

Bareos, ZFS and Puppet

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SYMGENIUS
YOUR HOSTING EXPERTS



Open Source **Backup**
Conference

on Bareos

About Me

- **Christian Reiß**
- **37 years old**
- **System Administrator at Symgenius**

About Me

- **Linux since 1995'ish (Kernel 1.3)**
- **B* evangelist**
- **Love Puppet**

Agenda

- **Motivation and a little(!) history,**
- **Bacula (Alternatives),**
- **ZFS Introduction,**
- **The Puppet Module.**

A Promise

- I'll try to do an 'easy listening',
- **No** code snippets.

About Symgenius

- **Symgenius**
- **Brand 'Power-Netz.de'**
- **Mid sized hosting company,**
- **Usual web-stack,**
- **Project hosting and housing**

Motivation – The situation

- **We do webhosting.**
- **Several hundred Servers,**
- **Several hundred Customers each,**
- **Thousands of files per webhost,**
- **Thousands of files per Maildir,**
- **And of course: mysql.**

Motivation - History

- **We used to backup with tar,**
- **Full backups of root into a tar located on a nfs share,**
- **Incrementals with a “find -ctime 1”.**
- **Everything piped through compression, ie. pigz or pbzip2.**

Motivation - History

- It did it's job.
- Compression on client-side,
- Monitoring was a **nightmare**,
- But Restoring was **hell**.

We tried several alternatives:

- **BackupPC**
- **Rsnapshot**
- **Rsnapshot + ZFS Snaps**
- **Bacula**

Motivation - Alternatives

- **BackupPC and rsnapshot failed.**
- **Backup times were 13+ hours due to amount of files,**
- **Job deletion even took longer.**
- **Backup + Job deletion exceeded 24 hours → Daily jobs piled up.**

Bacula solved several issues:

- **Backups are blazing fast even with high file counts,**
- **Backups are written inside a single archive volume,**
- **Restoring is bliss.**

... But also:

- **No heavy CPU load on client side (think compression)**
- **You could do Backups during work hours without Clients noticing (Well, except for MySQL Dumps...).**

**Client issue is solved,
but what about the server side?**

The Server needs:

- **Protection against Hardware faults:**
 - **RAID(-alike)**
 - **Bit-Rot**
- **Other things:**
 - **Transparent compression**
 - **Quotas per Server**

Also:

- **Should be hassle- and maintenance free (mostly).**
- **Needs to perform fast on 'normal' Hardware.**

All is solved with ZFS

**All is solved with ZFS
and Bareos.**

The features of ZFS include:

- [...] protection against data corruption,
- continuous integrity checking and automatic repair [...]

The features of ZFS include:

- **[...] RAID-Z [...]**

The features of ZFS include:

- **[...] support for high storage capacities, [...]**

The features of ZFS include:

- **[...] efficient data compression, [...]**

The features of ZFS include:

- [...] snapshots and copy-on-write clones, [...]

Apart from Sun OS ZFS is available

- **In Ubuntu 16.04 and up,**
- **In (future) Debian releases,**
- **And for all other Distributions via zfsonlinux.org.**
- **FreeNAS using ZFS as main storage**

ZFS - Install

- You install the package for your OS,
- Reboot,
- You do a “zpool create”,
- You might want to “zfs set” some stuff,
- Done.

This does not count as ‘code snippet’.

ZFS - Live Example

Our SD (also Dir) consists out of:

- **Intel Xeon CPU L5420 @ 2.50GHz**
- **8 total cores**
- **32gb Memory**
- **SSD for System and MySQL Data,**
- **22x 4TB 'NAS Grade' WD Reds.**
- **(currently) 1Gb NIC**

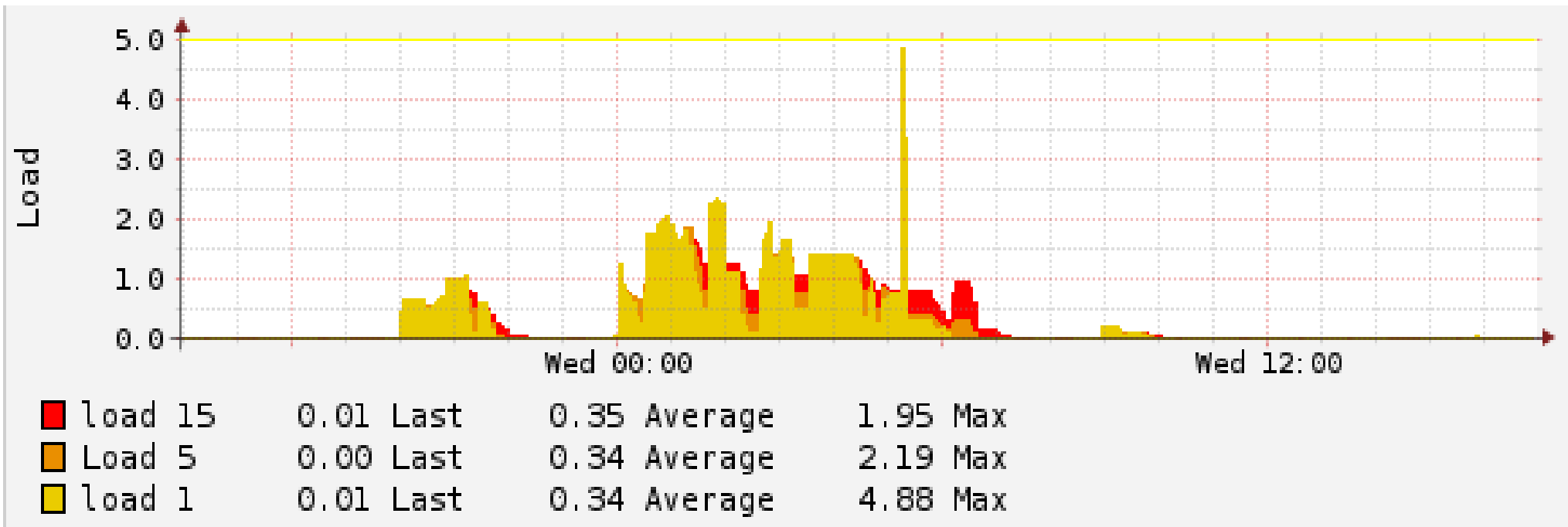
ZFS - Live Example

**We backup 35 servers simultaneously.
Both the CPU and NIC are maxed.**

**That's ~900Mbit of data transparently
compressed, RAID'ed and
checksummed **right there**.**

With 8 cores.

ZFS - System Load



ZFS - Live Example

```
[root@bertha d125.power-netz.de]# pwd
```

```
/bacula/storage/d125.power-netz.de
```

```
[root@bertha d125.power-netz.de]# df -h .
```

Filesystem	Size	Used	Avail	Use%	Mounted on
bacula/d125.power-netz.de	4.0T	992G	3.1T	25%	/bacula/storage/d125.power-netz.de

ZFS - Live Example



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on Bareos

```
[root@bertha d125.power-netz.de]# ls -lhat
total 992G
drwxr-x--- 268 bacula bacula 268 Jul 27 15:05 ..
-rw-r----- 1 bacula bacula 12G Jul 27 01:43 d125-daily-1420
-rw-r----- 1 bacula bacula 13G Jul 26 01:20 d125-daily-1274
-rw-r----- 1 bacula bacula 11G Jul 25 01:56 d125-daily-1119
-rw-r----- 1 bacula bacula 44G Jul 24 02:17 d125-weekly-1932
-rw-r----- 1 bacula bacula 14G Jul 23 01:26 d125-daily-0980
[...]
-rw-r----- 1 bacula bacula 31G Jul 17 01:38 d125-weekly-0828
-rw-r----- 1 bacula bacula 13G Jul 16 01:09 d125-daily-0309
[...]
-rw-r----- 1 bacula bacula 362G Jul 11 05:10 d125-monthly-5778
-rw-r----- 1 bacula bacula 64G Jul 9 01:56 d125-weekly-4000
-rw-r----- 1 bacula bacula 56G Jul 2 01:33 d125-weekly-3312
-rw-r----- 1 bacula bacula 45G Jun 24 01:13 d125-weekly-2846
-rw-r----- 1 bacula tape 359G Jun 11 04:38 d125-monthly-3633
```

ZFS - Live Example

```
[root@bertha ~]# zfs get compressratio
```

NAME	PROPERTY	VALUE
[...]		
bacula/d136.power-netz.de	compressratio	1.79x
bacula/d137.power-netz.de	compressratio	1.69x
bacula/d138.power-netz.de	compressratio	2.10x
bacula/d139.power-netz.de	compressratio	1.57x
[...]		

ZFS - Live Example

```
[root@bertha d125.power-netz.de]# du -h d125-monthly-3633 --apparent-size
```

```
359G    d125-monthly-3633
```

```
[root@bertha d125.power-netz.de]# du -h d125-monthly-3633
```

```
264G    d125-monthly-
```

Net Save of 95GB, that's **~30%!**

ZFS - Live Example

On a sidenote:

Deduplication does *not work*.

ZFS - Advantages

- **No more RAID controllers,**
- **Defense against Bit-Rot,**
- **Defense against Drive Faults*,**
- **Compression is done on Server,**
- **Quotas are possible,**
- **No hacks or workarounds.**
- **Everything is done transparently!**

Puppet.

The module does the usual:

- **It configures the director,**
- **The storage daemon**
- **And of course the FD's.**

→ Backups work :)

Each Server has:

- **An independent Pool for Full Backups,**
- **An independent Pool for Differentials,**
- **An independent Pool for Incrementals.**

In its own ZFS-Dataset.

Each Server:

- **Has limited bconsole shell access (using ACL's)**
- **Has its own device in bacula-sd**
- **Is fully monitored by Icinga/Nagios**

- **We wanted a fully automated System**
- **Non-destructive Installation**
- **Managing new Servers, adding ZFS**
- **Soft removal of retired Servers**

In addition to that:























- **One-File-per-Job (Volume)**
- **Monitor last Backup,**
- **Monitor MySQL Dumps,**
- **We check for a valid full-backup,**
- **We check for /bacula-restores dir.**

... Also:

- **Random Passwords generated**
- **bareos-fd.conf copy saved on dir**
- **Option to override IPs**


Set & override by hiera:

- **Accurate flag (default yes),**
- **Exclude of files,**
- **Include of files,**
- **Onefs flag (default yes).**

Service ▲▼	Status ▲▼	Status Information
bacula:_fd-daemon  	OK	PROCS OK: 1 process with command name 'bacula-fd'
bacula:_full_backup    	OK	full backup OK.
bacula:_last_backup    	OK	Backup completed in 93 Minutes. :) (01:37:06)
bacula:_mysql_backup    	OK	All 896 Databases dumped OK.
bacula:_quota    	OK	14% quota used.
bacula:_restore-dir    	OK	No /bacula-restores dir found.

Puppet Module

... and of course it will install the webui!

 Dashboard Director Filesets **Pools** Volumes Storages Clients Jobs Restore

hades.int.alpha-labs.net-webui

Pools

Show 10 entries Search:

Name	Type	Volumes	Maximum volumes	Volume retention	Maximum volume jobs	Maximum volume bytes
appserv.int.alpha-labs.net-daily	Backup	31	35	31 days	1	-
appserv.int.alpha-labs.net-hourly	Backup	23	30	1 days	1	-
appserv.int.alpha-labs.net-monthly	Backup	3	5	90 days	1	-
ares.int.alpha-labs.net-daily	Backup	31	35	31 days	1	-
ares.int.alpha-labs.net-hourly	Backup	24	30	1 days	1	-
ares.int.alpha-labs.net-monthly	Backup	4	5	90 days	1	-
arrakis.int.alpha-labs.net-daily	Backup	31	35	31 days	1	-
arrakis.int.alpha-labs.net-hourly	Backup	23	30	1 days	1	-
arrakis.int.alpha-labs.net-monthly	Backup	2	5	90 days	1	-
artemis.alpha-labs.net-daily	Backup	32	35	31 days	1	-

The End.

Thank you for your attention! \o/

The End.

As promised:

Bareos-Puppet Module available:

https://github.com/christianreiss/al_bareos

Contact me via:

email@christian-reiss.de

Questions?