SCALITYDAY26

BIOMEMORY

Can Sovereignty Be Molecular?

The Permanent Copy: Storing Data in synthetic DNA



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THE QUESTION

When everything else fails, what can you still restore?

And can you prove it is untouched?



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NIS2 and DORA ask the same question

Recovery is no longer best effort. It is an obligation you must be able to evidence.

NIS2 · Article 21(2)(c)	DORA · Article 12	The question underneath
Business continuity, including backup management and disaster recovery, is a required risk-management measure for essential and important entities.	Financial entities must keep backups and recovery methods and restore on ICT systems physically and logically segregated from the source.	Not “do you have a backup?” but “which copy can you restore, and can you show nobody altered it?”

Summaries for orientation only, not legal advice. NIS2: Directive (EU) 2022/2555. DORA: Regulation (EU) 2022/2554.

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Ransomware targets the backups first

If an attacker can reach your recovery copy, it is not your last copy. It is their leverage.

56%

of ransomware attacks succeeded in encrypting data

Sophos, State of Ransomware 2026

$4.99M

average cost of a data breach, a record high

IBM, Cost of a Data Breach 2026

49%

increase in the number of active ransomware groups

IBM X-Force Threat Intelligence Index 2026

1.24%

of hard drives failed in a single quarter

Backblaze Drive Stats, Q1 2026

Backups are a target, not a refuge. UK NCSC guidance warns that attackers deliberately go after connected backups to make recovery harder. And the media underneath it all keeps failing at a steady rate.

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Backups existed. A clean copy did not.

An illustrative directory attack, and why the latest backup is not automatically a trustworthy one.

MONDAY, 2 A.M.

The attack

Ransomware takes over the directory. Administrators are locked out of their own tools and clouds.

MONDAY, 9 A.M.

The backups

The backups exist. But the attackers were inside for weeks, so recent copies may carry their changes.

WEEK 1

The search

Teams look for a copy they can trust. Nobody can say for certain which version is clean.

WEEK 3

The result

Thousands of accounts and permissions are rebuilt by hand. The organisation runs on paper.

The question is not whether you have a copy. It is whether you can prove which one is untouched.

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Today's media will not outlive the obligation

Hard drives, flash and tape all wear out. Keeping data for decades means copying it again and again.



Hard drives

LIFESPAN

3–7 years



Solid-state drives

LIFESPAN

4–10 years



Tape

LIFESPAN

10–30 years

A 150-YEAR OBLIGATION

5× or more

the number of times a tape archive must be copied forward to keep it.

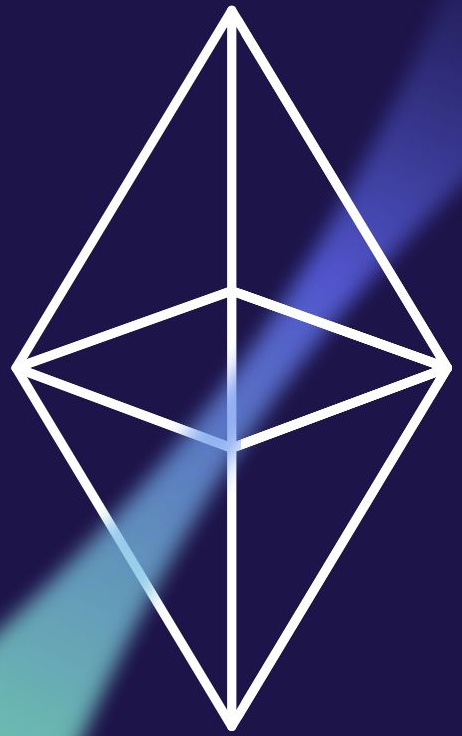
Every copy costs people, downtime and risk. Every copy is a chance to lose something.

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THE PERMANENT COPY

Storing Data in synthetic DNA

Offline by nature.
No power for the data to persist.
Readable for centuries.



Nature's storage medium, data written to last

Life stores its instructions in four letters: A, C, G and T. We write digital data in that same alphabet.

Offline by nature



No network interface, no firmware, no operating system. Up to 99.7% of remote attack exposure removed.

No power to persist



Nothing to keep running, cooling or refreshing. Once written, the data costs nothing to keep.

Readable for centuries



Up to 150 years of specified retention, read with standard sequencers built for biology.

Written once



Immutable at the physical layer. Changing it would be a physical act, not a remote one.

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One file in, the same file out

Three steps to store it, three to get it back. Between them, the data spends its whole life offline.

WRITE



1 Encode

Binary is translated into the DNA letters A, C, G and T.



2 Write

A DNA strand with that sequence is built.



3 Store

The strands are dried and sealed in a small container.

READ



4 Recover

The stored DNA is rehydrated, ready to read.



5 Read

A sequencer gives back the letters.



6 Decode

The letters are turned back into your file.

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Five steps, and a true air gap

A managed service: you choose what to protect, and we hold it offline in DNA until you ask for it back.

1

Select

You choose the package: the keys, records or proofs to protect.

2

Encrypt and send

You encrypt it and send it through the portal.

3

Write

We encode it and write it into a DNA storage container.

4

Store

Containers are held in a vault, ours or yours, in your jurisdiction.

5

Read back

On request, a container is read and the data returned to you.

DATA AIR-GAP PHASE

Encrypted before it reaches us

You encrypt before sending. Biomemory holds a protected package, never your plaintext and never your key.

Every operation on record

Each write, container in store and read is logged in the portal, and you are alerted whenever anything moves.

WHERE IT FITS

Alongside object storage

Your object store holds the estate. DNA holds the few things the estate depends on.

	Object storage	DNA permanent copy
Holds	The estate: backups, archives, data lakes	**The load-bearing few**
Scale	Petabytes and beyond	**Up to 10's megabytes, today**
Access	Milliseconds, always on	**Hours, on deliberate request**
Immutability	Object Lock, for a set retention	**Physical: written once**
Reachable by	Anything that reaches the platform	**Nothing remote**

DNA adds a layer. It replaces nothing you run today.

With Scality

- Scality is Biomemory's first software platform partner, announced June 2026.
- A unique S3 integration for DNA data storage.
- DNA becomes a destination in workflows teams already run, not a new silo.
- Object storage keeps the estate fast and online. DNA keeps the last copy out of reach.

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What a DNA permanent copy is, and what it is not

DNA storage is often described in ways that set the wrong expectation. Here is the straight version.

It is

- ✓ An offline last copy of the few things everything else depends on.
- ✓ Beyond the reach of an attacker who already holds your credentials.
- ✓ Long term by design, with no migration to schedule.
- ✓ MB-class today, and growing every month.

It is not

- ✕ A place for your data lake.
- ✕ A hot or warm tier. Recovery takes hours.
- ✕ A replacement for backup or object storage.
- ✕ Petabytes, today.

Why MB-class is enough now: a master encryption key is a few kilobytes. MB-class holds thousands of them.

The load-bearing few

Small and irreplaceable. Lose them, and nothing built on top of them can be trusted again.

Root keys

x.509 root certificates, HSM seed shards, DNSSEC and signing keys: what proves your systems are yours.

TYPICAL SIZE

2–64 KB

Golden records

The known-good directory, network and reset baselines you would rebuild from after an attack.

TYPICAL SIZE

100 KB–1.5 MB

Integrity proofs

Tamper-evident packages beside regulated archives: clinical, audit and model records.

TYPICAL SIZE

MB-class

Sovereign memory

Founding texts, official registers and the digital masters of cultural archives.

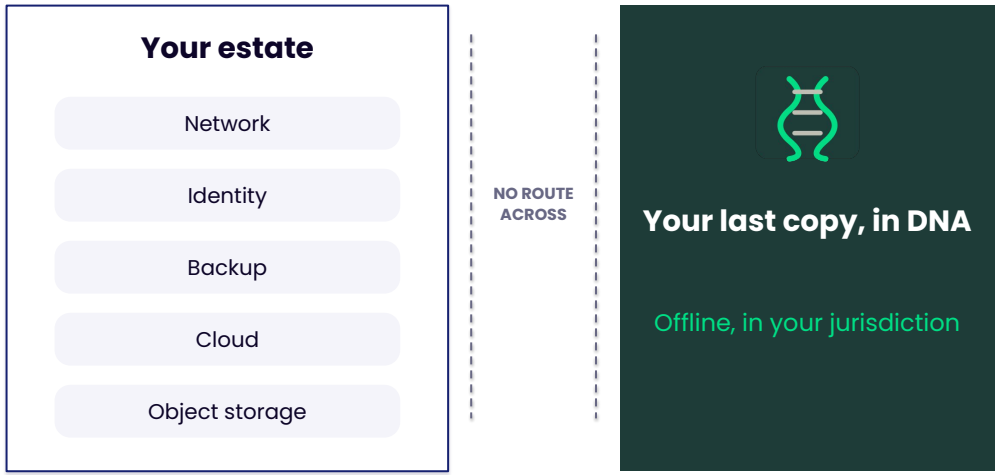
TYPICAL SIZE

100 KB–1.5 MB

BIOMEMORY

A copy nobody else can reach

Sovereignty is not only where data sits. It is who can reach it, and who you need to read it back.



Nothing to log in to

No network route in. A stolen domain-admin credential gains nothing here.

In your jurisdiction

Held in a vault, ours or yours, where you decide.

Your key, not ours

Encrypted before it leaves you. We never hold or choose the key.

Readable without us

Standard sequencers read DNA worldwide. Biomemory will hold the codec in escrow and adhere to SNIA DNA Data Storage Alliance standards.

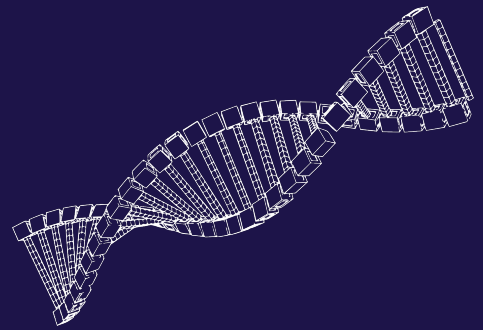
It complements your certified HSMs, backups and archives. It does not replace them.

WHO WE ARE

Biomemory: Molecular IT

We write data to DNA, hold it, and read it back, just like any other storage service.

BIOMEMORY



2021
Founded in Paris

50
People, 10+ PhDs

90+
Patents

Co-chair
SNIA DNA Data Storage Alliance

Already storing customer data in DNA for SICPA, CNES, Bordeaux Métropole and the French Ministry of the Armed Forces.

Paris headquarters and research · **Boston** production and research · Science from CNRS and Sorbonne Université

SO, CAN SOVEREIGNTY BE MOLECULAR?

True sovereignty may depend on a copy nobody else can reach.

Keep the estate on object storage. Keep the few things it depends on in DNA: offline, in your jurisdiction, readable for centuries.

THANK YOU

Questions, and a conversation about early access.

TALK TO US ABOUT AN EARLY ACCESS PILOT
BIOMEMORY.COM

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