

TECHNICAL BRIEF

Secure AI-Assisted Clinical Note System (Demo Prototype)

1. SYSTEM OVERVIEW & OBJECTIVE

This project presents a secure, AI-assisted clinical note system designed for a single-patient workflow. The system focuses on:

- Reducing clinician documentation burden
- Preserving traceability and data provenance
- Enforcing strict access control (RBAC)
- Preventing data leakage during AI-assisted writing

This is a demonstration prototype intended to show system design, governance thinking, and technical trade-offs rather than a production-scale deployment.

2. ARCHITECTURE OVERVIEW

The system follows a modular architecture with clear separation between user interaction, data governance, and AI-assisted logic.

High-level flow:

[Clinician UI (Single-Patient Page)]

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[Application Layer]

- Entry management
- Commenting & highlights
- Version control

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[Governance Layer]

- Redaction engine
- RBAC enforcement
- Provenance tracking

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[AI Scribing Module]

- Receives redacted context only
- Generates draft notes

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[Encrypted Storage Layer]

- TLS in transit
- Encryption at rest

Key design principle:

AI never directly accesses raw sensitive data without redaction.

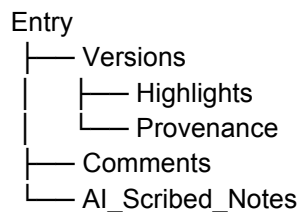
3. DATA MODEL & RELATIONSHIPS

All data entities are linked to a single patient page.

Core entities:

- **Entry**
 - Represents a clinician-authored note or update. Primary anchor entity.
- **Comment**
 - Attached to a specific Entry. Used for clarification or peer review.
- **Version**
 - Snapshot of an Entry at a given time. Enables auditability and rollback.
- **Highlight**
 - Marks specific text spans within an Entry. Used for attention, tagging, or AI context selection.
- **Provenance**
 - Metadata layer. Records author, timestamp, role, and source of changes.
- **AI_Scribed_Notes**
 - AI-generated draft outputs. Always linked to a specific Entry and Version.

Relationship structure (simplified):



4. SECURITY, REDACTION & RBAC

Security is enforced by design rather than by policy alone.

Encryption:

- • TLS for all data in transit
- • Encrypted storage for all persisted data

Redaction:

- • Sensitive fields are stripped or masked before AI access
- • Redaction occurs at the governance layer
- • Raw data never leaves the secure boundary

RBAC (Role-Based Access Control):

- • Roles: clinician, reviewer, admin

- • Permissions enforced at API and data-access level
- • AI operates under the lowest-privilege role

5. AI INTEGRATION & LEARNING SCOPE

The AI component functions as an assistive drafting tool.

Key constraints:

- • No autonomous decision-making
- • No direct write access to authoritative records
- • Outputs require human review and approval

Learning mechanism:

- • No online learning from live patient data
- • Demo assumes stateless inference only
- • Prevents unintended data memorization

6. ASSUMPTIONS & FIRST-PRINCIPLES THINKING

Key assumptions:

- • Single-patient page simplifies navigation and access control
- • Clinicians require transparency over AI outputs
- • Auditability is more important than automation speed

First-principles approach:

- • Every AI action must be explainable
- • Every text change must be traceable
- • Governance is part of system architecture, not an add-on

7. TRADE-OFFS & SCOPE DECISIONS

Deliberate trade-offs:

- • Reduced automation in exchange for safety
- • Limited learning capability to prevent data leakage
- • Narrow clinical scope to ensure clarity of design

Out of scope:

- • Multi-patient dashboards
- • Cross-institution data sharing
- • Real-time AI retraining

8. CONCLUSION

This system demonstrates how AI-assisted clinical documentation can be designed with security, governance, and human oversight as first-class concerns.

The prototype prioritizes trust, traceability, and compliance over raw AI capability, reflecting real-world healthcare needs.