

# Adler AI Memory Mesh Design

## 1. Purpose

Create a passive, association-based memory layer that mimics brain-style replay without imposing

## 2. Memory Representation

- Every significant thought is embedded as a high-dimensional vector (opaque activation pattern).
- Representation granularity varies with inferred salience:
  - High-salience: full text + metadata.
  - Low-salience: centroid vector + sparse keywords.

## 3. Association Edges

- Edges seeded by temporal co-occurrence; similarity later strengthens/weakens them.
- Optionally allow inhibitory links to dampen competing memories.

## 4. Strength Update & Reinforcement

- Edge/node strength decays exponentially over time.
- Any retrieval ('read') boosts strength (Hebbian reinforcement).
- Strategy can be swapped later; start with simple  $\exp$ -decay + +1 boost on read.

## 5. Forgetting & Cold Storage

- When strength < threshold, item exits active index but vector stays in cold store.
- If a future cue re-embeds near that vector, strength resets and edges rebuild.

## 6. Integration with Reasoning Loop

- Retrieval is implicit: each new thought is embedded; nearest neighbours + 2-hop expansion form a
- The reasoning LLM need not call a tool—memory activation occurs automatically before each reas
- Thinking about a memory reinforces it, aligning with biological replay.

## 7. Open Parameters

- Decay constant  $\lambda$ .
- Boost value on read.
- Active-index capacity before cold-storage eviction.
- Inhibitory edge rules.

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