

HX-Fusion

Deterministic Data Fusion & Mission-Answer Runtime

RELEASE CANDIDATE Local Runtime v1.0.0-rc1 | Embeddable software for ISR and decision-support integration

HX-Fusion converts supported multi-source evidence and structured mission questions into evidence-backed answers, explicit requests for missing information, or abstentions. It reconciles evidence, selects qualified computation and data representations, then compiles the smallest supported packet that satisfies endpoint and disclosure requirements. The Julia-native runtime provides the fusion-and-answer layer between source analytics and receiving applications—not merely another way to compress sensor data.

EVIDENCE → STATE → INTENT → PLAN & EXECUTE → REASSESS → PACKET → RECOVER

Evidence and time integrity

Preserves event, validity and arrival time, source lineage, uncertainty, correlated support, contradictions and retractions. Fixed windows, explicit watermarks and duplicate handling keep changing inputs traceable.

Representation-aware planning

Selects qualified data representations and explicit transitions under declared error and resource bounds. Unavailable or unsupported paths fail closed; there is no silent substitution.

Bounded multi-subject runtime

Isolates subject state, serializes conflicting work and overlaps eligible private preparation. Fixed workers, bounded queues and typed backpressure control admission without treating queue acceptance as a committed result.

Intent-driven execution

Assesses state against scope, freshness, uncertainty and policy; selects declared, qualified operator graphs; executes and reassesses whether the requested answer is actually supported.

Endpoint-sufficient packets

Produces minimal, standard or diagnostic HX-binary packets within exact encoded-byte budgets. Required uncertainty, freshness, provenance and contradiction disclosure remain intact. Refuses when no valid packet fits.

Durable, reproducible decisions

Journal-first commits, immutable histories, content-addressed artifacts and idempotent retries retain state, resolution and packet issuance separately. Checkpoint-suffix recovery reproduces canonical results and exact packet bytes.

ANSWER

Required targets are supported.

ACQUIRE

Identifies missing evidence requirements.

ABSTAIN

No complete answer or acquisition path.

Operational refusals and failures remain separate. ACQUIRE does not task a source; packet issuance does not assert delivery.

DEMONSTRATED CAPABILITY

Runtime v1. Recorded validation: 4,252 assertions across 89 groups; public two-subject lifecycle; one-/four-thread canonical parity; release self-test and exact recovery.

Bat Cave / Hurricane Helene. A bounded public-data ISR-surrogate exercise used 134 frozen government responses through an offline evidence adapter. It preserved route traversability as UNKNOWN and returned ACQUIRE, with packet and recovery parity. Bounded PASS.

PRODUCT & INTEGRATION

An in-process Julia runtime for single-node CPU execution, validated on Ubuntu Linux / Julia 1.12.6. The release includes public APIs, deployment instructions, a self-test and frozen qualification evidence.

Integration-specific adapters are required to map sensor analytics, model outputs and reports into supported evidence contracts. Host applications supply interfaces, communications and display.

CURRENT QUALIFICATION Bounded scalar-interval consensus (IntervalConsensusV0). Domain-specific algorithms and target environments require scoped integration and qualification. No claim of arbitrary sensor exploitation, autonomous collection, transport/delivery, QTT, GPU or distributed execution.

Evidence basis: v1.0.0-rc1 source and bound validation records (bb9a7590); RWQE-001 qualification report and receipt.