

Restic Backup for Linux

FreeNAS backup and replication

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Backup Linux and FreeNAS

- **Two use cases in my office**
 - Backup of my Linux laptop home dir
 - Backup of my FreeNAS storage
 - Static Files, ISO's Templates, Archived VM's
 - Active VM's

These cover the majority of all my backup needs.

Backup Linux and FreeNAS

- **Linux laptop backup (Ubuntu 16.04)**
 - Deja-Dup (GUI included with Ubuntu)
 - Few options, no cloud targets
 - Duplicity (cli)
 - Many targets, encryption(gpg), but no de-dup
 - Restic (cli + api)
 - Many targets, encryption(aes-256), global de-dup
 - Streaming operation
 - ~2x faster than duplicity

Backup Linux and FreeNAS

- **Linux laptop backup (Ubuntu 16.04)**

- Statistics

- Home Dir (200GB)
- Backup initial (~3 hours, FIOS to S3)
- Backup incremental over public Wifi ~ 3min
 - No VPN, no special ports, no mounted drives
- S3 usage ~150GB

Backup Linux and FreeNAS

- **Restic Init repository**

- Restic -r /path init
- Restic -r **sftp:user@host/path** init
- Export AWS_ACCESS_KEY_ID=xxxxxx
Export AWS_SECRET_ACCESS_KEY=yyyyyy
Restic -r s3:s3.amazonaws.com/bucket init

Backup Linux and FreeNAS

- **Restic sample commands**

- restic backup
- restic snapshots (list)
- restic check (remote meta-data)
- restic find (file or dir)
- restic restore latest -target /restore \
-path /home/dir
- restic mount /mnt/restic (FUSE mount all
snaps)

Backup Linux and FreeNAS

- **Restic advantages on S3**

- S3 has very restricted commands (put, get)
no modification of existing (disallows rsync)
- Restic essentially makes a remote filesystem
on S3 out of meta-data, and blobs
 - Meta-data (index, snapshots)
 - Blobs (1Mb to 8Mb encrypted files)
 - Blob name is the sha256 hash of contents

Backup Linux and FreeNAS

- **Restic de-dup**

- File Data cut into variable length 512k to 8Mb chunks, then encrypted.
- File contents determines chunk ‘cut points’
 - Shift-resistant variable-size blocks implemented with sliding window rolling-hash algorithm
 - Bit insertion/deletion doesn't alter other block checksums
 - Implemented with Rabin fingerprints (sliding 64bit window matches when lower x bits of checksum are 0 (similar to algorithm used by rsync)

Backup Linux and FreeNAS

- **Restic Demo**

- Written in Golang
- restic.net (download)
- rbackup script
<http://plone.4aero.com/Members/Imarzke/talks/restic/>

FreeNAS backup and replication

- **FreeNAS (FreeBSD, ZFS NAS)**

- Stable open-source multi-protocol NAS for servers, ESX, NFS shares, iSCSI, etc.
- Best with many HD, SSD, >16G RAM
- My lab/office NAS serves:
 - VM's, ISO, Plex DVR, Music, etc.



Dell 2950 III 32GB

6 x 2TB NL-SAS

FreeNAS backup and replication

- **Previous FreeNAS talks**

- Talk: ZFS and OpenStorage at PLUG, Oct 2011
- Howto: Building 10TB ZFS storage on Dell 2950, Apr 2014
 - This covers SmartOS , which was later replaced on the same HW with FreeNAS
 - SmartOS and FreeNAS both boot from USB media leaving all disks for storage.
- All talks at: plone.4aero.com

FreeNAS backup and replication

- **How to Backup FreeNAS ?**
 - Supported Options in FreeNAS v11.1U5
 - CloudSync to S3, Azure, GCP
 - ZFS send (to another ZFS server)
 - Cloud Sync great for:
 - Many small files
 - Large immutable files (ISO's , etc.)
 - Cloud Sync not ideal for Running VM's

FreeNAS backup and replication

- **How to Backup FreeNAS ?**

- Option 1, Cloud Sync

- S3, Azure, GCP, support via rclone
- All changed files uploaded again.
- Encryption support in 11.2 (rel 6/5/18)

- Rclone

- https://rclone.org/commands/rclone_sync/
- Similar to rsync -delete
- Compares modtime, size by default (not checksum)

FreeNAS backup and replication

- **How to Backup FreeNAS ?**

- Add s3 cloud sync

- Push/Pull
- Cred (key/secret)
- Bucket
- Folder
- Local NAS path
- Copy or Sync
(sync works like rsync -delete)

The screenshot shows the configuration form for a backup job in FreeNAS. The fields are as follows:

- Description:** Sync FSoftware
- Direction:** Push (with an information icon)
- Provider:** Credential
 - FreeNAS_CloudSync
 - Amazon S3 Buckets
 - 4aero.com
 - Folder: FreeNAS/FreeNAS_FSoftware
 - Server Side Encryption: None
- Path:** /mnt/bigpool/FSoftware (with a Browse button)
- Transfer Mode:** Sync
- Minute:** Every N minute (selected) / Each selected minute
 - 00 01 02 03 04 05 06 07 08 09

FreeNAS backup and replication

• S3 policy

- GUI needs two parts
- List all buckets
- Bucket 4aeroBackup
 - Bucket itself
 - contents of 1 folder only

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "VisualEditor0",
      "Effect": "Allow",
      "Action": [
        "s3:ListAllMyBuckets",
        "s3:HeadBucket"
      ],
      "Resource": "*"
    },
    {
      "Sid": "VisualEditor1",
      "Effect": "Allow",
      "Action": [
        "s3:PutAnalyticsConfiguration",
        "s3:GetObjectVersionTagging",
        "s3:CreateBucket",
        "s3:ReplicateObject",
        "s3:GetObjectAcl",
        "s3>DeleteBucketWebsite",
        "s3:PutLifecycleConfiguration",
        "s3:GetObjectVersionAcl",
        "s3:PutObjectTagging",
        "s3>DeleteObject",
        "s3:GetIpConfiguration",
        "s3>DeleteObjectTagging",
        "s3:GetBucketWebsite",
        "s3:PutReplicationConfiguration",
        "s3>DeleteObjectVersionTagging",
        "s3:GetBucketNotification",
        "s3:PutBucketCORS",
        "s3:GetReplicationConfiguration",
        "s3:ListMultipartUploadParts",
        "s3:PutObject",
        "s3:GetObject",
        "s3:PutBucketNotification",
        "s3:PutBucketLogging",
        "s3:PutAnalyticsConfiguration",
        "s3:GetObjectVersionForReplication",
        "s3:GetLifecycleConfiguration",
        "s3:ListBucketByTags",
        "s3:GetInventoryConfiguration",
        "s3:GetBucketTagging",
        "s3:PutAccelerateConfiguration",
        "s3>DeleteObjectVersion",
        "s3:GetBucketLogging",
        "s3:ListBucketVersions",
        "s3:ReplicateTags",
        "s3:RestoreObject",
        "s3:ListBucket",
        "s3:GetAccelerateConfiguration",
        "s3:GetBucketPolicy",
        "s3:PutEncryptionConfiguration",
        "s3:GetEncryptionConfiguration",
        "s3:GetObjectVersionTorrent",
        "s3:AbortMultipartUpload",
        "s3:PutBucketTagging",
        "s3:GetBucketRequestPayment",
        "s3:GetObjectTagging",
        "s3:GetMetricsConfiguration",
        "s3>DeleteBucket",
        "s3:PutBucketVersioning",
        "s3:PutObjectAcl",
        "s3:ListBucketMultipartUploads",
        "s3:PutMetricsConfiguration",
        "s3:PutObjectVersionTagging",
        "s3:GetBucketVersioning",
        "s3:GetBucketAcl",
        "s3:GetInventoryConfiguration",
        "s3:PutIpConfiguration",
        "s3:GetObjectTorrent",
        "s3:PutBucketWebsite",
        "s3:PutBucketRequestPayment",
        "s3:GetBucketCORS",
        "s3:GetBucketLocation",
        "s3:ReplicateDelete",
        "s3:GetObjectVersion"
      ],
      "Resource": [
        "arn:aws:s3:::4aeroBackup",
        "arn:aws:s3:::4aeroBackup/FreeNAS/*"
      ]
    }
  ]
}
```

FreeNAS backup and replication

FreeNAS VM backup

- Option 2 - ZFS replication
- Binary incremental diff
 - snapshot to snapshot
- No FS traversal to find diffs !
- No checksum computations
- Optional VM quiesce before snapshot (vCenter)

FreeNAS backup and replication

- **FreeNAS ZFS replication**

- Cloud provider (Rsync.net)
- FreeBSD VM
 - 1TB+
 - ssh access (provide FreeNAS public ssh key)
 - For info google (rsync + zfs)
- Use freeNAS GUI ssh public key (not root's ssh key)
- Remote Host key (used for known_hosts entry)

FreeNAS backup and replication

• Add Replication

- Remote vol/folder
- Compress = lz4
- Remote hostname
- Encrypt Cipher - fast
- Remote Hostkey
click “ssh key scan” to populate

Edit

Volume/Dataset:	bigpool/ftpsite
Remote ZFS Volume/Dataset:	data1/ftpsite
Recursively replicate child dataset's snapshots:	<input type="checkbox"/>
Delete stale snapshots on remote system:	<input checked="" type="checkbox"/>
Replication Stream Compression:	lz4 (fastest)
Limit (kB/s):	0
Begin:	03:00:00
End:	03:30:00
Enabled:	<input checked="" type="checkbox"/>
Remote hostname:	9647.zfs.rsync.net
Remote port:	22
Dedicated User Enabled:	<input type="checkbox"/>
Dedicated User:	
Encryption Cipher:	Fast
Remote hostkey:	9647.zfs.rsync.net ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQDFTs00sXYTQ EeLsUFETVUithGWXJSWAUyd6wpthMiZIHcmk46gKf QeW1LH/gefmQcULyVZk+lNc3spE09/GAuu8eJWBge cKGTsrHRT98PXKUW3TGMTXLt1/4gBvgCgAjbe+lM5 2ikedCa5Puf2yjaJ03qfEkvvv5BKLLPaJ5dUx9RHR 5k6A4RLLjwCJXeKAr78dGoKTEkvXejXg642fhfj0 mpepaL2uajmeRnS1+6qJk42IwvawjSyaSANYU4wJ3 IpebyAsdTOY5Q3uyrkNN/5UbHn7VD20reQhStzpu GrL4GtC+rxTr6WHyIapTBmf1Nr67j/3kpSaZRo/JD oVb 9647.zfs.rsync.net ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHhAYnTYAAAAIbmlzd HAYnTYAAABBBCTY0wckVywGZrcZNC5d0/op/03P0w kwbr16AyX5akv3s48Ql8fZHRq+2adMU000fsEJeJW FFnMO+0Vzs+4ktNU= 9647.zfs.rsync.net ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIJZ8HCHP19hJ1dSjs U3E3N6owsud774+VuGlwweYuAL5

OK Cancel Delete SSH Key Scan

FreeNAS backup and replication

- **Rsync.net as backup target**
 - Public Instructions only for rsync, not ZFS.
 - Google rsync + zfs for details
 - Requires 1TB+ account
 - Slightly more expensive than S3, but the only efficient way to backup running VM's to cloud.
 - [Arstecnica](#) article link
 - Rsync.net

Questions ?