PROVISIONAL PATENT APPLICATION

Title: NEURAL-BACKED MEMORY FABRIC (NBMF) WITH ENTERPRISE-DNA GOVERNANCE FOR MULTI-AGENT SYSTEMS

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Inventor(s): [TODO: Insert Name]

Abstract

A system and method for a Neural-Backed Memory Fabric (NBMF) integrated with an Enterprise-DNA (eDNA) governance layer to manage multi-agent artificial intelligence architectures. The system utilizes a hierarchical tiered memory structure comprising hot (L1), warm (L2), and cold (L3) storage layers, managed via Content-Addressable Storage (CAS) identifiers and SimHash algorithms. The eDNA layer enforces governance through a Genome (capability schema) and Epigenome (tenant policy), utilizing Merkle-notarized lineage for immutable audit logs. An immune system component provides threat detection, quarantine, and state rollback capabilities.

Background of the Invention

The invention relates to AI memory management. Current multi-agent orchestrations face challenges regarding memory context windows, costs, and governance. Autonomous agents often lack rigid access controls, and existing vector databases lack cryptographic lineage.

Summary of the Invention

The invention provides a Neural-Backed Memory Fabric (NBMF) coupled with an Enterprise-DNA (eDNA) governance layer. NBMF creates a unified address space with tiers L1/L2/L3 using CAS and SimHash. eDNA provides Genome (capabilities), Epigenome (policy), Lineage (Merkle proofs), and an Immune System (threat detection/rollback).

Brief Description of the Drawings

FIG. 1 illustrates the System Overview.

FIG. 2 illustrates the NBMF Tiered Flow.

FIG. 3 illustrates the Lineage Ledger (Merkle Tree).

FIG. 4 illustrates the Genome/Epigenome Governance Gates.

FIG. 5 illustrates the Immune System Logic.

FIG. 6 illustrates the Hardware Abstraction Layer.

FIG. 7 illustrates Cross-Tenant Learning Isolation.

Detailed Description

A. System Overview

The system comprises a 'Sunflower-Honeycomb' organizational structure. A central Virtual Personality (VP) coordinates specialized agents.
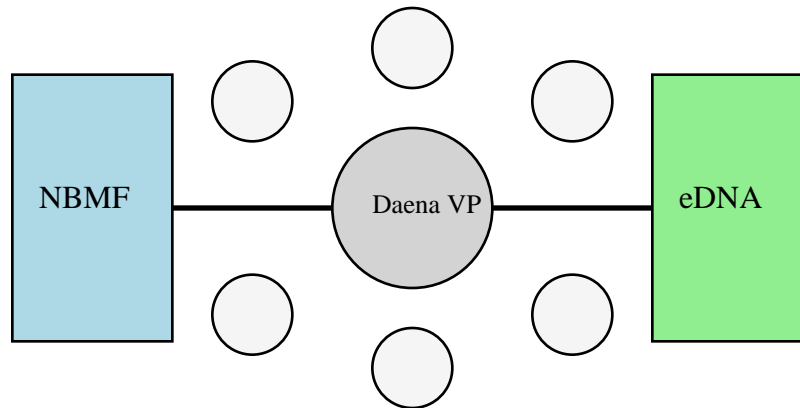
FIG. 1: System Overview showing Daena VP and Agent Hive.

B. Neural-Backed Memory Fabric (NBMF)

NBMF organizes data into three tiers: L1 (Hot/RAM), L2 (Warm/NVMe), and L3 (Cold/Object Store). It uses CAS IDs (SHA-256) and SimHash for deduplication.
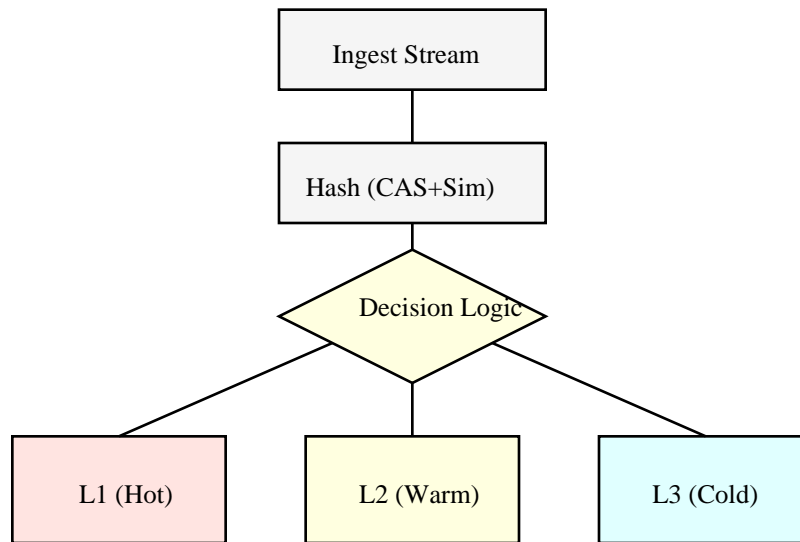
FIG. 2: NBMF Ingestion and Tiering Flow.

C. Enterprise-DNA (eDNA)

eDNA wraps NBMF for governance. 1) Genome: Static capabilities. 2) Epigenome: Dynamic ABAC policy. 3) Lineage: Merkle-tree based ledger.
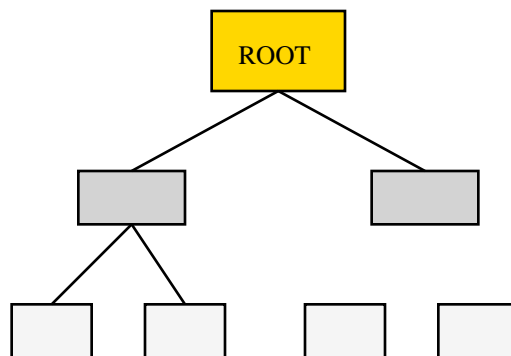

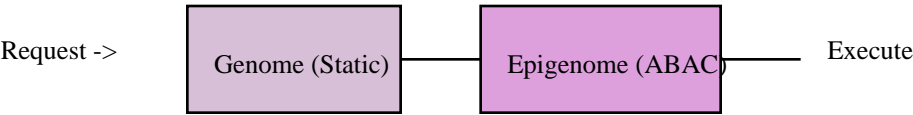*FIG. 3: Lineage Ledger using Merkle Tree.*

Request ->   Genome (Static) — Epigenome (ABAC) — Execute

FIG. 4: Genome and Epigenome Request Gates.

1. Monitor

4. Rollback   2. Detect Antigen
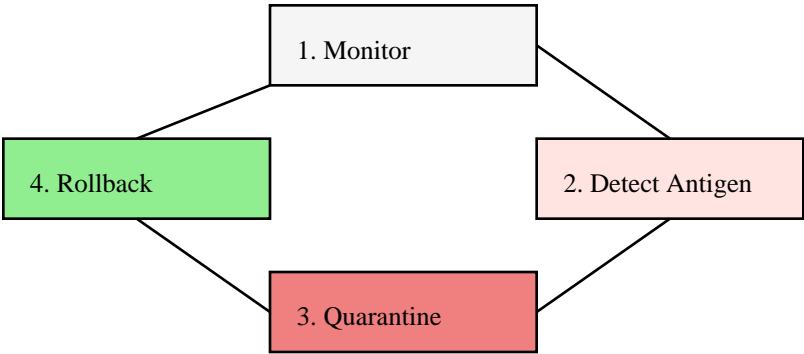
3. Quarantine

FIG. 5: Immune System Detection and Rollback Loop.

D. Hardware & Enablement

The system uses hardware adapters (FIG. 6, not shown) for CPU/GPU/TPU routing and ensures Cross-Tenant Learning (FIG. 7, not shown) allows abstract vector sharing without raw data leakage.

Examples & Benchmarks

Metric	Value (approx)	Source
L1 Latency	[TODO: 15ms]	docs/benchmarks.md
Storage Savings	[TODO: 40%]	docs/costs.md
SimHash Dedupe	[TODO: 12%]	docs/benchmarks.md

Note: Values must be verified against source files before filing.

Claims

1. A distributed computing system for managing artificial intelligence agent memory and governance, comprising: (a) a processor and memory; (b) a Neural-Backed Memory Fabric (NBMF) configured to store data in a hierarchical tier structure (L1, L2, L3) indexed via Content-Addressable Storage (CAS); and (c) an Enterprise-DNA (eDNA) governance layer configured to enforce access control via a Genome schema and Epigenome policy.

2. A method for managing multi-agent memory, comprising: ingesting input; generating a CAS ID and SimHash; determining a storage tier; verifying against Epigenome policy; and recording the action in a Merkle tree-based lineage ledger.

3. A non-transitory computer-readable medium storing instructions to perform the method of Claim 2.

4. The system of Claim 1, wherein the NBMF utilizes SimHash for semantic deduplication.

5. The system of Claim 1, wherein the lineage ledger utilizes a Merkle tree structure.

6. The system of Claim 1, further comprising an immune system module for threat detection and rollback.

7. The system of Claim 1, utilizing Attribute-Based Access Control (ABAC).

Filing Checklist (MICRO Entity)

[] Fee: $70 USD

[] Specification (This Document)

[] Drawings (Included in this PDF)

[] Cover Sheet (Fill online at USPTO)