

Backup made easy

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About me

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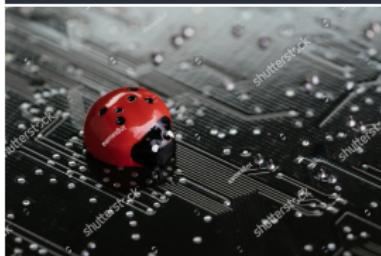
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Why backup? |



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Why backup? II

Have you ever...

- lost a storage medium or device?
- had a disk die on you?
- called dd if=/dev/zero of=/dev/xxx with the wrong device?
- run rm -rf / var as root?
- run rm -rf .*
- run find ~ (-name foo -or -name bar) -delete?
- dropped the wrong database?



Objectives I

Recovery Point Objective (RPO)

maximum acceptable interval during which transactional data is lost from an IT service

aka - How much data are you willing to lose?

Recovery Time Objective (RTO)

The amount of time elapsed between disaster and restoration of business functions

aka - How long until the data is back for use?



Objectives II

Data security

Who has access to the backup data, how safe is the backup location against loss?

Data retention

How far back can backups be kept? Is there enough storage?

Integrity

Is the backup's medium still ok, are the files kept the same as copied from the source?



Objectives III

Monitoring

Is the backup process completed without error, and on time?

Self-Service

Can the backup be accessed without administrator intervention? Do you protect against a user "Oopsie" and/or complete failure?

Further info [9], [5, pp. 793]



Borgmatic

Frontend for Borg Backup

<https://www.borgbackup.org/>



<https://torsion.org/borgmatic/>



Features I

- Encryption
- Compression
- Deduplication
- Database integration
- Block device backup (no file based restore!)
- Notifications
- Multiple backup locations
- Raw borg backup commands callable



Features II

- SystemD units/timers
- Include/exclude lists
- Browseable archives via FUSE mounts
- Selective restore with standard (rsync, cp, etc.) commands
- Complete restores
- Backup targets only need SSH (with sshfs) [3]
- GUI alternative - vorta [8] GUI frontend to BorgBackup
- Bare Metal Recovery with Relax-and-Recover [6]



Limitations

- Unix-based OS (Workarounds exist, but aren't pretty)
- No role based separation of concerns
- No ready made restore media/procedures
- No server-based scheduling
- No file based restore on block based backups
- No ready made self service solutions
- No volume shadow copy style backups



Alternatives |

Excerpt of [10]

- Vorta [8] GUI frontend to BorgBackup
- Restic [7] rather close competitor to Borg, Windows supported
- Amanda [1] „Enterprise ready”, lots of moving parts, GUI, Windows supported
- Bacula [2] „Enterprise ready”, lots of moving parts, GUI, Windows supported
- Duplicati [4] Windows supported, GUI



Alternatives II

Commercial, enterprisey solution examples

- EMC Networker
- Commvault
- HP Data Protector
- IBM Spectrum Protect (aka TSM)
- Veeam



DEMO: Set up lab

```
--> server: filesystems to utilize.  
=> client: Created volume larger than box defaults, will require manual resizing of  
      filesystems to utilize.  
=> server: Creating image (snapshot of base box volume).  
=> client: Creating image (snapshot of base box volume).  
=> server: Creating domain with the following settings...  
=> server: Creating domain with the following settings...  
=> server: -- Name: lab_server  
=> client: -- Name: lab_client  
=> client: -- Description: Source: /home/fuero/dev/talks/borgmatic/lab/Vagrantfile  
=> server: -- Description: Source: /home/fuero/dev/talks/borgmatic/lab/Vagrantfile  
=> client: -- Domain type: kvm  
=> server: -- Domain type: kvm  
=> client: -- Cpu count: 2  
=> server: -- Cpu count: 2  
=> client: -- Feature: acpi  
=> server: -- Feature: acpi  
=> client: -- Feature: apic  
=> server: -- Feature: apic  
=> client: -- Feature: pae  
=> server: -- Feature: pae  
=> client: -- Clock offset: utc  
=> server: -- Clock offset: utc  
=> server: -- Memory: 2048M  
=> client: -- Memory: 2048M  
=> server: -- Base box: rockylinux/9  
=> server: -- Storage pool: pool  
=> server: -- Image(vda): /home/fuero/.local/share/libvirt/pool/lab_server.img, virtio, 10G  
=> server: -- Disk driver opts: caches'none'  
=> client: -- Base box: rockylinux/9  
=> client: -- Storage pool: pool  
=> server: -- Graphics Type: vnc  
=> client: -- Image(vda): /home/fuero/.local/share/libvirt/pool/lab_client.img, virtio, 10G  
=> server: -- Vide Type: cirrus  
=> client: -- Disk driver opts: caches'none'  
=> client: -- Graphics Type: vnc  
=> client: -- Video: cirrus  
=> client: -- Video VRAM: 16384  
=> client: -- Video 3D accel: false  
=> client: -- Keymap: en-us  
=> client: -- TPM Backend: passthrough  
=> server: -- Video VRAM: 16384  
=> client: -- INPUT: type=mouse, bus=ps2  
=> server: -- Video 3D accel: false  
=> client: -- Keymap: en-us  
=> server: -- TPM Backend: passthrough  
=> server: -- INPUT: type=mouse, bus=ps2  
=> client: Creating shared folders metadata...  
=> server: Creating shared folders metadata...  
=> client: Starting domain.  
=> server: Starting domain.  
|
```

DEMO: init & first backup

```
fuero@t470: ~/dev/talks/borgmatic/lab$ # Launch the tmux session
fuero@t470: ~/dev/talks/borgmatic/lab$ ./create-session.sh
```

DEMO: Restore

```
fuero@t470: ~/dev/talks/borgmatic/lab$ # Launch the tmux session
fuero@t470: ~/dev/talks/borgmatic/lab$ ./create-session.sh
```

DEMO: Backup & Restore block device

```
fuero@t470: ~/dev/talks/borgmatic/lab$ # Launch the tmux session
fuero@t470: ~/dev/talks/borgmatic/lab$ ./create-session.sh
```

DEMO: Backup & Restore database

```
fuero@t470: ~/dev/talks/borgmatic/lab$ # Launch the tmux session
fuero@t470: ~/dev/talks/borgmatic/lab$ ./create-session.sh
```

Ideas for the adventurous

- Backup pod's volumes in Kubernetes via an injected container
- Server-side scheduling with client-side exposed SSH server
- Automatic filesystem snapshot creation and backup with a suitable filesystem and snappy
- Automatic backup before system updates with package manager hooks
- Backup remote systems to your computer via SSHFS



References

- [1] Amanda project. *Amanda*. Jan. 2024.
URL: <https://github.com/zmanda/amanda>
(visited on 01/14/2024).
- [2] Bacula project. *Bacula*. Jan. 2024.
URL: <https://www.bacula.org/>
(visited on 01/14/2024).
- [3] BorgBackup Project. *BorgBackup docs, Quickstart - Remote repositories*. Jan. 2024. URL:
<https://borgbackup.readthedocs.io/en/stable/quickstart.html#remote-repositories> (visited on 01/14/2024).
- [4] Duplicati project. *Duplicati*. Jan. 2024.
URL: <https://www.duplicati.com/>
(visited on 01/14/2024).
- [5] Thomas Limoncelli, Strata Chalup, and Christina Hogan. *The Practice of System and Network Administration: DevOps and other Best Practices for Enterprise IT*. 3rd ed. Vol. 1. Pearson Education, Nov. 2016. ISBN: 9780133415100. URL:
- [6] ReaR Project. *ReaR and Recover Linux Disaster Recovery*. Jan. 2024.
URL:
<https://relax-and-recover.org/>
(visited on 01/14/2024).
- [7] Restic project. *Restic*. Jan. 2024. URL:
<https://restic.net/> (visited on 01/14/2024).
- [8] Vorta Project. *Vorta*. Jan. 2024. URL:
<https://github.com/borgbase/vorta>
(visited on 01/14/2024).
- [9] Wikipedia. *Backup*. Jan. 2024. URL:
<https://en.wikipedia.org/wiki/Backup>
(visited on 01/14/2024).
- [10] Wikipedia. *List of backup software*.
Jan. 2024. URL:
https://en.wikipedia.org/wiki/List_of_backup_software (visited on 01/14/2024).



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