied by data. Simply drag the slider to whatever position on the drive want your system files to be placed.

Note that to the left of the data strip are the outer tracks and to the right are the inner tracks.

For very fine placement you can manually change the starting cluster at the top of the screen. You may wish to establish the exact cluster number by using your mouse on the disk display to find the cluster number before entering the boot time screen.

If you want a specific system file to be placed outside the system file block simply select a file from the top list and drag it into the bottom window called "Files to be placed at defined positions". Then a slider appears specifically for the file that you want to position. Position the file wherever you want using the slider. You may want your page file in its own location away from the rest of the block of system files. This feature enables you to do that!

We're sure that you'll truly agree that the power in this boot time module is unprecedented.

To run the boot time system file fragmentation simply ensure that "Run during next boot" is checked and next time you boot your system, the boot time module will run and reposition our system files according to the file layout you specified. The time it will take will vary according to a number of factors such as data that needs to be moved in and out to make space for the new location of the system files.

CONCLUSION

We trust that you'll enjoy the newfound level of hard drive performance that UltimateDefrag gives you. Please tell a friend about UltimateDefrag and direct them to our web site at:

www.disktrix.com

TECHNICAL SUPPORT

Technical Support for UltimateDefrag is provided by e-mail and online FAQ.
For e-mail technical support: **support@disktrix.com**

For web support via our Frequently Asked Questions: **www.diskTrix.com/support**

Do you have any features you would like to see in UltimateDefrag to improve your user experience? Please let us know at **userstories@disktrix.com**

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