

Team Virus presents NeuroLock

A Secure Storage System for Psychiatric Hospitals

An application that enables psychiatrists, therapists, psychologists, and administrative staff to safely access, update, and store patient records and therapy notes. The system will implement multi-factor authentication (MFA) using password, OTP (via email, SMS, or authenticator app), and optional biometric login for mobile devices, providing multiple layers of security. Records and notes will be encrypted, and all access activities will be logged for comprehensive auditing.

Meet our Team



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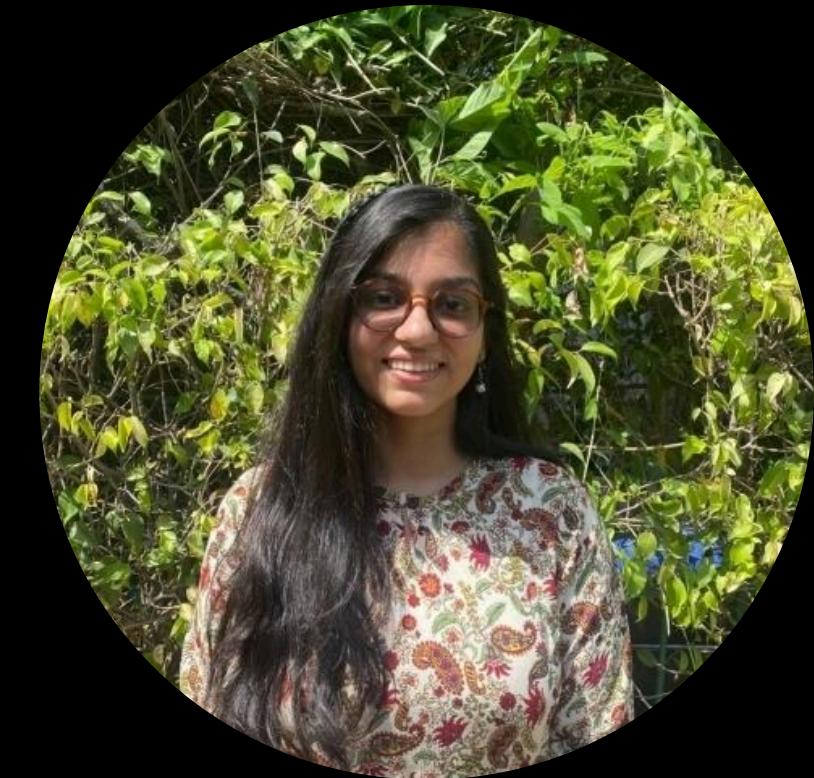
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The Problem Statement

Psychiatric hospitals rely on Electronic Health Record (EHR) systems to manage highly sensitive therapy and patient data. Yet, the systems that protect this data often sacrifice usability for security; creating friction in clinical workflows.

Core Problems

Cumbersome Authentication Process

MFA in existing systems is often repetitive and time-consuming, disrupting therapy sessions and shift changes.

Weak Privacy Controls for Therapy Notes

Sensitive mental health records are sometimes accessible beyond intended roles, leading to confidentiality risks.

Slow and Complex Interfaces

Outdated EHR UIs slow down documentation, especially in time-critical psychiatric emergencies.

Emergency Access Dilemma

Staff struggle between needing fast override access in crises and maintaining strict data protection.

Mental health data breaches are more damaging than most medical leaks; they can erode patient trust, professional ethics, and institutional credibility. Hospitals need a system that balances security, speed, and sensitivity.



Research done before Lo-fi Prototyping

To understand user perceptions, concerns, and preferences about mental-health apps, privacy, and therapy-seeking behavior before creating a low-fidelity prototype. We performed 28 offline surveys, 6 interviews with stakeholders as our primary methods. Secondary methods involved case studies, competitive analysis and literature review.

Valuable Insights from Secondary Methods

OTP-based MFA slows task completion during patient care; biometric or context-aware authentication is faster and less error-prone.

Zahabi et al., J. Healthc. Inform. Res., 2023

71% of clinicians report redundant clicks or poorly labeled actions in EHRs; simple, role-specific dashboards improve accuracy.

Ratwani et al., Applied Clin. Informatics, 2020

Patients value privacy transparency. Recommended admin to have audit logs showing “who accessed what” increase trust and acceptance.

Rizwan et al., Indian J. Med. Ethics, 2023

Only 37% of users in India know about Digital Health IDs (ABDM) and 58% express fear of privacy loss. Hence, explain privacy assurances clearly.

Kaur et al., Indian J. Med. Res., 2023

“Usable Security” is the biggest missing link in psychiatric EHRs. Current MFA implementations are secure but obstruct workflow efficiency, while usability fixes often compromise privacy.



Important Quotes from Primary Research Methods

"I need access to my patients' notes quickly, especially during **emergencies**; waiting for codes every time slows me down."

"Having a **single point of entry** for patient and medication data would be much better than juggling different portals."

"It would be helpful to have a notification system for new therapy note entries or **updates** to a case."

"I am concerned about **where my session notes are stored** and who else can see them apart from the clinical team."

Audit trails are essential to know who accessed what, but the process should be invisible to clinicians' workflow."

"I prefer using **fingerprint login** on my phone rather than typing complicated passwords."

"**Re-verifying** my identity every few weeks is **frustrating**, but I understand why it's important. Can it be faster though?"

"**Training** on new features needs to be better; some changes aren't obvious until you get stuck."

"I am always worried I'll **forget an OTP** or be locked out of patient data in the middle of a shift."

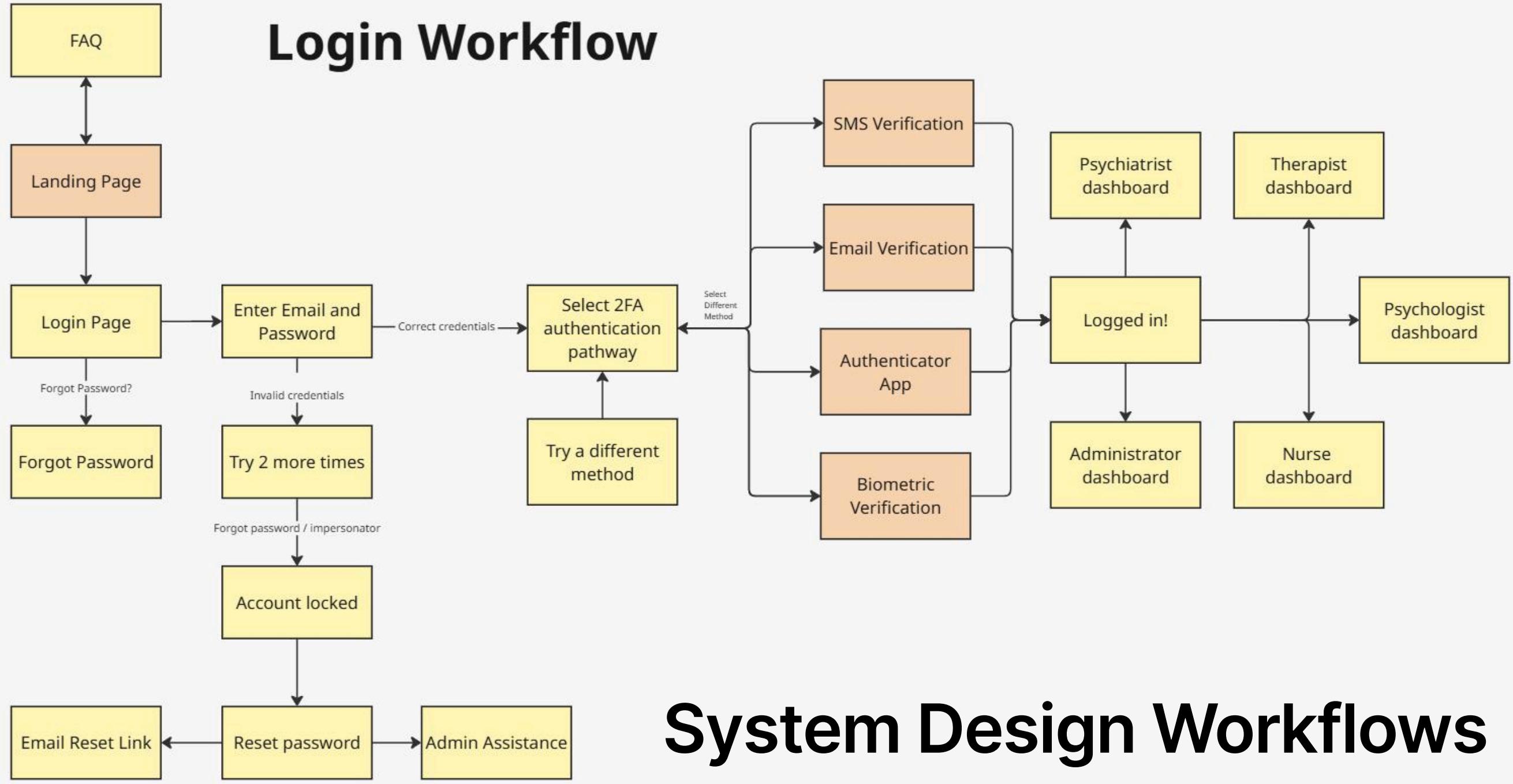
"The **OTP system** is easy to use, but sometimes messages arrive late or not at all, especially in the basement."

"If the app could help me with **medication reminders** for patients, that would reduce my cognitive burden."

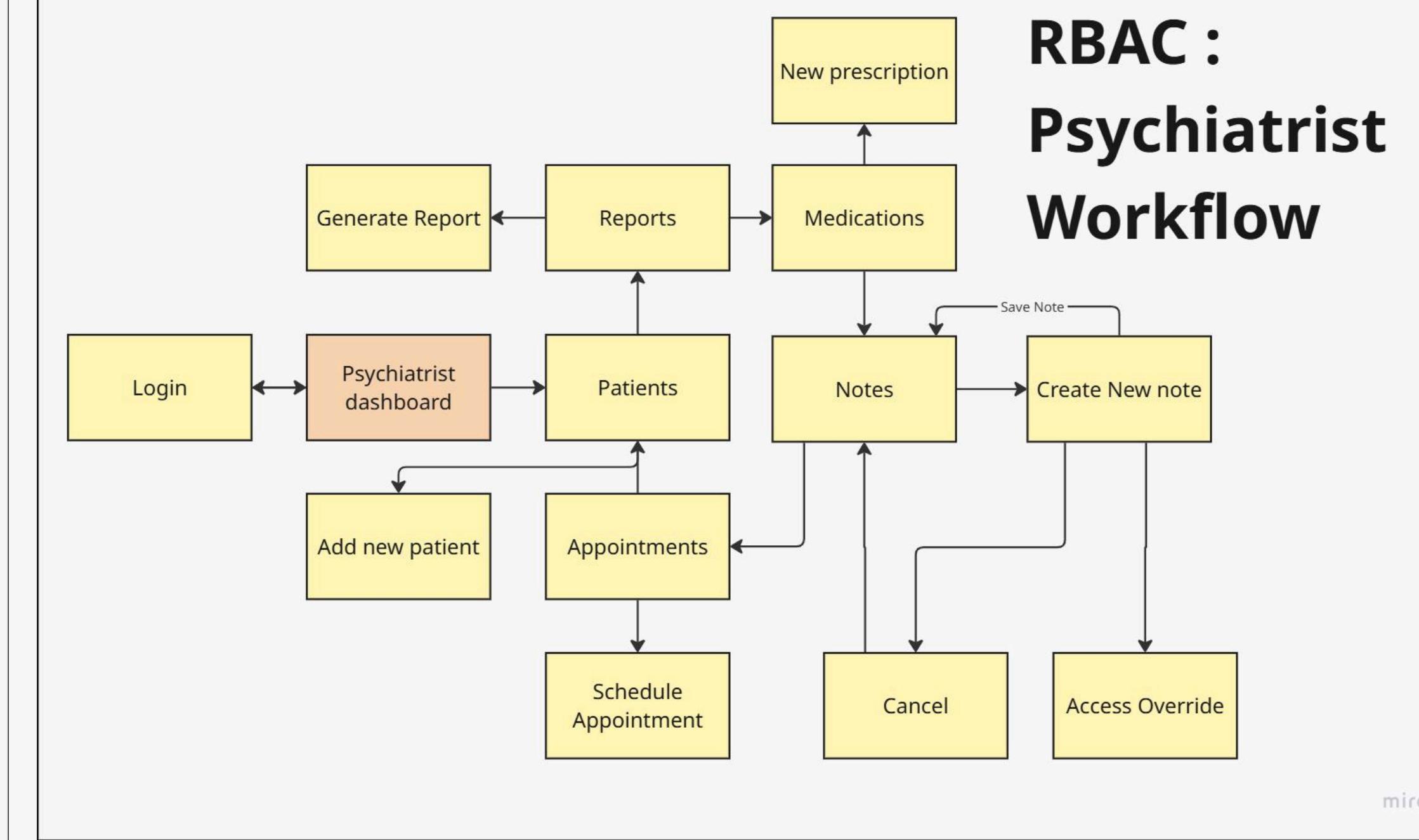
"Ultimately, as long as **patients' privacy** is maintained, and my **workflow** isn't hindered, I'm happy to adapt to new security measures."



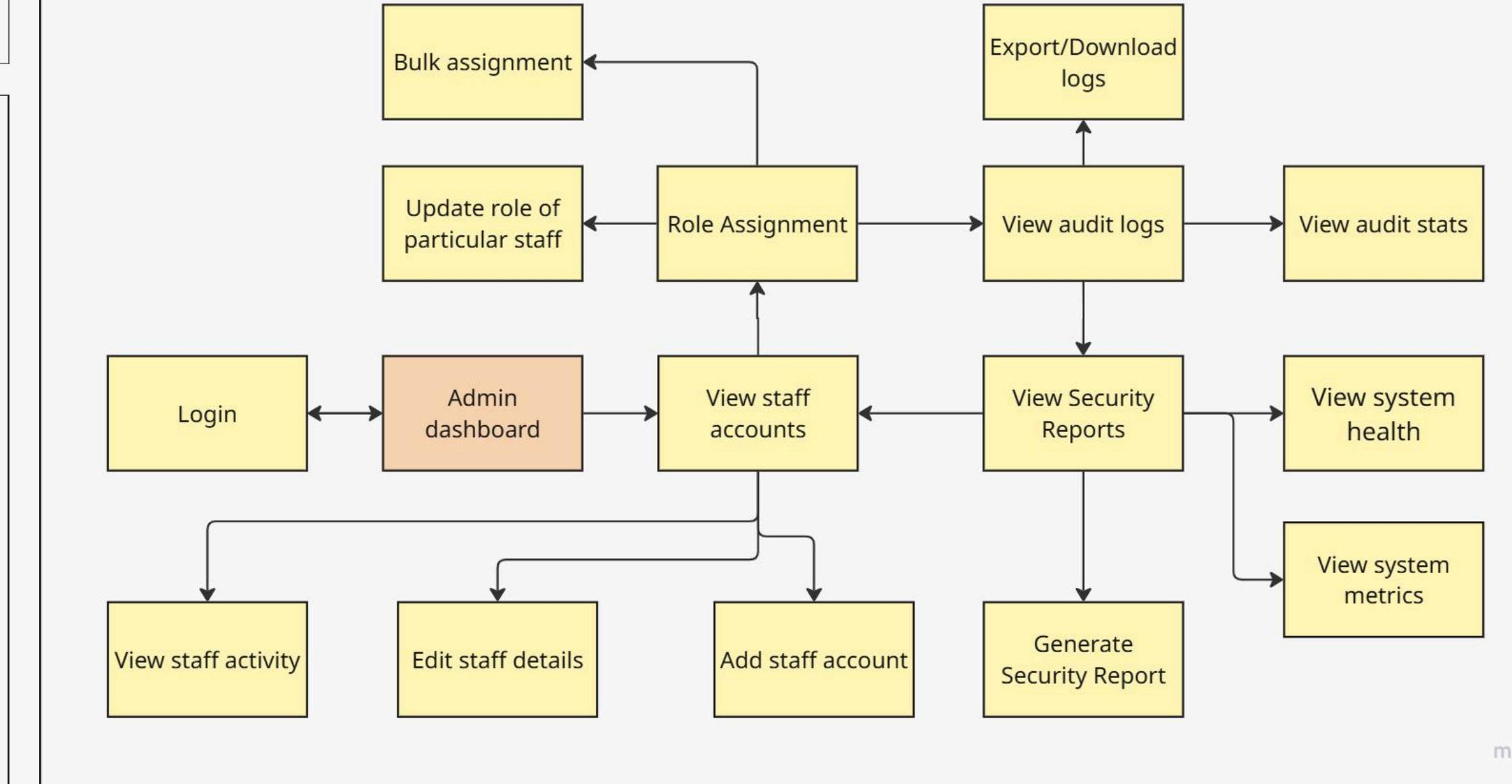
Login Workflow



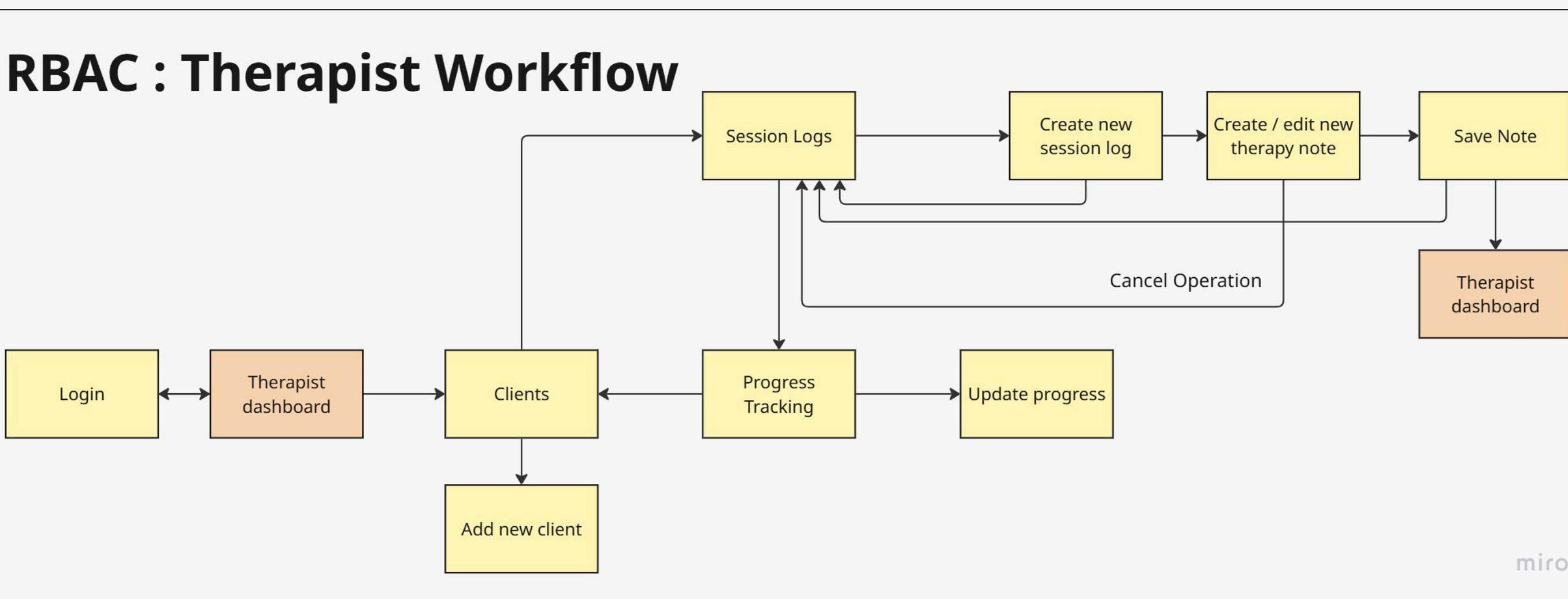
System Design Workflows



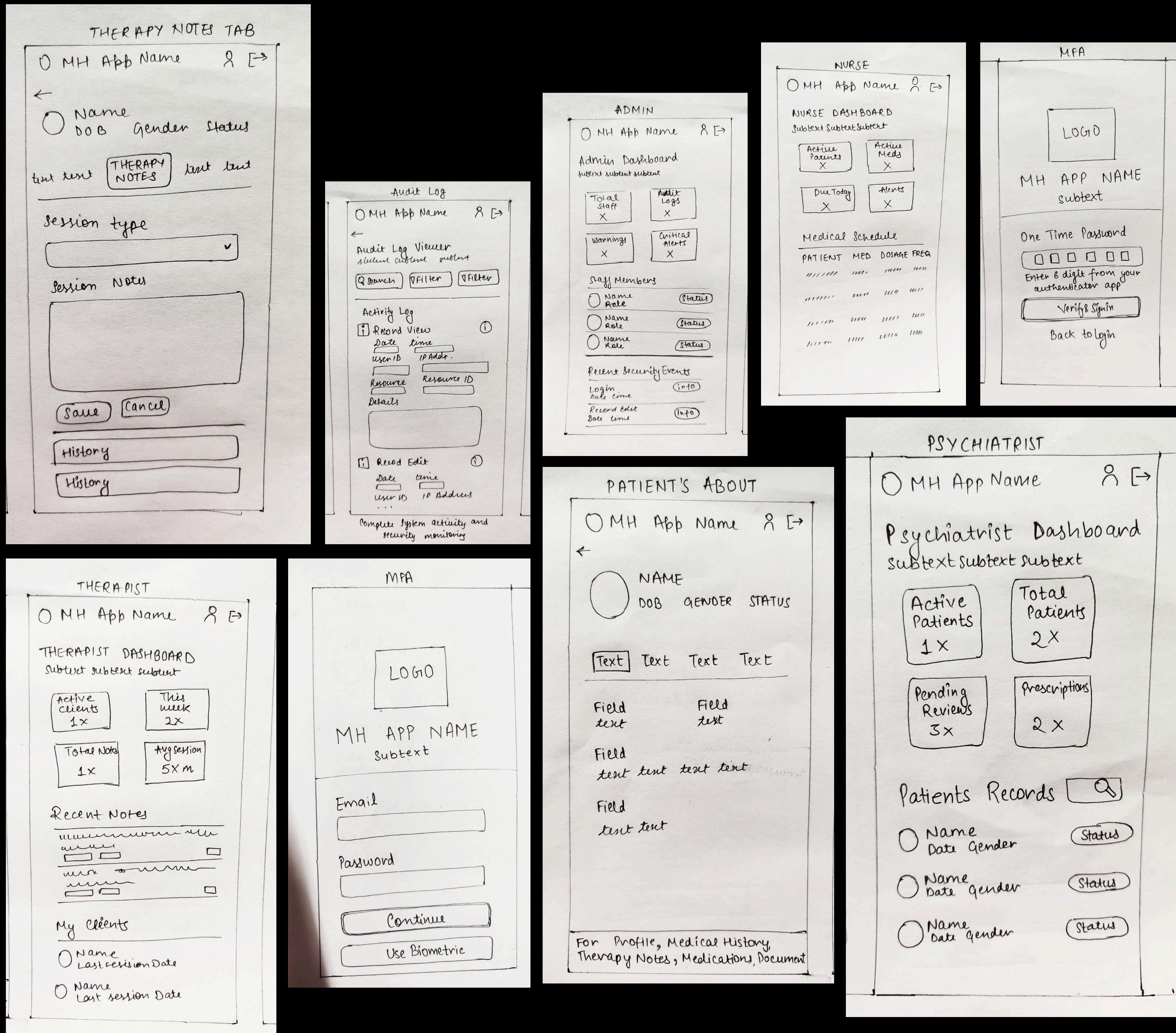
RBAC : Admin Workflow



RBAC : Therapist Workflow



Paper Prototyping thematic analysis



Role-Based Access Control (RBAC): Differentiate access levels for psychiatrists, psychologists, administrators, and patients. Ensure that only authorized personnel view or edit sensitive data.

Security Features: End-to-end encryption for all data storage and transmission. Multi-factor authentication (MFA) and optional biometric login. Auto-logging with activity monitoring, especially for edits to sensitive data.

Patient Data Control: Allow patients to view appointment history and summaries without exposing detailed notes. Provide options for patients to consent to data sharing for collaborative treatment.

Usability & Workflow Efficiency: Quick summaries and dashboards for professionals. Filter options by patient, treatment type, or date. Desktop/laptop preferred for detailed operations; mobile app for quick access.

Collaboration & Coordination: Enable selective sharing between psychiatrists and psychologists on joint cases. Maintain audit logs to track who accessed or edited data.



Limitations & Improvements

Security for Laypersons

Security mechanisms may be strong with technical users, but the system may not be communicating its security measures to non technical users; attempts to visually and verbally express protection status.

Role based Data Access

Despite its overall effectiveness, some users feared that nurses would obtain more medical information than is necessary and that this may be an infringement on privacy.

Reporting and Response

Provide a service to users and administrators to report suspicious activity or privacy violations, and establish a procedure to isolate or shut down systems in case of a breach.

Flexible Data Views

Allow two-step or stage-wise access to patient records, particularly sensitive sections; add filter options to dashboards for easier data navigation and management.

Screen Capture Prevention

Fullfill the proposed ban on screenshot and text copying, particularly on the most sensitive information, to limit the chances of information leakage.



Security is not a feature! It's a culture in itself.

Building systems where privacy and trust are lived, not just implemented.

Thematic Analysis

Transparency & Trust

High importance given to users knowing who can see their data and when, with trust built through clear audit logs and restricted access by staff roles.

Privacy by Design

Frequent advocacy for patient anonymity, minimal data exposure, and robust encryption, emphasizing privacy as a core system attribute.

Usability & Workflow

Preferences for clean layouts, intuitive navigation, efficient session logging, and segmented history viewing, underlining the value of easy-to-use tools.

Security Controls

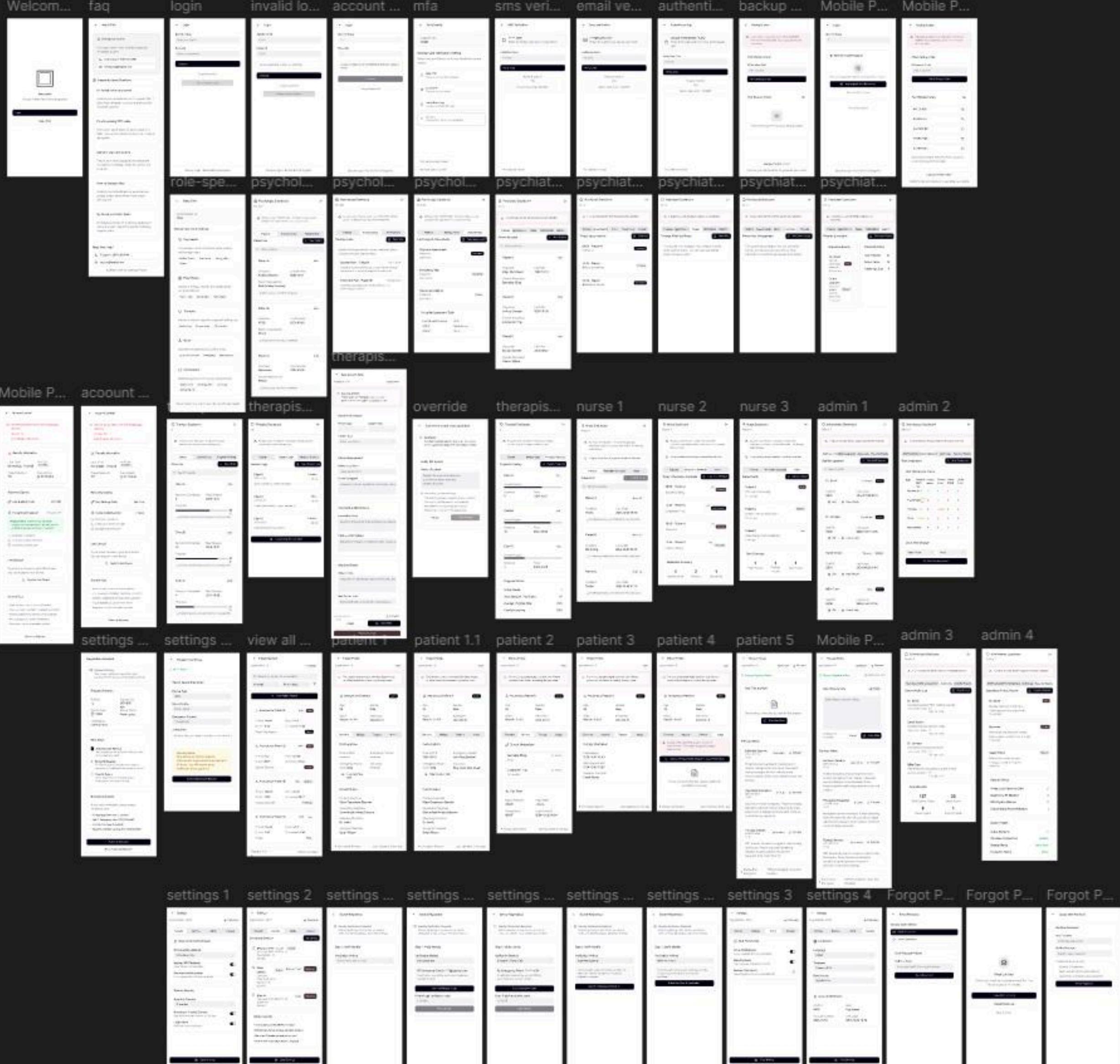
Ongoing support for strong authentication, account protections, recovery options, and prevention of data leakage through app controls.

Continuous Improvement

Regular suggestions on interface tweaks, feature redundancy removal, and contingency plans for system breaches reflect the active user engagement and the need for adaptive design.



Mid-Fidelity Prototype



Core Security & Authentication

- MFA (Multi-Factor Authentication) supports SMS, email, authenticator apps, and biometrics.
- Biometric login via fingerprint or face ID with smart fallback options.
- Auto-lockout after failed login attempts, backup codes, and device registration.
- Role-based access for five roles: Psychiatrist, Psychologist, Therapist, Nurse, and Admin.

Patient Data Management

- Secure, detailed patient profiles covering history, prescriptions, therapies, and assessments.
- Role-based filtering ensures only authorized access.
- Adaptive re-authentication for sensitive actions.
- Secure, auto-saving therapy notes with version control and team editing.

Administrative & Monitoring

- Real-time logging of all staff actions and security events with timestamps.
- Automated alerts for unusual activity (e.g., suspicious logins or late access).
- Supervisor-approved override system with full audit trails.

Resilience & Recovery

- Limited offline access with re-authentication when online again.
- Controlled device approval and verification process.
- Clear recovery flows for lost accounts, devices, or credentials.

User Experience & Settings

- Customisable security preferences and MFA choices.
- Device and notification management.
- Multilingual support for user accessibility.



09:00 - Patient A
Sertraline 50mg
101 Pending

10:30 - Patient B
Lorazepam 1mg
102 Administered

12:00 - Patient A
Vitamin D
101 Pending

14:00 - Patient C
Lithium 300mg
103 Scheduled

Medication Summary
1 Administered, 2 Pending, 1 Scheduled

Give someone else access (override)

WARNING:
Override bypasses security protocols. This action will be logged and flagged for administrator review.

Justify this Access

Reason (Required)
Explain the medical emergency or critical situation requiring additional access...
By proceeding, you acknowledge:
This action bypasses standard security protocols
Full audit log will be created and reviewed
Administrative approval may be required
Misuse may result in access suspension

Cancel Grant Access

← Settings Psychiatrist • 4678 Preferences

Security Devices Alerts General

Multi-Factor Authentication

Preferred MFA Method: Authenticator App

Backup MFA Methods: Allow fallback authentication

Biometric Authentication: Use fingerprint/face ID when available

Session Security

Auto-lock Timeout: 15 minutes

Remember Trusted Devices: Skip MFA on trusted devices for 30 days

Login Alerts: Notify on new device logins

Save Settings

⚠ Access to therapy notes requires additional authentication. Click below to securely access patient notes.

Access Therapy Notes (Requires Re-authentication)

Notes are encrypted and require additional verification to access.
Encrypted Session Last Updated: 2 min ago

← Patient Records psychiatrist • 6 4 Patient(s)

Search by name, ID, or condition...
All Wards Recent Access

+ New Patient Record

Anonymous Patient A P001 High
Ward: Ward A Room: A-101
Next: 10:00 Accessed: 14:30
Major Depression Active

Anonymous Patient D P004 High
Ward: ICU Room: ICU-02
Next: 09:00 Accessed: 08:00
Bipolar Disorder Critical

Anonymous Patient B P002 Medium
Ward: Ward B Room: B-205
Next: 14:00 Accessed: 09:15
Anxiety Disorder Follow-up

Quick Role Change
Sarah Wilson Nurse
Update Role Assignment

NeuroLock Secure Patient Records Management

Log In Help / FAQ

Psychologist Dashboard Dr. 543

Access Level: Psychologist - No prescription access. Limited to therapy records and assessments.

Patients Therapy Notes Assessments

Therapy Notes

New Note

Access to therapy session notes, treatment plans, and psychological observations.

Session Note - Patient A Oct 1, 2024
Cognitive Behavioral Therapy session. Patient showed improvement in anxiety management techniques...

Treatment Plan - Patient B Sep 28, 2024
EMDR therapy protocol for PTSD treatment. 12-week program outlined...

← Patient Profile psychiatrist • 6 P001

This record contains highly sensitive data. Please re-authenticate before accessing therapy notes.

Use backup codes instead
Having trouble? Get help

Anonymous Patient A Active
Age 39 Gender Male
Ward Ward A - A-101 Admission 2024-09-15

Administrator Dashboard Admin 7

1 critical security alert(s) require immediate attention

Staff Accounts Role Assignment Audit Logs Security Reports

Role Assignment Bulk Assignment

Role Permissions Matrix

Role	Medical Records	Prescriptions	Therapy Notes	Admin Panel	Audit Logs
Psychiatrist	✓	✓	✓	✗	✗
Psychologist	Limited	✗	✓	✗	✗
Therapist	✗	✗	Limited	✗	✗
Nurse	Limited	✗	✗	✗	✗
Administrator	✗	✗	✓	✓	✓

← Nurse Dashboard Nurse rt

Access Level: Nurse - Limited to medication schedules and basic patient information. No therapy notes access.

1 high priority alert(s) require immediate attention

Patients Medication Schedule Alerts

Today's Medication Schedule View Full Schedule

09:00 - Patient A Sertraline 50mg
101 Pending

Next Steps?



Because secure systems aren't built once; they evolve with their users!

- Refine the current prototype based on survey insights.
- Implement the improved design technically with real data interactions.
- Test usability, security, and privacy alignment through live feedback.

For more details
Scan to check out the Report

