

Technical Implementation Draft: My Neural Space (Personal OS)

1. Project Overview

**My Neural Space** is a modular, cross-platform Personal Operating System designed to manage the high-intensity transition from Civil Engineering (HBTU) to a Data Science career. It functions as a cognitive ecosystem that audits behavioral entropy, optimizes academic constraints, and automates career branding across a heterogeneous 4-device hardware stack.

Core Tech Stack:

- **Frontend:** Flutter (Mobile, Tablet, Desktop)
- **Backend:** Supabase (PostgreSQL, Real-time, Auth, Storage)
- **AI/LLM:** Z.ai Agentic API, Python (Data Science Engine)
- **Data Science:** Matplotlib, Seaborn, Pandas
- **Hardware Ecosystem:** Acer Aspire 7 (Compute Node), Lenovo Ideapad (Secondary), Moto Tab (Note Node), Mi 11X (Mobile Node)

2. Distributed Architecture & State Persistence (Stage 0)

2.1 Multi-Device Sync (Supabase)

To ensure seamless transitions between devices, a **Distributed State** model is implemented.

- **Relational Schema:** A normalized PostgreSQL schema utilizes JSONB for recursive node structures and time-series tables for activity logging.
- **Heartbeat Protocol:** The Mi 11X and Moto Tab act as "Edge Nodes," pulsing state changes to Supabase. The Acer Aspire 7 (Compute Node) listens to these pulses to mirror active sessions (e.g., active timers or open PDF coordinates) instantly.

2.2 Modular Monolith Frontend

- **State Isolation:** Using the **Provider** pattern and IndexedStack in Flutter to preserve transient UI states (scroll offsets, unsaved notes) during context switching between the core modules.
- **Glassmorphism UI:** A high-density data visualization interface designed for the 144Hz display of the Acer Aspire 7.

3. Behavioral Triad & Non-Linear Scheduling (Stage 1)

3.1 The Behavioral Auditor

Time is treated as a finite resource categorized into a "Triad":

1. **Work (W):** Weight = 1.5x (DSA, Projects, Lectures)
2. **Recovery (R):** Weight = 1.0x (Sleep, Family, Rest)
3. **Destroyers (D):** Weight = -2.0x (Time-leaks, unproductive habits)

**Neural Health Score (NHS):** A dynamic equation calculates daily efficiency:  $NHS = \frac{\sum(W \times 1.5) + \sum R}{(\sum D)^{1.2}}$  The exponential factor (1.2) ensures that "Destroyer"

activities have an accelerating negative impact, mathematically deterring long-duration distractions.

3.2 Precision Temporal Mapping

- **1440px Grid:** A custom UI where 1 pixel equals 1 minute.
- **GCal Mimic:** 2-way sync with Google Calendar API, featuring a "Tap-and-Drag" interface for sub-hour task planning with 15-minute snapping logic.

4. Recursive Knowledge Graphs & Visual Decay (Stage 2)

4.1 Universal Knowledge Graph

Instead of flat lists, the learning roadmap is mapped as a relational graph.

- **Recursive Modeling:** A self-referencing NeuralNode class allows infinite nesting: Topic → Sub-topic → Project → LaTeX Note.
- **LaTeX Integration:** Support for complex formulas in Structural Engineering and Deep Learning rendered using flutter\_math.

4.2 Visual Entropy Feedback

- **Habit-to-UI Link:** If the "Destroyer" count exceeds a threshold, the associated Skill Nodes undergo **Visual Decay** (CSS-based grayscale or darkening), providing a psychological deterrent to neglecting specific learning paths.

5. Academic Lifecycle & Attendance Optimization (Stage 3)

5.1 The "Safe Bunk" Calculator

To manage the HBTU 75% attendance constraint, the system treats attendance as a **Constraint Satisfaction Problem (CSP)**.

- **Logic:** It calculates the maximum permissible absence margin:  $Safe\_Bunks = \lfloor \frac{Attended}{0.75} \rfloor - (Attended + Missed)$
- **Freed Time Tracking:** Automatically reallocates "Cancelled Lecture" slots to the DSA/Project bucket.

5.2 Effort-Weighted Progress

Subjects are assigned difficulty multipliers (e.g., 0.8x for Surveying vs. 1.5x for Structural Analysis) to reflect true cognitive load in progress bars.

6. Agentic Branding & Resume Orchestration (Stage 4)

6.1 Z.ai Agentic Workflow

- **Live Resume Generation:** Upon mastering a "Skill Node" in Stage 2, the **Z.ai Agent** proactively suggests a LaTeX-formatted bullet point for the resume.
- **Split-Screen Diff:** A professional viewer on the Acer Aspire 7 to approve or reject AI-suggested modifications to the master resume.

6.2 LinkedIn Pipeline

A Kanban-style content manager that uses NLP to draft technical post drafts based on GitHub commits or completed academic milestones.

7. FinTech Auditor & Habit Correlation (Stage 5)

7.1 Financial Ingestion Pipeline

- **Pattern Matching:** A Python-based parser that auto-ingests debited amounts from banking notifications to categorize spending into "Life Cost" vs. "Asset Growth."

- **Liquidity Tracking:** Monitors available capital against the monthly investment goal, ensuring the target is met before discretionary spending is authorized.

## 7.2 Behavioral Correlation Analysis

- **Cross-Module Logic:** The system correlates financial "Destroyers" (unplanned spending) with the **Neural Health Score** from Stage 1.
  - **Visualization:** Using Seaborn to generate heatmaps that identify if high stress (low *NHS*) leads to increased impulsive expenditure, providing a holistic view of behavioral and financial discipline.
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## 8. Portfolio Summary

"I architected **My Neural Space**, a modular Personal OS designed to manage the high-intensity transition from Civil Engineering to Data Science. The system demonstrates full-stack command across six key domains: **(0) Distributed Systems** via Supabase real-time sync across a 4-device stack, **(1) Behavioral Science** through a non-linear Triad Weighting model for time auditing, **(2) Graph Theory** using recursive Knowledge Graphs with LaTeX integration, **(3) Constraint Optimization** to solve academic attendance requirements, **(4) Agentic AI** for automated career branding and resume orchestration, and **(5) Financial Analytics** by correlating expenditure patterns with cognitive performance. This project serves as a unified command center, bridging the gap between hardware synchronization, behavioral psychology, and professional automation."