D A O S

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BLUG, 30-Mar-2010, Brussels

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Who's that dude?

- Ulrich Krause, Germany

- Lotus Notes / Domino since 1993

- OpenNTF project chef !!HELP!!, TriggerHappy

- Developer

- Administrator

- German Notes Forum (http://www.atnotes.de)

- Blog http://www.eknori.de

The situation

- More and more storage is needed

- The average size of an application increases

- Duplicate attachments (n times)

- Duration of standard tasks increases

- Backup needs more and more time

- Network traffic increases

- I / O and performance issues

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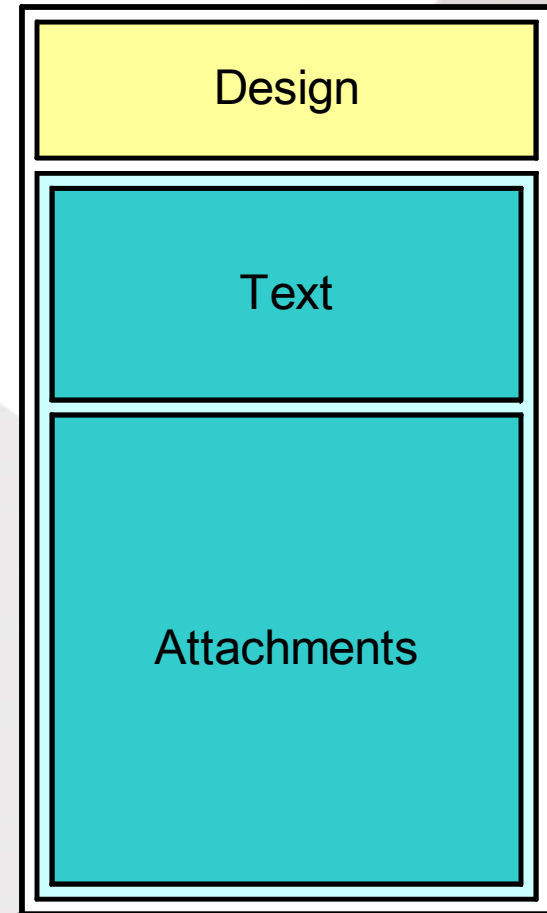Belux Lotus User Group

The aim

- Leverage existing storage

- Reduce size of applications

- Avoid attachment redundancies

- Speed-up standard tasks

- Reduce backup time

- Reduce network traffic

- Reduce disc I / O

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Application model (simplified)

- Design

- Documents

  - Text

  - Attachments
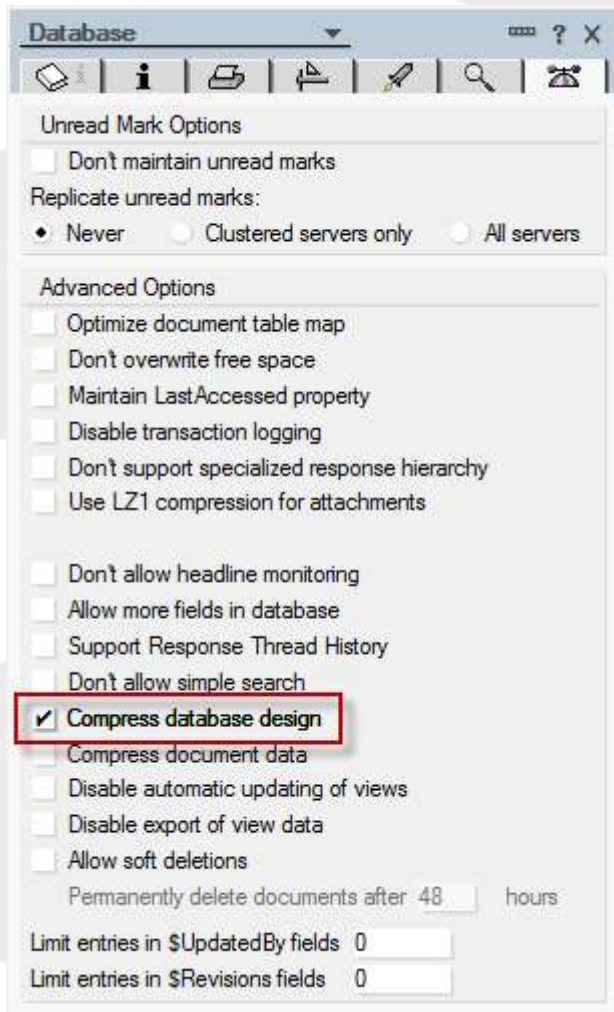
  - Embedded objects

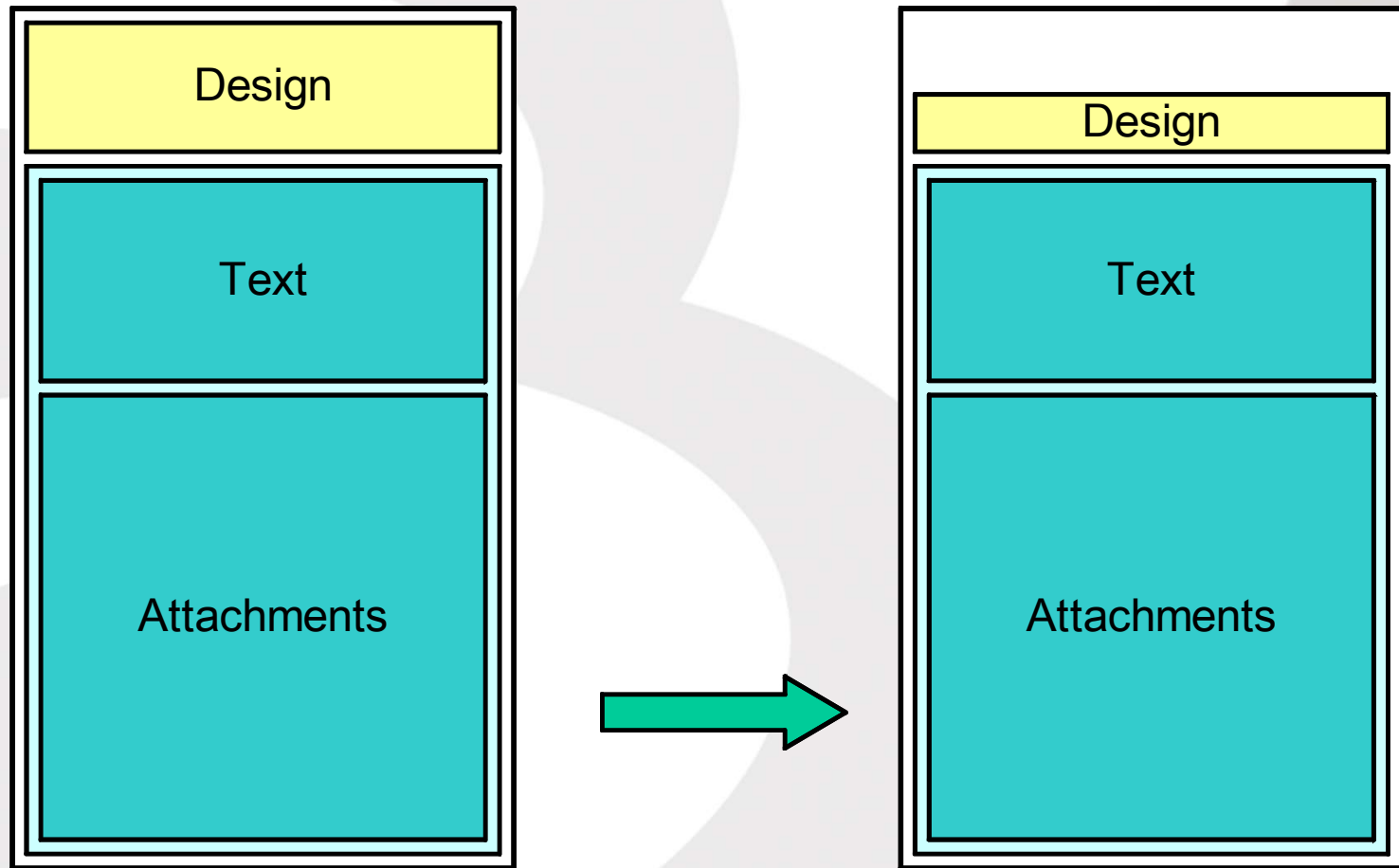| Design |
|--------|
| Text |
| Attachments |

Design Note Compression

Design Note Compression

- New feature as of Domino 8

- Needs ODS 48 or above

  - Create_R8_Databases=1

  - or Create_R85_Databases=1

  - load compact -c
  - load compact -c –n

- Reduces size of design by 30 – 50 %
  - IBM says: 55 – 60 %

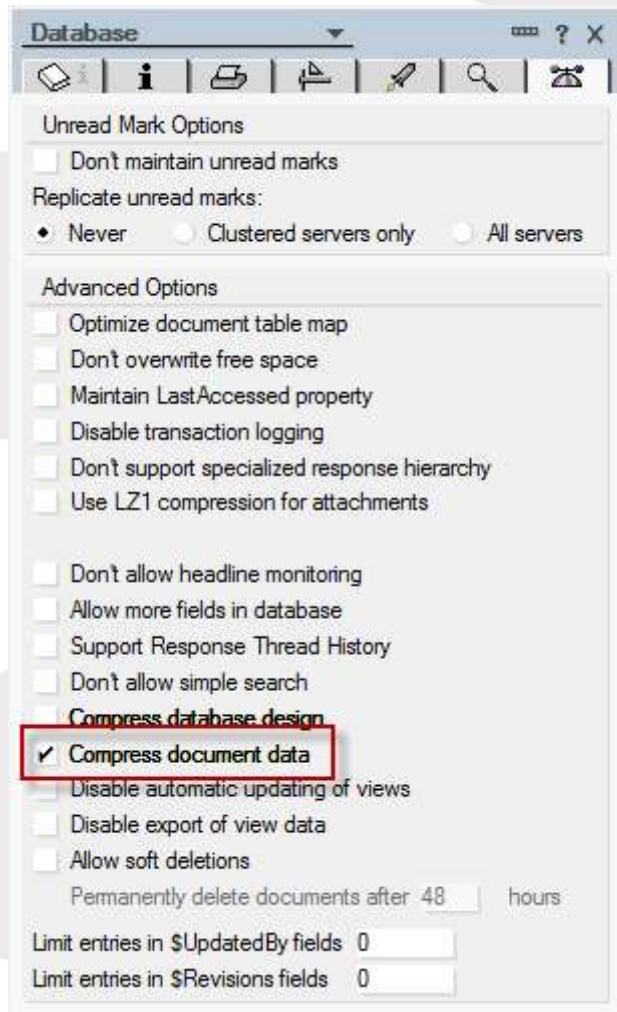- Reduces disc I / O

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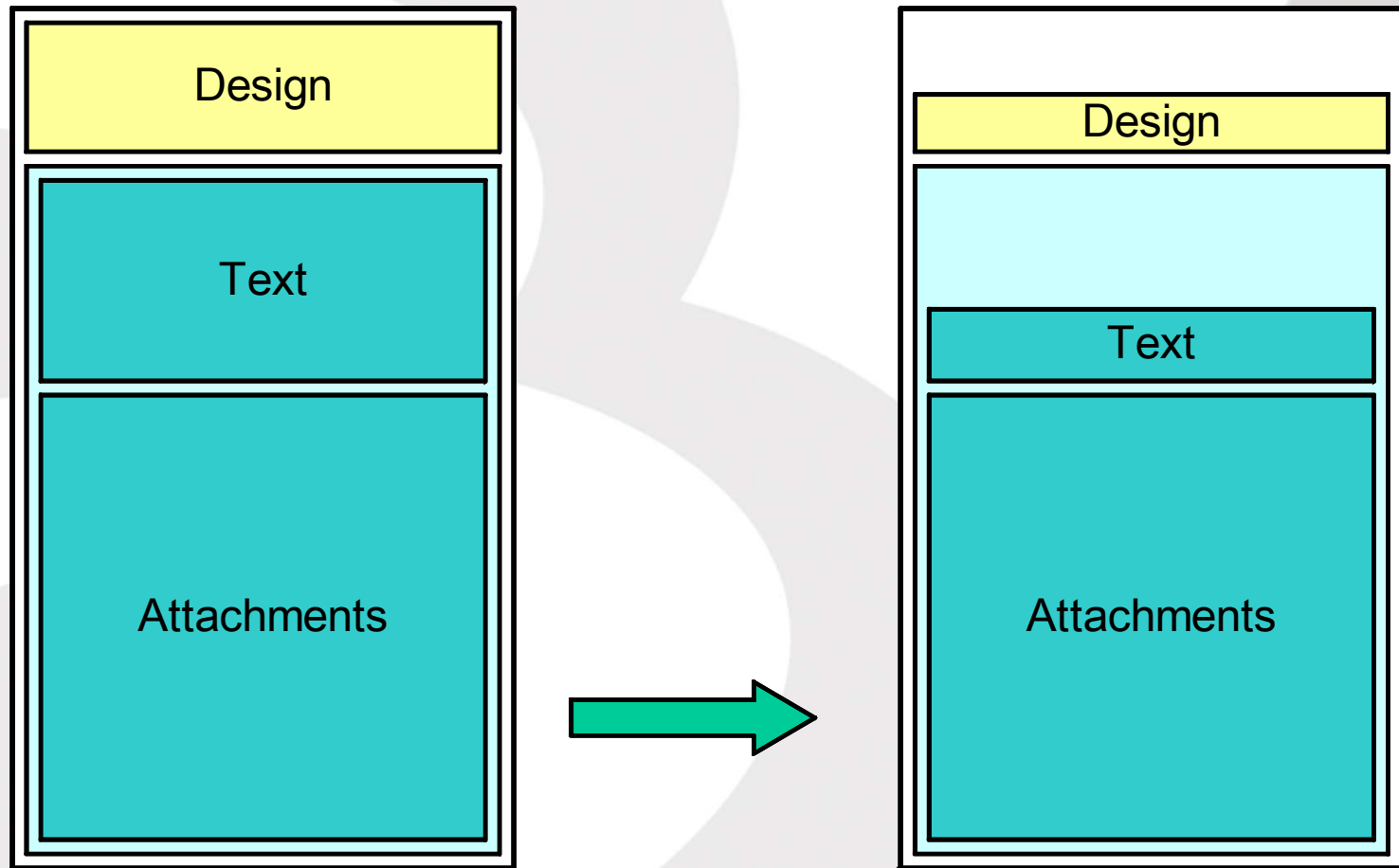# Design Note Compression

Document Body Compression

Document Body Compression

- New feature as of Domino 8.0.1

- Reduces Rich Text up to 60%

- Needs ODS 48 or above

  - load compact -c –v

- Check „Compress document data"

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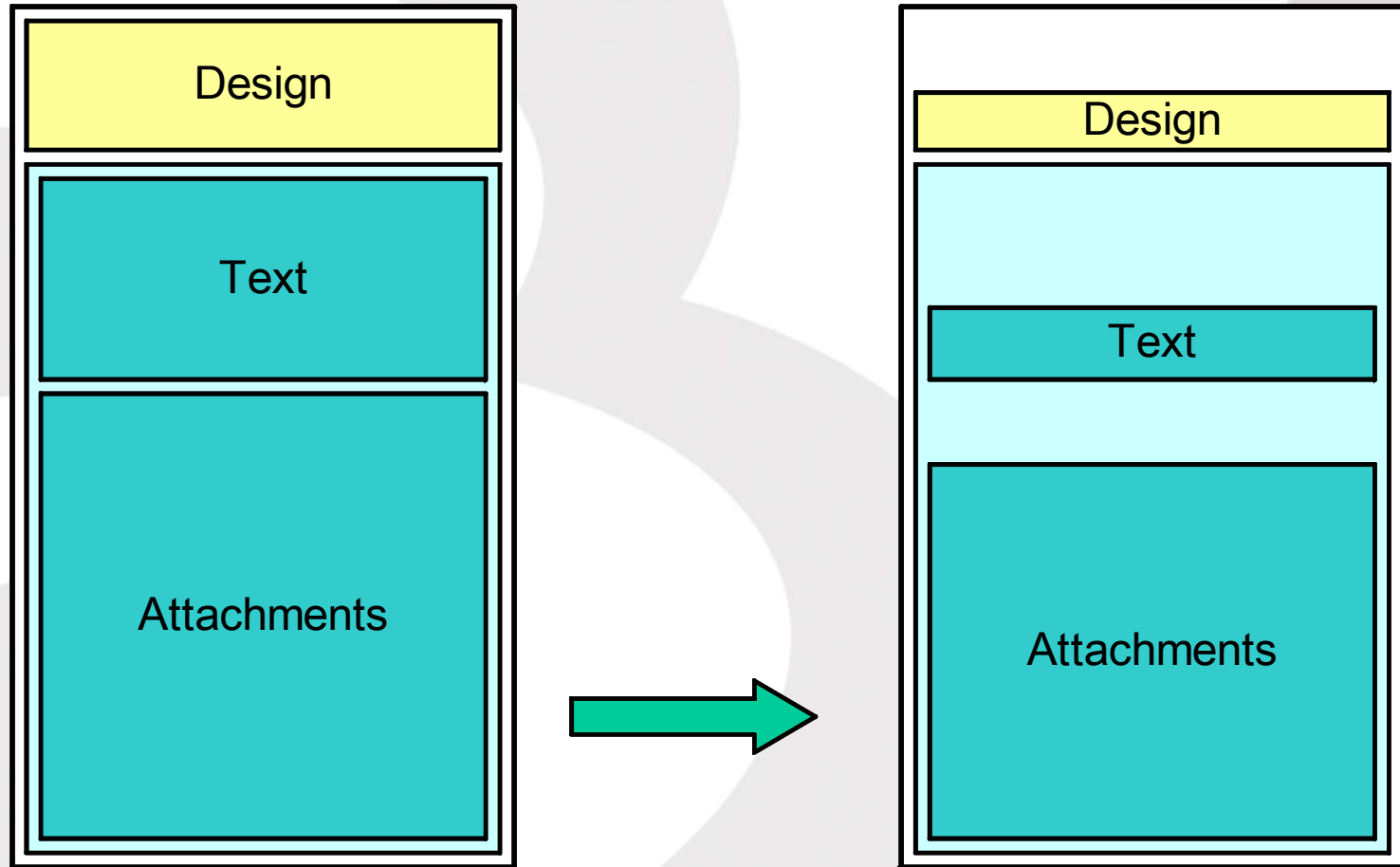# Document Body Compression

LZ1 Attachment Compression

LZ1 Attachment Compression

- As of release 6

- Replaces Huffmann algorithm

- NOT active when creating a new database.

- Recompress using

  - load compact -c –ZU

- Can cause problems with JAVA applets

  -
  DEBUG_ENABLE_LZ1_HOST_TYPES= 0

  - fixed in 8.5.1

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LZ1 Attachment Compression

DAOS Estimator

DAOS Estimator

- Free tool to plan your DAOS rollout

```
IBM Lotus Domino Attachment and Object Service Estimator, Version 1.4
Copyright (c) IBM 2008.  All rights reserved.

Database Name Orig NSF New NSF  Num    Dup    DAOS   Compr    Space    DAOS Ob
              Size     Size     Files  Files  Files  Size     Savings  Size
============= ======== ======== ====== ====== ====== ======== ======== =========
db\db1.nsf     1.4 MB   1.4 MB    0      0      0     0.0 KB   0.0 KB   0.0 KB
db\db2.nsf     1.4 MB   1.4 MB    0      0      0     0.0 KB   0.0 KB   0.0 KB

Summary:
     Total DB's analyzed:                           2
     Total DB's skipped due to errors:              0
     Total Size of NSF's Examined:                  2.8 MB
     Total Attachments found:                       0
     Total Duplicate Attachments found:             0
     Estimated Size of DAOSified NSF's:             2.8 MB
     Estimate Size of DAOS dir:                     0.0 KB
     Total Disk Savings:                            0.0 KB
     Compression Statistics:
       None:                                        0
       Huffman:                                     0
       LZ1:                                         0
       Huffman on LZ1 servers:                      0
01.08.2009 10:01:20   DAOSEST: DAOS Estimator shutdown
```

- Download: http://www-01.ibm.com/support/docview.wss?rs=463&uid=swg24021920

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DAOS Estimator (notes.ini)

- DAOS Estimator by default has a large gap in attachment size evaluation between 64k and 1 MB

- DAOSEST_BUCKETS=16,64,128,256,512,768,1024,2048,3072,4096

- The above line sets to:
- 16K, 64K, 128K, 256K, 512K, 768K, 1MB, 2MB, 3MB and 4MB

- Source: Lotus Software Knowledge Base

  - http://www-01.ibm.com/support/docview.wss?rs=0&q1=1418102&uid=swg21418102

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LZ1 != HUFFMAN

```
============== ======== ======== ====== ====== ====== ======== ========= ========
db\db1.nsf      17.5 MB   1.0 MB       1      0      1  16.5 MB    0.0 KB  16.5 MB
db\db2.nsf      17.5 MB 1020.0 K       1      0      1  16.5 MB    0.0 KB  16.5 MB

Summary:
     Total DB's analyzed:                          2
     Total DB's skipped due to errors:             0
     Total Size of NSF's Examined:              35.0 MB
     Total Attachments found:                      2
     Total Duplicate Attachments found:            0
     Estimated Size of DAOSified NSF's:          2.0 MB
     Estimate Size of DAOS dir:                 33.0 MB
     Total Disk Savings:                         0.0 KB
     Compression Statistics:
       None:                                       0
       Huffman:                                    1
       LZ1:                                        1
       Huffman on LZ1 servers:
```

- Db1 – LZ1 enabled
- Db2 – LZ1 disabled

- DAOS creates 2 .NLO Files !!

```
============== ======== ======== ====== ====== ====== ======== =
db\db1.nsf      17.5 MB   1.0 MB       1      0      1  16.5 MB
db\db2.nsf      17.4 MB 1002.0 K       1      0      1  16.5 MB

Summary:
     Total DB's analyzed:                          2
     Total DB's skipped due to errors:             0
     Total Size of NSF's Examined:              34.9 MB
     Total Attachments found:                      2
     Total Duplicate Attachments found:            1
     Estimated Size of DAOSified NSF's:          2.0 MB
     Estimate Size of DAOS dir:                 16.5 MB
     Total Disk Savings:                        16.5 MB
     Compression Statistics:
       None:                                       0
       Huffman:                                    0
       LZ1:                                        2
       Huffman on LZ1 servers:                     0
```
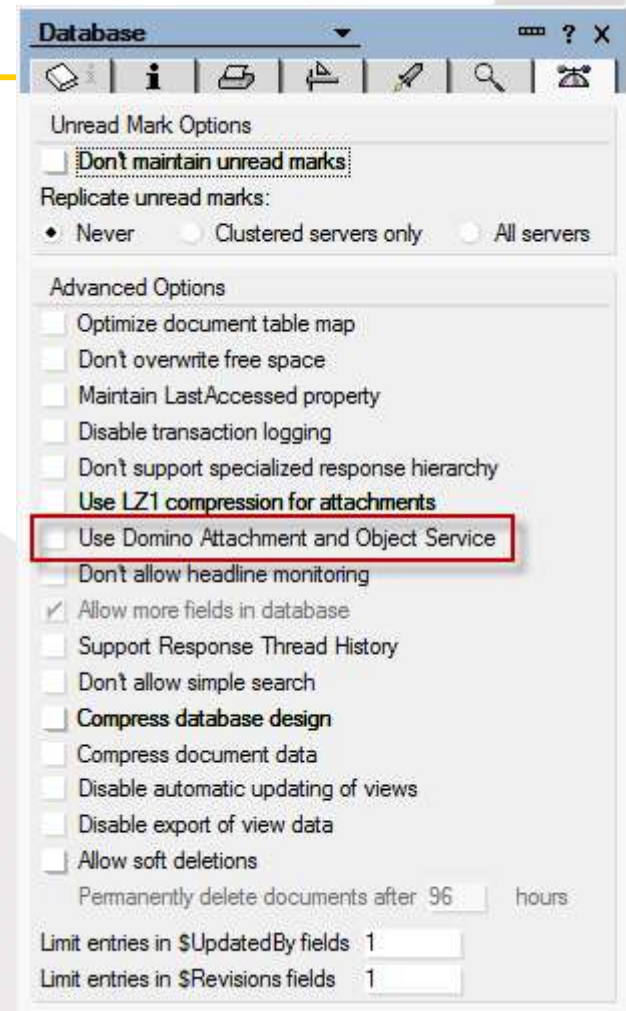
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DAOS

D A O S

- Domino Attachment Object Service

- Attachments are no longer stored in application

- Attachments are stored as NLO (Notes Large Object)

- Document contains only a ticket

- Separates static and dynamic data

- Only one copy of a bit-like attachment

- Transparent to users and 3rd-Party Products

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Prerequisites

- Domino 8.5 (ODS 51)

- SHARED MAIL OFF

- Transaction protocol

- Create DAOS Repository

- Activate DAOS on server

- Activate DAOS on application

Database ▾ ▭ ? X

| Unread Mark Options |
| Don't maintain unread marks |

Replicate unread marks:
- Never ○ Clustered servers only ○ All servers

Advanced Options
- Optimize document table map
- Don't overwrite free space
- Maintain LastAccessed property
- Disable transaction logging
- Don't support specialized response hierarchy
- **Use LZ1 compression for attachments**
- Use Domino Attachment and Object Service
- Don't allow headline monitoring
- ✓ Allow more fields in database
- Support Response Thread History
- Don't allow simple search
- Compress database design
- Compress document data
- Disable automatic updating of views
- Disable export of view data
- Allow soft deletions
- Permanently delete documents after 96 hours

Limit entries in $UpdatedBy fields 1
Limit entries in $Revisions fields 1

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Switch OFF Shared Mail

- Serverdocument – Shared Mail

- Field Shared Mail = None

- „Load object unlink shared.nsf"

> **Warning**
>
> To store new attachments in DAOS, you must enable Transaction Logging and set Shared Mail to None and save. With current settings, DAOS will not be used to store attachments for Notes databases linked to Shared Mail (SCOS) but can continue to retrieve existing attachments from the DAOS repository for those databases. To use DAOS with any database currently using Shared Mail, unlink the database using the server command 'object unlink <database>' command.
>
> OK

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Transaction Protocol

- Server document – Transactional Logging

- Required for DAOS – no discussion!!

- Use separate disk drive.

- Create log file folder

- Choose method

    - Circular
        - 4GB limit
    - Archive
        - No limit, backup will delete logs
    - Linear
        - Like circular, NO size limit

- CREATE_R85_LOGS=1

- Restart server

Basics	
Transactional logging:	Enabled
Log path:	logdir
Logging style:	Circular
Use all available space on log device:	○ Yes ● No
Maximum log space:	500 MB
Automatic fixup of corrupt databases:	Enabled
Runtime/Restart performance:	Standard

Quotas	
Quota enforcement:	Check file size when extending the file

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DAOS – Repository

- Use separate disk drive

- Can be SAN, NAS

- Each server has it's own repository

  - .NLO are encrypted with server.id
    - DAOS_ENCRYPT_NLO=0

  - Max. 1.000 subdirectories
  - Max 40.000 .NLO / subdirectory
  - = 40.000.000 .NLOs
  - Daos.cfg (in Domino Data Directory)
  - Daoscat.nsf

- Include repository in backup!!

Name ▲	Größe	Typ
3D6B1722A2E2C68B8860FC4A56073...	819 KB	NLO-Datei
3D7024DC88FBB63938F94BB08A700...	15 KB	NLO-Datei
3DB3AF5E81660D30AD4917D5EB564...	1.430 KB	NLO-Datei
3DCECA079AF6B18C8D6DE85C21BD...	5 KB	NLO-Datei
3DED9335E23CE68FDE38D31A6ECE1...	34 KB	NLO-Datei
03E25B70C155352AB54AECC180239...	376 KB	NLO-Datei
3ED40032A1B65C127B3B0386F43FC...	263 KB	NLO-Datei
3F0EC0B57632B9C7AB4C930AACE56...	10 KB	NLO-Datei
3F07E4DA3B2E0D9652ED908E58AA6...	6.613 KB	NLO-Datei
3F78BBF8678DA5EC58DC1083C2C33...	102 KB	NLO-Datei
3F01883873EED7EEC2438027E57877...	69 KB	NLO-Datei

Address E:\DAOS

Name ▲	S.	Type
0001		File Folder
0002		File Folder
0003		File Folder
0004		File Folder
0005		File Folder
0006		File Folder
0007		File Folder
0008		File Folder
0009		File Folder
0010		File Folder
0011		File Folder
0012		File Folder

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Activate DAOS on server

- Serverdocument – DAOS

- Minimum size of an object
  - DEFAULT 4kB, recommended 64kB (= DEFAULT in 8.5.1)
  - Evaluate with DAOS Estimator

- DAOS base path

DAOS Settings

Store file attachments in DAOS:	Enabled
Minimum size of object before Domino will store in DAOS:	4096
DAOS base path:	DAOS
Defer object deletion for:	0 days

- Delete objects in repositora
  - Depends on backup strategy
  - 0 Days = immediate delete after the refcount = 0

  - from console: TELL DAOSMGR PRUNE 0

- Restart server
  - show server

```
Waiting Tasks:              0
DAOS:                       Enabled
Transactional Logging:      Enabled
Fault Recovery:             Not Enabled
Activity Logging:           Not Enabled
```

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Activate DAOS on database

- Application properties – „propeller hat"

- Use Admin client for multiple applications

- Valid for new attachments only!

- Server console

  - Load compact –c –DAOS ON <Path\NSFs>

Database

Unread Mark Options
- [ ] Don't maintain unread marks
Replicate unread marks:
- (•) Never   ( ) Clustered servers only   ( ) All servers

Advanced Options
- [ ] Optimize document table map
- [ ] Don't overwrite free space
- [ ] Maintain LastAccessed property
- [ ] Disable transaction logging
- [ ] Don't support specialized response hierarchy
- [ ] **Use LZ1 compression for attachments**
- [ ] Use Domino Attachment and Object Service
- [ ] Don't allow headline monitoring
- [✓] Allow more fields in database
- [ ] Support Response Thread History
- [ ] Don't allow simple search
- [ ] **Compress database design**
- [ ] Compress document data
- [ ] Disable automatic updating of views
- [ ] Disable export of view data
- [ ] Allow soft deletions
  - Permanently delete documents after 96 hours
- Limit entries in $UpdatedBy fields 1
- Limit entries in $Revisions fields 1

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BUG Alert !!

- load compact -c –DAOS ON mail enables DAOS on ALL applications – not only on those in mail subdirectory !!

- Lotus Software Knowledge Base #1410926

- SPR AHOE7XHM9J

The Result
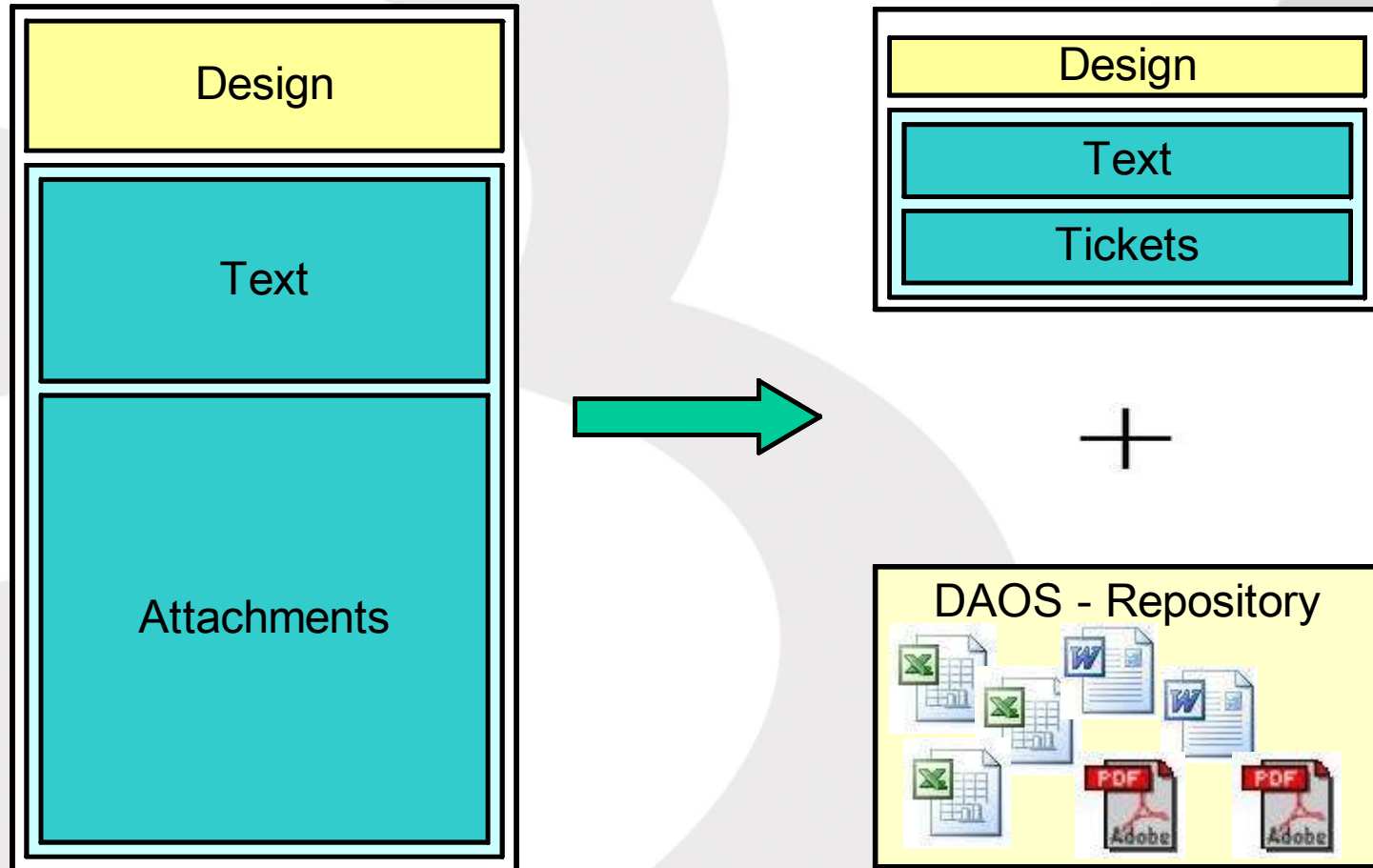
Transaction Protocol Trap

- load compact –c –DAOS ON

- NO attachment in DAOS repository

- tell daosmgr dbsummary → count = 0

```
>
> tell daosmgr dbsummary
DAOSMGR: Status DBSUMMARY started
DAOSMGR: List cataloged DAOS databases
Database Name                                    Count

C:\Programme\IBM\Lotus\Domino\data\db\db1.nsf      0
...\Programme\IBM\Lotus\Domino\data\mail\duser.nsf 0
```

Database

Unread Mark Options
- ☐ Don't maintain unread marks

Replicate unread marks:
- ● Never   ○ Clustered servers only   ○ All servers

Advanced Options
- ☐ Optimize document table map
- ☐ Don't overwrite free space
- ☐ Maintain LastAccessed property
- ☐ Disable transaction logging
- ☐ Don't support specialized response hierarchy
- ☐ Use LZ1 compression for attachments
- ☐ Use Domino Attachment and Object Service
- ☐ Don't allow headline monitoring
- ☑ Allow more fields in database
- ☐ Support Response Thread History
- ☐ Don't allow simple search
- ☐ Compress database design
- ☐ Compress document data
- ☐ Disable automatic updating of views
- ☐ Disable export of view data
- ☐ Allow soft deletions
-   Permanently delete documents after 96   hours

Limit entries in $UpdatedBy fields 1
Limit entries in $Revisions fields 1

DAOS and replication

- DAOS is a server feature!

- On a client replica, all attachments are stored in the application.

- Replicas on a NON-DAOS server store attachments in the application

- Each server in a cluster has it's own DAOS repository.

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DAOS and replication (cont.)

- Client → Server (8.5.1)
  - „known" attachments are no longer transferred to server
  - = „smart replication"

  - Forward mail
  - Reply with history

- Server → Server (8.5.1)
  - "known" attachments are no longer replicated to target server

- 8 new statistics

  - show stat DAOS

```
DAOS.Engine.Catalog = Synchronized
DAOS.Engine.Encryption = Disabled
DAOS.Engine.Status = Enabled
DAOS.Object.Attach_DAOSCreate = 1
DAOS.Object.Attach_DAOSOptimizedCreateLocal = 0
DAOS.Object.Attach_DAOSOptimizedCreateRemote = 2
DAOS.Object.Attach_NSFCreate = 0
DAOS.Object.Attach_TotalCreated = 3
DAOS.Object.Delete = 0
DAOS.Object.OptimizedCreateLocalSavingsMB = 0
DAOS.Object.OptimizedCreateRemoteSavingsMB = 491
11 statistics found
```

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DAOS and replication (cont.)

- Domino 8.5

- Domino 8.5.1

- WARNING!!: ADMINP_ACCELERATED_REPLICA_OVERRIDE=4 !!

DAOS and replication (last slide ☺)

DAOS and mail.box

- Remove RM_NO_LOG_OBJECTS_IN_MAILBOX from notes.ini.

- Enable DAOS on all mail.box files

- Enable DAOS on all mail files

- Increases performance

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DAOS and Encryption

- Increases number of NLO files!

- UserA writes an encrypted mail with attachment to User B
- User B writes an encrypted mail with same attachment to User A

- Results in 4 NLO Files in repository

- Does not save space but separates static from dynamic data

Name ▲	Größe	Typ
43A626D5E3098BA3A00DA086598A8641F5114ED100006468.nlo	26 KB	NLO-Datei
BE76F0855DD2094BC4977A680D2D4B814F79EC4900006468.nlo	26 KB	NLO-Datei
752A31BABDA94F7BF01E333FAD5519193064B49700006468.nlo	26 KB	NLO-Datei
F88F84B722FBDCF49F35576356304558538F3AFE00006468.nlo	26 KB	NLO-Datei

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DAOS and Quota

- Technote: 1405456

- Depends on the quota enforcement setting that is in place

- Check space used in file when adding a note

    - Acts on the physical size of the application (without attachments)
    - Possibly a problem when switching DAOS off!!

- Check file size when extending the file
- Check file size when adding a note

    - Both acts on the logical size of the application (with attachments)

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Keep daoscat syncronized

- DON'T use DDM !!

- Use program document

- Tell daosmgr resync

- SPR# DROO7ZNPZ8 - Added a new DAOSMGR resync switch to perform a quick resync. This new switch updates the DIT and DOI but does not run through the applications or updates the NLO refcounts. (8.5.1 IF1)

Program: nserver

Basics | Administration

Basics

Program name:	nserver
Command line:	-c "tell daosmgr resync"
Server to run on:	COMM3/RIKU/de
Comments:	

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DAOS OFF

- What happens when I disable / switch OFF DAOS?

- in application properties

  - No documents with attachments in the application

  - Application has documents with attachments
    - Status in Admin Client changes to „Read Only"

    DAOS-Status ◇
    Schreibgeschützt

    - DAOS still works for already stored attachments but no new attachments are written to the repository for the specific application.

- in server document
  - Same as 1

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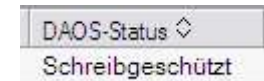
DAOS and missing .NLO

- NLO has been deleted on the OS level

- TELL DAOSMGR LISTNLO MISSING <application.nsf>
  - Output to <datadir> by default

DAOS and missing application

- NSF has been deleted on the OS level

- Message on server startup

  - Informational - The DAOS catalog is not synchronized. Deletions will be postponed. Please run 'tell daosmgr resync' at the next convenient opportunity to re-synchronize.

- Has the application been deleted by accident?

  - NO
    - TELL DAOSMGR RESYNC oder RESYNC FORCE

  - YES
    - Restore from backup
    - Create a new replica from a cluster mate

- Same behaviour when moving an application (on OS level)

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Another 50% ??

- Can cluster members share ONE DAOS repository?

  - DEFAULT: NO !!!

  - Experimental: YES, it is possible, BUT …
    - DON'T do this in a productive environment

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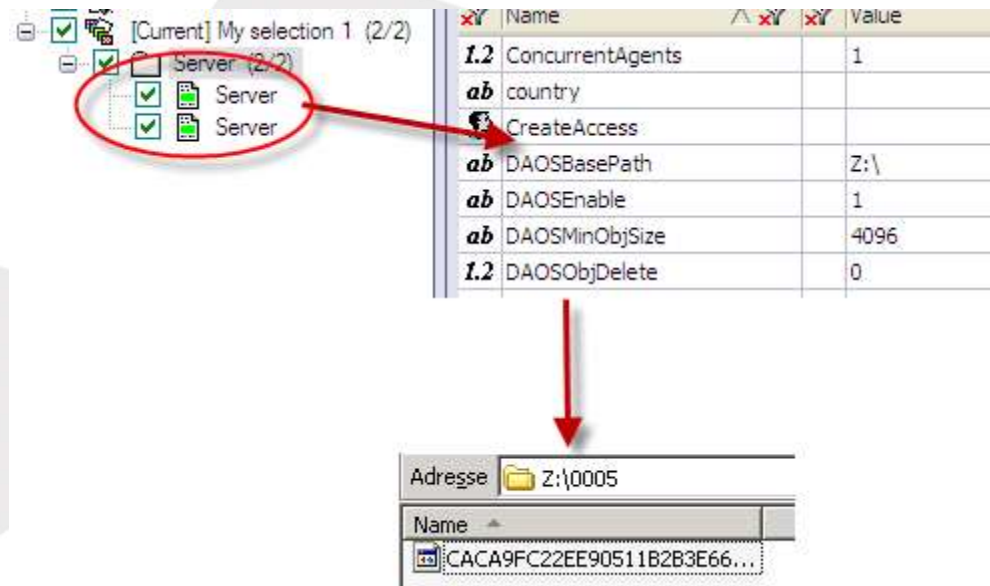
DAOS and Nagios
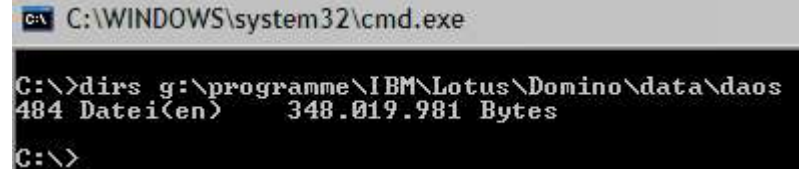
- Catalog.Status
- Repository.Size

- Plugin

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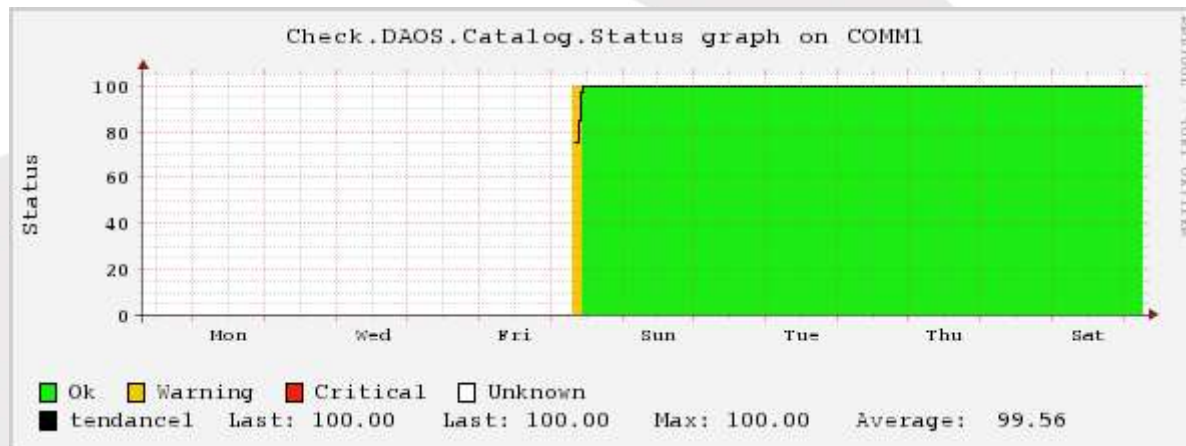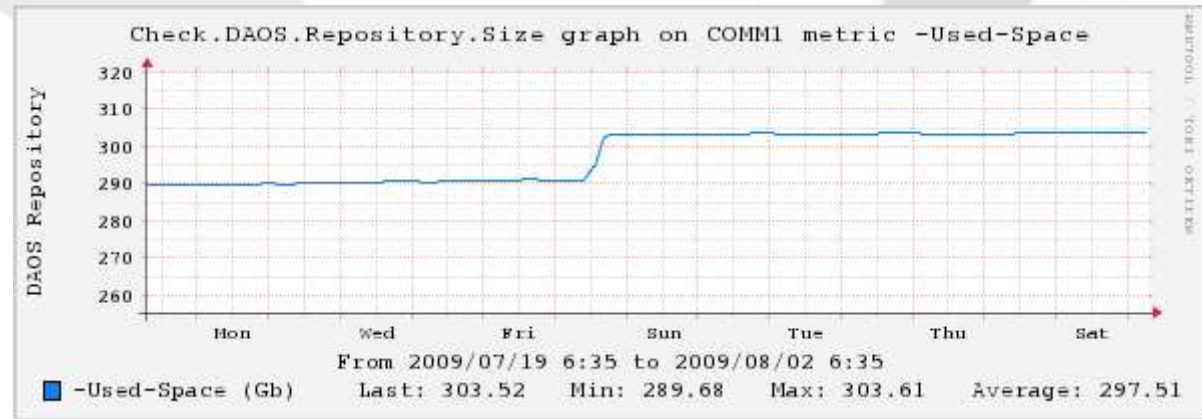
Statistics

Windows:

```
@echo off
setlocal
for /f "tokens=*" %%a in ('dir/w/s %1 ^|findstr "Datei(en)"') do (
set info=%%a
)
echo %info%
```



```
C:\WINDOWS\system32\cmd.exe

C:\>dirs g:\programme\IBM\Lotus\Domino\data\daos
484 Datei(en)     348.019.981 Bytes

C:\>
```

Linux:

```
#!/bin/sh
REPOSITORY=/local/daos
OUTFILE=/local/daos.txt
fCount=`find $REPOSITORY -type f | wc -l`
fSize=`du -ksb $REPOSITORY`
IFS="/"
array=($fSize)
fDate=$(date +"%d-%m-%Y")
echo $fDate / $fCount / ${array[0]}>> $OUTFILE
```



```
comm3:/etc/init.d # cat /local/daos.txt
12-03-2010 / 26235 / 18743907789
13-03-2010 / 31540 / 23090378662
comm3:/etc/init.d #
```

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DAOS and daos.cfg

- Contains information on file count and file size of .NLO files
- Created on server startup when it has been deleted
- Updated on server shutdown
- Do not backup or restore!!

DAOS and daoscat.nsf

- Contains index and refcount of NLO

- Contains index of all applications using DAOS

- Does NOT contain any view

- Re-Created on re-sync

- Created on server startup when it has been deleted

- Do not backup or restore!!

DAOS and Admin client

- **New columns regarding DAOS**

  - Logical size
  - Physical size
  - DAOS status
  - DAOS count
  - DAOS size

	Titel ◇		Logische Größe ◇	Physische Größe ◇			DAOS-Status ◇	DAOS-Anzahl ◇	DAOS-Größe ◇
🔷	DB1	ı	1.177.940	1.142.784	ı) ı	Schreibgeschützt	1	35.156 (03%)
🔷	DB2	ı	18.284.544	18.284.544	ı) ı	Entfällt	0	0

- **New columns regarding compression**

Gestaltungskomprimi ◇	Datenkomprimierung ◇	LZ1-Komprimierung ◇
Ja	Ja	Ja
Ja	Ja	Ja

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Backup & Restore

- No change in backing up NSF files.

- Additional backup job for NLO files

- NLO files do not require any special agent for backup

- IMPORTANT: the backup sequence

  - server is up during backup

    - NSF before NLO

  - server is down during backup

    - it's your choice ☺

- IBM Technote # 1358548 - DAOS Backup and Restore

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Resources

DAOS Wiki
http://www-10.lotus.com/ldd/dominowiki.nsf/archive?
openview&title=DAOS&type=cat&cat=null&tag=DAOS

DAOS Backup and Restore
http://www-10.lotus.com/ldd/dominowiki.nsf/dx/daosbackup-and-restore

DAOS Estimator
http://www.ibm.com/support/docview.wss?rs=463&uid=swg24021920

DAOS Technical Overview
http://www.nelotus.org/A55CBA/nelotus.nsf/87fde291d7608ada852564c9006eeba5/
b6523e7f4b15585b862575b5004d3488/$FILE/DAOSTechnicalOverview_NELotus.pdf

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Question and Answers

Contact me at:
ulrich.krause@eknori.de

Thank you
dank u wel
merci
Danke

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