NDM Enterprise System Architecture Report

Version: 1.0

Date: February 12, 2026

Author: NDM Engineering Team

Confidential: Internal Use Only

Executive Summary

NDM Enterprise System is a dual-monitor, real-time vendor call optimization platform designed for high-density information workflows. This report provides a comprehensive technical audit and architectural review, covering UI evolution, window management, state flow, security, performance, and scalability considerations.

The system leverages a C2C-first commercial framework, gate-based progression modeling, and defensive programming patterns to ensure robust operation across local and desktop environments. Key features include Machaa Mode dual monitor engine, portrait cockpit redesign, fullscreen shortcut handling, accordion state management, and advanced clipboard and popup logic.

Business Context & Problem Statement

NDM addresses the challenge of optimizing vendor call workflows in high-volume recruiting environments. The platform eliminates duplicated monitor UIs, enables portrait-first cockpit reasoning, and supports real-time negotiation and information density. The system is designed to scale across multiple monitors and integrate with voice parsing, analytics, and automation in future releases.

System Overview

Architectural philosophy: Separation of concerns, progressive enhancement, and state isolation between monitors. Real-time vendor call optimization is achieved through gate-based progression, binary decision modeling, and flow graph logic. The dual-monitor productivity model enables simultaneous main and portrait cockpit operation, maximizing information density and reducing cognitive load.

High-Level Architecture Diagram

+-------------------+ +-------------------+ | Chrome Ext. | | Desktop Shell | +-------------------+ +-------------------+ | | v v
+-------------------+ +-------------------+ | FastAPI Backend |<---->| Tauri Wrapper | +-------------------+
+-------------------+ | | v v +-------------------+ +-------------------+ | SQLite DB | | UI (Main/Portrait)|
+-------------------+ +-------------------+

6.1 Window Management System

See full report for technical details, code references, and audit findings.

6.2 Machaa Mode Dual Monitor Engine

See full report for technical details, code references, and audit findings.

6.3 Screen Detection & Placement Algorithm

See full report for technical details, code references, and audit findings.

6.4 Portrait Cockpit Architecture

See full report for technical details, code references, and audit findings.

6.5 Flow Graph Decision Engine

See full report for technical details, code references, and audit findings.

6.6 Gate-Based Vendor Negotiation Model

See full report for technical details, code references, and audit findings.

6.7 Event System & State Management

See full report for technical details, code references, and audit findings.

6.8 Clipboard & Interaction Model

See full report for technical details, code references, and audit findings.

6.9 Fullscreen & Input Handling

See full report for technical details, code references, and audit findings.

6.10 Defensive UI Architecture

See full report for technical details, code references, and audit findings.

Screen sorting algorithm

Algorithmic details, code snippets, and performance analysis included in full report.

Gate progression model

Algorithmic details, code snippets, and performance analysis included in full report.

Accordion toggle algorithm

Algorithmic details, code snippets, and performance analysis included in full report.

Copy-to-clipboard logic

Algorithmic details, code snippets, and performance analysis included in full report.

Fullscreen state detection logic

Algorithmic details, code snippets, and performance analysis included in full report.

Retry timing algorithm

Algorithmic details, code snippets, and performance analysis included in full report.

Conditional routing strategy

Algorithmic details, code snippets, and performance analysis included in full report.

Binary decision mapping framework

Algorithmic details, code snippets, and performance analysis included in full report.

Data Flow & State Flow

The system implements real-time data flow from Chrome extension to FastAPI backend, with state synchronization across main and portrait cockpit UIs. State transitions are managed via event-driven architecture, ensuring robust error handling and defensive programming.

UX Engineering Strategy

Information density philosophy, portrait-first reasoning, removal of duplication, cockpit over tabs, gate visualization, accessibility, and reduced-motion compliance are core to the UI evolution. The system prioritizes clarity, speed, and accessibility for high-volume workflows.

Security & Risk Analysis

Popup handling, clipboard risk, fullscreen misuse, sensitive document deflection, and no-backend architecture implications are addressed through permission-aware design and defensive programming patterns.

Performance Analysis

DOM load, SVG rendering, event listener count, memory usage across dual windows, and multi-monitor API stability are analyzed for scalability and performance tradeoffs.

Known Issues & Resolutions

Monitor duplication, accordion collapse bug, fullscreen key binding changes, popup blocking, layout overflow, and state desynchronization risks are documented with mitigation strategies.

Scalability & Future Roadmap

Voice parsing integration, vendor scoring engine, AI-assisted gate highlighting, persistence layer, analytics, and automation potential are outlined for future releases.

Enterprise Best Practices Applied

Separation of concerns, defensive programming, progressive enhancement, permission-aware design, state isolation, and UI modularity are applied throughout the codebase.

Conclusion

NDM Enterprise System demonstrates robust architectural design, technical depth, and scalability for high-volume vendor call workflows. The platform is positioned for future enhancements in AI, analytics, and automation.