



Defragging IBM Lotus Domino[®] servers

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a member of



v. 1.2



- Introduction

Although IBM Lotus Domino[®] is a multiplatform system, many facilities run on MS Windows[®] operating systems.

- NTFS

So, the NTFS file system is responsible for organizing physically the data on disk volumes for Domino servers.

- Problem 1

NTFS uses a transaction log to ensure the integrity of the file system but not for each file.

- Problem 2

Mail servers are working hard receiving and sending Notes mail, Internet mail, processing applications, agents and so on.

Effects

The disk controller punishes constantly I/O operations to volume data disk storage on Domino servers.

- Problem 3

NTFS is no wonder. It doesn't support operations like "persistent preallocation" and "online defragmentation" as ext4.

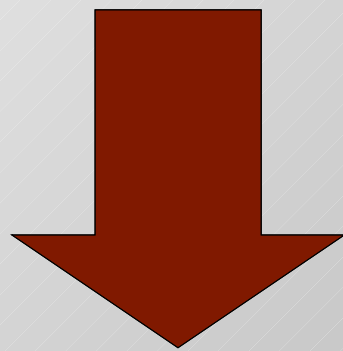
- Problem 4

NTFS performs a rapid
fragmentation of data volumes and
RAID level data files.

- Problem 5

The tool defrag.exe (Diskkeeper[®]) of MS Windows[®] servers is not compatible with open files. Ok, let's say it's not a good friend.

Problem 1 + Problem 2 +
+ Problem 3 + Problem 4 +
+ Problem 5



Server error. This dd.bb. cannot be read due to an
invalid on disk structure”

The Domino Administrator

11



Your name here

And now, what?



- Requirements for the program "x"¹³

a) "x" must be executed on server platform W2003/2008.

b) "x" must be compatible with 32/64 bits technologies.

c) "x" should defrag NSF's/NTFs/
FTs files safely.

d) "x" must run with Domino server
running.

- *A bit difficult, right?*



- Solutions



$x1 = \text{DefragNSF}^{\text{©}}$

$x2 = \text{DominoDefrag}$

Defrag.NSF

- *It's the world's first and only Domino-specific NSF database defragmentation product for W2003.*

Defrag.NSF

- Defrag.NSF tackles the file fragmentation issue by re-ordering the file and making sure that it is stored in a single contiguous location on the disk.

Defrag.NSF

defrag - (Performance) - IBM Domino Administrator

File Edit View Create Actions Help

PREEMPTIVE Domain defrag - (Performance)...

Defrag.NSF™
Running on pecdm1

Install Server Task

- Databases
 - By Fragments
 - By Health Index
 - By Name
- Logs**
 - Performance Logs
- Settings
 - Technical Settings

Run Date	Path	Before (sec)	After (sec)	Improvement	Before (frags)	After (frags)
m1/preemptive						
12/12/2008 10:37:48 AM	docs\External Docs.nsf	0.864	0.696	19.46%	45	1
12/12/2008 10:35:39 AM	mail\defrag.nsf	27.079	4.731	82.53%	156	1
12/12/2008 10:16:13 AM	mail\defrag.nsf	25.667	4.908	80.88%	150	1
09/12/2008 12:04:08 PM	dev\AttVaultVersions.nsf	1.334	1.096	17.89%	16	1
09/12/2008 07:16:58 AM	dev\VaultVersions.nsf	58.264	18.427	68.37%	109	1
07/12/2008 04:12:45 AM	mail\aosborne.nsf	86.353	25.412	70.57%	211	1
06/12/2008 04:07:51 AM	mail\defrag.nsf	12.450	7.264	41.66%	10	1
05/12/2008 07:50:04 AM	support\LSESS08.nsf	83.888	53.023	36.79%	35	1
05/12/2008 07:37:32 AM	support\LS2007.NSF	74.403	25.580	65.62%	140	1
05/12/2008 07:29:29 AM	public\builds.nsf	11.728	5.331	54.54%	28	1
05/12/2008 07:28:05 AM	docs\kbase.nsf	15.379	6.390	58.45%	31	1
05/12/2008 05:56:37 AM	public\builds.nsf	12.175	6.913	43.22%	31	1
05/12/2008 05:17:13 AM	dev\VaultVersions.nsf	66.643	19.924	70.10%	176	1

1 2 3

Defrag.NSF

- Commercial solution.
- Author: Preemptive Consulting
- More information:

Website

e-mail

Domino Defrag

- Opensource solution available at
- Author: Andrew Luder
- Compatible with W2003/2008 and 32/64 bits technologies.
- Link to the project here.



Domino Defrag

- `dominodefrag.exe` is a program written and compiled using C#.
- Uses a Notes API to interact with Domino server running.

DominoDefrag 32 bits

Copy the following files to the c:\Lotus
\Domino directory.

contig.exe

lcppn80.dll (Notes API)

dominodefrag.exe

DominoDefrag 64 bits

Copy the following files to the c:\Lotus
\Domino directory.

contig.exe

lcppn801.dll (W64 bits)

dominodefrag.exe (W64 bits)

Domino Defrag

The instructions for downloading these files are documented at the project website. You need to be registered at Openntf.org in order to download the applied instructions.

Domino Defrag

- Defrags any NSF / NTF / FT physically on disc and it's compatible with any level of RAID array disks.

Domino Defrag

- It's compatible with mailboxes, applications, Quicker, Traveler or any NSF.

- Supports Domino 5.x, 6.x, 7.x, 8.x. and DAOS.

Domino Defrag

- Install and forget.
- Plug & Play & Enjoy



Your name here

DominoDefrag

- Runs as a Domino server task.

```
Database Server      Idle task
Database Server      Idle task
Database Server      Platform Stats is idle
Database Server      Finalizar la ejecución del supervisor
Database server      procesar el supervisor
DominoDefrag          Defragging mail\adiaz.nsf
Admin Process        Idle
Admin Process        Idle
Admin Process        Idle
Admin Process        Idle
LDAP Server          Listen for connect requests on ICP Port:389
LDAP Server          Utility task
DIIOP Server         Listen for connect requests on ICP Port:63148
DIIOP Server         Utility task
```

DominoDefrag

- Moderate memory consumption on the Domino server.

contig.exe → 2 Mb RAM

dominodefrag.exe → max. 35 Mb RAM

Domino Defrag

- Example:

load dominodefrag

It will defrag all the data directory that the Domino server can see, including any expansion disk array or san. ("directory links").

Domino Defrag

- Example:

load dominodefrag mail

It will only defrag the "data/mail"
directory.

```
13/05/2009 15:51:19 DominoDefrag: mail/[redacted].nsf Before Fragments -> 92
13/05/2009 15:51:19 DominoDefrag: mail/[redacted].nsf After Fragments -> 1
13/05/2009 15:51:19 DominoDefrag: mail/[redacted].nsf Completed Defrag
13/05/2009 15:51:19 DominoDefrag: Termination complete
```

Domino Defrag

- Example:

load dominodefrag web.nsf

It will only defrag the application web.nsf

Domino Defrag

- Example:

```
load dominodefrag san.dir
```

It will defrag the san directory. It's an expansion disks array volume. ("directory links").



Domino Defrag

- Domino notes.ini parameters

Domino Defrag _Directory=mail

It will defrag "mail" directory if none was specified.

Domino Defrag

- Domino notes.ini parameters

Domino Defrag _Directory=names.nsf

It will only defrag names.nsf

database (the Domino Directory).

Domino Defrag

- Domino notes.ini parameters

DominoDefrag_MinuteInterval=120

DominoDefrag server task will
automatically run every 2 hours.

Domino Defrag

- Domino notes.ini parameters

Domino Defrag FT Index=1

Enables defrag associated full text index folder's files.

Domino Defrag

- Domino notes.ini parameters

DominoDefrag_VerboseLogging=1

Enables detailed amount of server console information.

Domino Defrag

- Domino notes.ini parameters

DominoDefrag_Compact=1

Enables allow in-place native compact before defrag.

Domino Defrag

- Domino notes.ini parameters

DominoDefrag_SummaryEmailAddress

= Administrator/eslug

Sends summary e-mail to specified e-mail address.

Domino Defrag

- Domino notes.ini parameters

DominoDefrag_TransactionLog=1

Will defrag transaction log files under the notes.ini "TRANSLOG_Path" directory value.

Domino Defrag

- Domino notes.ini parameters

Domino Defrag _DAOS=1

Will defrag DAOS files under the DAOS directory (if enabled).

Domino Defrag

- Domino notes.ini parameters

DominoDefrag_StartPoint=10

Specifies the average number of fragments required before a database is defragged.

DominoDefrag

- Notes.ini example

DominoDefrag_FTIndex=1

DominoDefrag_SummaryEmailAddress

=administrator@slug.es

Domino Defrag

- Experience and "know-how"

a) Start with small directories and expand defragging to the entire data directory.

Domino Defrag

- Experience and "know-how"

b) Once you have completed 5 or 6 tasks or dominodefrag's "sweeps", add index files.

Domino Defrag

- Experience and "know-how"

c) If the disk is highly fragmented from approximately 10 "sweeps" the disk should stabilize.

Domino Defrag

- Experience and "know-how"

d) Dominodefrag task will take over 24/48 hours and will gradually decrease in time spent.

Domino Defrag

- Experience and "know-how"

e) Dominodefrag is compatible with antivirus on Ms Windows[®] servers.

Don't worry about backup agents.

Domino Defrag

- Experience and "know-how"

f) Automate the defragging process from a "program" at Domino Administrator.

Domino Defrag

- Experience and "know-how"

Editar programa del servidor Cancelar

Programa: **dominodefrag**

General Administración

General	Programación
Nombre del programa: dominodefrag	Activado/Desactivado: Activado
Línea de comandos:	Horario de ejecución: 17:30 todos los días
Ejecutar en el servidor:	Ejecutar cada: 0 minutos
Comentarios: Proceso de defragmentación de disco del directorio data	Días de la semana: Dom, Lun, Mar, Mié, Jue, Vie, Sáb

Domino Defrag

- Experience and "know-how"

En el servidor	Ejec. el programa	Línea de comandos	Programación
	Compact	-B	04:00
	dominodefrag		17:30

Domino Defrag

- Experience and "know-how"

g) Never allow free space on RAID volume disk lower than 15%. Request more disks to the boss!

Domino Defrag

- Experience and "know-how"

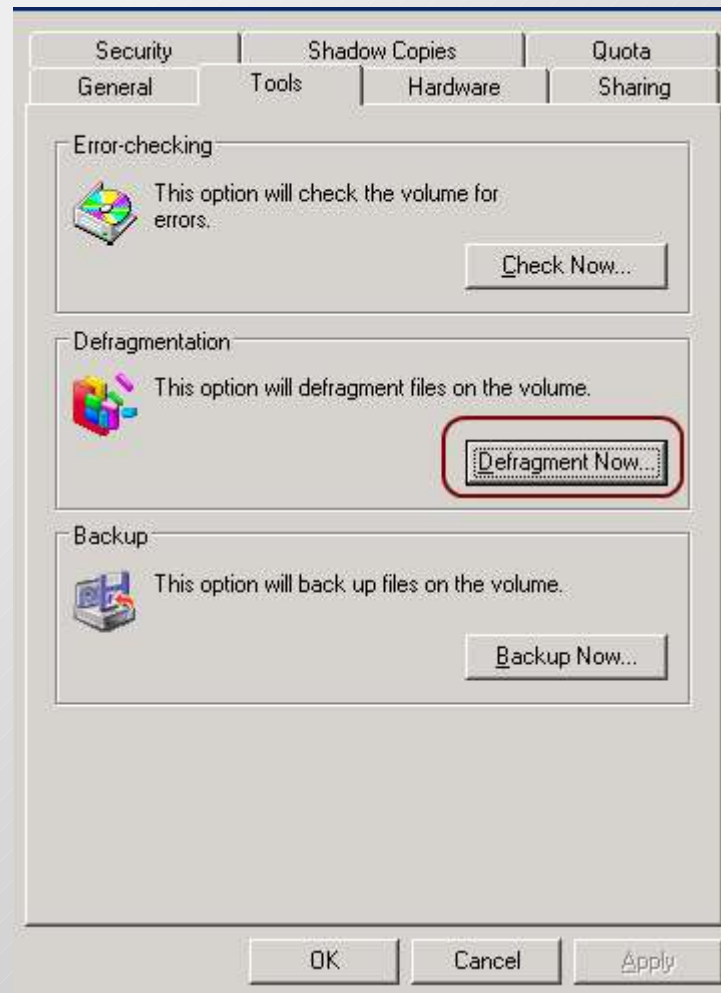
h) How to audit the benefits and improved RAID and Domino disk performance are detailed below.

Domino Defrag

With Domino server running, take a fragmentation report from the standard Windows defrag tool.

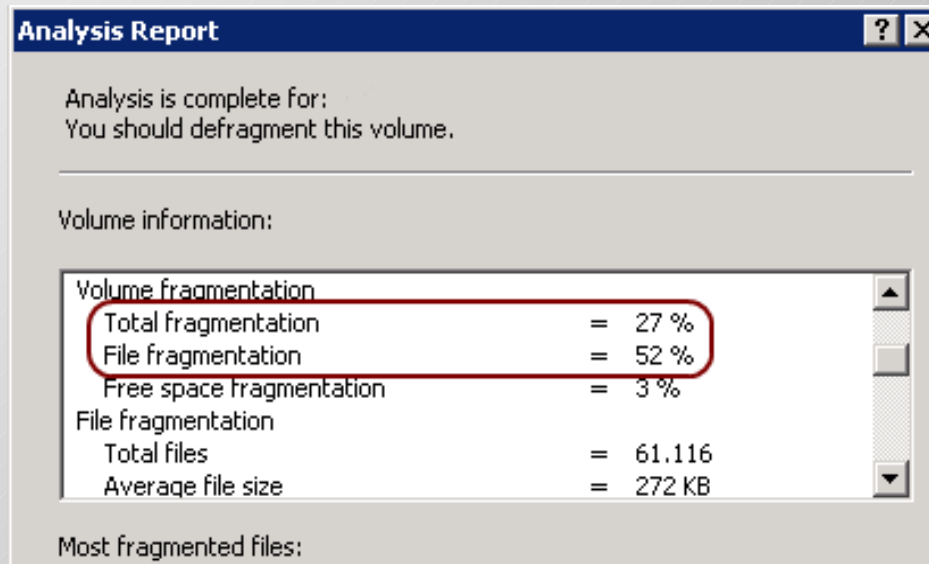
Warning: Please, operate with care.

Domino Defrag



Domino Defrag

- Take note of the most significant values before each dominodefrag.



Domino Defrag

- volume total fragmentation, volume file fragmentation, total fragmented files, total excess fragments and average fragments per file.

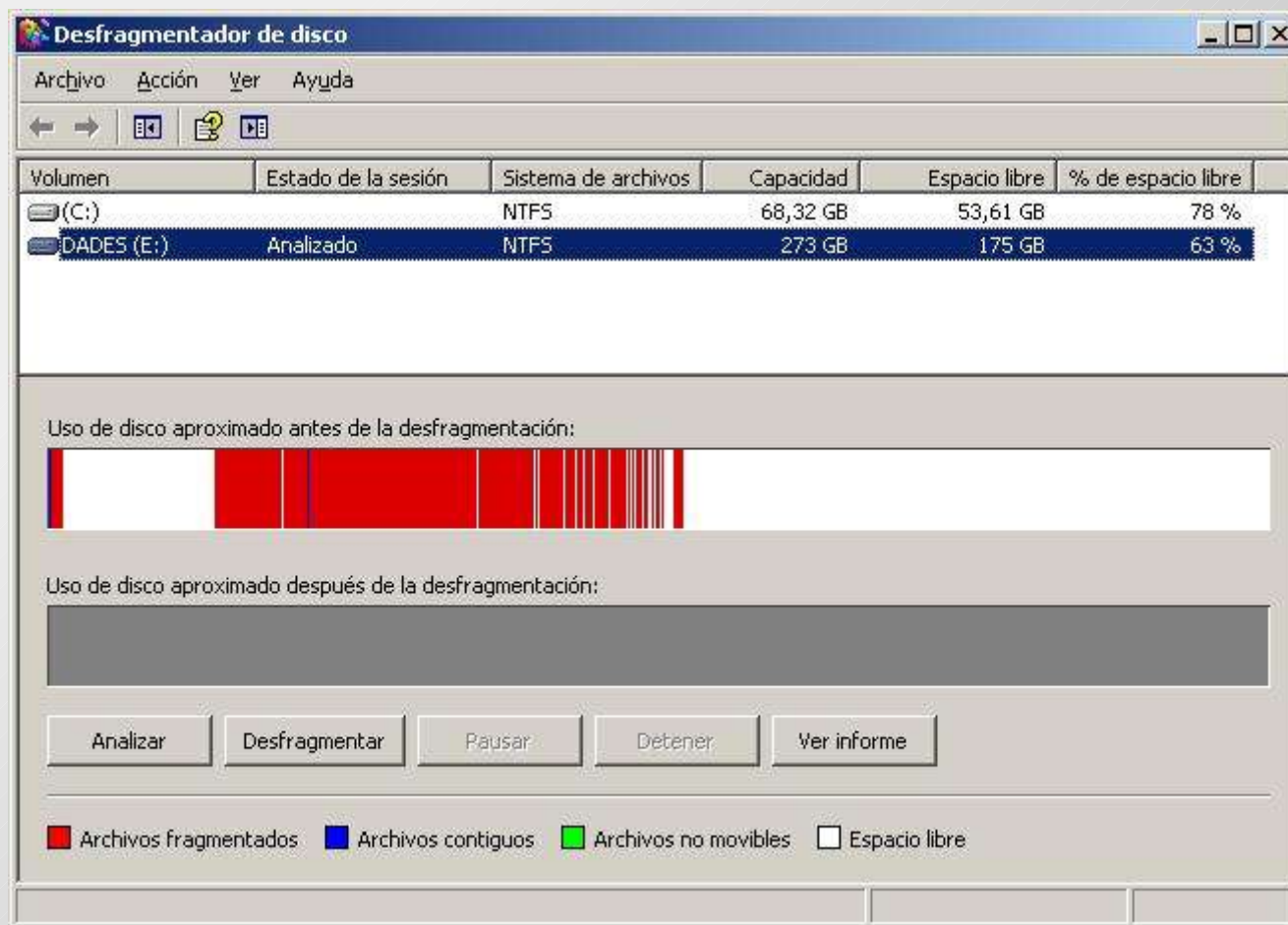
Domino Defrag

- You can make a table with your favourite spreadsheet and graph the values.

Domino Defrag

In the following slide, we'll see a high fragmented RAID volume = poor performance.

Domino Defrag



Domino Defrag

Capture the graphical display
volume status and exit this tool.
Then run the dominodefrag task.

Domino Defrag

Let's see the results of applying "dominodefrag" for 10 iterations on a Domino server in production.

Domino Defrag

From the sixth iteration (R6),
Windows started reporting that it was
not necessary to defrag the volume.

<u>Iteration</u>	R0	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
<u>Volume total fragmentation</u>	49%	21%	24%	27%	19%	11%	5%	1%	6%	1%	6%
<u>Volume file fragmentation</u>	98%	42%	48%	55%	38%	22%	10%	2%	12%	2%	12%
<u>Total fragmented files</u>	1998	1890	1799	1196	1067	749	502	666	913	683	916
<u>Total excess fragments</u>	307251	38149	35500	11949	14172	5824	3450	4312	8412	3288	6516
<u>Average fragments per file</u>	54,17	7,56	7,08	3,05	3,44	2,13	1,59	1,73	2,44	1,56	2,11

Domino Defrag

Desfragmentador de disco

Archivo Acción Ver Ayuda

Volumen	Estado de la sesión	Sistema de archivos	Capacidad	Espacio libre	% de espacio libre
(C:)		NTFS	68.32 GB	53.47 GB	78 %
DADES (E:)	Analizado	NTFS	273 GB	174 GB	63 %

Uso de disco aproximado antes de la desfragmentación:

Uso de disco aproximado después de la desfragmentación:

Desfragmentador de disco

Se ha completado el análisis de: DADES (E:)

Este volumen no necesita desfragmentación.

Ver informe Desfragmentar Cerrar

Archivos fragmentados Archivos contiguos Archivos no movibles Espacio libre

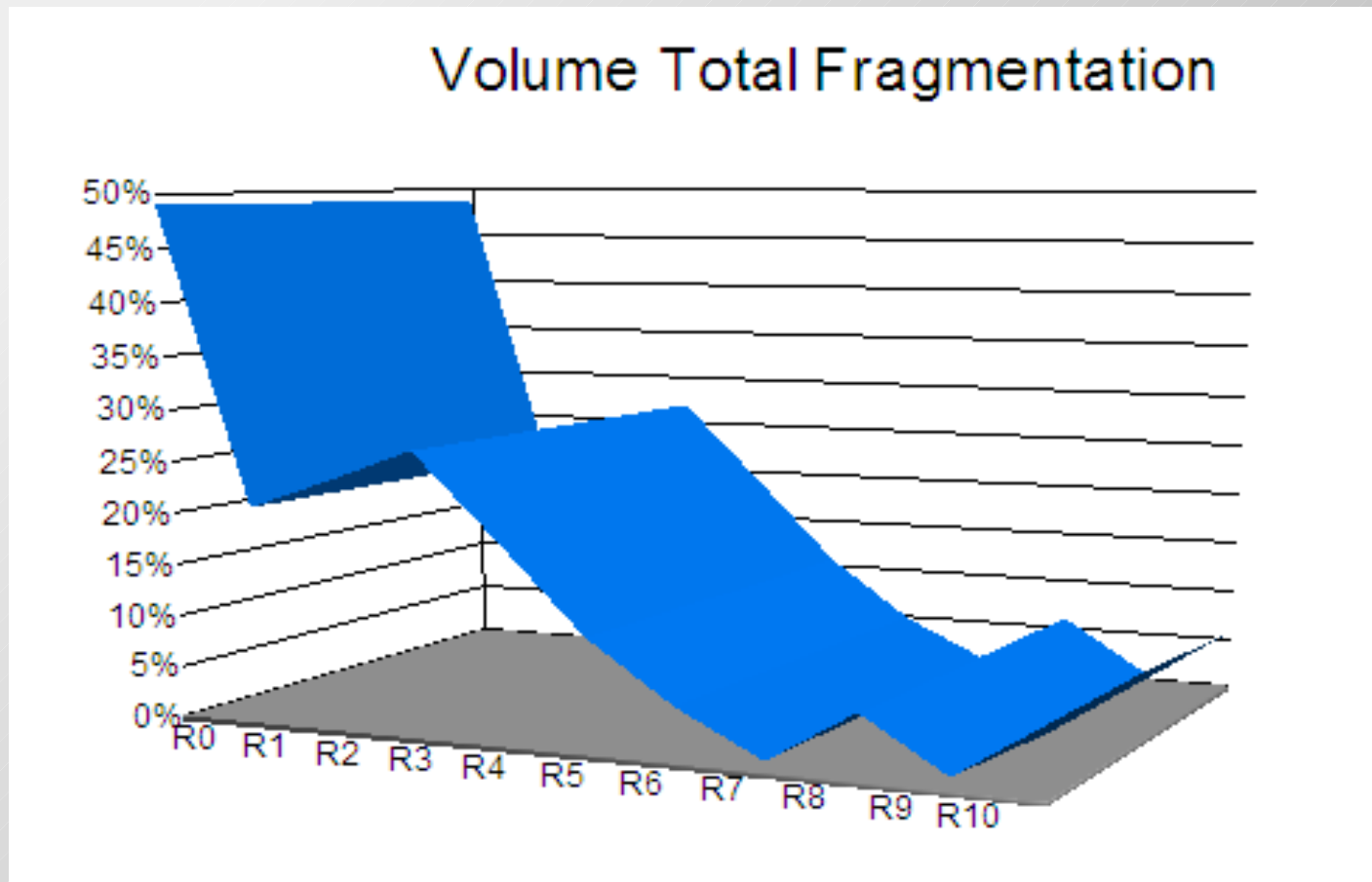
Domino Defrag

This is due to the fact that the volume fragmentation is lower than 10%.

Notice that the ideal number of average fragments per file should be 1.

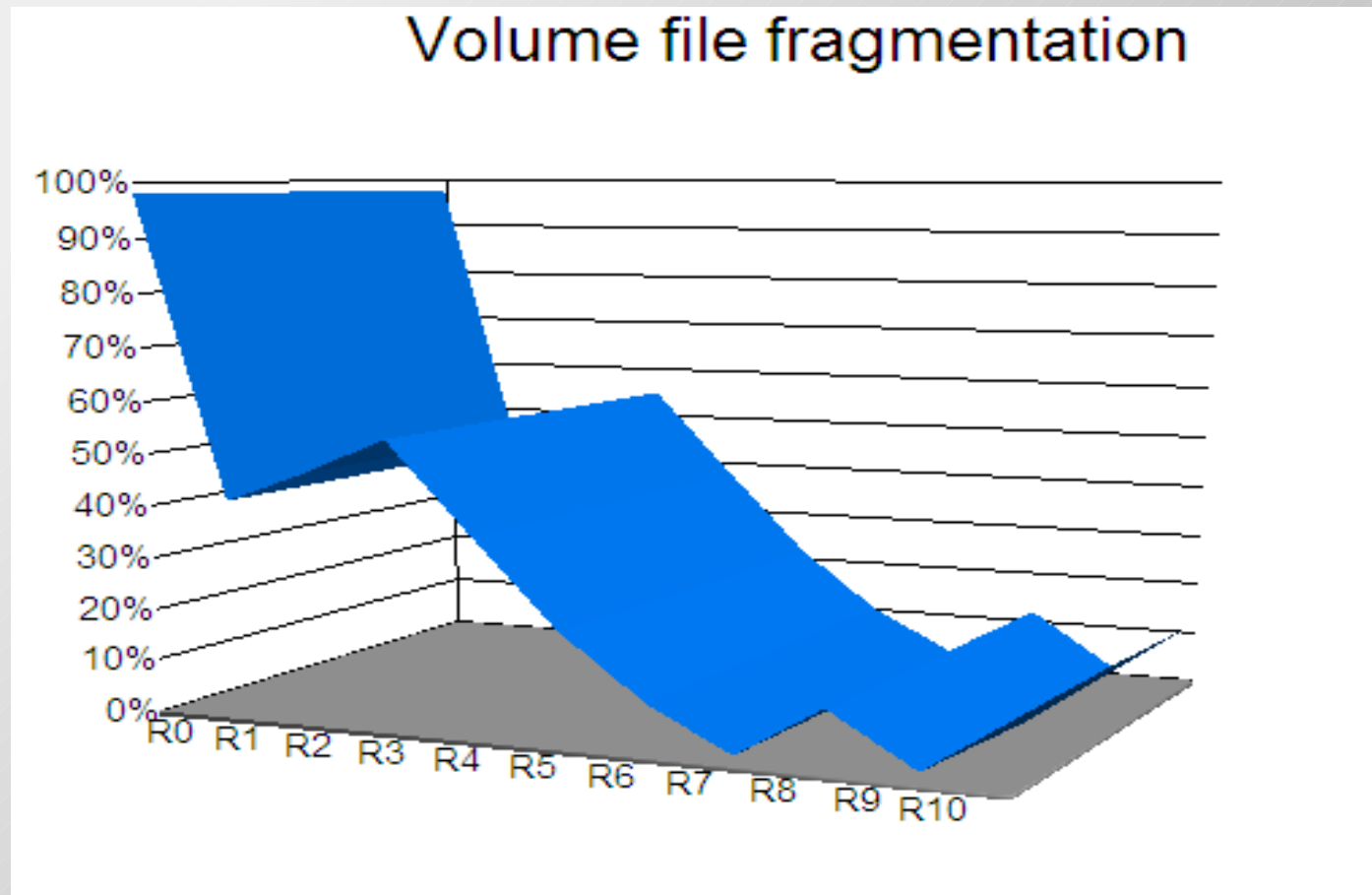
Domino Defrag

Graphs via Symphony 1.3



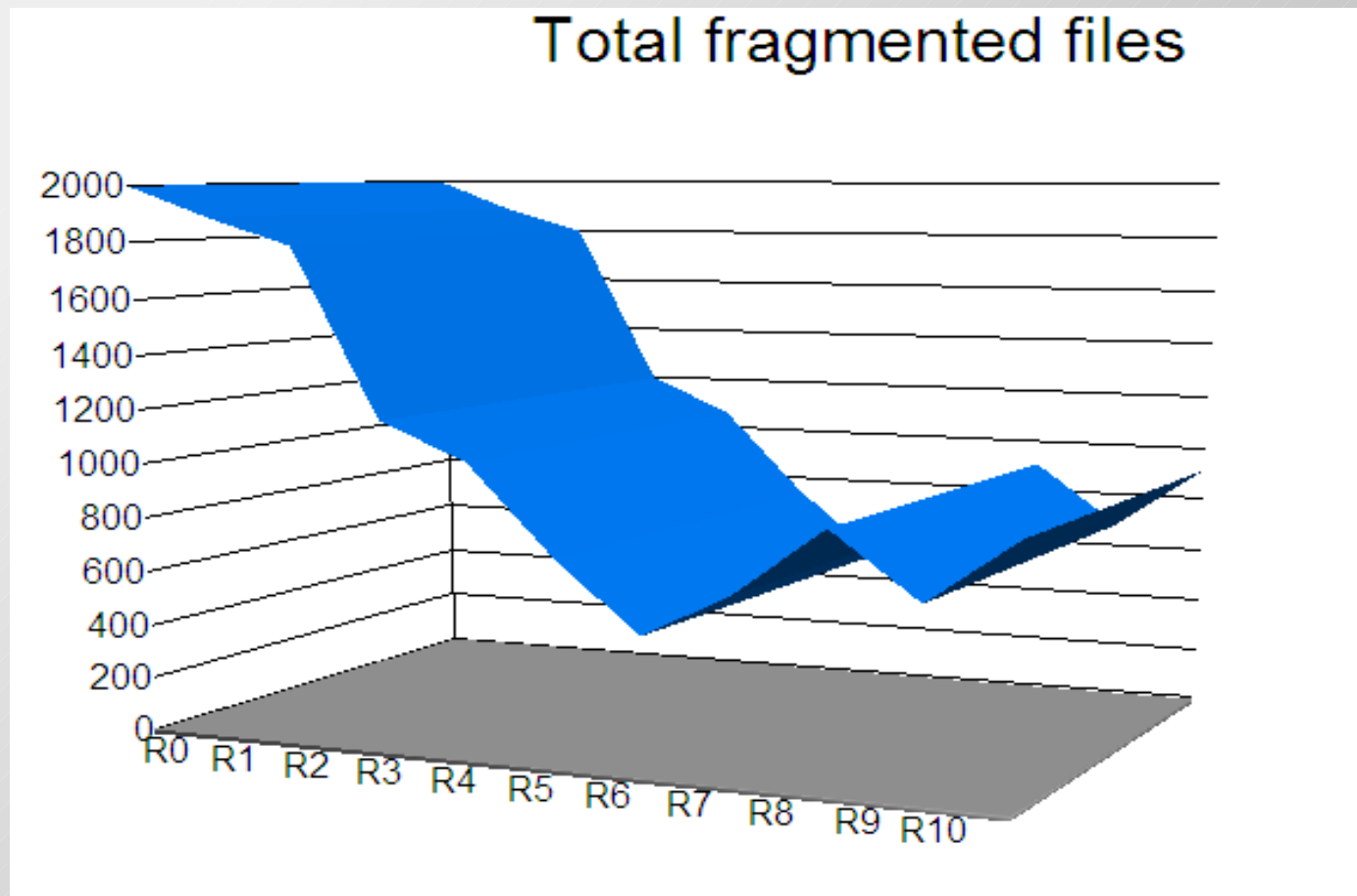
Domino Defrag

Graphs via Symphony 1.3



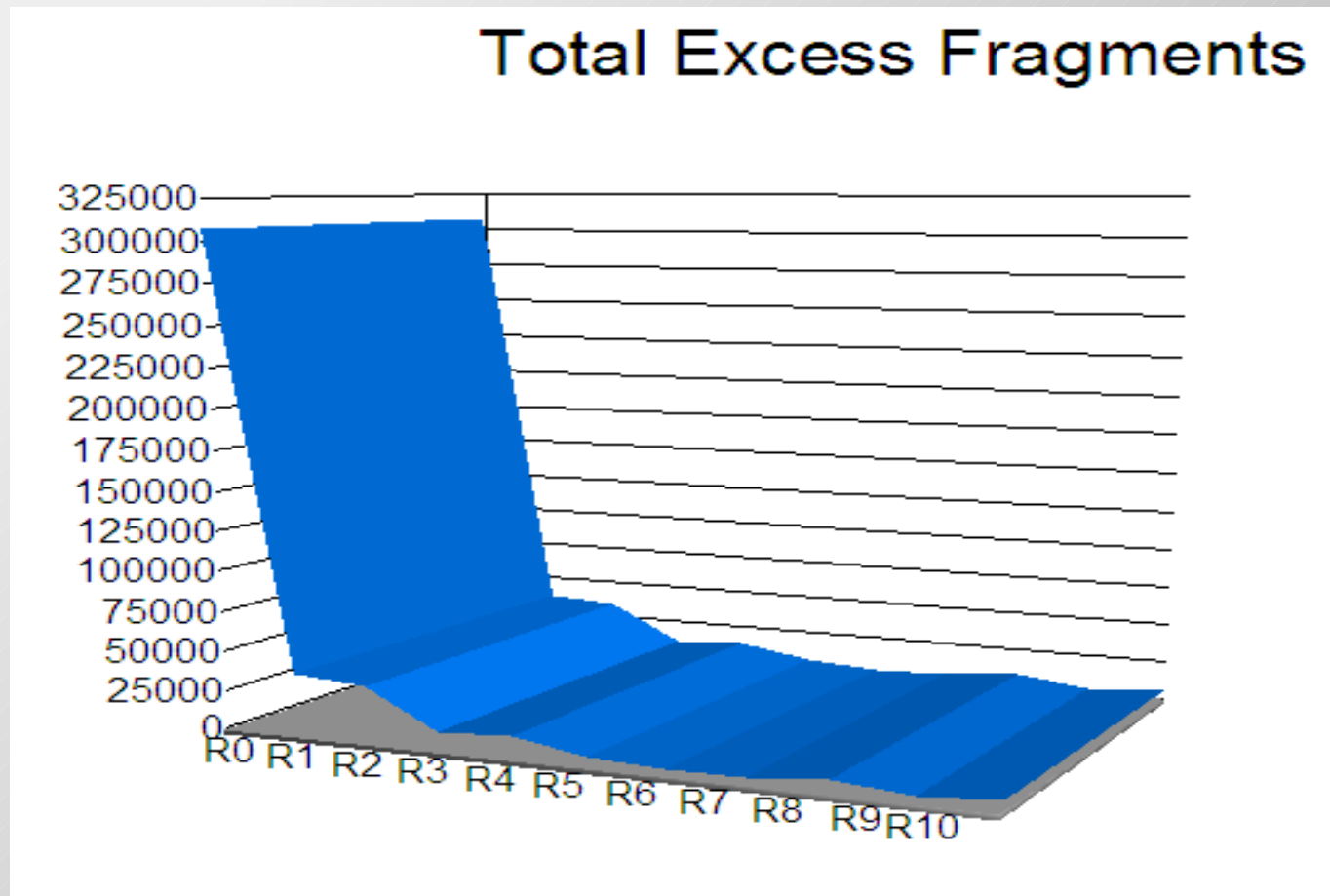
Domino Defrag

Graphs via Symphony 1.3



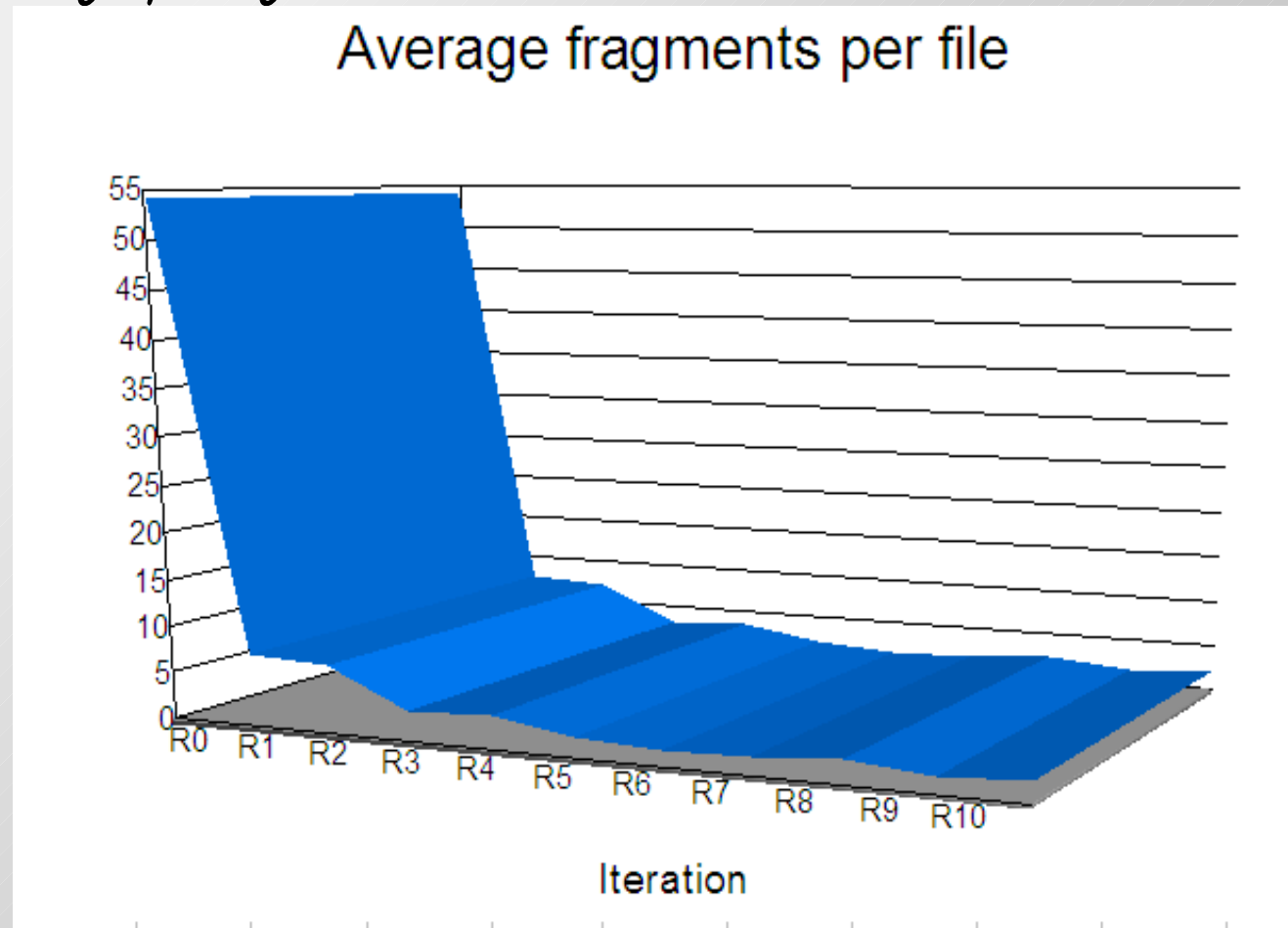
Domino Defrag

Graphs via Symphony 1.3



Domino Defrag

Graphs via Symphony 1.3



Domino Defrag

Analysis.

- With only one iteration (R1) the fragmentation of the volume decreases from 50% to 20%.

Domino Defrag

Analysis.

- With only one iteration (R1), total excess fragments decreases dramatically from 307,251 to 38,141.
So, better performance is expected.

Domino Defrag

Analysis. After 10 iterations, fragmentation volume stabilizes and remains more or less constant.

Remember that mailboxes are increasing size day by day.

Domino Defrag

Benefits and symptoms

- Overall improvement of system performance on any parameter of measure (Notes client, iNotes, views, applications, ...).

Domino Defrag

- Increase of performance of the Domino server: 100%, 200 %,
- Increased access speed to webmail (iNotes). I guarantee you will notice.

Domino Defrag

- Higher speed access to any NSF file.
- Decrease access to the RAID volume from the disk controller on the server.

Domino Defrag

- Less fatigue of controllers and disks. Reduced risk of hardware disks failures.
- Increased reliability and lifetime of the disk storage.

Domino Defrag

- Increased reliability during the process of making Domino server backups.
- Forget "forever" the error "this database cannot be read due to an invalid on disk structure".

Domino Defrag

- Forget the error "Database is corrupt -- cannot allocate space".

Domino Defrag

You'll see the typical time of execution of the "dominodefraq" task on a Domino server with RAID volume in good condition or "normalized".

DominoDefrag

Typical time for data = 100 Gb

Start time: 9:30H

End time: 12:07H.

with DominoDefrag_FTIndex=1

Domino Defrag

Notice that "typical time" varies depending on RAID technology and speed of the disks (SCSI disks, UltraSCSI, SAS, ...)

Domino Defrag

The following slides show some progress of continuous improvement experienced with "dominodefrag".

Domino Defrag

In the next slide we will see a RAID 5 with the data directory completely fragmented = poor performance.

Domino Defrag

The screenshot shows the 'Desfragmentador de disco' (Disk Defragmenter) window. It features a menu bar with 'Archivo', 'Acción', 'Ver', and 'Ayuda'. Below the menu is a toolbar with navigation and help icons. The main area contains a table with columns for 'Volumen', 'Estado de la sesión', 'Sistema de archivos', 'Capacidad', 'Espacio libre', and '% de espacio libre'. Two drives are listed: (C:) and DADES (E:). Below the table, there are two bar charts: 'Uso de disco aproximado antes de la desfragmentación' and 'Uso de disco aproximado después de la desfragmentación'. At the bottom, there are five buttons: 'Analizar', 'Desfragmentar', 'Pausar', 'Detener', and 'Ver informe'. A legend at the very bottom identifies the colors used in the bar charts: red for 'Archivos fragmentados', blue for 'Archivos contiguos', green for 'Archivos no movibles', and white for 'Espacio libre'.

Volumen	Estado de la sesión	Sistema de archivos	Capacidad	Espacio libre	% de espacio libre
(C:)		NTFS	68,32 GB	53,61 GB	78 %
DADES (E:)	Analizado	NTFS	273 GB	175 GB	63 %

Uso de disco aproximado antes de la desfragmentación:

Uso de disco aproximado después de la desfragmentación:

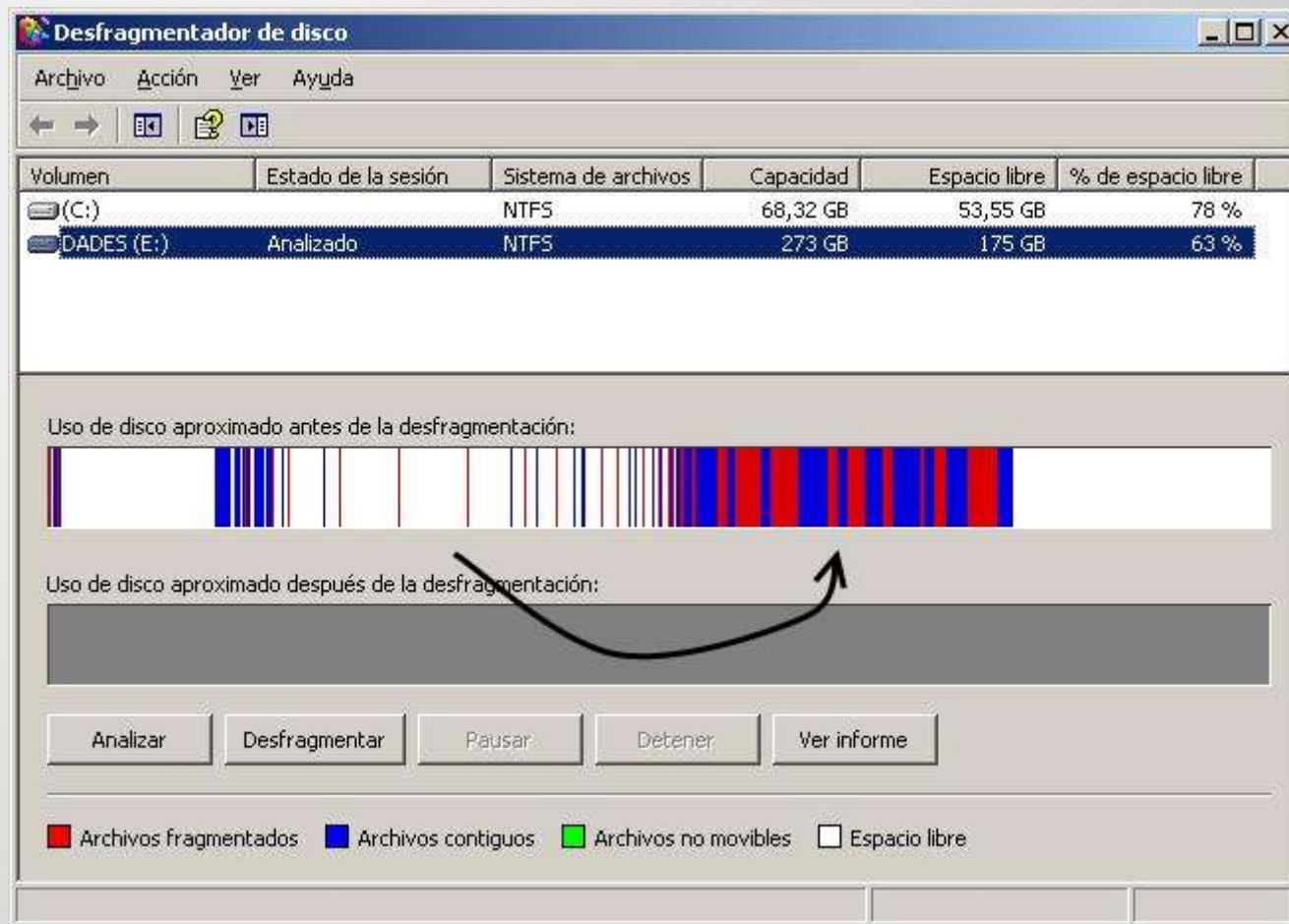
Analizar Desfragmentar Pausar Detener Ver informe

Archivos fragmentados Archivos contiguos Archivos no movibles Espacio libre

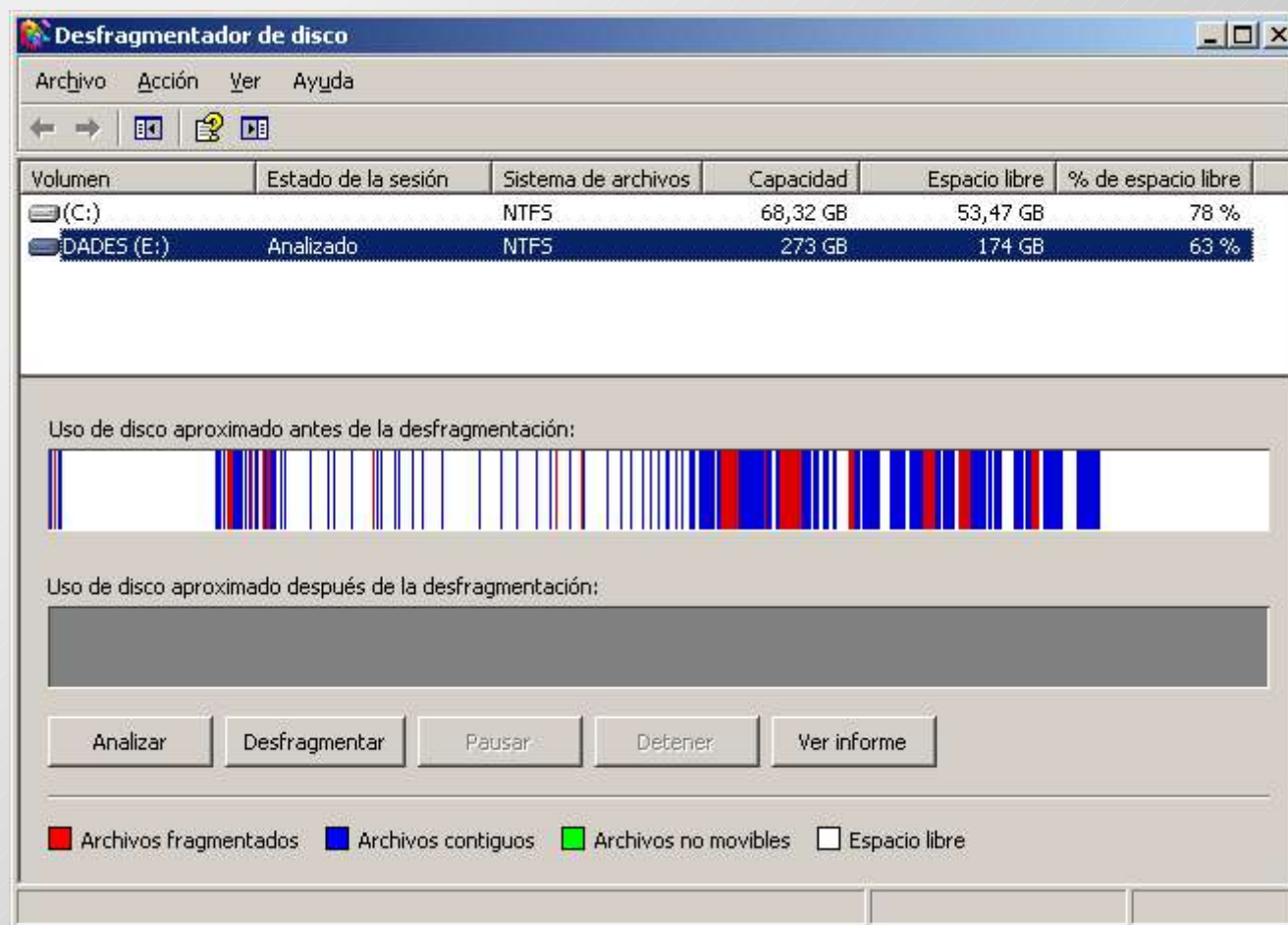
Domino Defrag

After several iterations of "dominodefraq" begin to gain share blue bands = better system performance.

Domino Defrag



Domino Defrag



Domino Defrag

The screenshot shows the 'Desfragmentador de disco' (Disk Defragmenter) window. It displays a table of volumes and their defragmentation status. The 'DADES (E:)' volume is currently analyzed and shows 63% free space. Below the table, there are two bar charts: one for 'Uso de disco aproximado antes de la desfragmentación' (approximate disk usage before defragmentation) and another for 'Uso de disco aproximado después de la desfragmentación' (approximate disk usage after defragmentation). The first chart shows a fragmented disk with many small blue and red bars, while the second chart shows a more contiguous disk with fewer, larger blue bars. At the bottom, there are buttons for 'Analizar', 'Desfragmentar', 'Pausar', 'Detener', and 'Ver informe'. A legend at the bottom identifies the colors: red for 'Archivos fragmentados' (fragmented files), blue for 'Archivos contiguos' (contiguous files), green for 'Archivos no movibles' (non-movable files), and white for 'Espacio libre' (free space).

Volumen	Estado de la sesión	Sistema de archivos	Capacidad	Espacio libre	% de espacio libre
(C:)		NTFS	68,32 GB	53,46 GB	78 %
DADES (E:)	Analizado	NTFS	273 GB	174 GB	63 %

Uso de disco aproximado antes de la desfragmentación:

Uso de disco aproximado después de la desfragmentación:

Analizar Desfragmentar Pausar Detener Ver informe

Archivos fragmentados Archivos contiguos Archivos no movibles Espacio libre

Domino Defrag

Volumen	Estado de la sesión	Sistema de archivos	Capacidad	Espacio libre	% de espacio libre
(C:)		NTFS	68.32 GB	47.50 GB	69 %
DADES (E:)	Analizado	NTFS	273 GB	141 GB	51 %
TLOG (Z:)		NTFS	279 GB	279 GB	99 %

Uso de disco aproximado antes de la desfragmentación:

Uso de disco aproximado después de la desfragmentación:

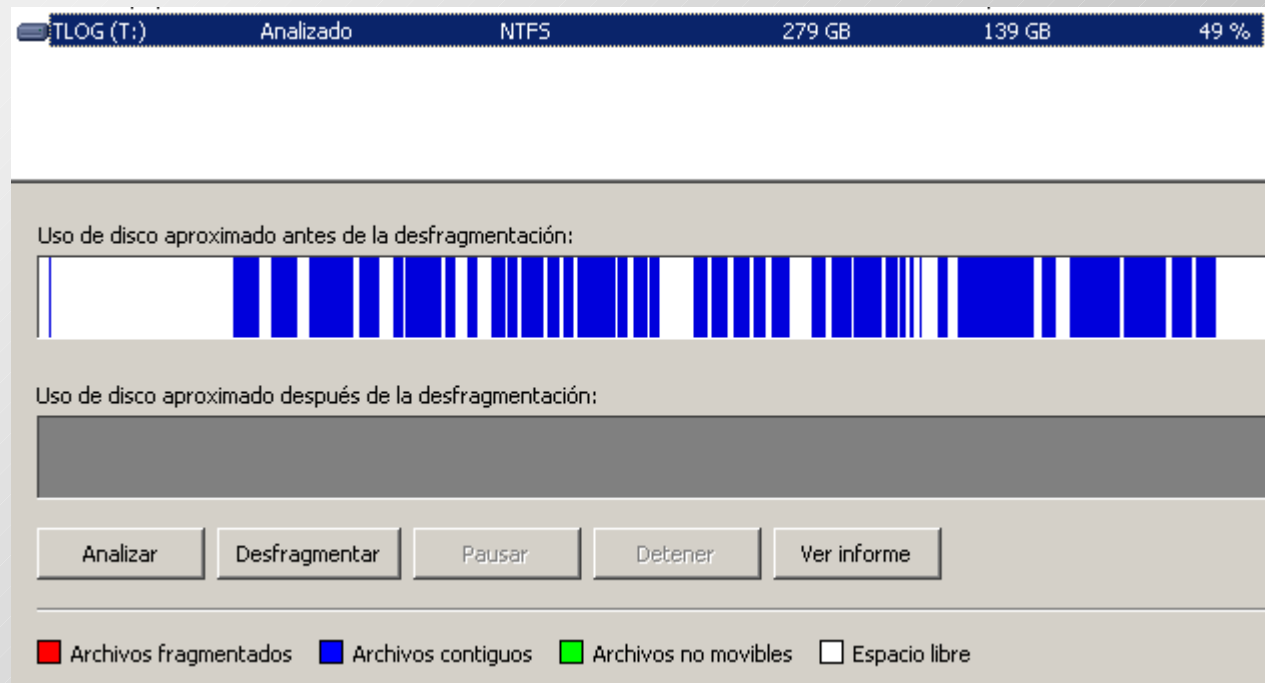
Analizar Desfragmentar Pausar Detener Ver informe

Archivos fragmentados Archivos contiguos Archivos no movibles Espacio libre

Domino Defrag

The target will attain the IBM corporate color...blue, it will mean the best performance of the RAID disks and Domino.

*Domino Defrag
like this one....*



Domino Defrag

*Now, let's see some slides with
"dominodefrag" in action.*

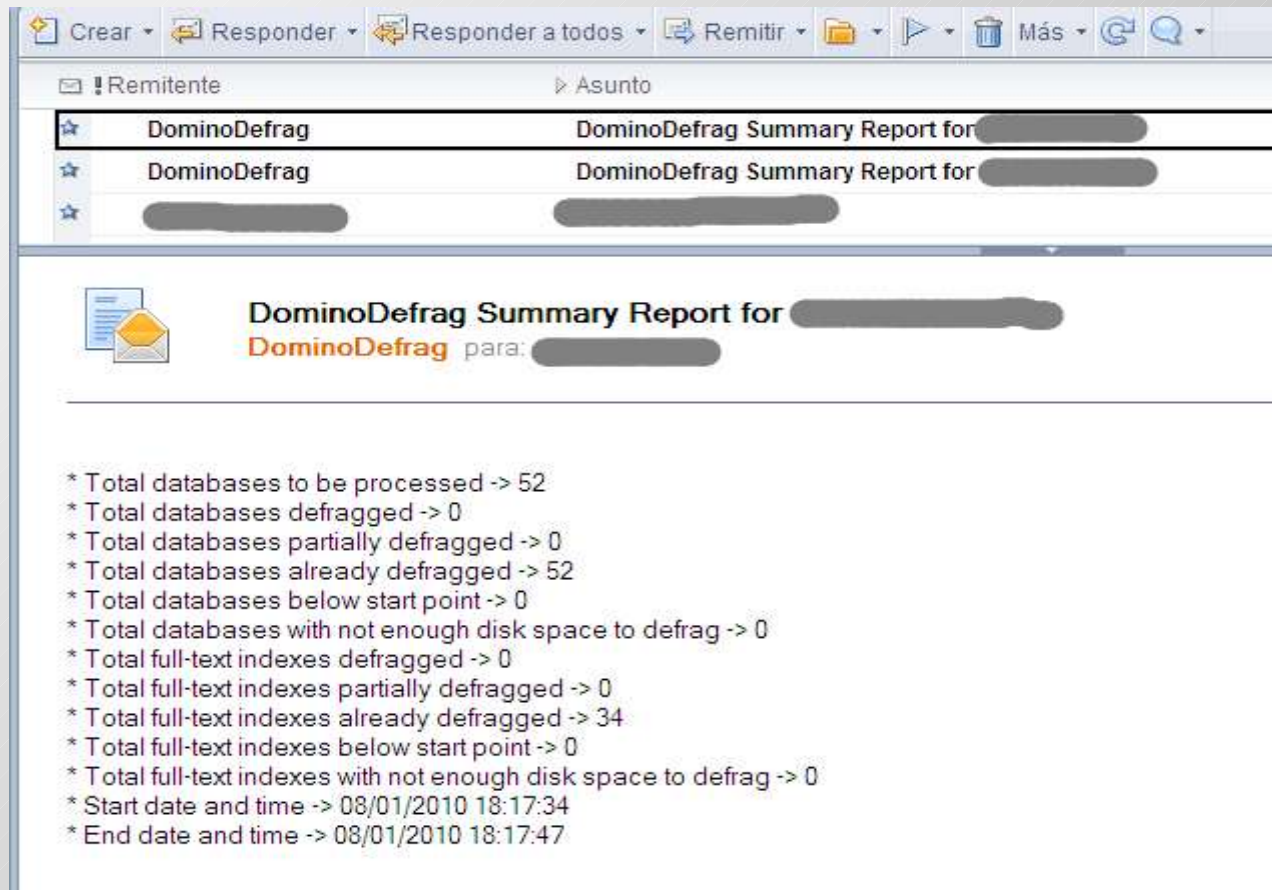
DominoDefrag

Executing over mail directory.

```
ccessed:      1  Documents Read:      0  Documents Written:      0
> load dominodefrag mail
13/05/2009 16:00:28  DominoDefrag: v1.4 (9 May 2009)
13/05/2009 16:00:28  DominoDefrag: Initializing...
13/05/2009 16:00:28  DominoDefrag: Running on Windows 5.2.3790.Service Pack 2
13/05/2009 16:00:28  DominoDefrag: Using contig.exe version 1.55
13/05/2009 16:00:28  DominoDefrag: 32bit version running on 32bit platform
13/05/2009 16:00:28  DominoDefrag: Directory -> e:\lotus\domino\data\mail
13/05/2009 16:00:28  DominoDefrag: Process Full Text Index -> Off
13/05/2009 16:00:28  DominoDefrag: DominoDefrag_MinuteInterval parameter not fo
und. Task will only run once
13/05/2009 16:00:28  DominoDefrag: MinuteInterval -> 0
13/05/2009 16:00:28  DominoDefrag: Initialization complete
13/05/2009 16:00:29  DominoDefrag: mail\aalvarez.nsf Started Defrag
```

DominoDefrag

Report delivered to the administrator.



The screenshot shows an email client interface with a toolbar at the top containing icons for 'Crear', 'Responder', 'Responder a todos', 'Remitir', 'Más', and a search icon. Below the toolbar, there is a header section with 'Remitente' and 'Asunto'. The main content area displays a list of emails, with the selected one being a 'DominoDefrag Summary Report for [redacted]'. The report content is as follows:

- * Total databases to be processed -> 52
- * Total databases defragged -> 0
- * Total databases partially defragged -> 0
- * Total databases already defragged -> 52
- * Total databases below start point -> 0
- * Total databases with not enough disk space to defrag -> 0
- * Total full-text indexes defragged -> 0
- * Total full-text indexes partially defragged -> 0
- * Total full-text indexes already defragged -> 34
- * Total full-text indexes below start point -> 0
- * Total full-text indexes with not enough disk space to defrag -> 0
- * Start date and time -> 08/01/2010 18:17:34
- * End date and time -> 08/01/2010 18:17:47

DominoDefrag

Executing over external disks.

```

04 142 232) disconnected. 0 message[s] received
> load dominodefrag tlog.dir
08/01/2010 18:17:33 DominoDefrag: v2.1 (3 Dec 2009)
08/01/2010 18:17:34 DominoDefrag: Initializing...
08/01/2010 18:17:34 DominoDefrag: Running on Windows 5.2.3790.Service Pack 2
08/01/2010 18:17:34 DominoDefrag: Running on Domino 265
08/01/2010 18:17:34 DominoDefrag: Using contig.exe 1.55
08/01/2010 18:17:34 DominoDefrag: 32bit version running on 32bit platform
08/01/2010 18:17:34 DominoDefrag: Directory -> tlog.dir
08/01/2010 18:17:34 DominoDefrag: Process Full text Index -> On
08/01/2010 18:17:34 DominoDefrag: DominoDefrag_MinuteInterval parameter not fo
und. Task will only run once
08/01/2010 18:17:34 DominoDefrag: DominoDefrag_StartPoint not found. Defaultin
g to 2
08/01/2010 18:17:34 DominoDefrag: Verbose Logging -> Off
08/01/2010 18:17:34 DominoDefrag: Compact Database Before Defrag -> Off
08/01/2010 18:17:34 DominoDefrag: Summary Email Address ->
08/01/2010 18:17:34 DominoDefrag: Transaction Log -> Off
08/01/2010 18:17:34 DominoDefrag: DAOS -> Off
08/01/2010 18:17:34 DominoDefrag: Initialization complete
08/01/2010 18:17:34 SMTP Server: Message 005EFE20 (MessageID: ) received from
pppoe-9 size 1779 bytes
08/01/2010 18:17:34 SMTP Server: (95.1
) disconnected. 1 message[s] received
08/01/2010 18:17:35 DominoDefrag: tlog\mail\ .nsf Already Defragmented

```

DominoDefrag

Command "show tasks".

```
Database Server Finalizar la ejecución del supervisor
Database Server Procesar el supervisor
LDAP Server Providing service for [redacted]
DIIOF Server Providing service for [redacted] from [redacted]
.5
DominoDefrag Defragging san\mail\brovirad.nsf
DIIOF server Providing service for [redacted] from [redacted]
.5
LDAP Server Providing service for [redacted]
Admin Process Idle
```

Domino Defrag

"dominodefraq" reliability

*Executed daily on Domino servers in
production for over 7 months without
any issues.*

Domino Defrag

"dominodefraq" reliability

Some diagnoses were executed on the

Domino server to verify its

robustness.

Domino Defrag

Test 1

Stop the Domino server with `c:\lotus\domino\nsd -kill` while `dominodefraq` was running and `nsf` being defragged was checked.

Domino Defrag

Result test 1

Nsf undamaged and in perfect condition

Test passed (incredible, seeing is believing).

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Test 2

Stop the execution of "dominodefraq"
from the Windows Task Manager also
by "brute force".

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Result test 2

Error messages on the Domino console without any adverse effects. Test passed.

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Limitations

You cannot stop the task using the command "tell dominodefrag quit". You must always expect the completion of the task.

Domino Defrag

Abstract

Domino defrag is a great addition to improving performance and health of IBM Lotus Domino[®] servers.

Domino Defrag

The best vaccine for your Domino server on Windows!

What are you waiting for try it?

Domino Defrag

Recommended reading

- IBM technote 1229817 - "Slow
.....
response from a Domino server due to
.....
fragmentation of the data drive"

Domino Defrag

Recommended reading

- Lotus Notes and Domino wiki
article - "IBM Lotus Domino Server
performance: Hard disk
fragmentation"

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Recommended reading

- *The Weird World of Eknorri -*

"Database Defragmentation - Poor

Man's Solution"

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Recommended reading

- Adam Osborne's blog - "Busting the

Myth - how Compact-C fragments

databases"

Credits



<http://slug.es>

“Defragging IBM Lotus Domino[®] servers”

v. 1.2 English version

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Gracias

Gràcies

Eskerrik asko

Merci

Thank you

Dankeschön

Grazie

Gracia