Next-Generation Windows Backup

Linux and Windows backup · https://nuabee.com/documents/next-generation-windows-backup/

Background and challenges

Nuabee has been operating a cloud-native Windows backup solution (to S3 storage) for a decade. However, this solution has critical limitations:

Issues identified

- **Poor performance** on file servers containing a large number of files (several million)
- **Critical threshold**: beyond 3-4 TB of data per disk to be backed up, malfunctions occur.
- **Insufficient restore speeds**, particularly problematic in DRP contexts where large filers of several dozen TB must be restored within 4 hours.

Strategic evolution

Building on the success of our tests on very large Linux file servers (over 20 TB) using Restic on Linux environments, Nuabee launched the development of a Windows agent in 2024 based on this proven engine.

The Restic engine: disruptive technology

Restic, an open source project launched in 2014, is revolutionizing the traditional approach to backup thanks to several major technical innovations.

Déduplication intelligente

- **Segmentation** based on *content-defined chunking* mechanisms
- **Granular elimination** of redundancies at the source
- Sharing data between servers to optimize storage space (repository)
- **Significant reduction** in the volume of data transferred

Advanced Snapshot System

- **Complete state capture** at a given moment in time
- **Fast and accurate restoration** by a specific date
- **Lifecycle management** via retention policies (Linear or via GFS)
- **Intuitive navigation** through backup history

Portability and flexibility

- **Multi-target support**: S3, Wasabi, Backblaze B2, NAS, SAN
- Uniform data format ensuring portability
- **Simplified migration** between environments
- **Independence** from storage providers

Optimized performance

- **Development in GO language** for maximum efficiency
- ZSTD compression to reduce network footprint
- **Exceptional restore speeds**: several TB/h in a cloud environment
- Native parallelization of operations

CERN, a global leader in critical infrastructure, relies on Restic for:
~ 2.5 billion files backed up
~ 18 petabytes of data managed
Operational reliability proven over several years

The Nuabee Windows Image Agent

Technical architecture

The agent leverages the Windows Volume Shadow Copy Service (VSS), automatically creating transparent snapshots for each volume to be backed up. This approach ensures data consistency even on production systems.

Extended compatibility

Full support for current Windows Server versions:

- **Windows Server 2012 R2** to **Windows Server 2025** (beta)

Native VSS integration

- **Transparent snapshots** without service interruption
- **Application consistency** guaranteed
- **Automatic management** of file locks
- Compatibility with critical databases and applications

Catering services

Performance objectives

Final testing in a Windows environment targets performance **greater than 1 TB/h**, in line with existing Linux results.

Benchmark results (Linux)

The environments demonstrate restoration capabilities of 1 to 2 TB/h under optimal conditions:

Recommended configuration:

- **8 vCPU** minimum
- **16 Go RAM** minimum
- Dedicated high-speed network
- SSD storage for temporary caches

Optimization factors

- **Parallelization** of restoration flows
- **Smart cache** for frequently accessed data
- **Adaptive compression** based on content type
- Network optimization to minimize latency

Competitive advantages of this solution

For critical environments

- **Scalability**: Native management of multi-terabyte environments
- **Reliability**: Proven architecture in demanding environments
- **Performance**: Recovery speeds adapted to DRP requirements

For operation

- **Flexibilité** : Support multi-cloud natif
- **Savings**: Drastic reduction in stored volumes
- **Serenity**: A sustainable and scalable open-source solution

This new generation of Windows agents marks a decisive step forward in Nuabee's backup strategy, combining technical robustness with operational excellence.