STUDY_NOTION

A PROJECT REPORT
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CERTIFICATE

Certified that **Rakshit Rajput (2300290140134), Prashu Pandey(2300290140124), Payal Pundir (2300290140114)** has/ have carried out the project work having **“Study_Notion (Project-KCA451)** for **Master of Computer Application** from Dr. A.P.J. Abdul Kalam Technical University (AKTU) (formerly UPTU), Lucknow under my supervision. The project report embodies original work, and studies are carried out by the student himself/herself and the contents of the project report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

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Study Notion
ABSTRACT

Study_Notion is an AI-powered mock interview web application designed to assist individuals in preparing effectively for real-world job interviews. Built using a modern tech stack including **Next.js**, **Firebase**, and **Gemini API**, the platform simulates realistic interview scenarios to help users evaluate and improve their performance.

Users begin by selecting their target role and uploading relevant information such as resumes or LinkedIn profiles. Based on this data, the Gemini-powered AI generates tailored interview questions, provides contextual feedback, and analyzes user responses for clarity, confidence, and content. The application offers a structured dashboard where users can view performance metrics, track progress, and receive actionable suggestions for improvement.

Authentication and user management are securely handled using Firebase Auth, while real-time updates and state persistence ensure a smooth, responsive experience. Study_Notion aims to democratize interview preparation by providing intelligent, accessible, and personalized coaching—empowering students, job seekers, and professionals to face interviews with confidence and clarity.

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TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Overview

Study_Notion is an AI-driven web-based interview preparation platform designed to simulate realistic mock interviews on any topic of the user's choice. Built using Next.js for the frontend and integrated with Google's Gemini API, Study_Notion empowers students, job seekers, and professionals to practice and refine their interview skills in a fully automated environment.

As the landscape of hiring becomes increasingly competitive, candidates are expected to be well-prepared not only in knowledge but also in articulation, confidence, and adaptability. Study_Notion addresses this need by offering on-demand, intelligent mock interviews tailored to specific domains or technologies, helping users build confidence and receive constructive practice without the need for a human interviewer.

The platform delivers a clean, responsive user interface, ensuring seamless interaction across devices. Users can select a topic, initiate an interview session, and engage with AI-generated questions in a conversational manner. The AI responds contextually based on user input, simulating the dynamic nature of real-world interviews.

By fusing cutting-edge technologies and practical learning strategies, Study_Notion stands as a personalized preparation tool tailored to modern job market demands.ate stands as a personalized preparation tool tailored to modern job market demands.

1.2 Problem Statement

In the current job market, technical competence alone is not enough—candidates must also be effective communicators who can perform well under pressure. However, traditional interview preparation methods such as reading question banks or practicing with peers often fall short in simulating the unpredictability and intensity of real interviews.

Additionally, not everyone has access to experienced mentors or mock interview partners who can offer targeted feedback. The absence of structured and personalized mock interview environments leads to lack of preparedness, increased anxiety, and missed opportunities.

Study_Notion was conceptualized to eliminate these barriers by offering AI-driven mock interview sessions that are accessible, customizable, and realistic, allowing users to practice at their own pace and convenience.

1.3 Objectives

The key objectives of Study_Notion are as follows:

- To provide users with a realistic and intelligent mock interview experience using natural language AI.
- To allow users to select any subject area or domain and generate topic-specific interview sessions dynamically.
- To simulate follow-up questions and varied question complexity to mirror real interviews.
- To create an intuitive interface that ensures a smooth and distraction-free interview practice session.
- To help users build self-confidence and fluency in responding to domain-specific and behavioral questions.
- To serve as a preparation aid for fresh graduates, experienced professionals, and those transitioning between career paths.

1.4 Scope

Study_Notion aims to serve as a comprehensive mock interview simulator with the following features and scope:

- AI-Powered Mock Interviews: Uses Gemini API to generate and conduct domain-specific interviews based on user input.
- Responsive Web Interface: Built with Next.js for a fast, responsive experience across desktop and mobile.
- No Sign-Up Required: Allows instant access to interview simulations without mandatory account creation.
- Scalable & Modular: The backend is structured to support future enhancements such as analytics, performance tracking, and user profiles.
- Security & Privacy: Ensures that no personal data is stored, making it suitable for anonymous usage.
- Future Expansion Potential: Could include voice-based interviews, result summaries, integration with LinkedIn, and resume feedback in future iterations.

1.5 Features

- Instant Interview Simulation
  Users can immediately begin a mock interview by entering a topic—no setup or configuration required.

- Conversational AI
  Gemini API powers intelligent questioning and context-aware responses for a realistic interview experience.

- Custom Topic Input
  The AI dynamically adjusts questions based on the subject entered by the user.

- Real-Time Interaction
  Delivers back-and-forth question-answer flow with follow-ups to test depth of knowledge.

- Minimal UI Design
  Clean and focused interface with no distractions, suitable for interview-like conditions.

- Device Compatibility
  Fully responsive design works smoothly on smartphones, tablets, and desktops.

- Anonymous Practice
  No login required; users can practice anonymously and revisit as many times as

needed.

- Lightweight Backend Logic
  Designed to run AI sessions asynchronously while maintaining fast front-end responsiveness.

1.6 Background

- Rise of AI in Career Tools
  With the rise of advanced AI models and APIs like Gemini, it's now possible to simulate human-like interviews with near real-time understanding and adaptability. This allows for training experiences that were previously only possible with human mentors or costly services.

- Limitations of Traditional Preparation
  Conventional preparation methods such as PDFs, mock tests, and coaching sessions lack interactivity and adaptability. These formats often cannot respond to a user's answer with follow-up questions or vary difficulty levels, making them less effective for realistic preparation.

- Technology Stack & Architecture
  Study_Notion is developed using Next.js, leveraging its capabilities for server-side rendering and static generation. The Gemini API handles natural language processing and response generation. The architecture ensures modularity, enabling easy scaling and future enhancements.
  The application is intentionally kept lightweight to allow high responsiveness and minimal loading time, which is crucial for keeping users engaged during practice sessions. As no login is required, the app respects user privacy while focusing on utility and experience.

- By merging AI capabilities with an accessible web interface, Study_Notion empowers users to take control of their interview preparation in a modern, efficient, and scalable way.

CHAPTER 2

FEASIBILITY STUDY

2.1 ECONOMICAL FEASIBILITY

Study_Notion demonstrates strong economic viability through its lightweight architecture, reliance on open-source technologies, and low maintenance costs. The platform eliminates the need for human interviewers by leveraging the Gemini AI, thereby reducing ongoing operational expenses. It is designed for scalability, offering a high return on investment with minimal financial risk.

Key Economic Factors:

- **Development & Operational Costs**

- Low Initial Investment:
  ▪ Built with open-source technologies like Next.js and Tailwind CSS
  ▪ Uses free-tier or affordable AI APIs (Gemini) and hosting (Vercel)

- Maintenance:
  ▪ Serverless deployment reduces infrastructure management
  ▪ Stateless architecture minimizes backend complexity

- **Revenue Streams**

- Freemium Model:
  ▪ Basic mock interviews are free for all users
  ▪ Premium access for features like feedback reports, saved sessions, and topic analytics.

- Institutional Subscriptions:
  ▪ Colleges and bootcamps can subscribe for bulk usage for students
  ▪ Integration with ed-tech platforms or resume services as paid plugins

- **Cost-Benefit Advantages**

- For Users:
  ▪ Significantly cheaper than human-led mock interviews (typically ₹1000+ per

session)
  ▪ Available 24x7, saving time and increasing accessibility

- For Developers:
  ▪ Minimal upkeep due to serverless and modular design
  ▪ Potential for passive revenue via scalable usage-based subscriptions

2.2 TECHNICAL FEASIBILITY

Study_Notion is technically feasible due to its use of modern frameworks, efficient API integrations, and a simple yet powerful architecture. The technologies employed are battle-tested, scalable, and easy to maintain, making the system stable even under high usage.

Key Technical Feasibility Factors:

- **Technology Stack**
  - Frontend:
    - ▪ Next.js for server-side rendering and optimized performance
    - ▪ Tailwind CSS for responsive UI development
  - Backend:
    - ▪ Serverless API routes within Next.js handle Gemini requests
  - AI Integration:
    - ▪ Gemini API (Google) powers contextual interview conversations
    - ▪ All communication is stateless, ensuring scalability
- **Performance & Scalability**
  - Hosted on Vercel for automatic CI/CD and CDN delivery
  - Stateless architecture allows horizontal scaling

    - Lightweight design ensures fast initial load and low memory footprint

- **Security & Privacy**
    - No user sign-in needed, ensuring anonymous use and minimal data risk
    - Potential for tokenized sessions or temporary conversation IDs for privacy

2.3 OPERATIONAL FEASIBILITY

Study_Notion is operationally feasible due to its minimalist interface, low dependency infrastructure, and self-guided user flow. The platform is designed to be intuitive and accessible for both first-time and returning users without requiring any formal onboarding.

Key Operational Feasibility Factors:

- **User Adoption & Ease of Use**
    - Simple Workflow:
        - Type in a topic → Start interview → Respond to questions
        - No login, no setup — designed for spontaneous use
    - Minimal Learning Curve:
        - Follows familiar web navigation patterns
        - Helpful tooltips for new users
- **Administration & Content Management**
    - Fully Automated AI Logic:
        - Gemini handles generation of questions and follow-ups
        - No manual moderation or content creation required

- Monitoring:
  - ▪ Basic analytics can be added to track usage and system health

- **Support & Maintenance**
  - Requires near-zero manual intervention after deployment
  - Can integrate with lightweight error reporting tools like Sentry
  - Easily extensible for new features due to modular design

  - ## 2.4 BEHAVIOURAL FEASIBILITY
    - Study_Notion aligns well with user behavior trends that show increasing trust in AI-driven learning tools. Its focus on mock interview simulation resonates with students, job-seekers, and professionals who value on-demand, personalized practice.
  - **Key Behavioural Feasibility Factors:**

- **User Acceptance & Trust**
  - AI Confidence:
    - ▪ Users are already familiar with AI in tools like ChatGPT and Google Assistant
    - ▪ Clearly explains AI usage and purpose (e.g., "AI-generated question based on your topic")

  - Privacy Considerations:
    - ▪ No personal data stored or shared
    - ▪ Users can interact anonymously

- **Demographic Fit**
  - Students & Freshers:
    - ▪ Comfortable with web-based self-learning tools
    - ▪ High demand for interview readiness in competitive environments

    - Working Professionals:
        - Appreciate flexibility of usage (any time, any place)
        - Interested in preparing for role changes or promotions

- **Behavioral Incentives**
    - Gamification (optional):
        - Earn stars/badges for number of sessions or topics covered
        - Track personal progress with streaks or performance hints
    - Testimonials & Social Proof:
        - Option to add anonymous feedback from users
        - Logos of partner bootcamps or communities in future versions

CONCLUSION

Study_Notion is a technically sound, economically efficient, and behaviorally aligned platform for AI-based interview preparation. By leveraging advanced language models, a minimalistic user interface, and cloud-first deployment, it offers a realistic mock interview experience that can scale to a wide audience.

With zero onboarding friction, low-cost infrastructure, and high engagement potential, Study_Notion has strong prospects for long-term viability and adoption among learners and professionals alike.

CHAPTER 3

SOFTWARE REQUIREMENT SPECIFICATION

The product defined in this Software Requirements Specification (SRS) document is Study_Notion, a peer-to-peer file sharing web application tailored for students and educators. It simplifies the sharing of notes, assignments, and study materials in a secure, efficient, and user-friendly environment. Study_Notion aims to eliminate the friction in academic collaboration by enabling seamless upload, download, and organization of study resources.

The platform supports real-time file sharing, secure user authentication, session tracking, and administrative oversight. Designed as a responsive web application, it provides accessibility across devices and platforms.

3.1 Functionalities:

Study_Notion includes a comprehensive set of functionalities to ensure seamless academic collaboration:

1. User Management

- Registration & Login
    - Sign-up via email or third-party providers (Google, GitHub)
    - Authentication handled via Clerk for secure session management
- User Profile
    - Customizable profile with university, course details, and profile picture

    - View upload/download history and bookmarks

2. File Sharing System

- Upload & Download
    - Users can upload notes, PDFs, and assignment files
    - Downloads are tracked for analytics and access history
- Categorization & Tagging
    - Files can be organized using subject tags and metadata
- Sharing Options
    - Shareable links with expiration settings
    - Download restrictions based on role or access level

3. Real-Time Collaboration

- Live Sessions
    - Initiate real-time file sharing sessions for study groups
- Chat Support
    - Integrated chatbox for communication during file sessions (future scope)

4. Admin & System Functions

- Admin Dashboard
    - User and file activity logs
    - Session monitoring and usage statistics
- Content Moderation

    - Report and flag inappropriate files
    - Admin review and action system

5. Notification System

- Email alerts for uploads in subscribed subjects
- System notifications for file updates or admin messages

6. Security & Privacy

- End-to-end encryption for all file transfers
- Secure file storage with limited-time access links

3.2 User and Characteristics:

1. Students

- Share and receive academic files
- Bookmark useful resources
- Participate in collaborative sessions

2. Educators

- Upload lectures, notes, assignments
- Moderate content and manage classroom file access
- Analyze student engagement via downloads

3. Admins

- Monitor platform usage
- Handle flagged content
- Enforce rules and security policies

3.3 Features of the Project:

- Secure File Transfer using encryption
- Real-Time Session Sharing for group studies
- Clerk Authentication Integration
- Subject-Based File Categorization
- Search and Filter Tools for efficient file discovery
- Responsive UI using React and Tailwind CSS
- Analytics Dashboard for user and file insights
- Role-Based Access Control (RBAC)
- Integration Ready with future LMS APIs
- GDPR-Compliant Data Handling

3.4 Features of Admin:

Administrators are equipped with powerful tools to ensure the platform's integrity, performance, and user satisfaction.

- User & File Management: Activate/deactivate users, delete harmful content

- Session Monitoring: Track live file sessions
- System Logs: Full audit trail for user activity
- Encryption Oversight: Manage encryption protocols for secure sharing
- System Configuration: Set limits for file size, access permissions
- Health Monitoring: Track server status, storage, uptime
- RBAC Enforcement: Assign and manage user roles securely
- Diagnostic Tools: Identify and fix technical issues
- Reports & Analytics: File usage, traffic, and platform engagement
- Scheduled Maintenance: Update schedules with alert systems
- Admin Profile Management: Update admin info and preferences

CHAPTER 4

SYSTEM REQUIREMENTS

System requirements define the functional and non-functional elements crucial for the successful development, deployment, and maintenance of Study_Notion. This chapter outlines how the system is designed to deliver a secure, scalable, and intuitive experience for peer-to-peer academic file sharing and collaboration.

4.1 FUNCTIONAL REQUIREMENTS

Study_Notion offers a real-time file-sharing experience tailored for students and educators. The system provides intuitive interaction, secure upload/download mechanisms, and collaborative capabilities.

1. User Management & Profiles

- Registration & Authentication
    - Secure sign-up/login using email or third-party providers (e.g., Google, GitHub)
    - Clerk-based authentication with JWT session tokens for secure access
- User Profiles
    - Profile customization with course, department, and institutional details
    - Dashboard displaying recent uploads, download history, and bookmarked files

2. File Sharing & Collaboration

- File Upload & Download
    - Users can upload notes, assignments, and study material (PDFs, DOCs, etc.)
    - Download tracking to allow content analytics
- Search & Categorization
    - Tag-based classification and full-text search for locating study material efficiently
- Live Sharing Sessions
    - Real-time sessions for file sharing among group members or classmates
    - Session access via temporary links or session codes

3. Notifications

- Real-time and scheduled notifications for:
    - New file uploads in subscribed subjects
    - File download confirmation and live session invitations
    - Admin updates or platform announcements

4. Administrative Functions

- User Management
    - Admins can activate, deactivate, or ban users
- File Moderation
    - Review flagged content and remove inappropriate material
- Platform Insights

    - View platform activity logs and analytics dashboard

These functional requirements ensure that Study_Notion supports fast, accessible, and secure file exchange between users in academic settings.

4.2 NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements define the quality benchmarks that Study_Notion must meet to ensure consistent performance, strong security, and long-term usability.

1. Performance

- Capable of handling hundreds of concurrent users with minimal latency
- Backend optimization for file transfers and real-time sharing
- CDN-enabled file delivery to ensure speed and uptime

2. Security

- End-to-end encryption (AES-256 for storage, TLS 1.3 for data in transit)
- JWT-based session handling via Clerk for access control
- Regular security audits, with compliance to OWASP Top 10 standards

3. Reliability

- Target uptime of 99.9%, supported by cloud infrastructure (e.g., Vercel/Render)
- Daily backups and multi-region failover mechanisms
- Version control and rollback support for safe deployment of updates

4.3 DESIGN GOALS

The design goals of Study_Notion center around user-centric development, focusing on accessibility, modularity, and platform resilience.

1. Usability

- Responsive user interface built with React.js and Tailwind CSS
- Simple navigation for file upload/download, live sessions, and profile management
- Accessibility support for screen readers, keyboard shortcuts, and color contrast

2. Scalability

- PostgreSQL with Prisma ORM for scalable data handling
- Microservice-ready backend for modular feature addition
- Cloud-native deployment strategy ensures horizontal scaling

3. Security

- AES-256 encryption for stored files, TLS 1.3 for transfer
- Role-Based Access Control (RBAC) to limit access to sensitive features
- Continuous dependency monitoring to mitigate third-party vulnerabilities

4.4 SYSTEM SEQUENCE DIAGRAM

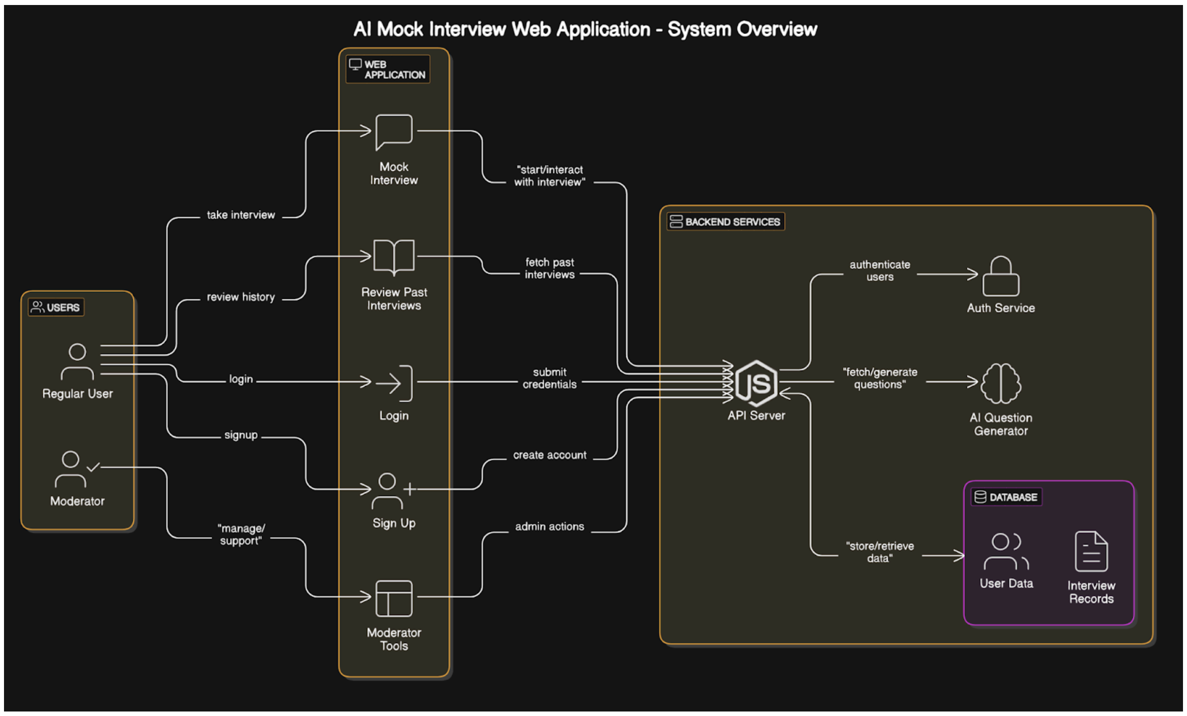


Fig 4.1: System Sequence

Key Interactions:

This diagram outlines the interactions between core actors (User and Admin) and the system across common tasks like login, file upload, live sharing, and admin control.

Process Description:

1. Login/Signup: User or Admin initiates secure access to the platform
2. Authentication: Clerk verifies credentials and issues a secure JWT
3. File Upload/Download: User uploads a file, others can download with access permissions

4. Initiate Live Session: A user starts a live session for collaborative sharing
5. Join Session: Participants join the session using a unique code
6. Flag File: Users can report content; admin receives alerts
7. Admin Review: Admin reviews flagged files and performs moderation
8. System Updates: Admin modifies platform settings such as max file size, subject categories
9. Session Tracking: Admin views logs for user activity and system performance

CONCLUSION

This chapter outlines the key system requirements for building and maintaining Study_Notion. The functional specifications ensure secure, efficient, and flexible file-sharing among students and educators. The non-functional requirements reinforce system integrity through performance, reliability, and robust security protocols. Together, these elements form a scalable, accessible, and intelligent academic collaboration platform.

CHAPTER 5

SYSTEM DESIGN

The system design of Career Mate leverages a modern web architecture combining Next.js, Firebase, and Gemini API to deliver a high-performance, AI-driven career guidance platform. This chapter outlines the primary and secondary design phases, as well as the user interface strategy that ensures responsiveness, accessibility, and real-time interaction.

5.1 PRIMARY DESIGN PHASE

The primary design phase focuses on defining the system architecture, component-level wireframes, and the core workflows integrating Gemini AI and Firebase services.

1. Wireframes for Key Modules

- Authentication Module
  - Simple, secure login and registration via Firebase Authentication.
  - OAuth sign-in using Google and LinkedIn with role-based access (User/Admin).
  - "Forgot Password" recovery using Firebase's built-in email workflows.
- User Dashboard
  - Central hub with widgets for career insights, skill gap analysis, resume feedback, and AI-driven suggestions.
  - Real-time tracking of saved recommendations, career history, and completed milestones.

- AI Career Guidance
    - Structured inputs (e.g., education, interests, skills).
    - Graphs and progress bars to visualize results from Gemini AI.
    - Option to save or modify career roadmap steps.

2. Data Flow Overview

- Client Interaction Flow
    - Frontend built with Next.js (React framework) for fast navigation and static/dynamic rendering.
    - Real-time interactions using Firebase's Realtime Database or Firestore.
- Gemini API Integration
    - Resume and user inputs sent to Gemini via secure HTTPS requests.
    - Gemini returns role suggestions, gap analysis, and learning resources.
    - Results stored temporarily in Firestore for user review and long-term tracking.
- Firebase Backend Flow
    - Firestore: Stores user profiles, resume metadata, AI insights, and roadmap history.
    - Firebase Functions: Handles secure backend logic (e.g., calling Gemini API, logging activity).
    - Firebase Storage: Stores uploaded resumes securely.

5.2 SECONDARY DESIGN PHASE

This phase focuses on refining user experience, optimizing performance, and implementing advanced security and data consistency mechanisms.

1. Enhanced UI Using Tailwind CSS & Component Libraries

- Consistency and Aesthetics
    - Tailwind CSS ensures utility-first styling with adaptive spacing, contrast, and font hierarchy.
    - Reusable Next.js components improve code maintainability and UI consistency.
- Accessibility
    - Keyboard navigation, ARIA roles, and screen-reader-friendly elements are incorporated.
    - Responsive layouts adapt fluidly across devices with dynamic resizing and collapsible menus.

2. Firebase Optimizations

- Efficient Data Handling
    - Batched writes and indexed queries reduce read/write times in Firestore.
    - Realtime updates ensure career insights and notifications appear without refresh.
- Cloud Functions
    - Used to abstract Gemini API calls and handle pre/post-processing of data.
    - Ensures business logic and sensitive keys remain secure and off the client.
- Caching Layer
    - Frequently accessed AI results are cached locally or in Firestore for improved response time.
    - Debounced input handling for AI requests avoids excessive API usage.

5.3 USER INTERFACE DESIGN

The UI of Study Notion is crafted for clarity, speed, and personalization, catering to users ranging from students to professionals.

1. Responsive Layout

- Built using Tailwind CSS grid/flex utilities for fully responsive design.
- UI components adjust fluidly for mobile, tablet, and desktop resolutions.

2. Core Interface Components

- Dashboard
    - Displays career roadmap progress, resume insights, and AI recommendations.
    - Shortcut cards for uploading resumes, exploring job roles, and revisiting past guidance.
- Resume Analysis Interface
    - Upload interface with drag-and-drop support.
    - Visual feedback showing resume parsing status and AI feedback.
- Career History & Insights
    - Timeline-based view of all previous sessions and AI outputs.
    - Filtering by date, job role, or recommendation type.

3. Visual Enhancements

- Icons from libraries like Lucide/Material enhance interactivity.
- Smooth transitions via Framer Motion improve user experience.

- Tooltips and hint texts guide new users through the platform.

CONCLUSION

The system design of Study_Notion ensures a future-ready, AI-powered web application through the strategic integration of Next.js, Firebase, and Gemini API. The primary design lays the foundation with core modules and data flows, while the secondary phase fine-tunes the system for responsiveness, scalability, and accessibility. A visually consistent and intuitive user interface complements the backend, ensuring a seamless experience that empowers users to make informed career decisions.

CHAPTER 6

ARCHITECTURE

The architecture of Study_Notion is crafted to deliver a real-time, AI-enhanced mock interview experience. Built using modern web technologies, the platform emphasizes scalability, performance, modularity, and data security. The layered design promotes clean separation of concerns, ensuring efficient development, easy maintenance, and robust integrations with AI and cloud services.

6.1 LAYERED ARCHITECTURE

1. Frontend Layer:

The frontend of Study_Notion serves as the main interaction point for users, offering an intuitive and responsive interface for scheduling, taking, and reviewing mock interviews.

- Technologies Used:
  - Next.js – Server-side rendering and API routes for optimized performance.
  - Tailwind CSS – Utility-first styling for rapid and responsive UI development.
  - Material UI – Prebuilt, accessible components for cohesive design.
  - Framer Motion – Smooth animations for transitions and feedback.
- Core Functionalities:
  - AI-driven mock interview UI with real-time feedback.
  - Dynamic interview generation using the Gemini API.
  - Integrated dashboard to view history, performance analytics, and improvement tips.

    - Interactive forms for inputting job roles, experience, and interview preferences.

- User Experience:
    - Responsive layout for mobile and desktop.
    - Dark/light mode toggle.
    - Accessibility compliance with ARIA support and keyboard navigation.

2. Backend Layer:

The backend, partially embedded in Next.js API routes and Firebase Cloud Functions, manages business logic, AI integration, and persistent storage.

- Technologies Used:
    - Next.js API Routes – Lightweight backend functionality.
    - Firebase Cloud Functions – Scalable backend for handling events like feedback analysis or scheduling.
    - Gemini API – Processes prompts to simulate realistic interview questions and give AI feedback.
- Responsibilities:
    - Manages user session and interview context.
    - Sends structured prompts to Gemini API and parses results.
    - Handles interview scheduling, result generation, and response scoring.
    - Integrates with external APIs for career-related question banks or behavioral patterns.
- Scalability & Performance:

    - Serverless Firebase Functions auto-scale with usage.
    - Async calls to Gemini ensure smooth user flow.
    - Firestore listeners for real-time updates (e.g., “interview complete”).

3. Database Layer:

Firebase provides the real-time database and authentication services, ensuring secure and instant access to user data.

- Technologies Used:
    - Firebase Firestore – NoSQL cloud database for structured interview records and performance data.
    - Firebase Auth – Handles OAuth2.0 logins and session tokens.
    - Firebase Storage – For storing user-uploaded resumes or feedback reports.
- Key Functions:
    - Stores mock interview questions, user answers, and AI evaluations.
    - Maintains a performance tracking log for personalized insights.
    - Provides atomic reads/writes for consistency during interviews.

6.2 REAL-TIME CAPABILITIES

Study_Notion uses real-time features to mimic the responsiveness of a real interviewer and improve feedback turnaround.

1.AI-Driven Interview Sessions

- Gemini API processes user role input and generates context-aware questions.
- Follow up with clarifying questions and structured feedback on answers.

2. Live Feedback and Evaluation

- AI-generated insights (strengths, weaknesses, next steps) are shown post-session.
- Firebase listeners reflect changes instantly in the user dashboard.
- Background Processing

3.Firebase Functions run asynchronously for:

- Processing full interview transcripts.
- Generating career readiness scores.
- Summarizing performance with natural language explanations.

6.3 SECURITY ARCHITECTURE

Security is embedded at every layer to protect sensitive user information and ensure safe handling of AI data.

1.Authentication & Session Management:

- Firebase Auth supports secure OAuth login (Google, GitHub).
- JWT-based session tokens for API authorization.

2.Data Protection:

- All data in Firestore is encrypted in transit and at rest.
- HTTPS enforced across all communications.
- Role-based access for admin and user features.

3.Compliance & Best Practices:

- Fine-grained Firestore security rules.

- Secure Firestore reads/writes using custom claims.
- Compliant with OWASP standards for web app security.

Conclusion

The architecture of Study_Notion combines the power of real-time databases, modern frontend frameworks, and AI-driven logic to create a platform that prepares users for real-world interviews. Leveraging Next.js, Firebase, and Gemini AI, the system is robust, scalable, and secure — making it a forward-thinking solution for students and professionals looking to improve their interview skills. Its modular design ensures adaptability for future features like video interviews, performance benchmarking, and personalized coaching.

CHAPTER 7

PROJECT SCREENSHOTS

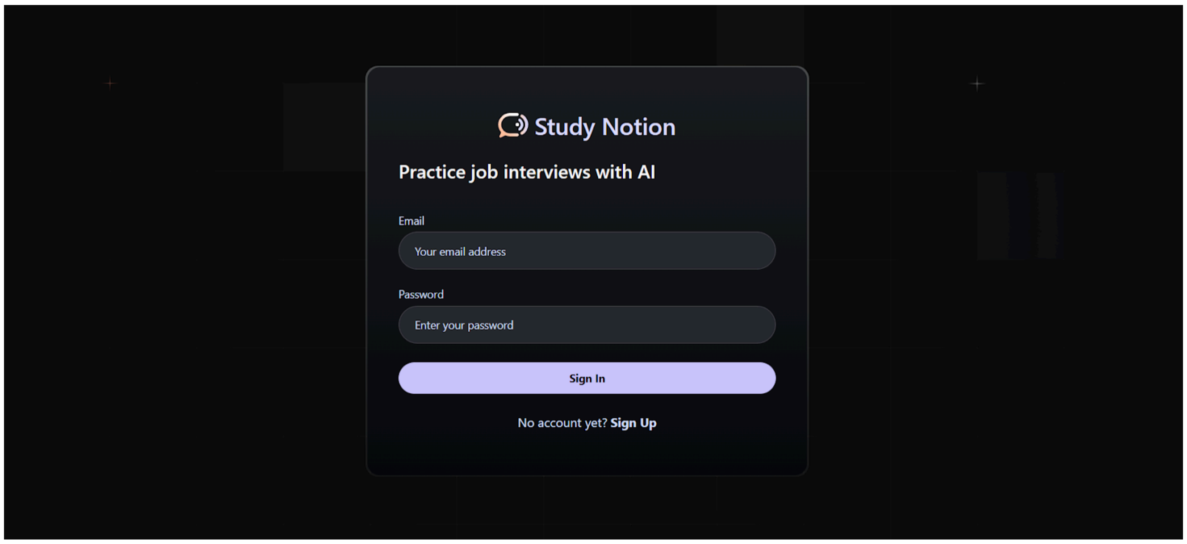


Fig. 7.1 Study_Notion Login Page

The login page provides users with a secure and straightforward interface to access their StudyNotion account. It features fields for email and password input, along with a "login" button to authenticate users. Additionally, it may include options for password recovery and new user registration, ensuring a smooth entry point to the platform.

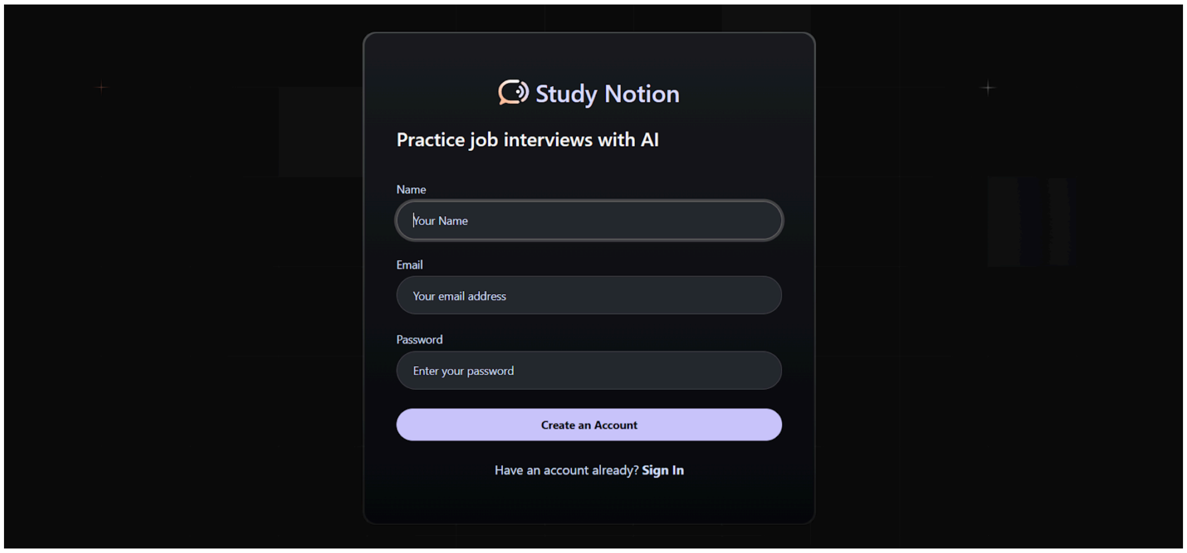


Fig. 7.2 Study_Notion Signup Page

The sign-up page allows new users to create an account on StudyNotion by providing essential information, such as email, password, and any additional fields (like name or role). The form is designed for simplicity and security, with validation to ensure that users enter valid information. Upon successful registration, users are granted access to the platform's features.

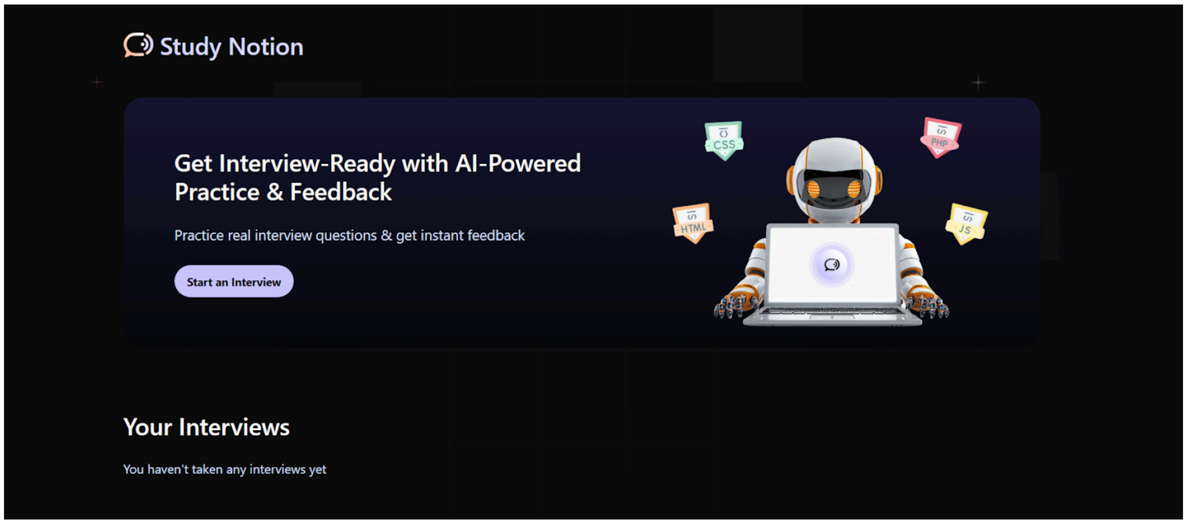
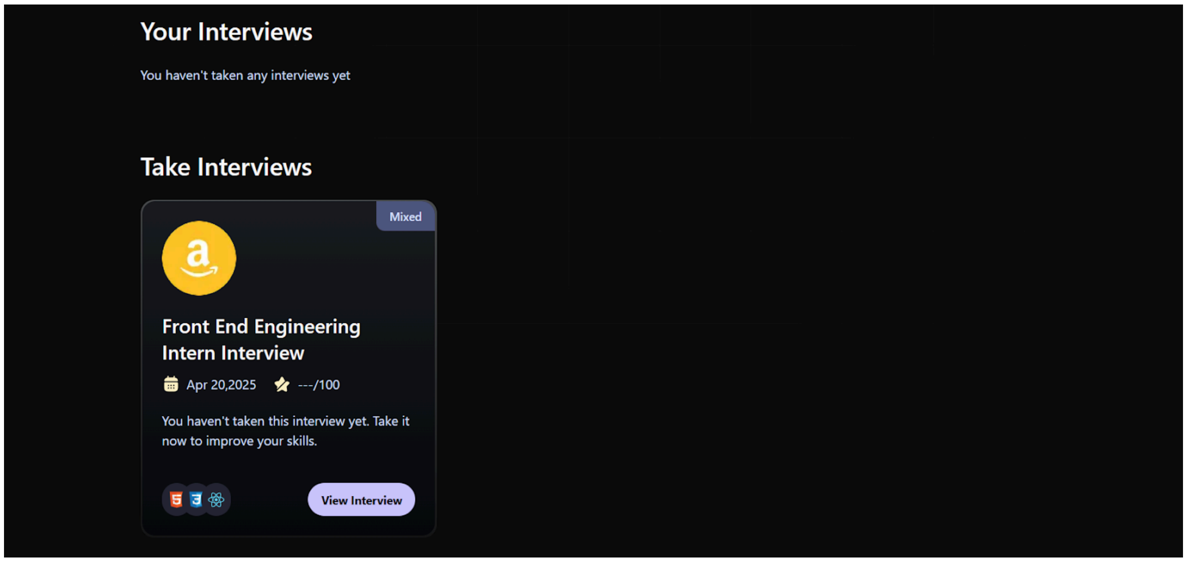

Study Notion
Get Interview-Ready with AI-Powered Practice & Feedback
Practice real interview questions & get instant feedback
Start an Interview
CSS
PHP
HTML
JS
Your Interviews
You haven't taken any interviews yet

Fig. 7.3 Study_Notion Landing Page

The landing page serves as the introductory interface to StudyNotion, highlighting the platform’s key features and value propositions. It typically includes navigation to core areas such as course offerings, interview generation, and user profiles. The design is user-friendly, with clear calls to action like “Get Started” or “Learn More,” encouraging visitors to sign up or explore the platform further.


Your Interviews

You haven't taken any interviews yet

Take Interviews

Mixed

Front End Engineering Intern Interview

Apr 20,2025 ---/100

You haven't taken this interview yet. Take it now to improve your skills.

Fig. 7.4 Past Interviews Page

The past interview page displays a history of previous AI-generated interviews that users have participated in. It allows users to review their past interview questions, responses, and performance. This page is designed to help users track their progress and prepare for future interviews by learning from past experiences.

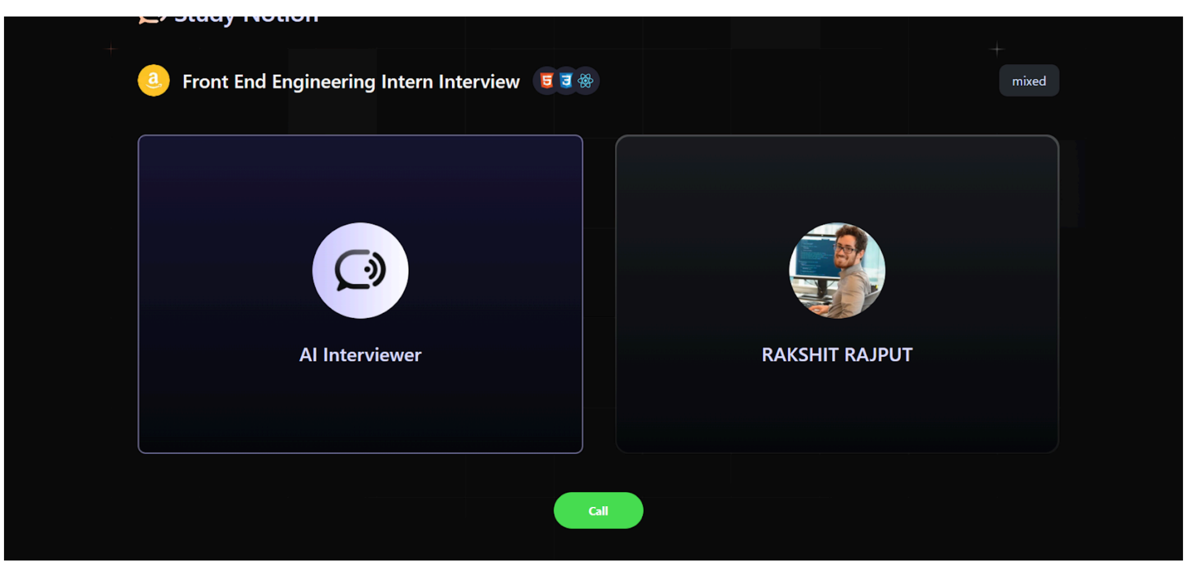


Fig. 7.5 Past Interviews

The past interview review page enables users to revisit and analyze their previous interview sessions in detail. It provides an opportunity to evaluate their responses, review feedback, and identify areas for improvement. This page is designed to offer insightful analysis, helping users refine their interview skills and better prepare for future opportunities.

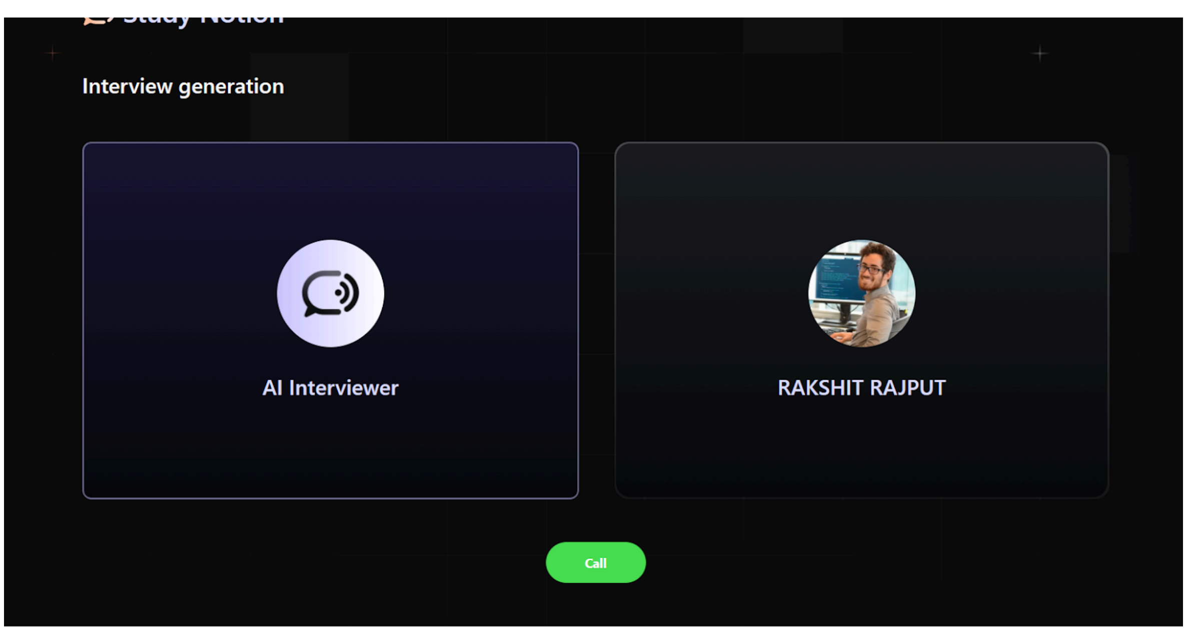
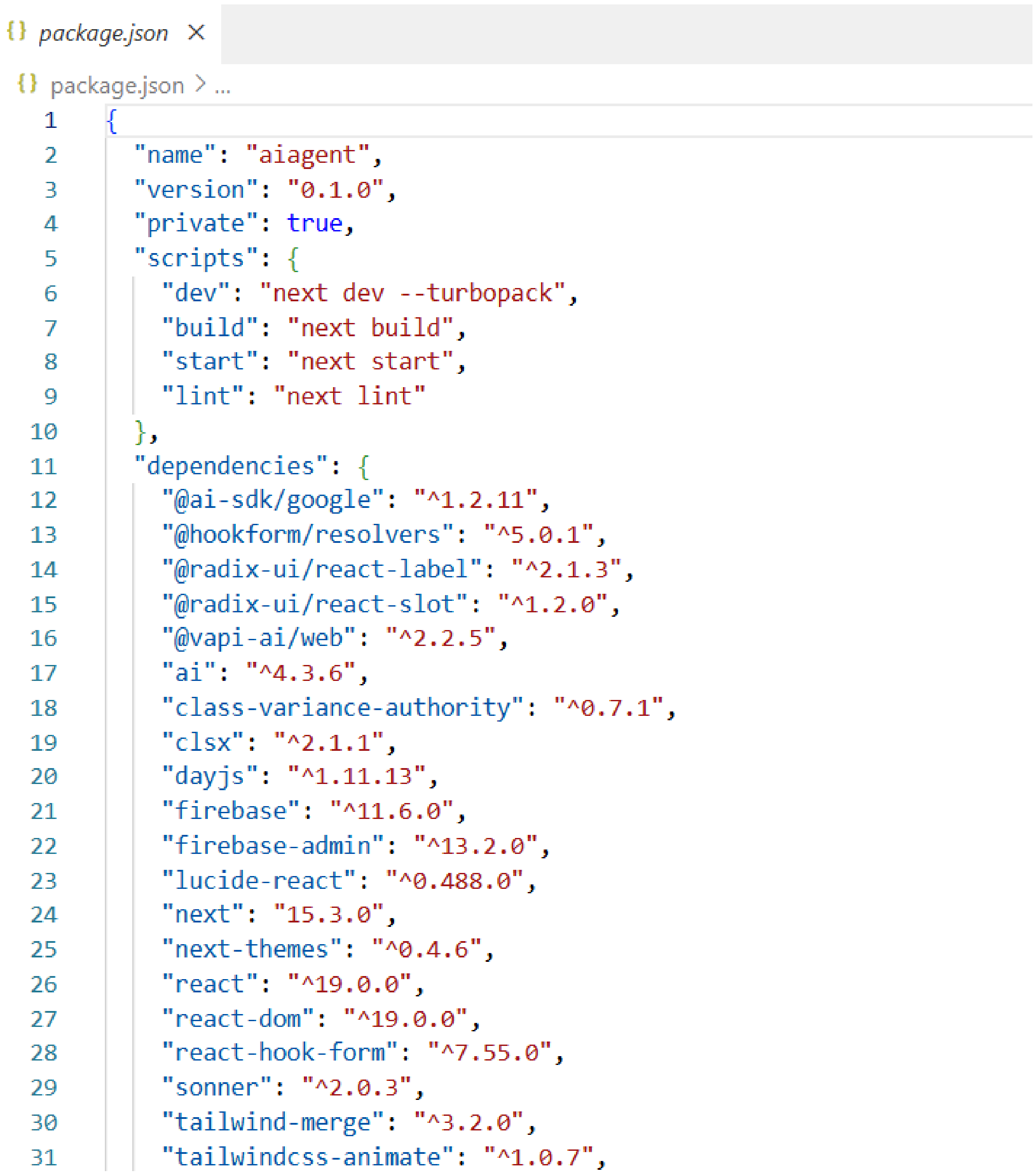


Fig. 7.6 New Interview Generation

The new interview generation page allows users to generate personalized interview questions based on their selected course content or career focus. It provides an intuitive interface where users can choose topics or job roles, and the Gemini API dynamically generates relevant interview questions. This page is designed to streamline the preparation process, providing users with tailored practice sessions.

Chapter 8

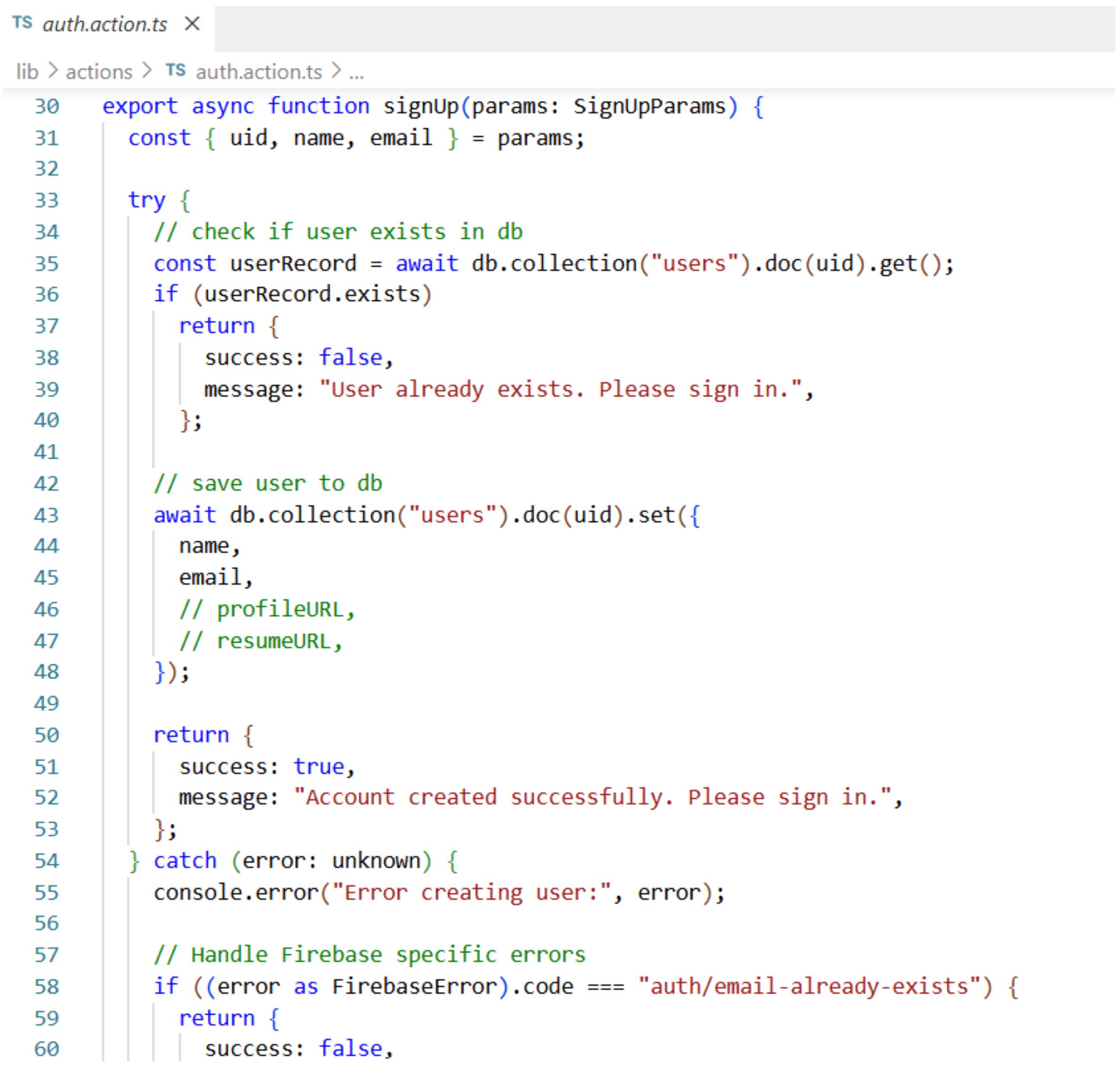
Code Screenshots



```json
{
  "name": "aiagent",
  "version": "0.1.0",
  "private": true,
  "scripts": {
    "dev": "next dev --turbopack",
    "build": "next build",
    "start": "next start",
    "lint": "next lint"
  },
  "dependencies": {
    "@ai-sdk/google": "^1.2.11",
    "@hookform/resolvers": "^5.0.1",
    "@radix-ui/react-label": "^2.1.3",
    "@radix-ui/react-slot": "^1.2.0",
    "@vapi-ai/web": "^2.2.5",
    "ai": "^4.3.6",
    "class-variance-authority": "^0.7.1",
    "clsx": "^2.1.1",
    "dayjs": "^1.11.13",
    "firebase": "^11.6.0",
    "firebase-admin": "^13.2.0",
    "lucide-react": "^0.488.0",
    "next": "15.3.0",
    "next-themes": "^0.4.6",
    "react": "^19.0.0",
    "react-dom": "^19.0.0",
    "react-hook-form": "^7.55.0",
    "sonner": "^2.0.3",
    "tailwind-merge": "^3.2.0",
    "tailwindcss-animate": "^1.0.7",
```

Fig. 8.1 Package.json

The package.json file defines the project's dependencies, scripts, and metadata. In StudyNotion, it includes essential packages like Express, Mongoose, and the Gemini API client, helping manage the backend environment and streamline development tasks.

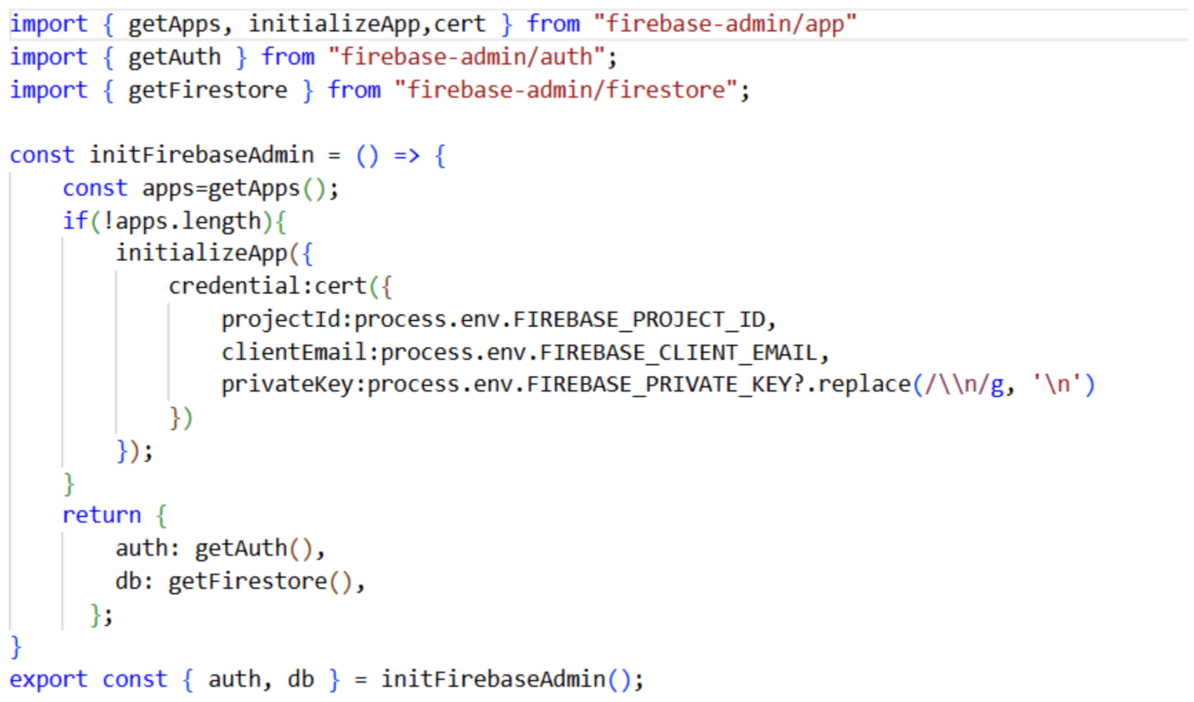

auth.action.ts ×

lib > actions > auth.action.ts > ...

```typescript
export async function signUp(params: SignUpParams) {
  const { uid, name, email } = params;

  try {
    // check if user exists in db
    const userRecord = await db.collection("users").doc(uid).get();
    if (userRecord.exists)
      return {
        success: false,
        message: "User already exists. Please sign in.",
      };

    // save user to db
    await db.collection("users").doc(uid).set({
      name,
      email,
      // profileURL,
      // resumeURL,
    });

    return {
      success: true,
      message: "Account created successfully. Please sign in.",
    };
  } catch (error: unknown) {
    console.error("Error creating user:", error);

    // Handle Firebase specific errors
    if ((error as FirebaseError).code === "auth/email-already-exists") {
      return {
        success: false,
```

Fig. 8.2 Firebase signup

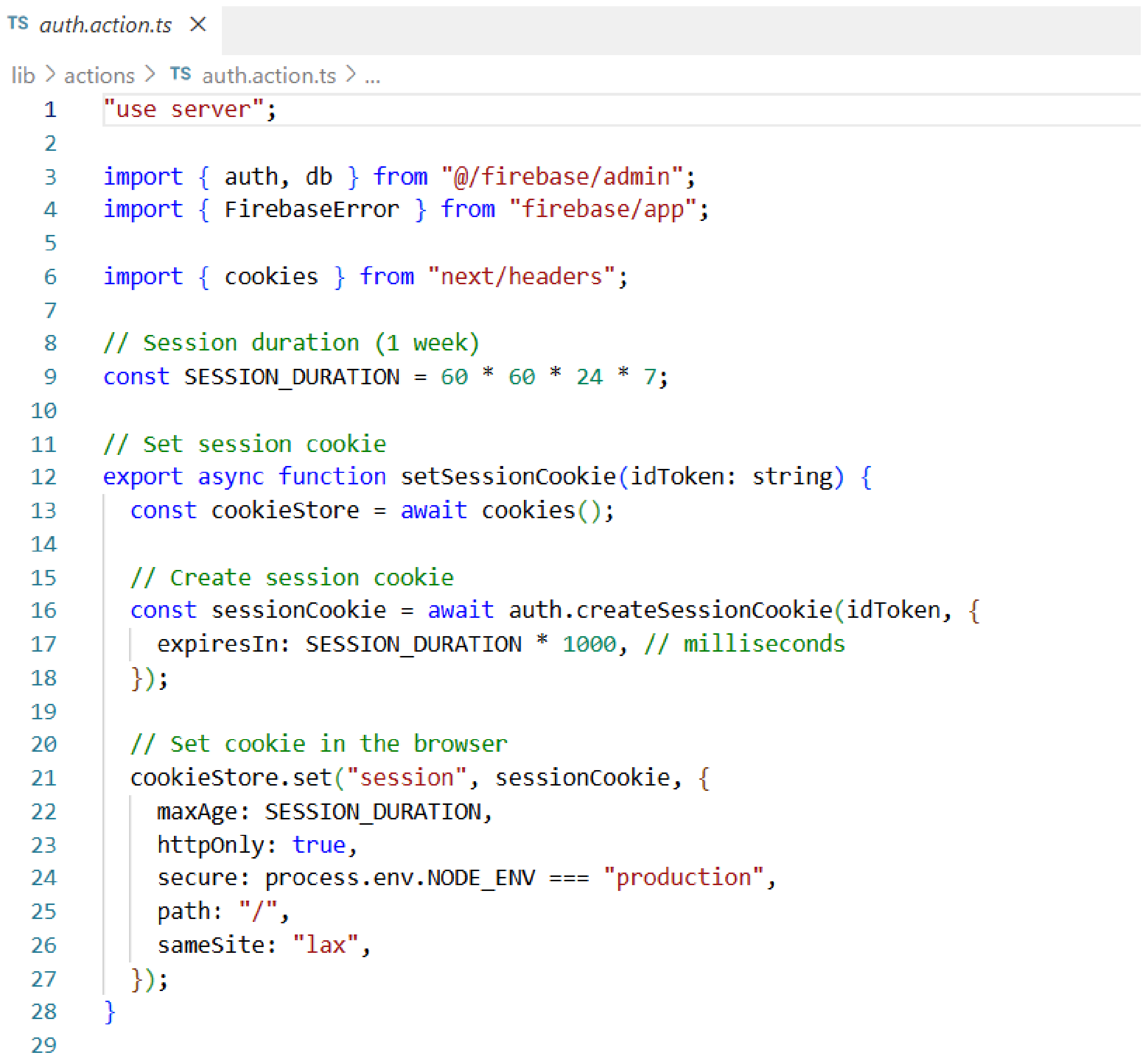
This code handles user authentication using Firebase. It allows users to sign up, log in, and manage sessions securely. Firebase simplifies the authentication process with built-in support for email/password and other providers, making the system reliable and scalable for StudyNotion.



```
import { getApps, initializeApp,cert } from "firebase-admin/app"
import { getAuth } from "firebase-admin/auth";
import { getFirestore } from "firebase-admin/firestore";

const initFirebaseAdmin = () => {
    const apps=getApps();
    if(!apps.length){
        initializeApp({
            credential:cert({
                projectId:process.env.FIREBASE_PROJECT_ID,
                clientEmail:process.env.FIREBASE_CLIENT_EMAIL,
                privateKey:process.env.FIREBASE_PRIVATE_KEY?.replace(/\\n/g, '\n')
            })
        });
    }
    return {
        auth: getAuth(),
        db: getFirestore(),
      };
}
export const { auth, db } = initFirebaseAdmin();
```

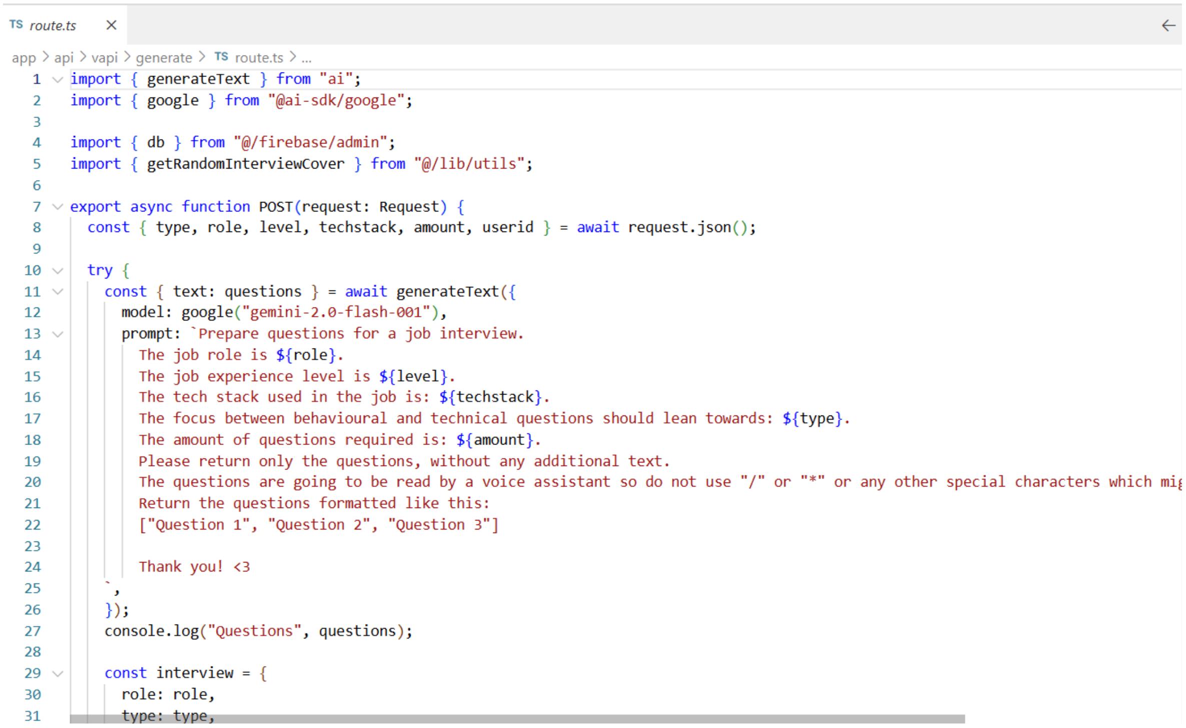
Fig. 8.3 firebase admin

This code uses the Firebase Admin SDK to manage authentication and securely verify user tokens on the server side. It's primarily used to authenticate API requests, manage users, and ensure that only authorized users can access protected routes in StudyNotion.



```
"use server";

import { auth, db } from "@/firebase/admin";
import { FirebaseError } from "firebase/app";

import { cookies } from "next/headers";

// Session duration (1 week)
const SESSION_DURATION = 60 * 60 * 24 * 7;

// Set session cookie
export async function setSessionCookie(idToken: string) {
  const cookieStore = await cookies();

  // Create session cookie
  const sessionCookie = await auth.createSessionCookie(idToken, {
    expiresIn: SESSION_DURATION * 1000, // milliseconds
  });

  // Set cookie in the browser
  cookieStore.set("session", sessionCookie, {
    maxAge: SESSION_DURATION,
    httpOnly: true,
    secure: process.env.NODE_ENV === "production",
    path: "/",
    sameSite: "lax",
  });
}

```

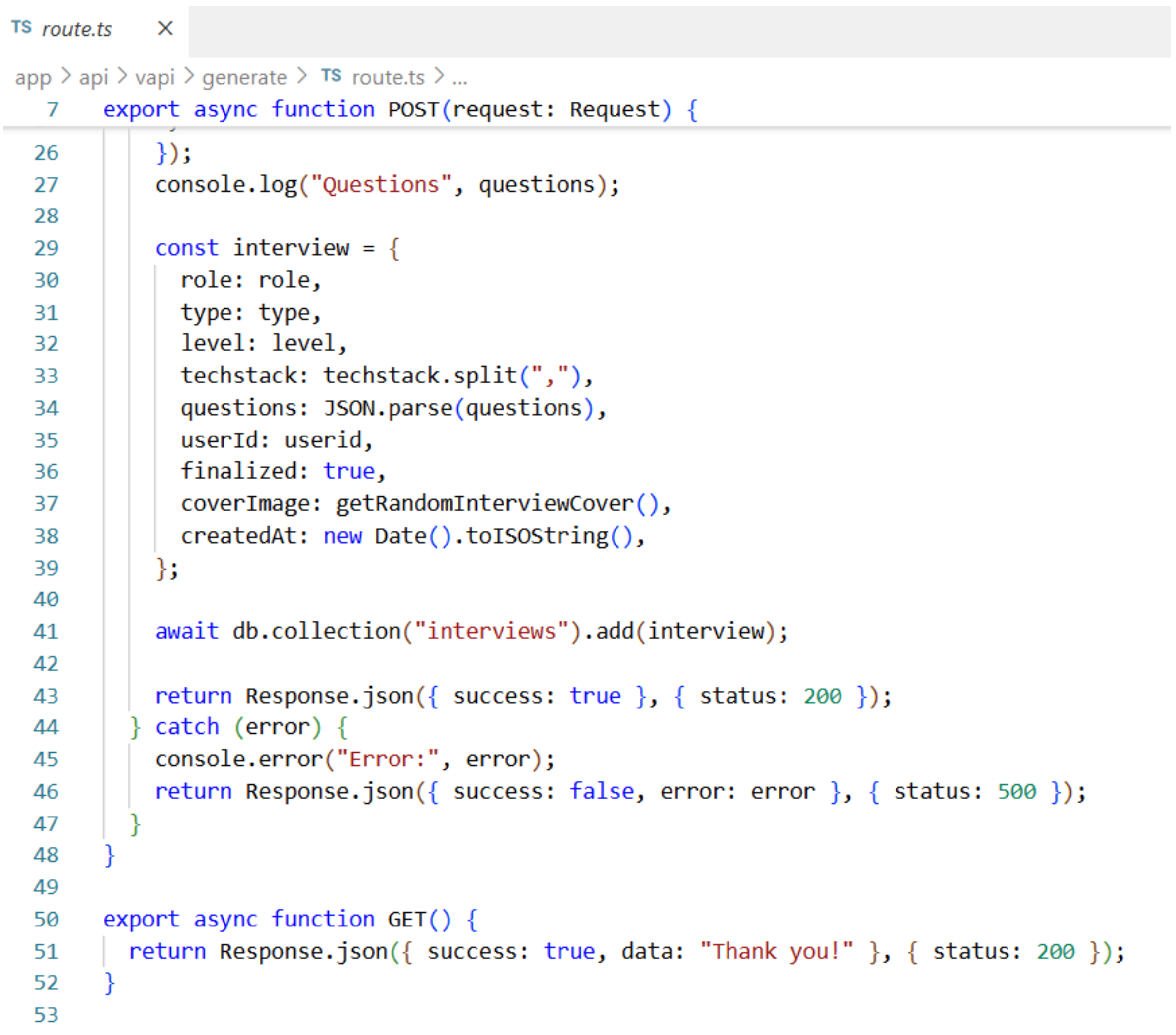
Fig. 8.4 firebase auth function



route.ts

app > api > vapi > generate > route.ts > ...

```
import { generateText } from "ai";
import { google } from "@ai-sdk/google";

import { db } from "@/firebase/admin";
import { getRandomInterviewCover } from "@/lib/utils";

export async function POST(request: Request) {
  const { type, role, level, techstack, amount, userid } = await request.json();

  try {
    const { text: questions } = await generateText({
      model: google("gemini-2.0-flash-001"),
      prompt: `Prepare questions for a job interview.
        The job role is ${role}.
        The job experience level is ${level}.
        The tech stack used in the job is: ${techstack}.
        The focus between behavioural and technical questions should lean towards: ${type}.
        The amount of questions required is: ${amount}.
        Please return only the questions, without any additional text.
        The questions are going to be read by a voice assistant so do not use "/" or "*" or any other special characters which mi
        Return the questions formatted like this:
        ["Question 1", "Question 2", "Question 3"]

        Thank you! <3
    `,
    });
    console.log("Questions", questions);

    const interview = {
      role: role,
      type: type,
```



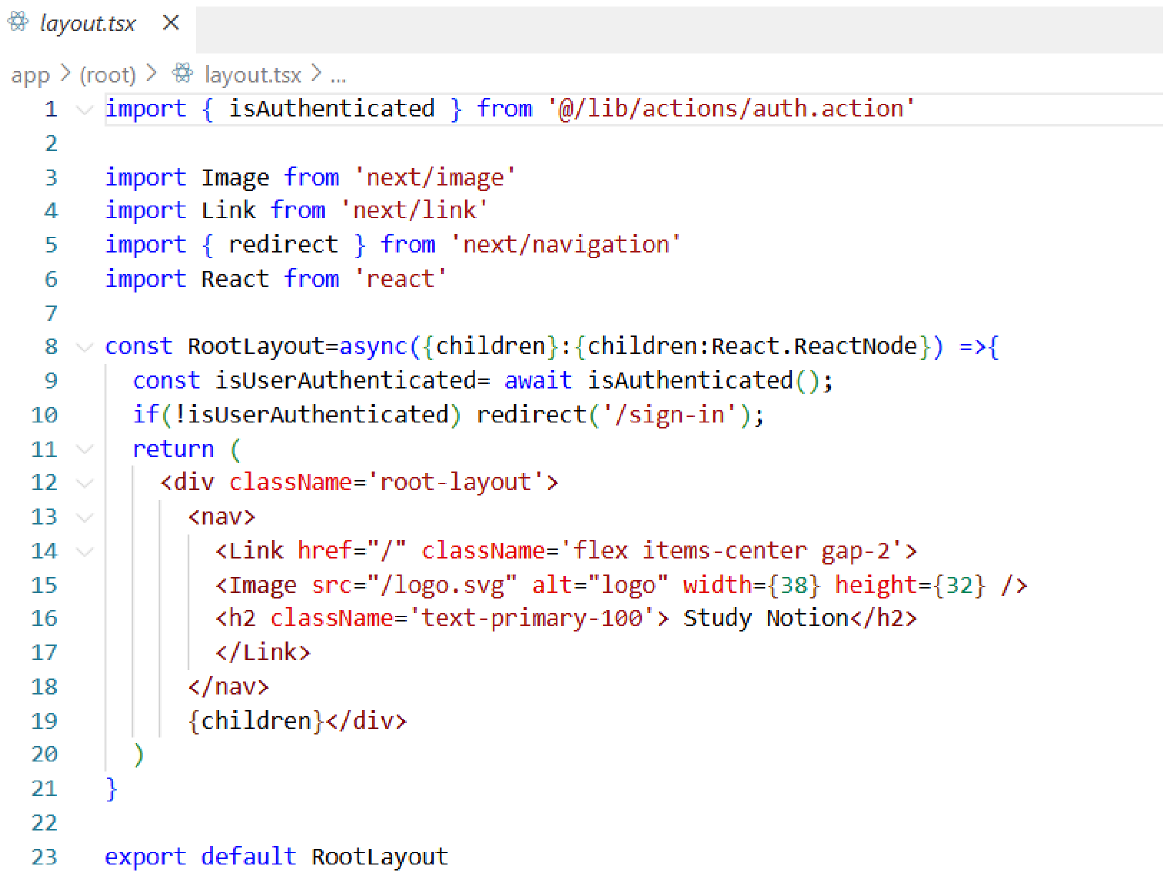
TS route.ts ×

app > api > vapi > generate > TS route.ts > ...

```
export async function POST(request: Request) {
    });
    console.log("Questions", questions);

    const interview = {
      role: role,
      type: type,
      level: level,
      techstack: techstack.split(","),
      questions: JSON.parse(questions),
      userId: userid,
      finalized: true,
      coverImage: getRandomInterviewCover(),
      createdAt: new Date().toISOString(),
    };

    await db.collection("interviews").add(interview);

    return Response.json({ success: true }, { status: 200 });
  } catch (error) {
    console.error("Error:", error);
    return Response.json({ success: false, error: error }, { status: 500 });
  }
}

export async function GET() {
  return Response.json({ success: true, data: "Thank you!" }, { status: 200 });
}
```

Fig. 8.5 Interview Generation code

The route.ts file defines the API endpoints for the StudyNotion backend. It maps various HTTP routes to their respective controller functions, handling requests like user authentication, course management, and interview generation. This structure keeps the code organized and makes the API easier to maintain and scale.

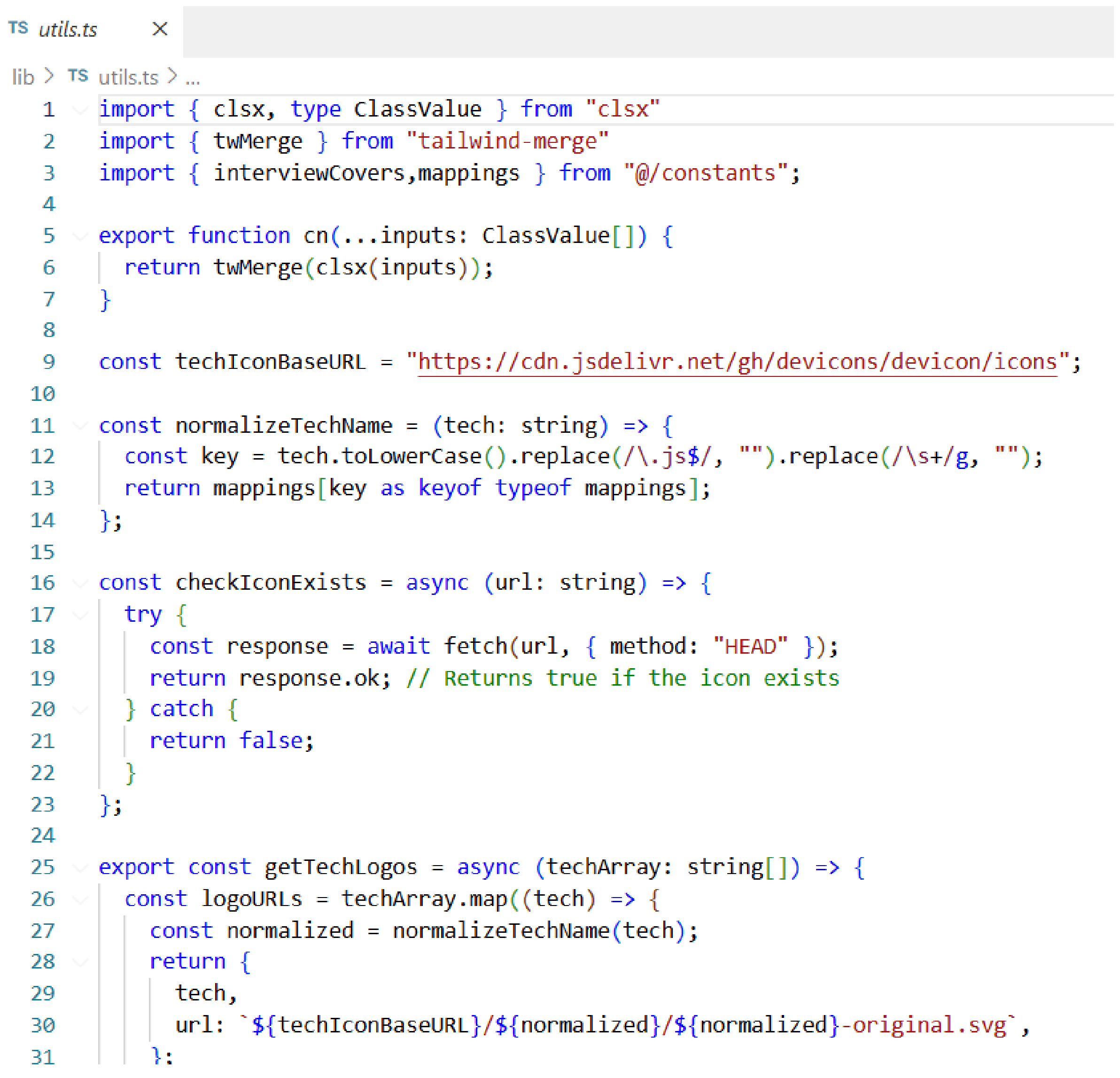

layout.tsx ×

app > (root) > layout.tsx > ...

```tsx
import { isAuthenticated } from '@/lib/actions/auth.action'

import Image from 'next/image'
import Link from 'next/link'
import { redirect } from 'next/navigation'
import React from 'react'

const RootLayout=async({children}:{children:React.ReactNode}) =>{
  const isUserAuthenticated= await isAuthenticated();
  if(!isUserAuthenticated) redirect('/sign-in');
  return (
    <div className='root-layout'>
      <nav>
        <Link href="/" className='flex items-center gap-2'>
        <Image src="/logo.svg" alt="logo" width={38} height={32} />
        <h2 className='text-primary-100'> Study Notion</h2>
        </Link>
      </nav>
      {children}</div>
  )
}

export default RootLayout
```

Fig.8.6 Layout form

The layout.ts file sets up the base layout for the StudyNotion frontend. It defines the common structure shared across pages—such as headers, sidebars, or footers—and ensures a consistent UI throughout the application. It's typically used in frameworks like Next.js or when building reusable layout components in React.



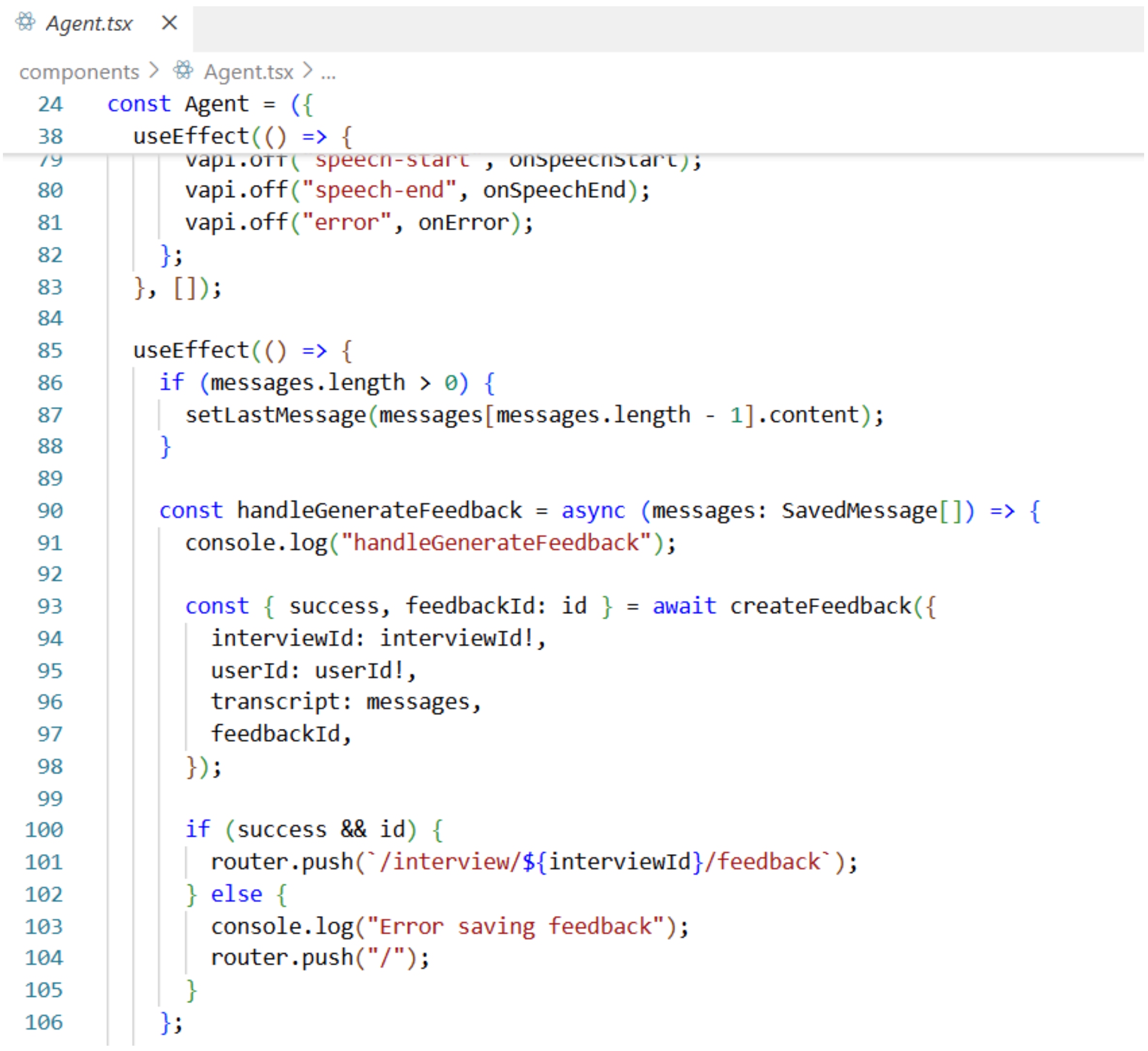
utils.ts

lib > utils.ts > ...

```ts
import { clsx, type ClassValue } from "clsx"
import { twMerge } from "tailwind-merge"
import { interviewCovers,mappings } from "@/constants";

export function cn(...inputs: ClassValue[]) {
  return twMerge(clsx(inputs));
}

const techIconBaseURL = "https://cdn.jsdelivr.net/gh/devicons/devicon/icons";

const normalizeTechName = (tech: string) => {
  const key = tech.toLowerCase().replace(/\.js$/, "").replace(/\s+/g, "");
  return mappings[key as keyof typeof mappings];
};

const checkIconExists = async (url: string) => {
  try {
    const response = await fetch(url, { method: "HEAD" });
    return response.ok; // Returns true if the icon exists
  } catch {
    return false;
  }
};

export const getTechLogos = async (techArray: string[]) => {
  const logoURLs = techArray.map((tech) => {
    const normalized = normalizeTechName(tech);
    return {
      tech,
      url: `${techIconBaseURL}/${normalized}/${normalized}-original.svg`,
    };
```

Fig. 8.7 utils code

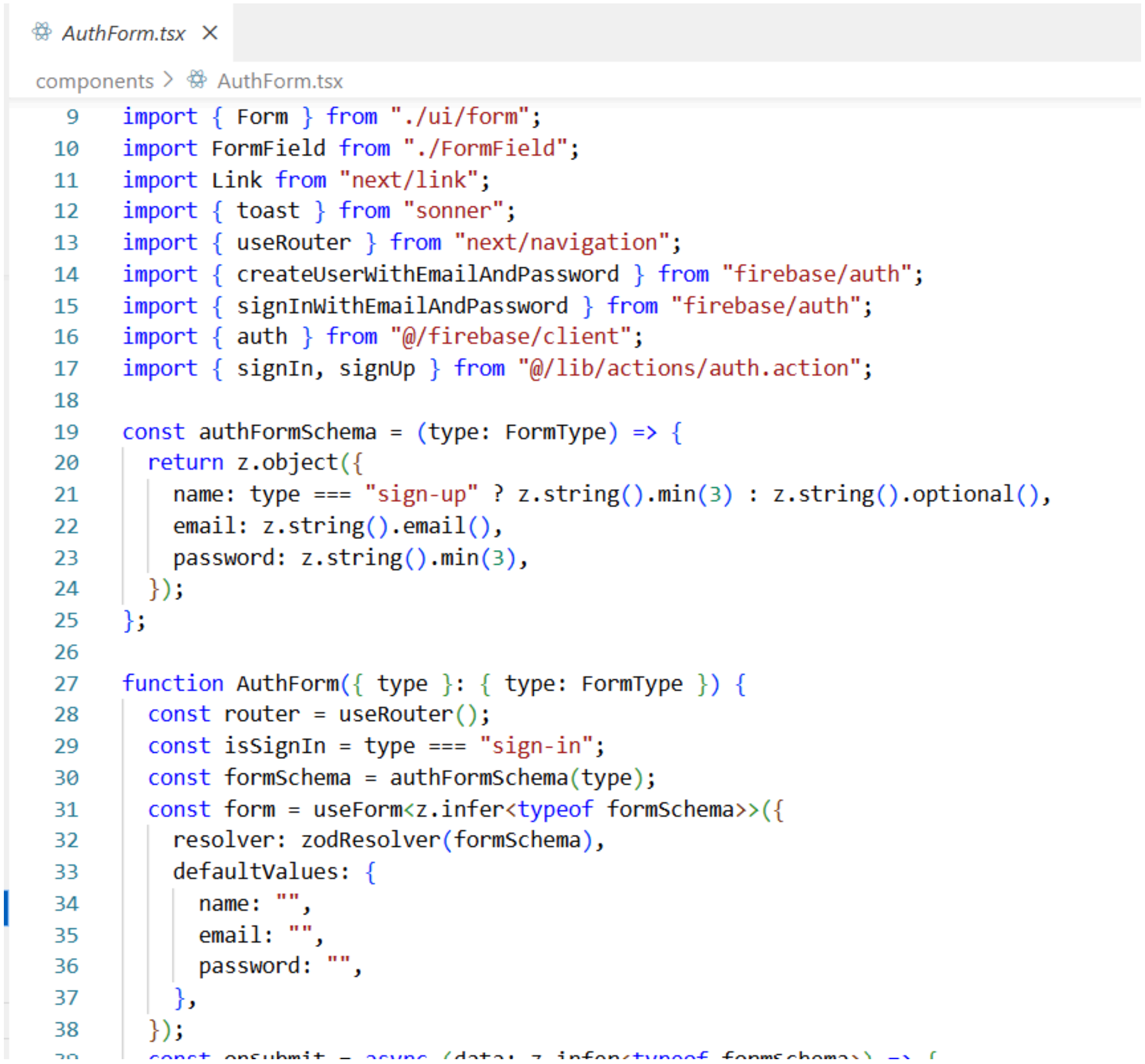
The utils.ts file contains reusable helper functions used across the StudyNotion project. These functions handle common tasks such as data formatting, token validation, or API request handling, helping keep the codebase clean and maintainable.



```
const Agent = ({
  useEffect(() => {
      vapi.off("speech-start", onSpeechStart);
      vapi.off("speech-end", onSpeechEnd);
      vapi.off("error", onError);
    };
  }, []);

  useEffect(() => {
    if (messages.length > 0) {
      setLastMessage(messages[messages.length - 1].content);
    }

    const handleGenerateFeedback = async (messages: SavedMessage[]) => {
      console.log("handleGenerateFeedback");

      const { success, feedbackId: id } = await createFeedback({
        interviewId: interviewId!,
        userId: userId!,
        transcript: messages,
        feedbackId,
      });

      if (success && id) {
        router.push(`/interview/${interviewId}/feedback`);
      } else {
        console.log("Error saving feedback");
        router.push("/");
      }
    };
```

Fig. 8.8 Agent frontend code

This code handles the integration of the Gemini API on the frontend. It sends user input—like selected topics or questions—to the backend or directly to the Gemini API and displays the AI-generated interview questions in the UI. It ensures smooth interaction between users and the AI-powered interview generation feature in StudyNotion.


AuthForm.tsx ×

components > AuthForm.tsx

```
import { Form } from "./ui/form";
import FormField from "./FormField";
import Link from "next/link";
import { toast } from "sonner";
import { useRouter } from "next/navigation";
import { createUserWithEmailAndPassword } from "firebase/auth";
import { signInWithEmailAndPassword } from "firebase/auth";
import { auth } from "@/firebase/client";
import { signIn, signUp } from "@/lib/actions/auth.action";

const authFormSchema = (type: FormType) => {
  return z.object({
    name: type === "sign-up" ? z.string().min(3) : z.string().optional(),
    email: z.string().email(),
    password: z.string().min(3),
  });
};

function AuthForm({ type }: { type: FormType }) {
  const router = useRouter();
  const isSignIn = type === "sign-in";
  const formSchema = authFormSchema(type);
  const form = useForm<z.infer<typeof formSchema>>({
    resolver: zodResolver(formSchema),
    defaultValues: {
      name: "",
      email: "",
      password: "",
    },
  });
```

Fig. 8.9 Auth Form

The authentication form handles user login and sign-up processes on the platform. It includes fields for entering email and password, and may offer additional options for social logins or password recovery. The form is designed for ease of use and security, ensuring that users can access their accounts quickly and safely. Validation messages guide users to provide correct input, enhancing the overall user experience.

CHAPTER 9

CONCLUSION

Modular Layered Architecture

- MockMeta adopts a clean, modular 3-layered architecture—Frontend, Backend, and Database—which promotes long-term maintainability, feature modularity, and horizontal scalability across cloud-native deployments.

User-Centric Frontend Design

- Built using Next.js, the frontend delivers a smooth, dynamic, and accessible user experience. Tailwind CSS and Material UI ensure responsive design, consistent layouts, and component-level reusability. Features like dark/light theme toggle, animated interactions, and real-time dashboards help keep users engaged throughout their mock interview journeys.

Scalable Backend Infrastructure

- MockMeta utilizes Next.js API routes combined with Firebase Cloud Functions to manage AI logic, session orchestration, and user interaction flows. The integration with the Gemini API allows for AI-powered interview simulation and adaptive feedback generation. The backend supports asynchronous processing for smooth load distribution and fault tolerance.

Real-Time AI Capabilities

- Powered by the Gemini API, Study_Notion delivers mock interviews tailored to user roles, experience, and domains. AI-generated questions, live feedback, and dynamic performance summaries are rendered in near real-time. The system also tracks contextual progress and learning goals to personalize each session over time.

Cloud-Native and Scalable

- Hosted on Firebase with serverless architecture, Study_Notion is built to scale automatically with increasing user traffic. It supports global deployment, CDN-backed static content delivery, and load-balanced function execution, making it a robust platform for large-scale use.

Enterprise-Grade Security

- Authentication is handled by Firebase Auth using secure OAuth 2.0 providers. User session tokens are JWT-based and verified on each request. User interview data and analytics are encrypted using Firebase's in-transit and at-rest encryption mechanisms, ensuring data privacy and integrity.

Seamless AI Integration & Automation

- AI features like question generation, answer evaluation, and roadmap suggestions are fully automated using Gemini API. Background processing is handled via Firebase Functions, enabling deferred tasks (e.g., analytics generation, transcript parsing) without blocking user flow.

Real-Time Data Integrity and Performance

- The application uses Firebase Firestore for real-time storage and sync. Indexed queries, batched writes, and listener-based updates allow the system to instantly reflect new user data and provide low-latency interactions. The NoSQL structure is optimized for handling session logs, feedback records, and AI interaction threads.

Built for Continuous Evolution

- Study_Notion is engineered for adaptability. Future enhancements may include video-based mock interviews, ML-based performance benchmarking, and Gamified leaderboards. Its flexible microservice-compatible design ensures that new modules or APIs can be integrated with minimal refactoring.

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These references supported the technical planning, architectural decisions, and feature implementations throughout the development of Study_Notion. They served as foundational materials for understanding frameworks, tools, APIs, and best practices in building scalable, secure, AI-integrated web applications.

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