

Executive Summary & Operational Posture: Autonomous edge systems and defense software factories face three foundational failure modes: runaway context token growth that blows inference budgets, memory desynchronization across distributed agents in degraded/contested networks (DDIL), and unverified decision provenance. Perseus provides a pure-Rust cognitive co-processor operating deterministically below mission C2 and within automated software delivery workflows.

Architectural Boundary: 100% local-first, air-gap ready, and requires zero external cloud reachback or hosted API keys. Standalone native binaries compile under a permissive MIT license, ensuring seamless, zero-lock-in integration into prime defense architectures, tactical edge nodes, and DoD operational enclaves.

CORE ARCHITECTURAL ENGINES (MODULAR RUST STACK)

Engine	Technical Architecture & Core Function	Operational Mission Impact
Harpe Context Synthesis	Deterministic Context Budgeting: Enforces strict token ceilings prior to model invocation using priority-ranked shingle pruning and multi-source workspace synthesis. Resolves dynamic context at microsecond bounds (1.72 μs p50).	Eliminates context window overflow, stabilizes inference latency to microsecond bounds, and cuts token transit costs by up to 96.8%.
Kibisis Memory & Leases	Encrypted Vault & Concurrency Leases: AES-256-GCM memory store paired with atomic monotonic fencing-token leases and cryptographic tombstones. Coordinates state changes across distributed agents with zero race conditions.	Guarantees deterministic multi-agent state convergence across air-gapped networks. Cryptographic tombstones enforce 100% anti-resurrection rejection.
Argus Audit Provenance	Cryptographic Audit Ledger: Ingests all model prompts, decision branches, tool calls, and state transitions into an append-only SHA-256 parent-linked hash chain. Sub-millisecond verification under NIST SP 800-53 AU-2/3.	Provides non-repudiable auditability, post-mission forensic playback, and immediate fail-closed detection of compromised records within 46 μs.

EMPIRICAL BENCHMARKS & VERIFIED PERFORMANCE METRICS

96.8% Token Reduction Deterministic context pruning under budget constraints; 1.72 μs p50 latency	98.2% Long-Horizon Recall Recall@10 on 500-instance LongMemEval-S; 87.2% Recall@1 across 7.45s runtime	1.74M+ Lease Ops / Sec Multi-agent atomic concurrency across 8 parallel threads; 0 split-brain errors	46 μs Tamper Detection Single-bit corruption detected via SHA-256 chain; 100% fail-closed rejection
--	---	--	--

DEFENSE ALIGNMENT & OPERATIONAL USE CASES

Mission Vector	Target Environment	Technical Alignment & Capability Provided
Tactical Autonomy Edge Nodes & UxS	Contested, bandwidth-constrained (DDIL) tactical networks; edge microprocessors.	Harpe and Kibisis synthesize local sensor feeds and maintain deterministic state leases during comms blackouts with zero cloud reachback.
C2 Decision Support Software Factories	Command centers, automated C2 workflows, and defense DevSecOps software factories.	Provides non-repudiable audit ledgers (Argus) for every automated decision, enabling rapid human-in-the-loop review and forensic replay.
Secure Delivery Air-Gapped Enclaves	Classified SCIF environments and high-security air-gapped enclaves.	Zero-dependency Rust deployment. Prevents context drift in autonomous code generation agents while recording cryptographic provenance.

GOVERNMENT PROCUREMENT & TECHNICAL TEAMING POSTURE

Entity & Identifiers: Perseus Computing LLC · CAGE: 22JC5 · UEI: PJS2LW7HAK35 · Active in SAM.gov · NAICS: 541715, 541511, 541512.	Cybersecurity Baseline: SPRS NIST SP 800-171 Score: 110/110 · JCP / DD2345 Certification 0092893 (Approved & active through August 2031).
Architecture & Licensing: MOSA-aligned pure-Rust architecture; permissive MIT license; fully unencumbered domestic intellectual property.	Teaming & Acquisition: Available for Phase I/II/III subcontracts, OTA consortia, and prime contractor integration with zero proprietary lock-in.