# **Specification: Self-Organizing Memory for Anaya AI Mental Health Guide**

### **1. The Goal**

We want our AI system to have a **memory that evolves over time**.  
Instead of storing past conversations in a flat, linear log, the system should **automatically organize and connect related themes**.  
This makes the AI **feel more adaptive, personalized, and supportive** over repeated interactions.

### **2. Why This Matters**

* **Pattern Recognition** → The AI will recognize recurring issues (e.g., “stress before presentations”).
* **Personalization** → Future responses can adapt based on the user’s history.
* **Engagement** → Users feel understood because the AI remembers and builds on prior sessions.

### **3. The Core Idea**

**Layered memory system**:

* **Short-Term Memory** → Keeps track of the current conversation.
* **Long-Term Memory** → Stores summaries of past sessions.
* **Organizing Mechanism** → Automatically groups related experiences (e.g., “sleep,” “work stress,” “relationships”) into themes.

### **4. How It Works (High-Level Technical Approach)**

1. **Storage**:
   * Each conversation snippet is converted into a **vector embedding** (numerical representation of meaning).
   * Stored in a memory database (e.g., **ChromaDB, Pinecone, Weaviate**).
2. **Organization**:
   * Use **clustering algorithms** (e.g., k-means, HDBSCAN) or **graph-based structures** to group related memories.
   * Over time, clusters reorganize as more data is added (self-organizing).
3. **Retrieval**:
   * When generating a response, the system retrieves **the most relevant memories or clusters**, not just raw logs.
   * The AI uses both **context of the current chat** + **long-term memory themes**.

### **Analogy (for clarity)**

* Humans don’t recall every word spoken.
* Instead, we remember **patterns and themes** (e.g., “She often talks about work stress”).
* These patterns influence **how we respond** in future conversations.
* The AI will function in a similar way.

*The goal of the AI is to develop a* ***self-organizing memory****—a system that doesn’t just store chat logs, but actively groups and summarizes recurring themes. This ensures the AI adapts over time and feels more like a supportive companion who remembers and learns from the user’s journey.*