



**SLAC** Secure Linux  
Administration  
Conference 2017 **22.-24. Mai 2017 | Berlin**

# Agenda

- Bareos Overview
- Some Features
  - VMWare Backups
  - Always Incremental
- Demo
  - Web UI and ACLs: Self-Service-Restore-Portal
- Bareos for DevOps
  - API and command line interfaces
  - Integration with open source management tools



# Bareos Introduction

- Bareos is a fork of the bacula.org project
- Fork started by Marco van Wieringen 2010
  - Implement own ideas
  - Speed up development
  - Sustain open source project
- First Release 2013
- Since then yearly a new major version



# Data Sovereignty – NO vendor lock-in

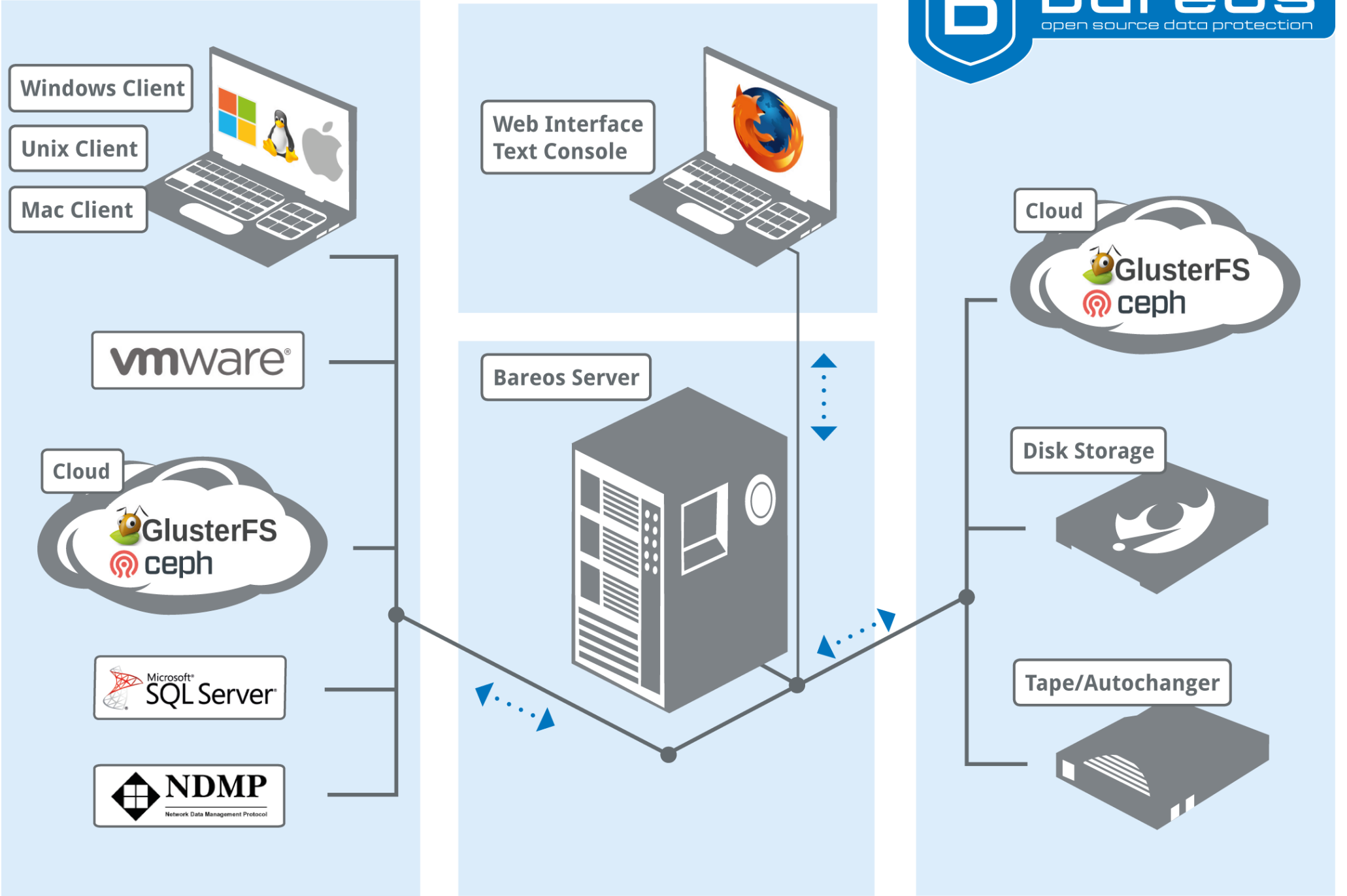
- Bareos is 100% Open Source:
  - Affero GNU Public License (AGPL)
  - Code cleanup and re-factoring
  - A lot of new features
  - Python Plugin Interface
  - Growing Open Source Community
  - Open Storage Format
  - Only Open Source backup software lets you for sure restore your data whenever you decide

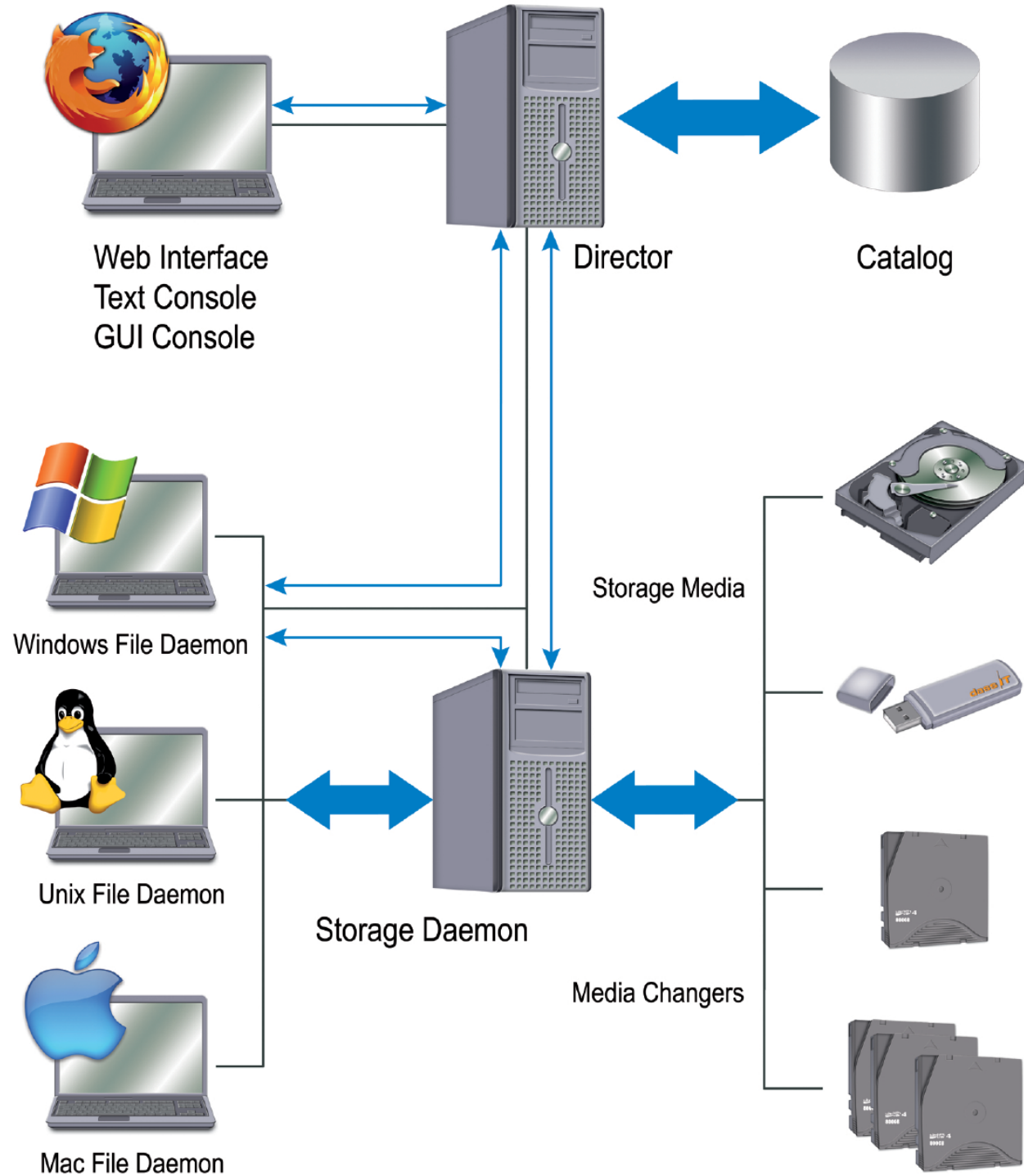


# Bareos Overview

- All common sense features of a network backup system, like
- Multiplatform support: Linux, Unix, Windows, MacOS
- Scheduler with multi generation support (Full-, differential-, incremental, virtual full, accurate, ...)
- Inventory (“catalog”) in database (MySQL, Postgres)
- Restore via CLI or GUI on any client
- Encrypted data, transport, ACLs, ...
- Backup media: disk, tape, library, cloud
- Scripting interface for pre- and post - jobs

# Bareos Architektur





# Packaging

## Repacking using an own Open Build Server

- All packages out of one source
- All major Linux Distributions
- MacOS
- Windows Installer Packages with lean redesign of cross compile makefiles, silent install possible







## New Features since 13.2

- Support for hardware encryption with LTO (4 and upwards) and enterprise tape libraries
- Client-quota support
- Native NDMP Support
- Bandwidth limitation
- Windows Backup „all (local) drives“ option in fileset definition and Windows File daemon
- Passive Clients
- Storage replication “Backup to disk to cloud”



## New Features in 14.2

- Performance tuning (variable blocksize)
- Storage Abstraction Layer
  - Backup to Cloud Storage (Ceph, Gluster)
- Windows Director / Storage Daemon (disk-only)
- Improved Windows Support (*NotToBackup* Key, VMP, EFS, Windows 2012 Deduped Volume)



## (Some) new Features in 15.2

- VMware Plugin (Disk Images, Incremental)
- WebUI with self service portal restore browser
- Director API (JSON-ified)
- Secure Erase - sponsored by cardtech for compliance reasons: HIPAA, FACTA, GLB, SOx, PCI DSS, ...
- Backup of Ceph / Gluster storage
- Plugins:
  - MySQL, Icinga / Nagios, LDAP
- Full List: [https://www.bareos.org/en/whats\\_new.html](https://www.bareos.org/en/whats_new.html)

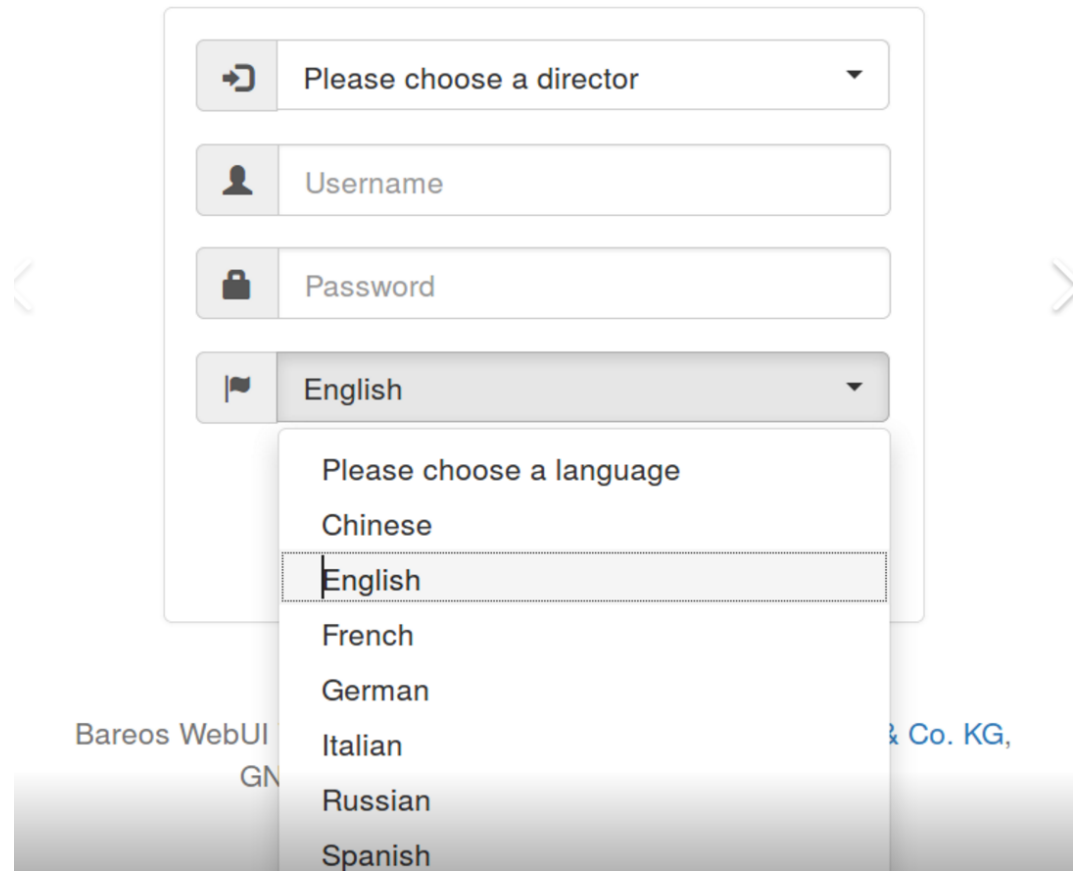


## Some new features in 16.2

- Always Incremental
  - Minimized network load
  - Daily consolidation of last incremental jobs on storage
  - Virtual Full consolidations less often necessary
- Active Sponsored Developments
  - Director Reload Enhancements
  - Client initiated Backups
  - NDMP Enhancements
- Add client via console
- Windows VSS Enhancements

# New WebUI features in 16.2

- WebUI
  - Storage / Media handling
  - Update Checks for Server /
  - Multi-Tenancy / improve
  - Multilanguage:
    - English
    - German
    - Spanish
    - Chinese
    - Italian
    - Dutch



Client

amy-fd

Backup jobs

(591) 2016-09-07 21:00:02 - backup-amy - Incremental

Merge all client filesets

Yes

Merge all related jobs to last full backup of selected backup job

Yes

Restore to client

amy-fd

Restore job

RestoreFiles

Replace files on client

never

Restore location on client

/tmp/bareos-restores/

File selection

Name	Size	Date
/	0.00 B	1970-01-01 01:00:00
etc/	8.19 KB	2016-08-18 17:59:58
.pwd.lock	0.00 B	2015-07-25 17:47:22
.updated	163 B	2015-12-10 19:27:25
DIR_COLORS	5.11 KB	2016-07-12 13:44:01
DIR_COLORS.256color	5.7 KB	2016-07-12 13:44:01
DIR_COLORS.lightbgcolor	5.13 KB	2016-07-12 13:44:01
GREP_COLORS	94 B	2016-01-12 10:51:54
NetworkManager/	4.1 KB	2016-08-03 09:44:39
X11/	66 B	2015-12-10 19:30:24
adjtime	16 B	2015-07-25 17:51:55
aliases	1.52 KB	2016-02-22 15:11:51
alternatives/	33 B	2016-08-18 17:59:33
anacrontab	541 B	2015-07-13 13:37:17
audisp/	41 B	2016-08-18 17:59:34
audit/	102 B	2016-08-18 17:59:34
avahi/	33 B	2016-04-27 16:16:34
bareos-webui/	61 B	2016-08-18 18:15:32
directors.ini.rpmnew	1.05 KB	2016-08-12 16:57:34
directors.ini.rpmsave	1.04 KB	2016-07-18 18:53:12
bareos/	4.1 KB	2016-08-18 18:00:36
bash_completion.d/	50 B	2016-06-03 14:17:54
bashrc	2.84 KB	2016-02-22 15:11:51
binfmt.d/	6 B	2016-02-01 15:04:04
chkconfig.d/	6 B	2015-11-24 12:58:51
cups.d/	60 B	2015-10-10 10:00:00

Restore



# Self-Service-Restore-Portal

- Use ACLs to restrict API access to a certain system
- ACLs (named consoles) are handled by the director and effect all connections by the user
  - Bconsole (CLI)
  - Web UI
  - Scripts using the API

# Roles and Consoles

- Profiles.conf – restrict profile with name 'webui-restricted'
- to only access a client called 'centos-fd'

```
Profile {  
    Name = webui-restricted  
    CommandACL = !.bvfs_clear_cache, !.exit, !.sql, !configure,  
!create, !delete, !purge, !sqlquery, !umount, !unmount, *all*  
    Job ACL = *all*  
    Schedule ACL = *all*  
    Catalog ACL = *all*  
    Pool ACL = *all*  
    Storage ACL = *all*  
    Client ACL = centos-fd  
    FileSet ACL = *all*  
    Where ACL = *all*  
    Plugin Options ACL = *all*  
}
```




# Roles and Consoles

- Consoles.conf – Named console ‘myuser’ gets profile ‘webui-restricted’

```
Console {  
  Name = myuser  
  Password = "linux"  
  Profile = webui-restricted  
}
```

# Unrestricted Admin Console














- Can see all clients

 Dashboard Jobs Restore Clients Schedules Storages Director centos-dir admin

Show


Clients

Show 25 entries Search:

Name	Version	Status	Actions
centos-102	16.2.5	Enabled	  
centos-fd	16.2.5	Enabled	  
centos-rear	16.3.1	Enabled	  
percona-fd	16.2.4	Enabled	   

# Restricted USER Console





- Can see only one allowed client

 Dashboard Jobs Restore Clients Schedules Storages Director centos-dir myuser ▼

Show

Clients

Show 25 entries Search:

Name	Version	Status	Actions
centos-fd	 16.2.5	Enabled	  

Showing 1 to 1 of 1 entries

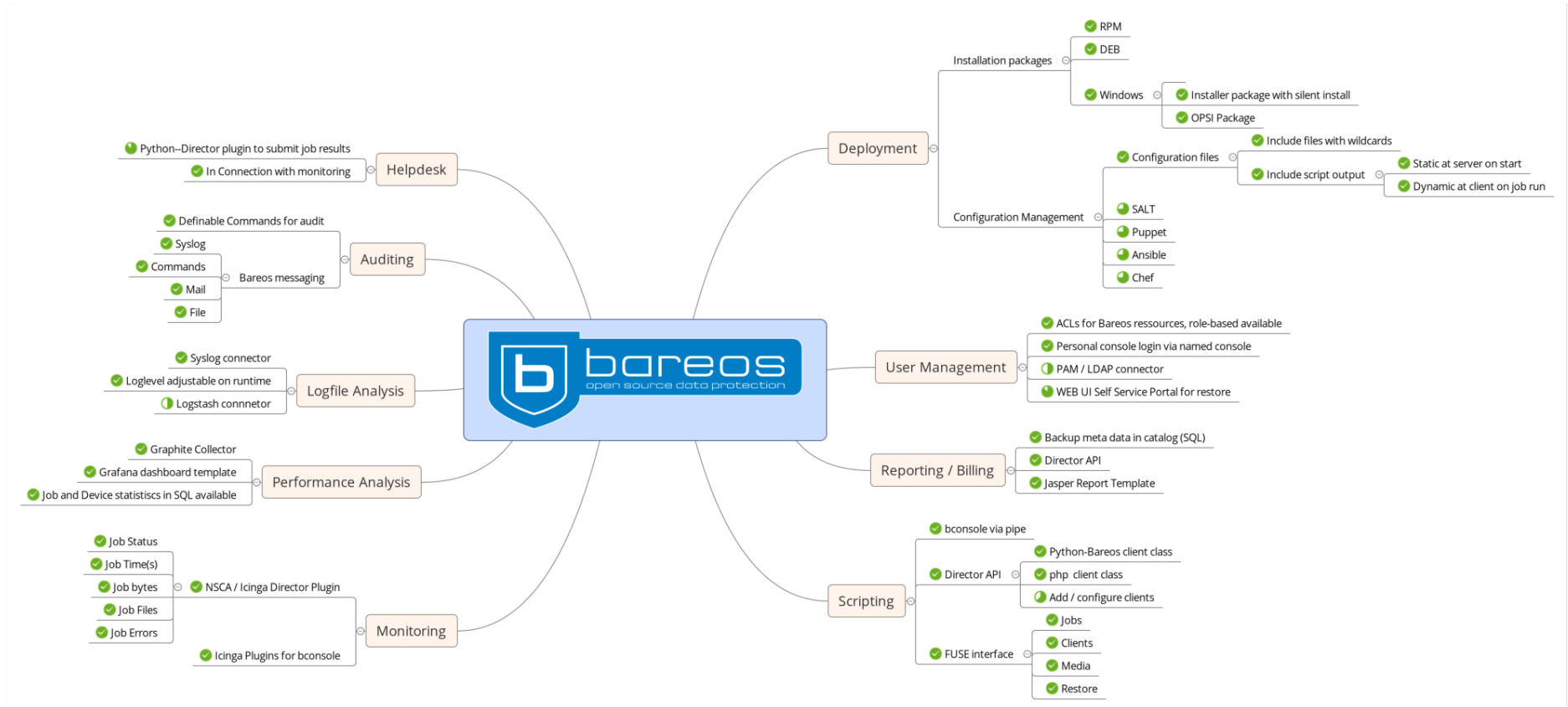
First Previous 1 Next Last

# DevOps: API usage

- Web UI and bconsole use the Director API
- Python class for API access available
- All director commands scriptable
- Sample implementation bsmc (Bareos simple management CLI)

```
bsmc rest /etc/vimrc # restores file /etc/vimrc from backup  
  
bsmc incr # runs incremental backup immediately  
  
bsmc query sched # Shows scheduler  
  
bsmc archive /etc/vimrc /etc/bash.bashrc /etc/profile.d/  
# make backup of the named file using the predefined job called  
'archive'
```

# DevOps: Integration with toolchain



Dedicated presentation at OSDC:

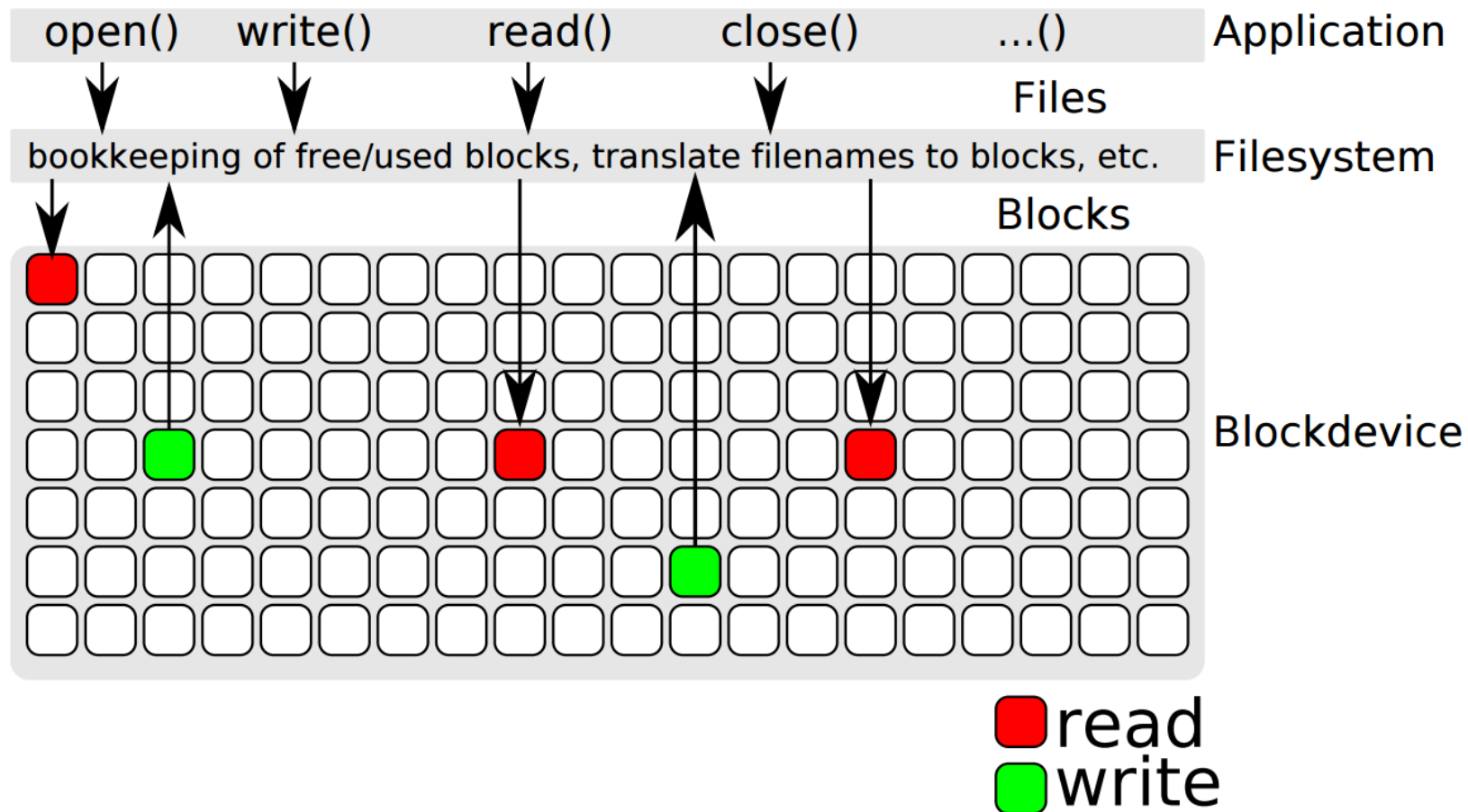
[https://www.bareos.com/en/company\\_news/bareos-talks-at-cebit-in-hanover-and-at-osdc-in-berlin.html](https://www.bareos.com/en/company_news/bareos-talks-at-cebit-in-hanover-and-at-osdc-in-berlin.html)

# VMWare Snapshot Backup

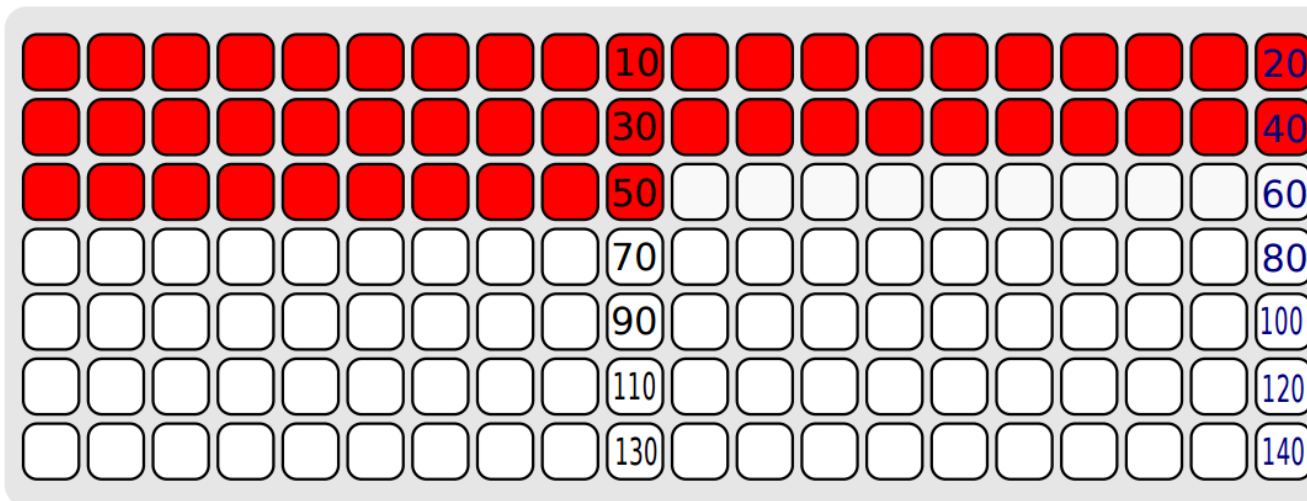
- Available since Bareos 15.2
- Plugin uses Python Plugin interface for file-daemon
- Makes use of VCenter API
- Triggers Snapshot
- Full Backup
- Incremental Backup using CBT (Changed Block Tracking)
- Restore of image into origin VM or vmdk image file

# VMWare Blocks

- Filesystem translates between files and blocks



# Day One

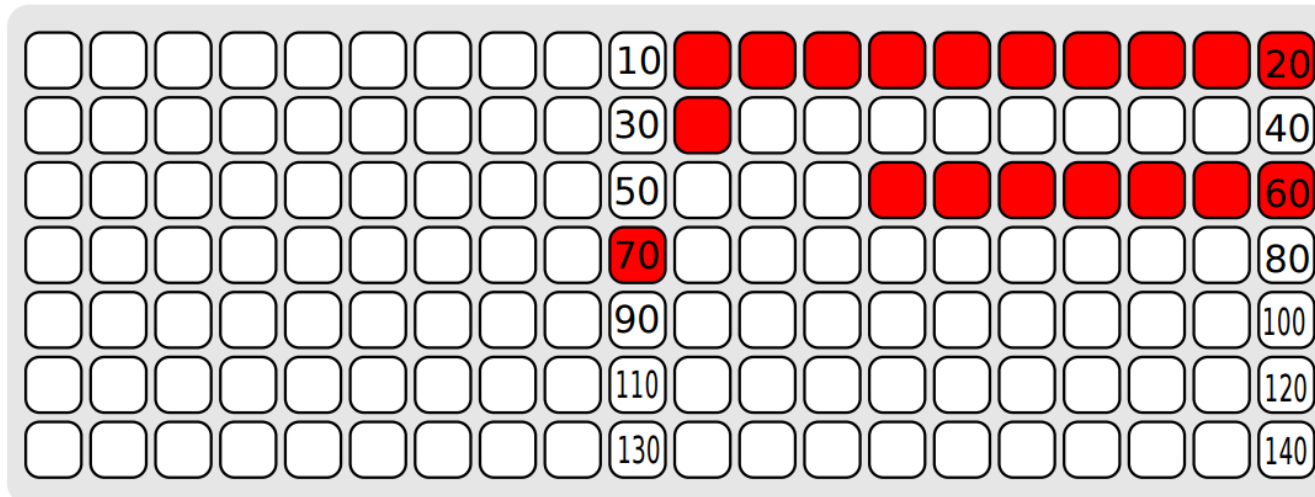


changed blocks:  
1-50

blocks  changed  
 unchanged



# Day Two



changed blocks:

11-20

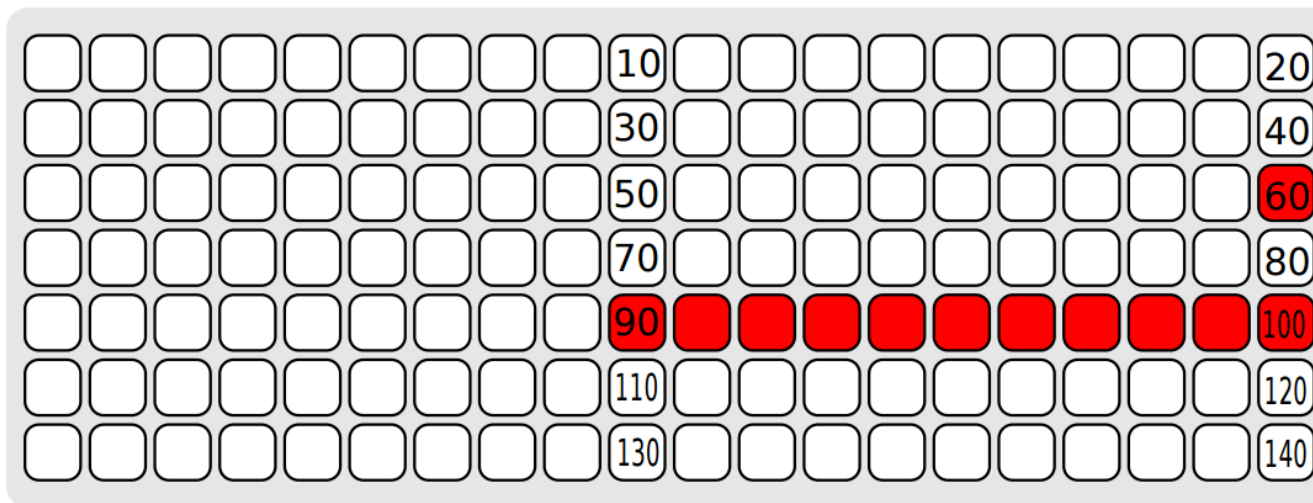
31

54-60

70

blocks  changed  
 unchanged

# Day Three



changed blocks:

60

90-100

blocks  changed  
 unchanged



# VMWare Changed Blocks to backup

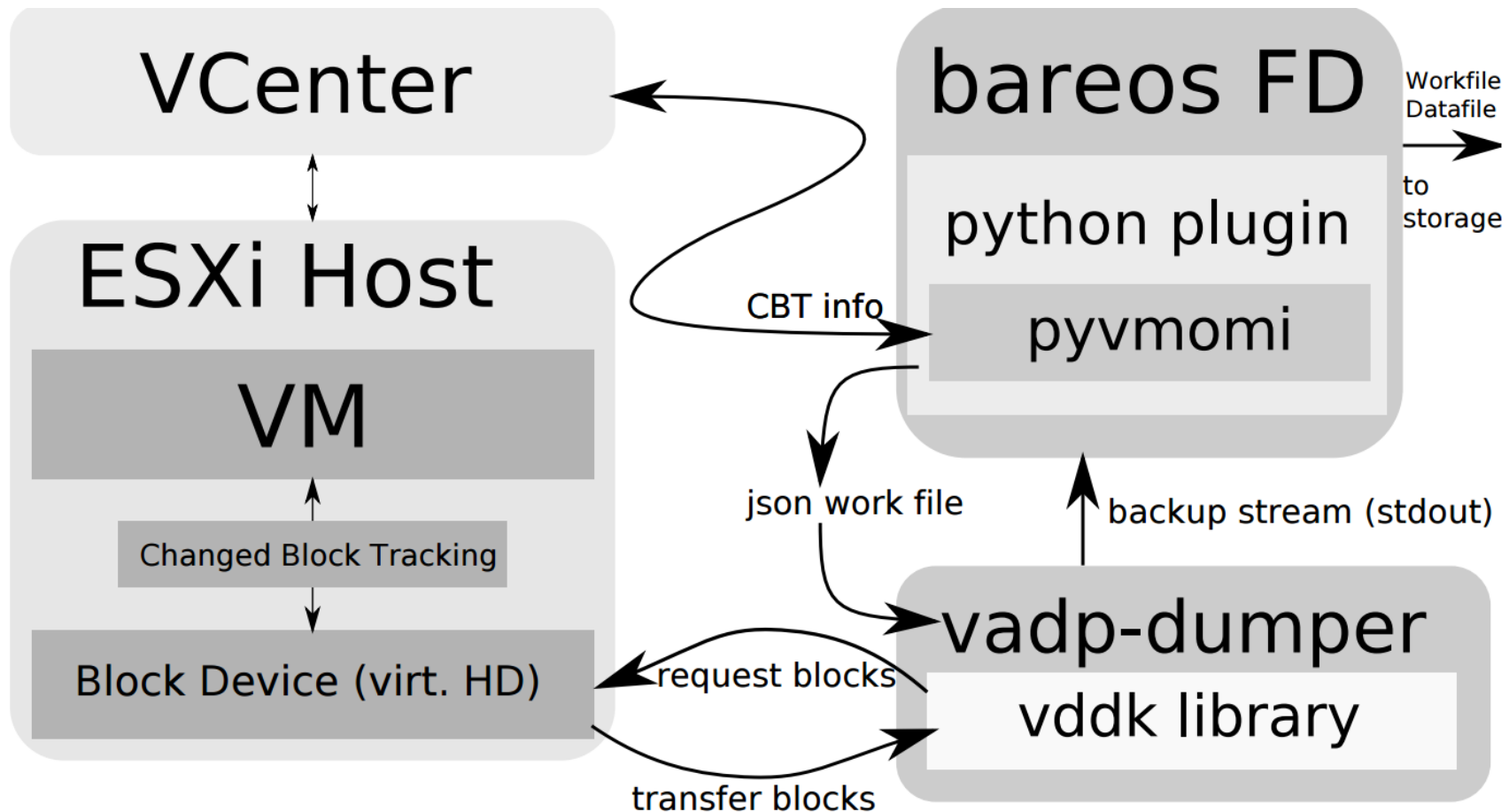
- Day 1: Blocks 1-50
- Day 2: Blocks 11-20, 31, 54-60, 70
- Day 3: Blocks 60, 90-100
- Restore must match backup order



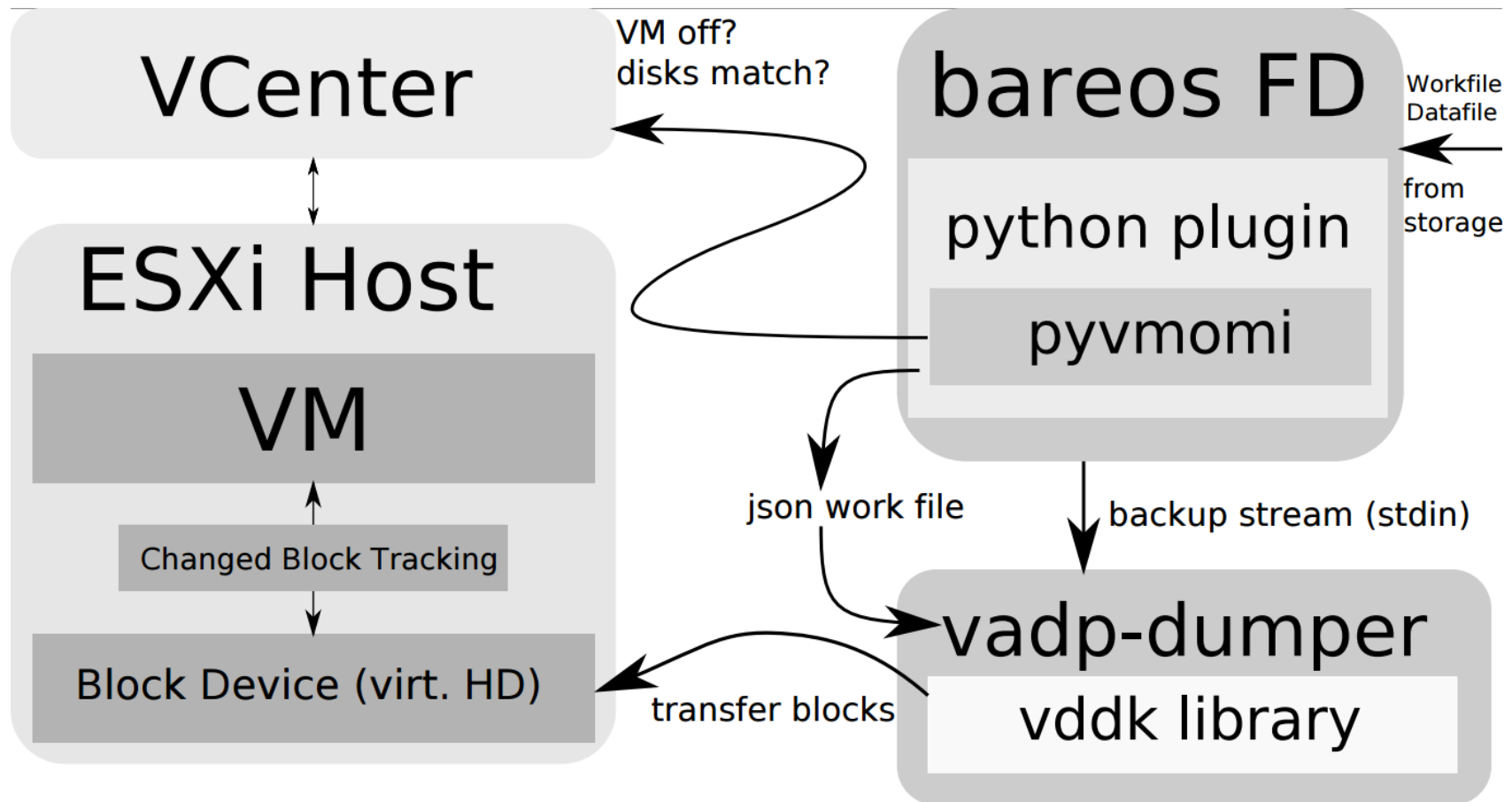
# Changed Block Backup

- OS-independent
- no backup of never used blocks
- only backup blocks that have changed
- full, inc and diff possible
- much faster as no time-stamps have to be checked

# Running a VMWare Backup



# Running a VMWare Restore



More Details: <http://osbconf.org/archiv/2015-2/>

# Always Incremental

- Always Incremental:
  - Do a Full backup only once
  - Regular incremental backups forever
- Advantage:
  - Avoid long running (days, weeks) full backups in large environments
- Problem:
  - A Restore might need to gather data from hundreds of jobs, which can be very slow.

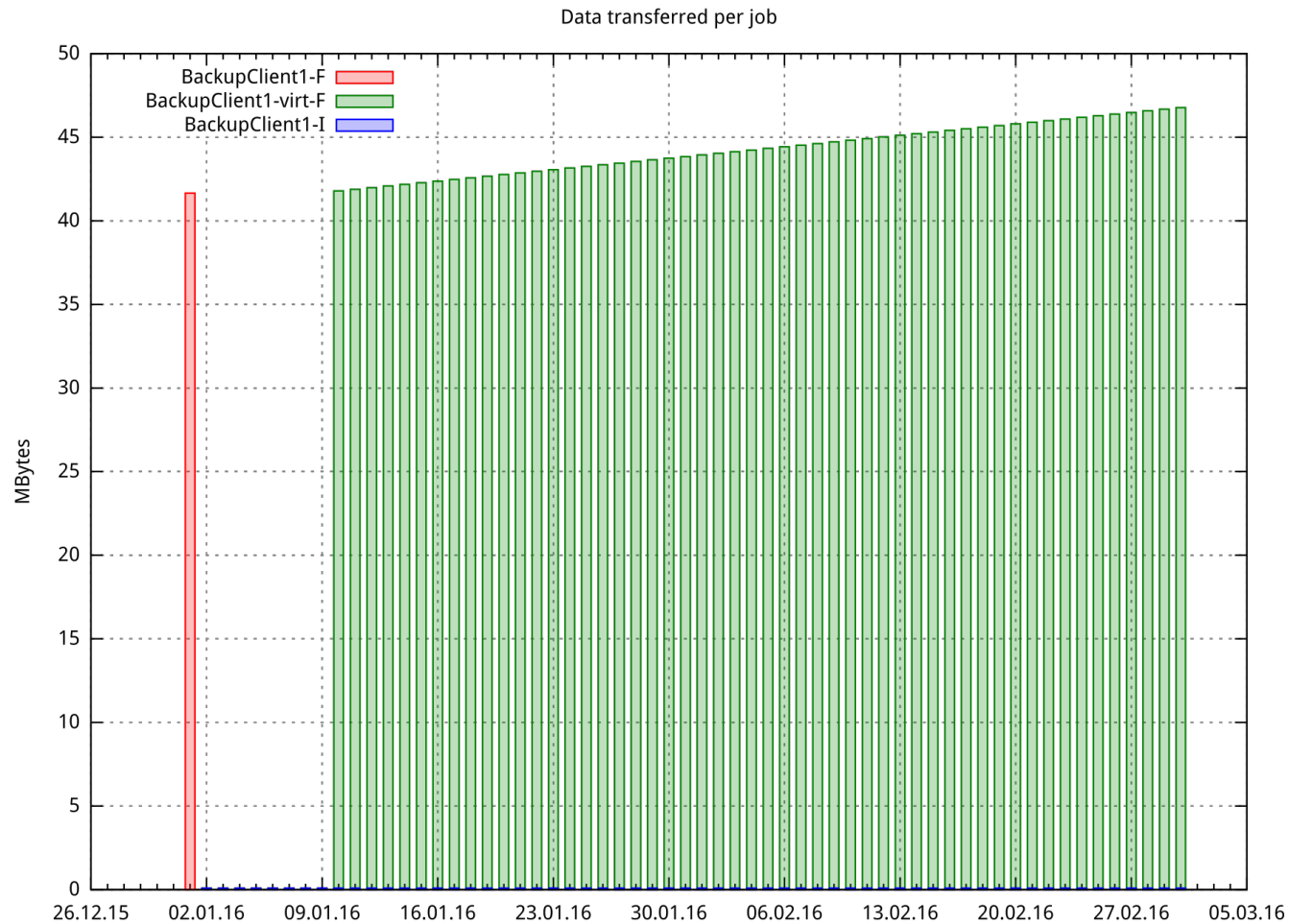
# Always Incremental

- Before 16.2:
  - Create a virtual full backup from existing backup jobs regularly
  - Good:
    - Minimal data transfer from clients
  - Problem:
    - Need to reorganize all data in the backup. May imply heavy I/O and CPU load (database). Eventually impossible with large data sets.



# Always Incremental

- Old approach with daily virtual full backups

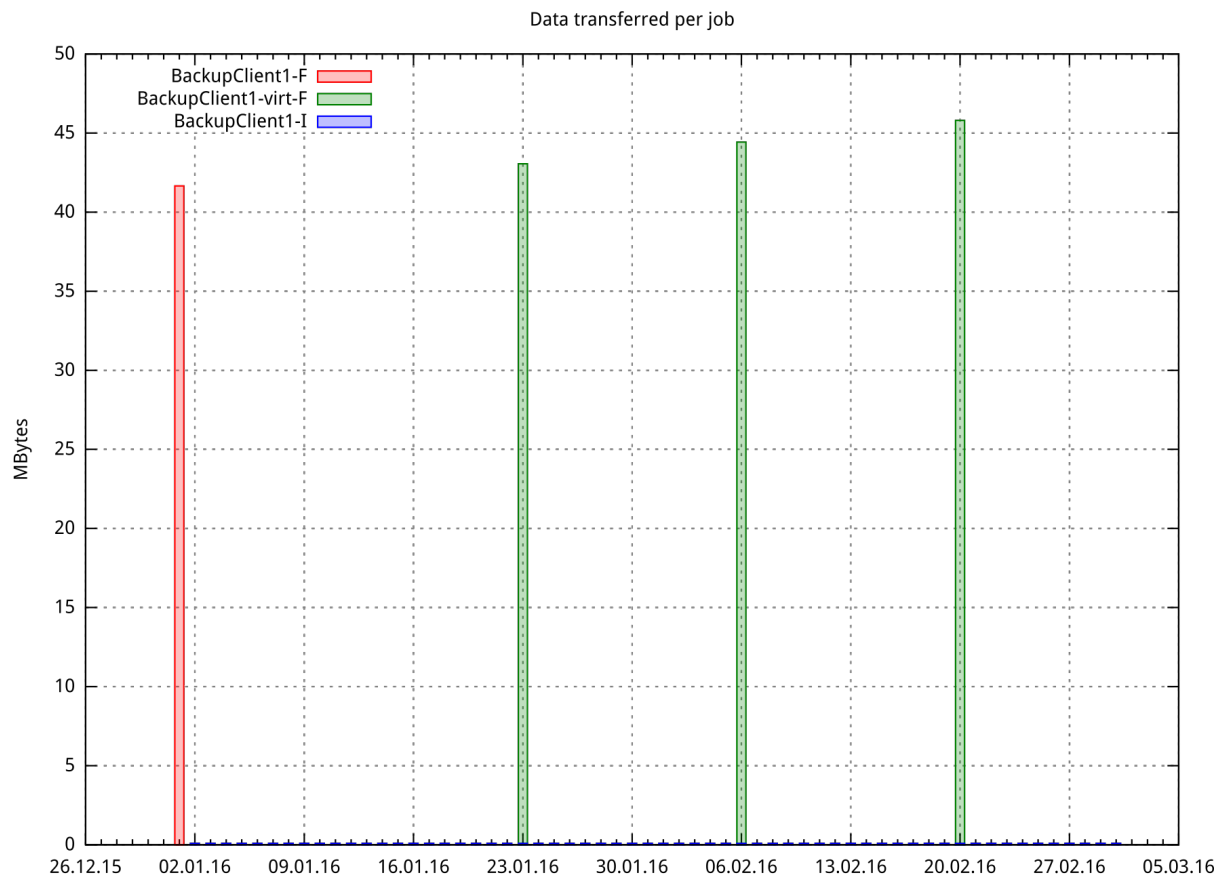


## Always Incremental 16.2

- Regularly consolidate incremental backups
  - Less jobs touched
  - Less data moved
  - Reduced number of incremental jobs needed for restore
- Never (or less times) consolidate full backups

# Always Incremental 16.2

- Regularly consolidate incremental backups, never (or less times) consolidate full backups





# Publicity

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bareos

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High Activity

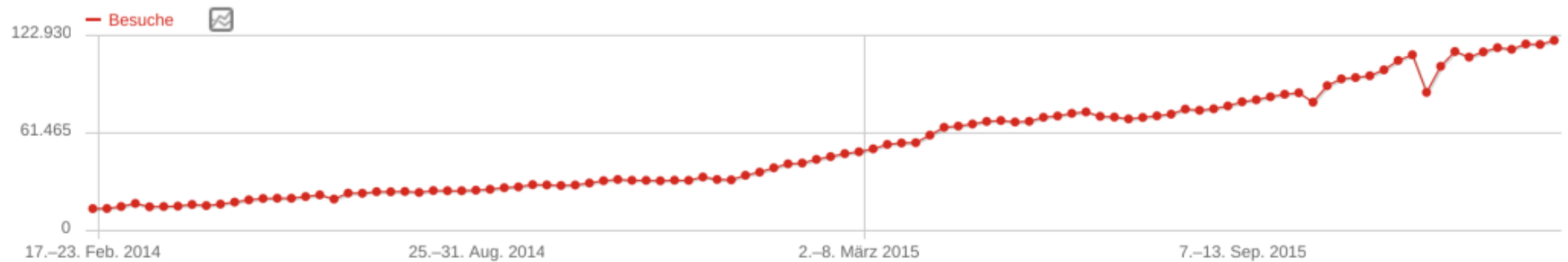
- “ This is one of the largest open-source teams in the world, and is in the top 2% of all project teams on Open Hub.”
- Bareos recommended on SILLIS list of open source applications by French government
- 



*Admin Magazine* #17 / 2013 Editor's summary:  
*The Bareos fork of Bacula adds new features,  
expanded functionality, and simplified configuration*

# Downloads

- Weekly unique visits on [download.bareos.org](http://download.bareos.org)





# Customers

- Several Max-Planck-Institutes
- Cardtech: Payment Transaction Provider
- Bavarian State Archives
- Lab Logistics Group
- Mixed industries
  - Public / government
  - Universities / Research
  - SMB
  - Provider
  - Finance



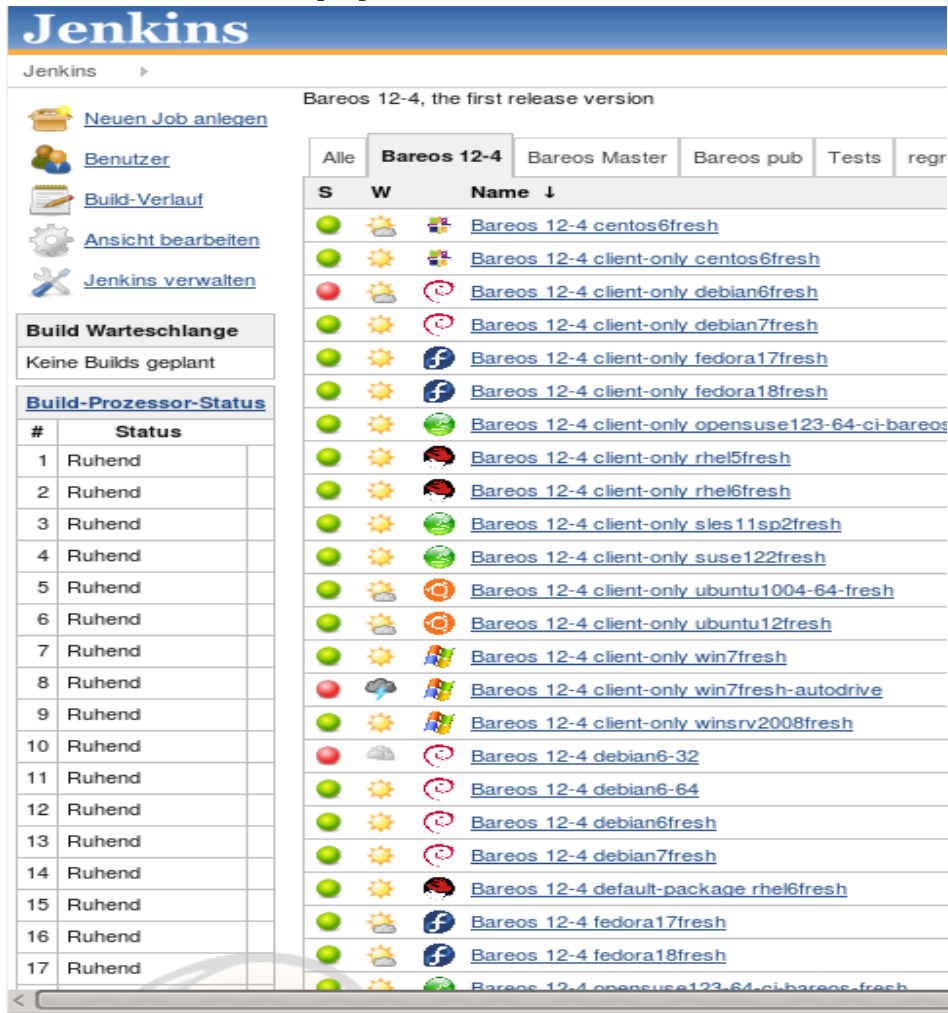


# Free Software + Subscription

- Up2date source code always freely available via GIT.  
100% Open Source (A)GPL.
- Public on [download.bareos.org](http://download.bareos.org):
  - Binary packages for all major releases
- Subscription service:
  - Additional intermediate and maintenance releases including quality assurance of binary packages
  - Prerequisite for Bareos support offerings

# Standard Development Environment

- Jenkins CI tests, install packages on each supported distribution **Project Bareos.org\_nightly\_Debian**



**Jenkins**

Jenkins >

[Neuen Job anlegen](#)

[Benutzer](#)

[Build-Verlauf](#)

[Ansicht bearbeiten](#)

[Jenkins verwalten](#)

**Build Warteschlange**

Keine Builds geplant

**Build-Prozessor-Status**

#	Status
1	Ruhend
2	Ruhend
3	Ruhend
4	Ruhend
5	Ruhend
6	Ruhend
7	Ruhend
8	Ruhend
9	Ruhend
10	Ruhend
11	Ruhend
12	Ruhend
13	Ruhend
14	Ruhend
15	Ruhend
16	Ruhend
17	Ruhend

Bareos 12-4, the first release version

Alle	Bareos 12-4	Bareos Master	Bareos pub	Tests	regre
S	W	Name ↓			
		<a href="#">Bareos 12-4 centos6fresh</a>			
		<a href="#">Bareos 12-4 client-only centos6fresh</a>			
		<a href="#">Bareos 12-4 client-only debian6fresh</a>			
		<a href="#">Bareos 12-4 client-only debian7fresh</a>			
		<a href="#">Bareos 12-4 client-only fedora17fresh</a>			
		<a href="#">Bareos 12-4 client-only fedora18fresh</a>			
		<a href="#">Bareos 12-4 client-only opensuse123-64-ci-bareos</a>			
		<a href="#">Bareos 12-4 client-only rhel5fresh</a>			
		<a href="#">Bareos 12-4 client-only rhel6fresh</a>			
		<a href="#">Bareos 12-4 client-only sles11sp2fresh</a>			
		<a href="#">Bareos 12-4 client-only suse122fresh</a>			
		<a href="#">Bareos 12-4 client-only ubuntu1004-64-fresh</a>			
		<a href="#">Bareos 12-4 client-only ubuntu12fresh</a>			
		<a href="#">Bareos 12-4 client-only win7fresh</a>			
		<a href="#">Bareos 12-4 client-only win7fresh-autodrive</a>			
		<a href="#">Bareos 12-4 client-only winsrv2008fresh</a>			
		<a href="#">Bareos 12-4 debian6-32</a>			
		<a href="#">Bareos 12-4 debian6-64</a>			
		<a href="#">Bareos 12-4 debian6fresh</a>			
		<a href="#">Bareos 12-4 debian7fresh</a>			
		<a href="#">Bareos 12-4 default-package rhel6fresh</a>			
		<a href="#">Bareos 12-4 fedora17fresh</a>			
		<a href="#">Bareos 12-4 fedora18fresh</a>			
		<a href="#">Bareos 12-4 opensuse123-64-ci-bareos-fresh</a>			

Prototype with new scripting framework and matrix for client-only and databases

Configuration Matrix			void	mysql	postgresql	sqlite3
6.0	bareos-client-only	32				
		64				
	bareos-all-daemons	32				
		64				
7.0	bareos-client-only	32				
		64				
	bareos-all-daemons	32				
		64				

9 Tage 0 Stunden - <a href="#">#42</a>	9 Tage 12 Stunden - <a href="#">#41</a>	12 Minuten	
3 Monate 4 Tage - <a href="#">#25</a>	6 Monate 7 Tage - <a href="#">#20</a>	9 Minuten 18 Sekunden	
6 Tage 19 Stunden - <a href="#">#178</a>	1 Monat 4 Tage - <a href="#">ssh problem</a>	12 Minuten	
6 Tage 17 Stunden - <a href="#">#42</a>	1 Monat 1 Tag - <a href="#">ssh</a>	7 Minuten 55 Sekunden	
6 Tage 19 Stunden - <a href="#">#79</a>	Unbekannt	3 Minuten 56 Sekunden	
6 Tage 18 Stunden - <a href="#">#194</a>	9 Tage 13 Stunden - <a href="#">#191</a>	11 Minuten	
6 Tage 18 Stunden - <a href="#">#210</a>	6 Tage 19 Stunden - <a href="#">#209</a>	14 Minuten	
6 Tage 19 Stunden - <a href="#">#72</a>	1 Monat 16 Tage - <a href="#">#45</a>	20 Minuten	



# Subscription and support

- Subscription customers can buy additional support packages with guaranteed response time at several service level
- Incident based
- Unlimited support with 24x7 availability possible
- Distribution through partners



# Roadmap 17.2

- Database backend rewrite (loadable queries)
- Performance Enhancements for large installations on database level (Denormalization of file-table)
- NDMP Enhancements
  - Performance
  - Direct Access of NDMP tape devices
- Storage Daemon with Local and Remote address
- Web UI
  - Usability improvements
  - More languages



# Contact and links

- Subscription, Support, References, Partner:  
<http://www.bareos.com>
- Community, Documentation, Download:  
<http://www.bareos.org>
- GIT:  
<https://github.com/bareos>
- Bug- and feature- tracker Mantis:  
<https://bugs.bareos.org>
- Maik Außendorf  
[maik.aussendorf@bareos.com](mailto:maik.aussendorf@bareos.com) Tel. +49 221 630693-93





# Open Source Backup **CONFERENCE**

SEPT 25 – 26 | 2017

Cologne,  
**GERMANY**

