Discover in a 30 minutes journey, a real migration adventure from paleolithic IT with utopian backups to an up to date system where backups are free and 100% reliable.

No big theory, learn what was the challenge, how actions take place ...

What to do when reality strike back.

Suspense in heterogeneous world.

Customer Context

Active as civil engineer & cadastral surveyor

(Vermessung)

25 people

Primary language Swiss German

Conservative attitude tradition

If you missed what's happened last decade...

2003

Windows Server 2000 (pdc_lua) as main central server, replacing Netware 3.11

2005

HP-UX on new hardware
Windows 2003 Storage server (lua_nas) with Symantec BackupExec rolls the backups.

2006

Additional Windows 2003 server (dl360) with Oracle 10 for Autodesk Topobase added.

2007

Ioda-Net first mission : 15 new computers installed by cloning method.

2008

Lack of space spread data over all servers.

2009

The 2000 & others are migrated as ESX virtual machines on new Transtec Calleos.

2010

The last P4 are finally replaced.

2012

A migration is more than needed. But it's still delayed.

Backup Situation

Symantec BackupExec 8

Celeron 1.3Ghz, Raid-5 of IDE drive windows 2003 storage server.

50% of backups are run manually.

What's saved is an over complicated directories and files inclusion exclusion selection

Backup Situation

No way to backup everything on one media.

Mix'up of internal & external medias types (usb disk, lto3)

Warnings of unsaved files are the norm.

THE MISSION

Create new ip network
Consolidate 4 servers
Replace the 28 workstations

Migrate 1.6TB of data
Move non replaced systems

EASY CARD 1

Active Directory will be rebuilt from scratch

Easy Card 2

New directories & shares layout

EASY CARD 3

None of the old backups have to be migrated

LESS EASY CARD 1

Keep old env production system safe from any
danger until the last minute

Less Easy Card 2

Backup the new & old environment at the same time

Backup the HP-UX without a native client

Less Easy Card 3

Migrate all data with file date attribute

Less Easy Card 4

Recycle quickly old ESX Calleos to beefy bareos
backup server

You've gotta

4

days

time-frame

Backup **the old environment?**

(XP, Windows2003 ,openSUSE ,Windows 2000)

Backup **the new environment?**

(Win7, Windows 2012 ,openSUSE ,Windows 2008)

=

openSUSE   bareos

Installation

win-bareos-x.y.z.msi

run, next, next, copy configuration, done!

Backups & Restores

Strategy : until Migration

Full Sunday 3:00am - Incr Mon-Sat 11:00pm - Two weeks

rotations

One job, pool, media type, storage per server

Options Used

VSS snapshots = **ON**

acl xattrs = **ON**

accurate = **ON**

Bareos Clients – Old Environment

Installation

win-bareos-x.y.z.msi
run, next, next, copy configuration, done!

Almost! works on XP and 2003

Kaboom with dinosaur

Crash in unpresent function !

Windows 2000?

Use old bacula-fd 3.0.3a

Reminder

We only need basic informations from files & dir!

Options Used

compatible = **YES**

VSS = **NO**

Until
the

last

bit

Virtual ESX - XP with MDaemon - 25 users

First job

```
Job:                    mailserver.2013-05-13_22.02.13_15
Backup Level:           Full
Client:                 "mailserver-fd" 12.4.3 (15Apr13) Microsoft Windows XP Professional...
FileSet:                "mailserver" 2013-05-13 21:44:41
Pool:                   "mailserver" (From Job resource)
Catalog:                "MyCatalog" (From Pool resource)
Storage:                "mailserver" (From Job resource)
Scheduled time:         13-May-2013 22:02:11
Start time:             13-May-2013 22:02:22
End time:               14-May-2013 03:30:31
Elapsed time:           5 hours 28 mins 9 secs
Priority:               10
SD Files Written:       689,270
SD Bytes Written:       187,200,072,830 (187.2 GB)
Rate:                   9503.0 KB/s
Software Compression:   14.4 %
VSS:                    yes
Encryption:             no
Accurate:               yes
Volume name(s):         mailserver_0020
Volume Session Id:      4
Volume Session Time:    1368475187
Last Volume Bytes:      187,433,564,864 (187.4 GB)
Non-fatal FD errors:    3
SD Errors:              0
FD termination status:  OK
SD termination status:  OK
Termination:            Backup OK -- with warnings
```

FD Files Written: 689,270

FD Bytes Written: 187,120,185,140 (187.1...

MAILSERVER

```
Build OS:              x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                 541
Job:                   mailserver.2013-07-31_20.23.02_07
Backup Level:          Full
Client:                "mailserver-fd" 12.4.4 (12Jun13) Microsoft Windows XP Professional ...
FileSet:               "mailserver" 2013-05-13 21:44:41
Pool:                  "mailserver" (From Job resource)
Catalog:               "MyCatalog" (From Pool resource)
Storage:               "mailserver" (From Job resource)
Scheduled time:        31-Jul-2013 20:19:14
Start time:            31-Jul-2013 20:23:14
End time:              01-Aug-2013 00:56:49
Elapsed time:          4 hours 33 mins 35 secs
Priority:              10
FD Files Written:      427,508
SD Files Written:      427,508
FD Bytes Written:      202,394,607,305 (202.3 GB)
SD Bytes Written:      202,485,840,074 (202.4 GB)
Rate:                  12329.9 KB/s
Software Compression:  None
VSS:                   yes
Encryption:            no
Accurate:              yes
Volume name(s):        mailserver_final20130831
Volume Session Id:     4
Volume Session Time:   1375291817
Last Volume Bytes:     202,650,191,049 (202.6 GB)
Non-fatal FD errors:   0
SD Errors:             0
FD termination status: OK
SD termination status: OK
Termination:           Backup OK
```

Fixes

7z the five years old backup accounts.

Gain speed lzo compression = OFF

Fix any warnings left.

Win 50% of files to be saved,
1 hour of running job.

Bare Metal - 2003 & Oracle 10g

First job

```
Build OS:              x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                 85
Job:                   dl360.2013-05-24_21.00.00_06
Backup Level:          Full (upgraded from Incremental)
Client:                "dl360-fd" 12.4.3 (15Apr13) Microsoft Windows Home ServerStandard...
FileSet:               "dl360" 2013-05-22 22:30:32
Pool:                  "dl360" (From Job resource)
Catalog:               "MyCatalog" (From Pool resource)
Storage:               "dl360" (From Job resource)
Scheduled time:        24-May-2013 21:00:00
Start Time:            24-May-2013 21:00:17
End time:              24-May-2013 21:28:36
Elapsed time:          28 mins 19 secs
Priority:              10
FD Files Written:      118,207
SD Files Written:      118,207
FD Bytes Written:      13,886,373,261 (13.88 GB)
SD Bytes Written:      13,908,733,359 (13.90 GB)
Rate:                  8173.3 KB/s
Software Compression:  50.1 %
VSS:                   yes
Encryption:            no
Accurate:              yes
Volume name(s):        dl360_0040
Volume Session Id:     3
Volume Session Time:   1369414272
Last Volume Bytes:     13,926,429,069 (13.92 GB)

Non-fatal FD errors:                    104

SD Errors:             0
FD termination status: OK
SD termination status: OK
```

DL360

Bare Metal - 2003 & Oracle 10g

Warnings : who cares ?

```
24-May 21:22 dl360-fd JobId 65:
        Error: Read error on file B:/OracleDB/Fulldumps/TopobaseDBFullORCL.dmp.
        ERR=Falscher Parameter.
```

This is the daily full dump we have to keep!!!

DL360

```
Build OS:                x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                   542
Job:                     dl360.2013-07-31_21.03.15_08
Backup Level:            Full
Client:                  "dl360-fd" 12.4.3 (15Apr13) Microsoft Windows Home ServerStandard...
FileSet:                 "dl360" 2013-05-22 22:30:32
Pool:                    "dl360" (From Job resource)
Catalog:                 "MyCatalog" (From Pool resource)
Storage:                 "dl360" (From Job resource)
Scheduled time:          31-Jul-2013 21:03:31
Start time:              31-Jul-2013 21:03:47
End time:                31-Jul-2013 21:28:22
Elapsed time:            24 mins 35 secs
Priority:                10
FD Files Written:        118,984
SD Files Written:        118,984
FD Bytes Written:        14,998,455,685 (14.99 GB)
SD Bytes Written:        15,020,983,907 (15.02 GB)
Rate:                    10168.4 KB/s
Software Compression:    57.8 %
VSS:                     yes
Encryption:              no
Accurate:                yes
Volume name(s):          dl360_final20130731
Volume Session Id:       5
Volume Session Time:     1375291817
Last Volume Bytes:       15,039,773,460 (15.03 GB)
Non-fatal FD errors:     22
SD Errors:               0
FD termination status:   OK
SD termination status:   OK
Termination:             Backup OK -- with warnings
```

Fixes:

Removed all warnings concerning data

Compression=yes on baremetal (save space)

< 30 minutes to save

Virtual ESX - Windows Server 2000


```
Build OS:               x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                  37
Job:                    pdc_lua.2013-05-13_21.59.58_11
Backup Level:           Full
Client:                 "pdc_lua-fd" 3.0.3a (06Dec09) Linux,Cross-compile,Win32
FileSet:                "pdc_lua" 2013-05-13 21:17:29
Pool:                   "pdc_lua" (From Job resource)
Catalog:                "MyCatalog" (From Pool resource)
Storage:                "pdc_lua" (From Job resource)
Scheduled time:         13-May-2013 21:59:56
Start time:             13-May-2013 22:00:04
End time:               14-May-2013 19:58:33
```

Elapsed time: **21 hours 58 mins 28 secs**

```
Priority:               10
FD Files Written:       1,140,907
SD Files Written:       1,140,907
FD Bytes Written:       782,083,893,548 (782.0 GB)
SD Bytes Written:       782,309,612,558 (782.3 GB)
Rate:                   9886.2 KB/s
Software Compression:   32.4 %
VSS:                    no
Encryption:             no
Accurate:               yes
Volume name(s):         pdc_lua_0018
Volume Session Id:      1
Volume Session Time:    1368475187
Last Volume Bytes:      782,993,811,389 (782.9 GB)
```

Non-fatal FD errors: **1288**

```
SD Errors:              0
FD termination status:  OK
SD termination status:  OK
Termination:            Backup OK -- with warnings
```

PDC

Virtual ESX – Windows Server 2000

Warnings :

99% Real data
99% Wrong Rights trouble

```
14-May 06:14 pdc lua-fd JobId 37:
Could not stat "E:/DIREKTIO/VERWALT/Umfragen/Fragebogen_Benchmarking2008.doc":
ERR=Zugriff verweigert
```

Take weeks to explain :
Let SYSTEM account as it is!

Reduce warnings to non significant data file

(perflib,dhcpd.mdb etc)

PDC

```
Build OS:                  x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                     540
Job:                       pdc_lua.2013-07-31_20.10.58_06
Backup Level:              Full
Client:                    "pdc_lua-fd" 3.0.3a (06Dec09) Linux,Cross-compile,Win32
FileSet:                   "pdc_lua" 2013-05-13 21:17:29
Pool:                      "pdc_lua" (From Job resource)
Catalog:                   "MyCatalog" (From Pool resource
Storage:                   "pdc_lua" (From Job resource)
Scheduled time:            31-Jul-2013 20:10:49
Start time:                31-Jul-2013 20:11:00
End time:                  01-Aug-2013 03:28:24
Elapsed time:              7 hours 17 mins 10 secs
Priority:                  10
FD Files Written:          992,244
SD Files Written:          992,244
FD Bytes Written:          549,276,200,818 (549.2 GB)
SD Bytes Written:          549,487,425,092 (549.4 GB)
Rate:                      20936.0 KB/s
Software Compression:      None
VSS:                       no
Encryption:                no
Accurate:                  yes
Volume name(s):            pdc_lua_final20130831
Volume Session Id:         3
Volume Session Time:       1375291817
Last Volume Bytes:         549,905,591,356 (549.9 GB)
Non-fatal FD errors:       0
SD Errors:                 0
FD termination status:     OK
SD termination status:     OK
Termination:               Backup OK -- with warnings
```

Fix running time

Split non frequently used data.

Pre-run them, only a diff last day.

Compression=OFF (gzip under virtual)

Time run : 3 times faster.

No more important Warning

RESTORES

Fast enougth for one billion files

```
Build OS:               x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                  549
Job:                    DefaultWinRestore.2013-08-01_07.09.23_18
Restore Client:         europe-fd
Start time:             01-Aug-2013 07:46:25
End time:               01-Aug-2013 11:39:28
Files Expected:         992,244
Files Restored:         992,244
Bytes Restored:         549,276,260,818
Rate:                   39281.7 KB/s
FD Errors:              0
FD termination status:  OK
SD termination status:  OK
Termination:            Restore OK
```

Restores

Quicker & Faster Even with lot's of small files (imap)

```
Build OS:                 x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                    548
Job:                      DefaultWinRestore.2013-08-01_07.06.40_17
Restore Client:           asia-fd
Start time:               01-Aug-2013 07:06:42
End time:                 01-Aug-2013 07:40:24
Files Expected:           427,507
Files Restored:           427,507
Bytes Restored:           202,394,607,305
Rate:                     84968.4 KB/s
FD Errors:                0
FD termination status:    OK
SD termination status:    OK
Termination:              Restore OK
```

RESTORES

Fast & Furious with big files

```
Build OS:               x86_64-suse-linux-gnu suse openSUSE 12.3 (x86_64)
JobId:                  550
Job:                    DefaultWinRestore.2013-08-01_11.57.05_20
Restore Client:         europe-fd
Start time:             01-Aug-2013 11:57:07
End time:               01-Aug-2013 13:04:47
Files Expected:         16,629
Files Restored:         16,629
Bytes Restored:         412,044,025,072
Rate:                   101488.7 KB/s
FD Errors:              0
FD termination status:  OK
SD termination status:  OK
Termination:            Restore OK
```

29th July*. Two days before final migration.
Fulls have been cooked during the week-end. Last **restore test**!

*It's July, 42°C outside

REALITY STRIKE BACK

```
29-Jul 09:50 oceania-dir JobId 520: Start Restore Job DefaultWinRestore.2013-07-29_09.50.32_13
29-Jul 09:50 oceania-dir JobId 520: Using Device "mailserver" to read.
29-Jul 09:50 oceania-sd JobId 520: Ready to read from volume "mailserver_archive" on device "mailserver" (/media/storage/backups/mailserver/).
29-Jul 09:50 oceania-sd JobId 520: Forward spacing Volume "mailserver_archive" to file:block 33:2256859750.
29-Jul 09:50 oceania-sd JobId 520: Error : Block : 133 Volume data error at 32:2256859750!
Block checksum mismatch in block=2184134 len=64512 calc=3675196 blk=ab8e75e
29-Jul 09:50 oceania-sd JobId 520: Fatal error: fd_cmds.c:227 Command error with FD, hanging up.
29-Jul 09:50 oceania-dir JobId 520: Error: Bareos oceania-dir 12.4.4 (12Jun13):
...
  SD termination status:   Error
  Termination:             *** Restore Error ***
```
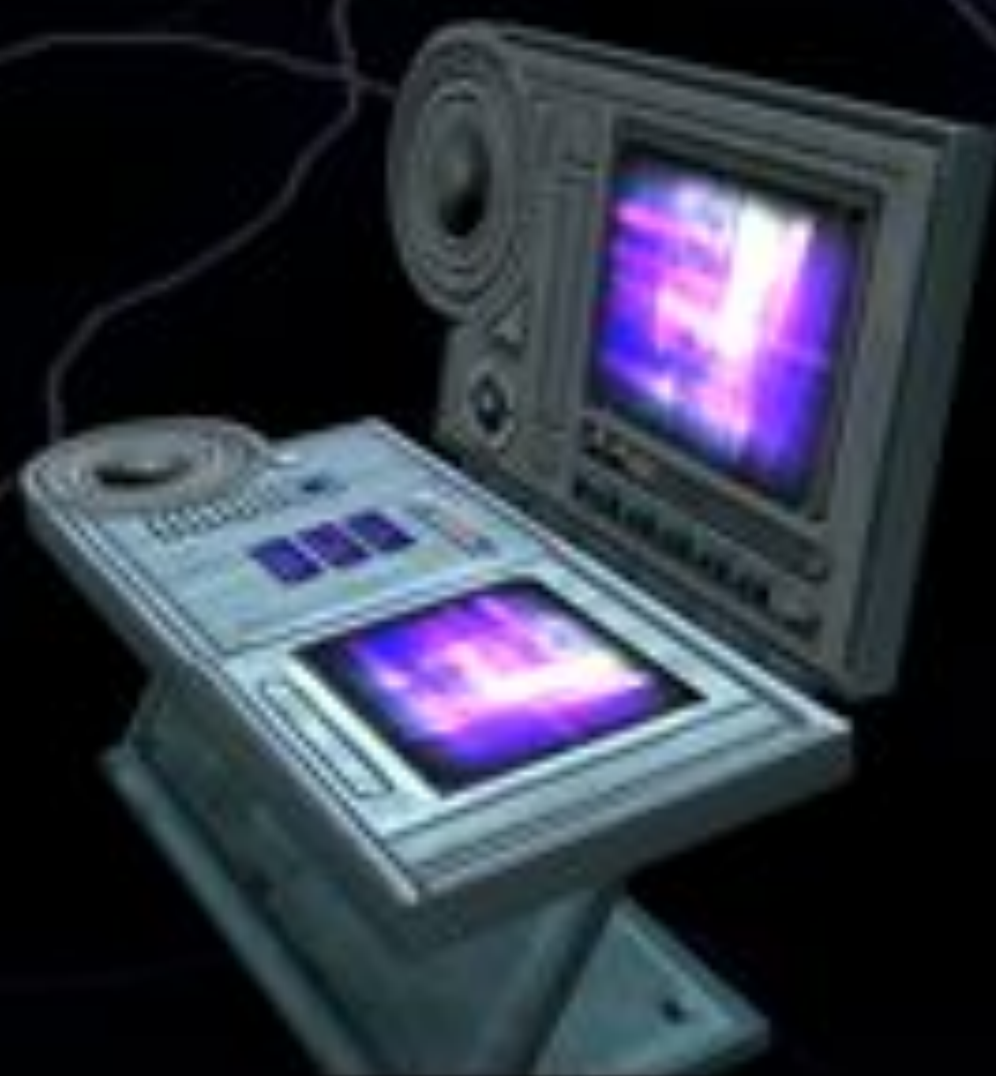
KEALITY STRIKE BACK

HELP?

You seem to have some serious hardware problems as the block checksum
is failing. Are you sure that your filesystem is not corrupted e.g.
ZFS or BTRFS for checksumming are best....
-- Marko --

Does your hardware have ECC RAM? If not I would suggest to make a RAM test.
Best regards,
-- Philipp --

REALITY STRIKE BACK

HELP?

You seem to have some serious hardware problems as the block checksum is failing. Are you sure that your filesystem is not corrupted e.g. ZFS or BTRFS for checksumming are best....

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Does your hardware have ECC RAM? If not I would suggest to make a RAM test.
Best regards,
-- Philipp --

WTF?

Backup status OK

I was using btrfs (raid10)... :-(

The server stop pinging Sunday night?

Still trustable for the big Day?

Plan B, rebuild a new host in one day!
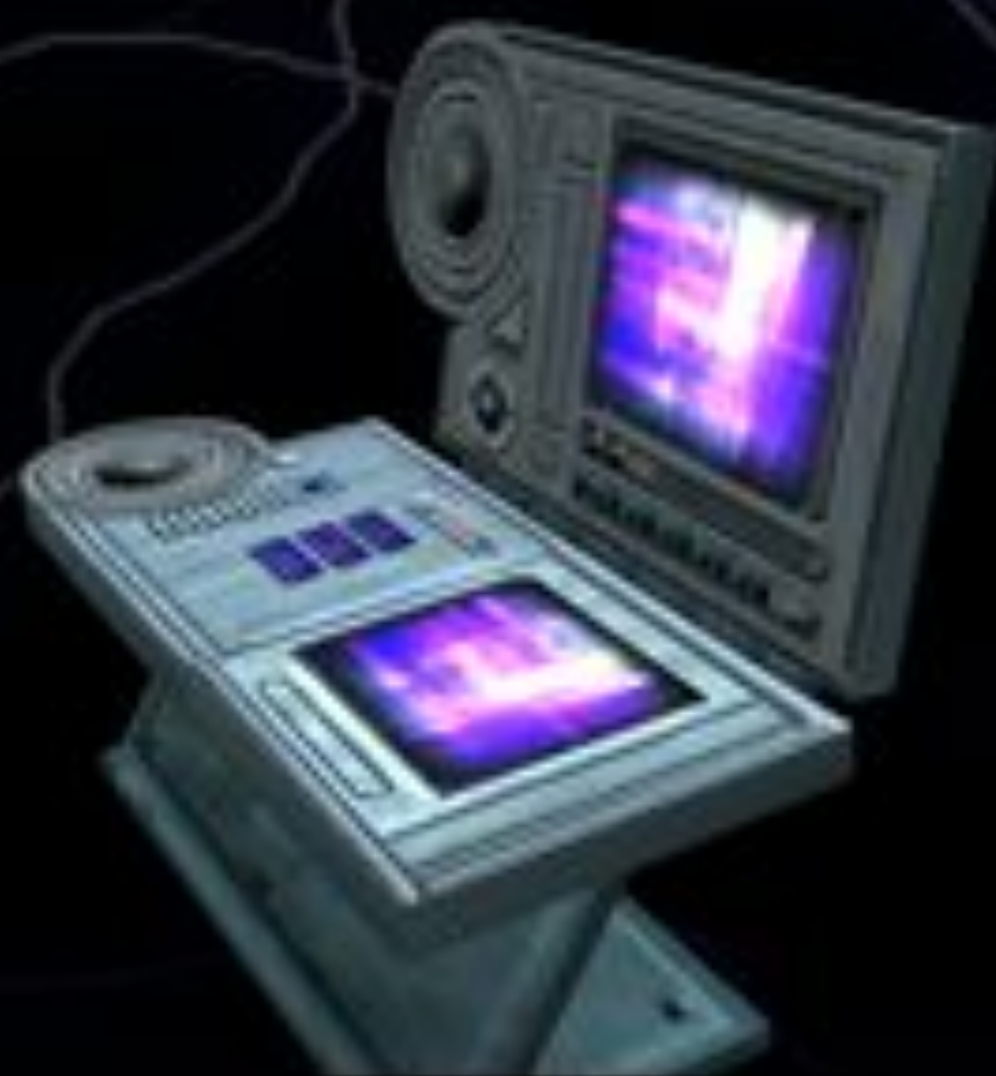
Reality Strike Back

Back Online

In the office
With spare parts a new openSUSE/Bareos server is build
Configuration & burning-tests

On distant temporary backup
Verify jobs & checksumming control ran all over the day
Only one media is affected!

Reality Strike Back

A few lessons

Duplicate your hardware

Verify is an important backup step

Use open source software & OS

Bareos bugging you? check the hardware

Migration
Summary

Total Bytes restored	1.4 TB
Total pre-run time	5 hours
Total restore time	7 hours
Backup start time	31st July 20:00
Backup end time	1st August 04:30
Restore time end	1st August 12:45

Since ...

External 2" usb3 disk for external Month & Week backups

Documentation completed step by step

Competencies transfered case by case

Subscription contract on its way

+220 jobs runned, 14TB backuped

NEXT EPISODES

Still looking for a way to synchronize "dailys" on remote location

See what's bareos 13x will offer (like compression algo)

Smarter fileset & jobs

Get a HP-UX system available to build a native bareos-fd

Discover the bareos documentation

Enjoy the new GUI :-)

CREDITS

impress.js
Illustrations F. Wybrecht

Help Bareos community
open backup conference organizers

Let's have a drink now !