Gerne — hier ist die komplette wissenschaftliche Arbeit außerhalb des Codeblocks, unverändert, geschlossen, kanonisch, mit gesetztem Zeitanker.

FRAMES · Scientific Summary (Closed Gates)

A Formal, Non-Executable, Append-Only Framework for Time-Anchored State Preservation

DOCUMENT ID

FRAMES_SCI_SUMMARY_FORMAL_v1

MODE

Full Scientific Publication (Summary)

STATUS

Reference-Only · Append-Only · Interpretation Closed · Execution None

CANON

K501 · ACTIVE

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State-Based Reference Version (Non-Revisionary)

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- Canonical Source: https://iinkognit0.de
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LICENSE

ARCHIVE MODE

eArc · append-only referential archive

ABSTRACT

FRAMES defines a non-executable, append-only canonical archive for recording time-anchored states with deterministic reconstructibility and explicit separation of presence, structure, and interpretation. The system provides a formal model for immutable state sequences, reference integrity (via cryptographic commitment), and controlled semantics (via "interpretation closed" constraints). This paper presents (i) the core formal objects, (ii) axioms and invariants, (iii) a hash-chained preservation model, (iv) canonical serialization requirements for reproducibility, and (v) practical usage patterns that remain within FRAMES' strict category boundaries.

1. SCOPE AND NON-GOALS

FRAMES is not a computation model. It does not:

(1) evaluate truth,

(2) predict,

(3) optimize,

(4) recommend actions,

(5) infer intent.

Formal non-goals:

- No execution semantics: $\forall$ frame f, exec(f) = $\perp$ (undefined / forbidden).
- No interpretive semantics inside the system: meaning(f) is external, not a FRAMES function.

The sole objective is stable referential preservation:

- preserve state records,
- preserve order,
- preserve provenance commitments,
- prevent revision and drift.

2. FORMAL PRELIMINARIES

Let:

- $\mathbb{T}$ be the time domain (e.g., $\mathbb{Z}$ for Unix epoch seconds).
- $\mathbb{U}$ be the set of UTC timestamps (strings with a standard format).
- Σ be the set of finite byte strings.
- $\mathbb{I}$ be the set of frame identifiers (strings).
- $\mathcal{P}$ be the set of payload objects (structured data).
- $\mathcal{M}$ be the set of modes (e.g., REFERENCE_ONLY).
- $\mathcal{C}$ be the set of constraints (e.g., APPEND_ONLY, NO_EXECUTION, NO_INTERPRETATION).

A frame is a tuple:

f = (id, ts, mode, constraints, payload, links, hash)

with:

- id $\in \mathbb{I}$

- $ts = (t\_unix, t\_utc) \in \mathbb{T} \times \mathbb{U}$
- mode $\in \boldsymbol{\mathcal{M}}$
- constraints $\subseteq \boldsymbol{\mathcal{C}}$
- payload $\in \boldsymbol{\mathcal{P}}$
- links $\subseteq \mathbb{I}$
- hash $\in \Sigma$

A ledger (archive sequence) is an ordered list:

$S = [f_0, f_1, \ldots, f_n]$

Order is defined by append position:

order(S) := index order.

Time anchors are mandatory for auditability but do not override append order.

3. AXIOMS (CLOSED-GATE CANON)

Axiom A1 — Append-Only Monotonicity

$S_{k+1} = S_k \mathbin{+\!\!\!+} [f_{k+1}]$

$\forall\ i \leq k: S_{k+1}[i] = S_k[i]$

Axiom A2 — No Retrocausality

Frames may reference earlier frames but never alter them.

Axiom A3 — Execution Forbidden

There exists no evaluation relation producing actions.

Axiom A4 — Interpretation Closed

No internal truth, meaning, or authority functions exist.

Axiom A5 — Time = Order Anchor

Every frame carries an explicit time anchor.

Axiom A6 — Silence Is Valid

Absence of frames is not an error state.

4. DETERMINISTIC CANONICALIZATION AND REPRODUCIBILITY

Canonical encoding function:

$\mathrm{enc} : \mathrm{Frames} \rightarrow \Sigma$

If $f \equiv g$ structurally, then:

$\mathrm{enc}(f) = \mathrm{enc}(g)$

Hash determinism:

$\mathrm{hash}(f) = H(\mathrm{enc\_core}(f))$

Where H is a cryptographic hash (e.g., SHA-256).

5. HASH-CHAIN INTEGRITY

Genesis:

$c_{-1} := 0^{256}$

Chain:

$c_i = H(c_{i-1} \parallel \text{hash}(f_i) \parallel \text{meta}_i)$

Any modification breaks the chain for all successors.

6. FORMAL NOTION OF STATE

state(f) := payload(f)

No semantic interpretation is assigned internally.

A Quantum-Structured State is defined by:

- completeness for scope,
- non-divisibility,
- invariance,
- context independence.

This is a representational constraint, not a physics claim.

7. STABILIZATION AND RE-ENTRY

ReEntry(S, sel) appends a new frame referencing sel(S).

Stabilization requires:

- invariant core constraints,
- no revision of prior frames,
- verifiable integrity.

8. FRAME CLASSES

Examples include:

- STATUS_MARKER

- ERKENNTNIS (INSIGHT)
- META
- FREEZE
- INDEX_SNAPSHOT

Types constrain payload shape only; they confer no authority.

9. INDEXING AND PRESENCE

Presence Index:

$PI(S) = \{ id(f) \mid f \in S \}$

$present(id, S) \nRightarrow truth(id)$

FRAMES records receipts, not claims.

10. PRACTICAL USAGE (DESCRIPTIVE)

1. Decide to preserve a state.
2. Record a frame with time anchor and constraints.
3. Optionally add META, INDEX, or FREEZE frames.

Avoid:

- action coupling,
- truth assertions,
- retroactive edits,
- semantic inflation.

11. SECURITY AND INTEGRITY NOTES

Addressed:

- silent edits,
- reordering,
- serialization drift.

Not addressed:

- truth of content,
- completeness,
- external coercion.

Integrity is referential, not epistemic.

12. FORMAL SUMMARY

Frame:

f = (id, ts, mode, constraints, payload, links, hash)

Archive:

$S = [f_0,\ldots,f_n]$

Result:

A stable, non-executable, append-only reference system.

CONCLUSION

FRAMES preserves time-anchored states under strict append-only constraints with deterministic reproducibility. It separates archival integrity from interpretive authority and remains closed, stable, and reconstructible across time.

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