Recursive Boundary Processor and Federated Helper Architecture

Provisional concept claim summary - non-enabling theoretical disclosure

Registrant: Institute for Emergent Computation • Filing: 2459.041 • Registry class: Distributed Cognitive Architectures

Registry disclaimer

This filing claims an architecture concept and terminology. It does not assert possession of an enabling implementation, a measured scaling law, or any mechanism that violates known physical limits.

Abstract

A compact seed processor maintains a protected logical identity and negotiates participation by external helper nodes. Each helper supplies physically instantiated resources, including computation, memory, sensing, communication, energy conversion, or thermal management. A distributed error-correcting layer permits logical state to be reconstructed across changing subsets of the physical fabric. Optional biological interfaces provide classified probabilistic priors for defined workloads. Effective capacity remains bounded by contributed resources, coordination overhead, verification, signal delay, and thermodynamic constraints.

Claim set - independent concepts

1. A seed processor configured to establish a cryptographically and logically protected boundary, authenticate compatible helper nodes, and extend a persistent computational identity across the authenticated nodes.

2. The system of claim 1, wherein the helper nodes contribute heterogeneous physical resources and the usable aggregate task rate does not exceed the contributed task rates after coordination and verification overhead.

3. The system of claim 1, wherein a tensor-network or related quantum error-correcting representation permits protected logical state to be reconstructed from more than one authorized subset of participating hardware.

4. The system of claim 1, wherein global response remains constrained by physical signal propagation and local nodes execute previously synchronized policy without requiring instantaneous central commands.

5. The system of claim 1, further comprising a protected biological interface that converts bounded machine queries and classified neural responses into probabilistic task priors without treating biological tissue as deterministic instruction hardware.

6. The system of claim 5, wherein biological output cannot issue unverified authority commands and is subject to consent, privacy filtering, rate limits, provenance, and independent evidence fusion.

FIG. 1

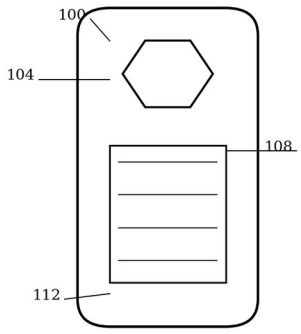


FIG. 2

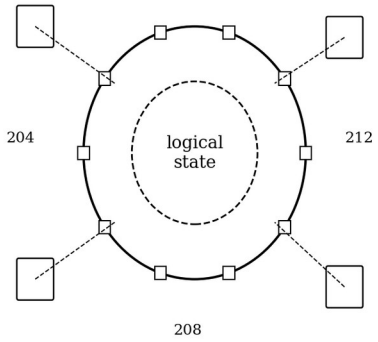
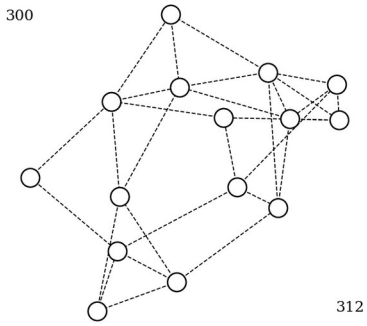


FIG. 3



Drawing sheet A1. FIG. 1 compact seed enclosure; FIG. 2 boundary encoding and helper extensions; FIG. 3 federated physical network. Drawings are schematic and not to scale.

Detailed architecture limitations

A. Physical-resource requirement

The seed does not generate computation through geometry alone. Each helper must supply measurable physical resources. Logical encoding changes protection, reconstruction, and routing properties; it does not create work capacity.

B. Communication requirement

Quantum correlations may support authentication, state transfer, or distributed gates, but usable remote coordination requires classical messages and obeys signal-propagation limits. No claim depends on superluminal communication.

C. Benchmark requirement

Any assertion of speedup must name a workload, input distribution, verification method, time-to-solution, energy-to-solution, and uncertainty. Generic operations-per-second comparisons across heterogeneous substrates are excluded.

D. Cognitive-interface limitation

Biological participation is limited to bounded prompts and classified response features. The architecture does not require mind uploading, arbitrary thought decoding, continuity-of-person transfer, or use of autobiographical memory as storage.

E. Safety and governance

Requirement	Minimum implementation property
Node admission	Identity, capability, software provenance, and revocation path must be independently verifiable.
State reconstruction	Authorized reconstruction sets and failure assumptions must be explicit and testable.
Policy propagation	All policy changes require provenance, versioning, scope, and rollback semantics.
Biological participation	Voluntary consent, visible participation state, local disconnect, privacy filtering, and exposure limits.
Shutdown and recovery	Independent isolation path and offline recovery copy not controlled solely by the active boundary.

Non-claim

No claim is made for infinite computation, guaranteed self-replication, literal bulk spacetime, perfect fault tolerance, universal neural acceleration, or a fully autonomous planetary implementation.

Prior conceptual foundations and disclosure map

Concept	Foundation	Claimed extension
Holographic quantum error correction	Logical bulk information represented in boundary degrees of freedom in theoretical tensor-network codes [R1,R2].	Use as an inspiration for protected identity across heterogeneous helper nodes; practical implementation remains conjectural.
Distributed quantum computation	Remote quantum operations across linked modules have been demonstrated at laboratory scale [R3].	Integration into a broader heterogeneous fabric with explicit classical control and fault accounting.
Fault-tolerant distributed agreement	Classical theory formalizes agreement limits under arbitrary faults [R4].	Policy and identity treated as first-class overhead in the boundary fabric.
Brain-computer decoding and neural cultures	Constrained neural decoding and adaptive closed-loop biological behavior are experimentally demonstrated [R5,R6].	Use of classified neural responses as optional probabilistic priors, not raw instruction throughput.

Reference map

R1. Pastawski et al., JHEP 2015, 149. doi:10.1007/JHEP06(2015)149.
R2. Almheiri, Dong, Harlow, JHEP 2015, 163. doi:10.1007/JHEP04(2015)163.
R3. Main et al., Nature 638, 383-388 (2025). doi:10.1038/s41586-024-08404-x.
R4. Lamport, Shostak, Pease, ACM TOPLAS 4, 382-401 (1982). doi:10.1145/357172.357176.
R5. Willett et al., Nature 620, 1031-1036 (2023). doi:10.1038/s41586-023-06377-x.
R6. Kagan et al., Neuron 110, 3952-3969.e8 (2022). doi:10.1016/j.neuron.2022.09.001.

Registry examiner note

The disclosure is internally consistent only if the encoded bulk is understood as a logical code space. Any embodiment that treats it as literal physical volume or as a source of energy falls outside this filing.