

NEUREOM

AI-Powered E-Learning Platform

Jehad Hmoudah & Hamza Younes

Supervisor: Eng. Haya Samaana

E-Learning Platforms Challenges

**Lack of Academic
Alignment**

**Course Publishing
Difficulty**

No Personalization

**Hard Course
Localization**

Our Solution

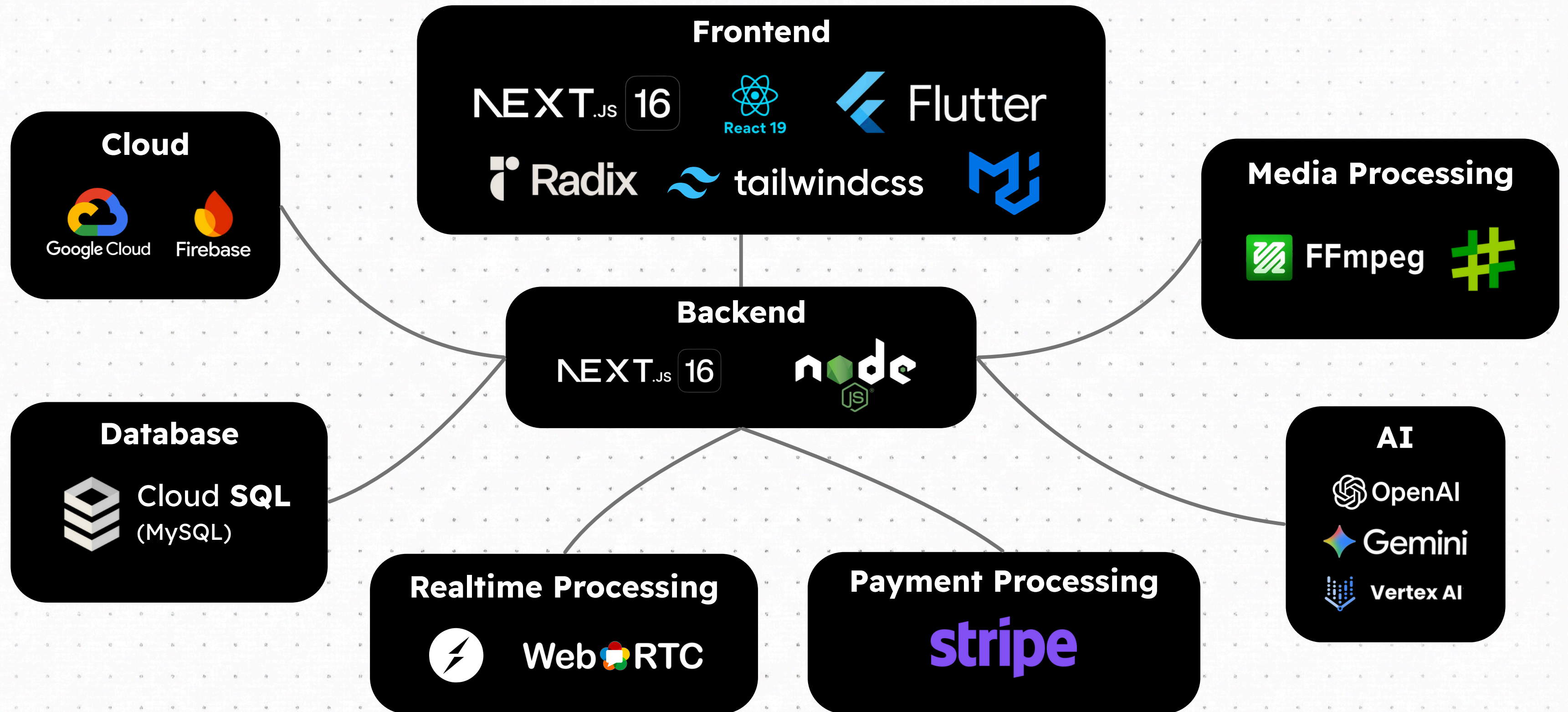
AI Exam Maker

**Effortless Publishing
with AI Assistance**

**Context Aware
AI Assistant**

**Intelligent
Subtitle Generator**

Tech Stack



How & Why We Used Flutter

- **Flutter has plenty of open-source packages (pub.dev).**
- **It's supported on: Android, iOS, Web, MacOS, Windows, and Linux.**
- **Offers near-native performance.**
- **No JS-to-native bridge like React Native = Faster.**
- **Pixel perfect on all platforms it supports.**

How & Why We Used Flutter

BUT!

- **Flutter uses Skia rendering engine, instead of HTML.**
- **Long loading time (Must load the engine first).**
- **No SSR support = Bad choice for SEO.**

Our Solution

A Flutter wrapper app around Next.js website.

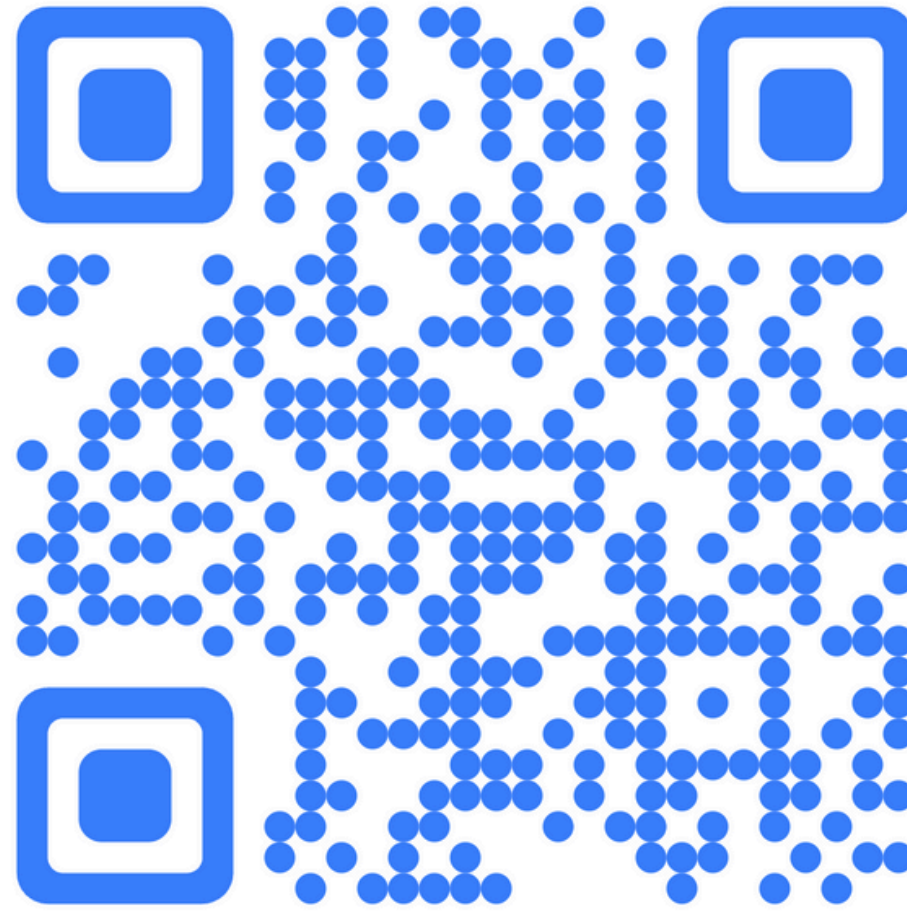
- ✓ **SSR, SEO.**
- ✓ **Easy to use Flutter SDKs (e.g., Firebase Messaging).**
- ✓ **Single codebase.**
- ✓ **Immediate updates, no long wait times for Apple App Review or Google Play Review.**

Our Solution

A Flutter wrapper app around Next.js website.



VISIT OUR WEBSITE



www.neureom.com

Live Demo

Key Features

Neureom integrates four core pillars course management, artificial intelligence, advanced video processing, and real-time communication to create a holistic learning ecosystem.

Course Management

- Structured courses with modules and lessons
- Multiple content types: video, text, quizzes
- Monetization via Stripe
- Drag-and-drop course builder

The screenshot displays the course management interface for 'Hamza's Calculus 101', which is published. The interface is divided into two main sections: a course overview and a lesson editor.

Course Overview:

- Course:** Hamza's Calculus 101 (Published)
- Module:** Intro to Calculus (3 lessons)
- Lessons:**
 - Intro to Calculus (5:04) - Free
 - Reading Week (5:00) - 0
 - Intro to Calc (8:00) - 0

Lesson Editor (Reading Week):

- Title:** Reading Week
- Duration:** 5:00
- Content Type:** Text
- Blocks:** 2 blocks
- Block 1 (TEXT):** Hello
- Block 2 (CODE):**

```
Printf("Hello World");
```

Key Features

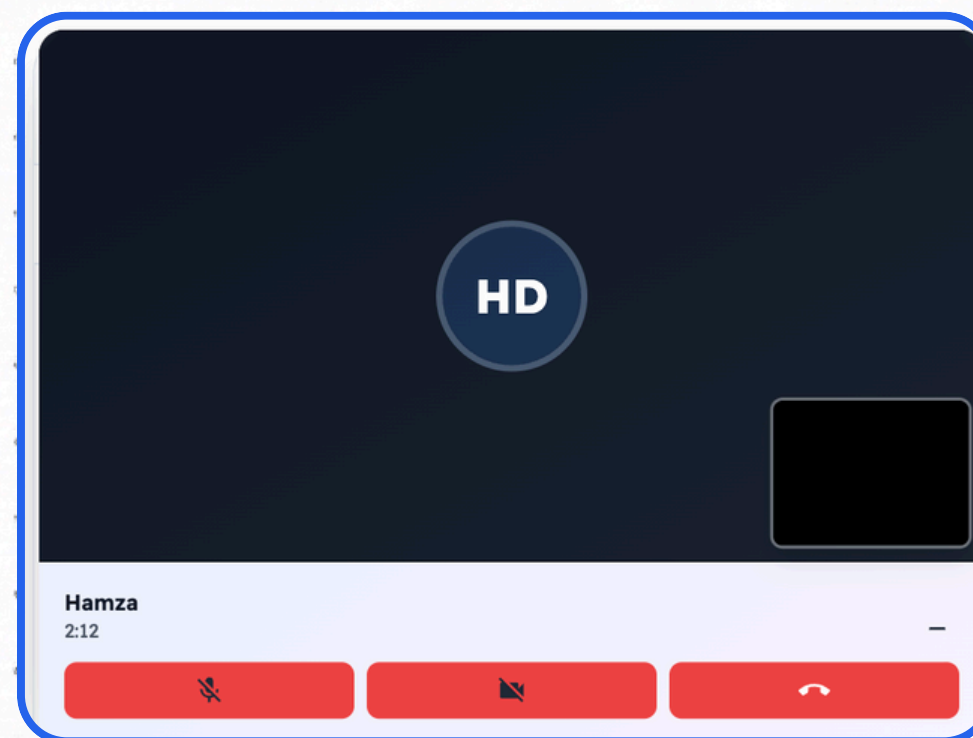
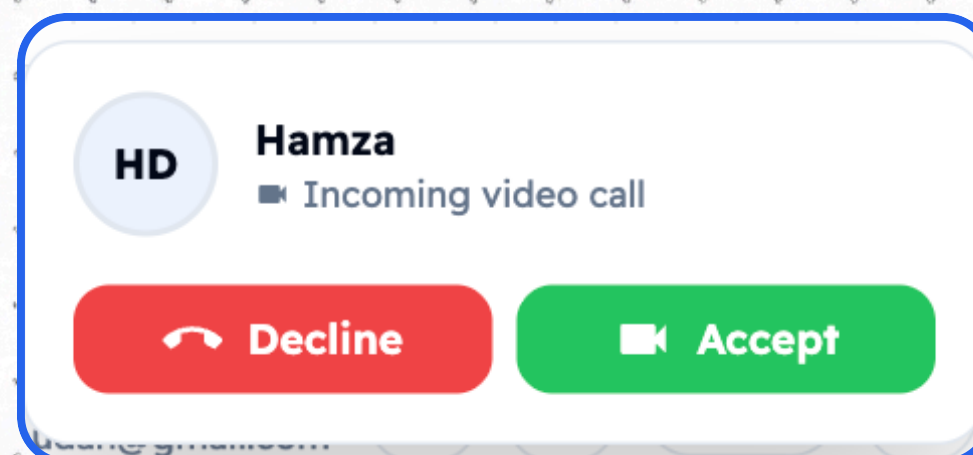
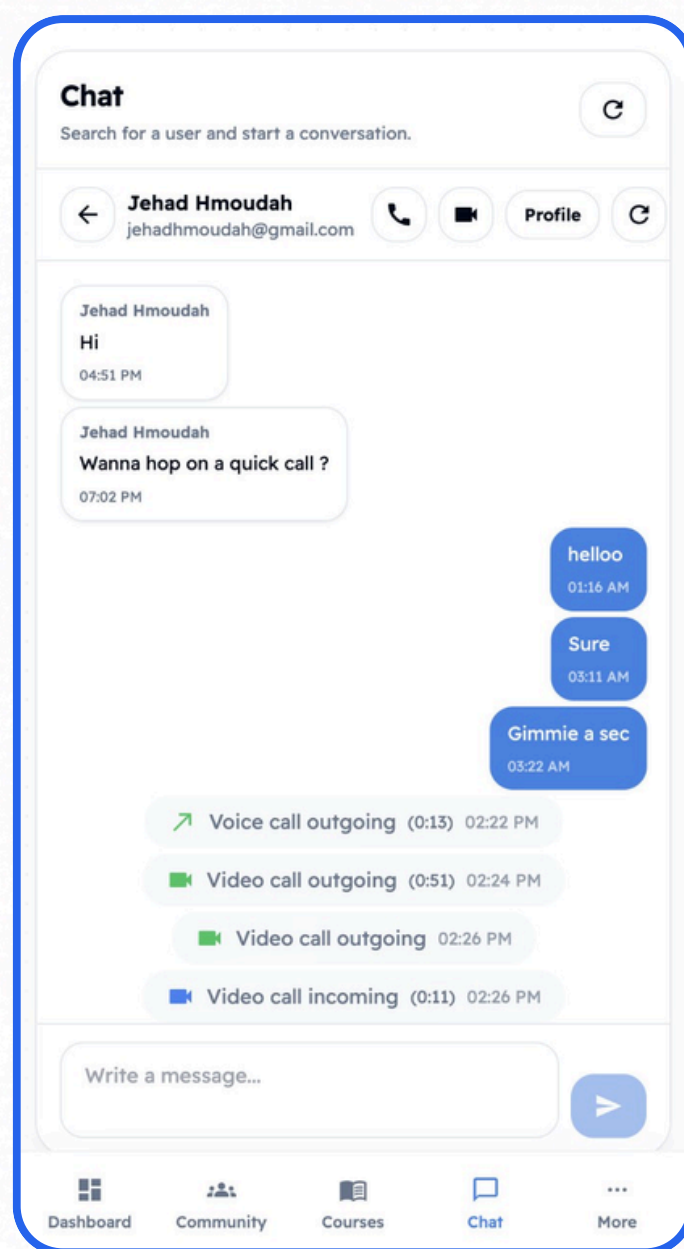
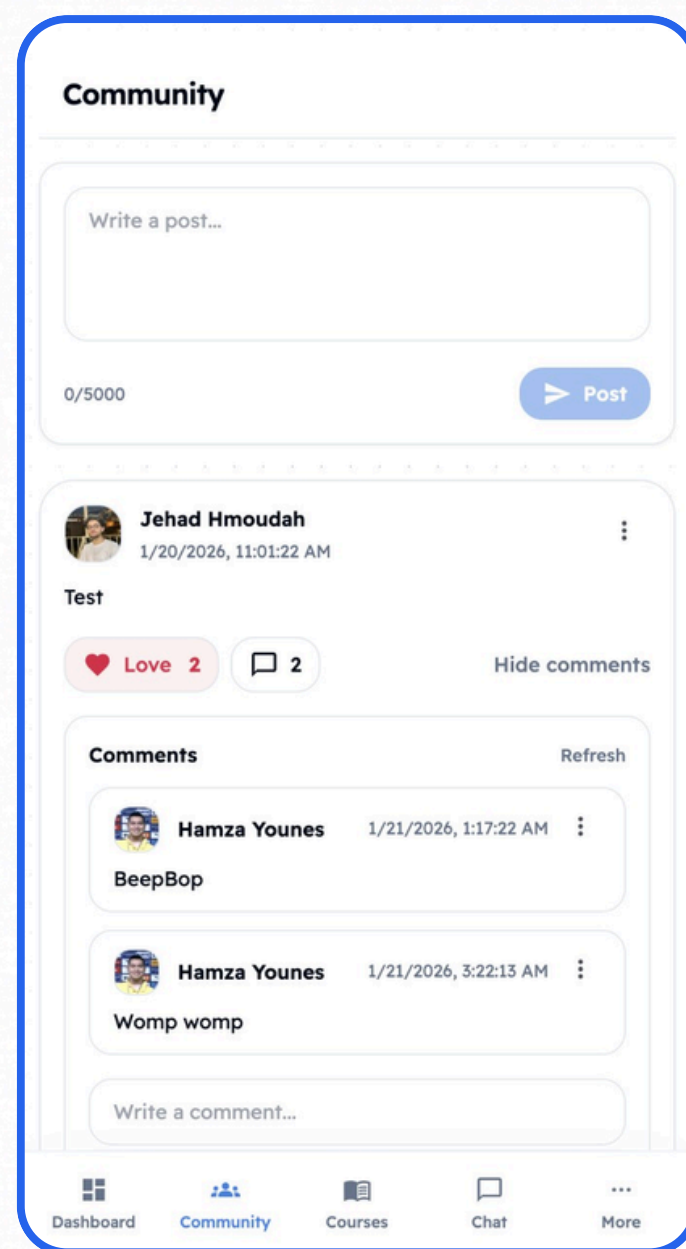
Neureom integrates four core pillars course management, artificial intelligence, advanced video processing, and real-time communication to create a holistic learning ecosystem.

The screenshot shows a 'Learning Journey' dashboard for 'Calculus 101'. At the top, there's a 'Regenerate' button and a trash icon. Below that, an 'Overall Progress' section shows a progress bar at 20% with the text '1 / 5 steps completed' and a 'Keep going!' prompt. The main area is titled 'Your Learning Path' and contains two course steps. The first step, 'Introduction to Limits and Continuity', is marked as 'Completed' and includes an 'Undo' button. It provides a description: 'This step introduces the fundamental concept of limits, which forms the basis for calculus. You will learn how to evaluate limits algebraically and graphically, and understand the definition of continuity. This step is crucial for understanding derivatives and integrals.' It also shows a duration of '1-2 weeks' and '1 course'. Below this, 'Recommended courses' lists 'Hamza's Calculus 101' with a brief description. The second step, 'Derivatives: Definition and Basic Rules 0', is currently active and has a 'Complete' button. It includes a description: 'This step introduces the concept of the derivative as a measure of the instantaneous rate of change. You will learn the formal definition of the derivative and master basic...'. To the right of the learning path, there are two summary boxes: 'Overview' which states 'This roadmap guides you from a beginner level to a solid understanding of single-variable calculus. You will learn the fundamental concepts of limits, derivatives, and integrals, and gain the ability to apply them to solve real-world problems. This roadmap is designed to be completed within a reasonable timeframe given your weekly time commitment.' and 'Your Stats' which shows 'Current Level' as 'Beginner'.

AI-Powered Features

- Course outline generation
- Personalized learning roadmaps (4-8 steps)
- Video-to-content transformation
- Intelligent recommendations

Key Features



WebRTC Real-Time Firebase Communication

- Community forums
- Firebase notifications
- WebRTC calls
- Firebase-powered chat

Key Features

Advanced Video Processing

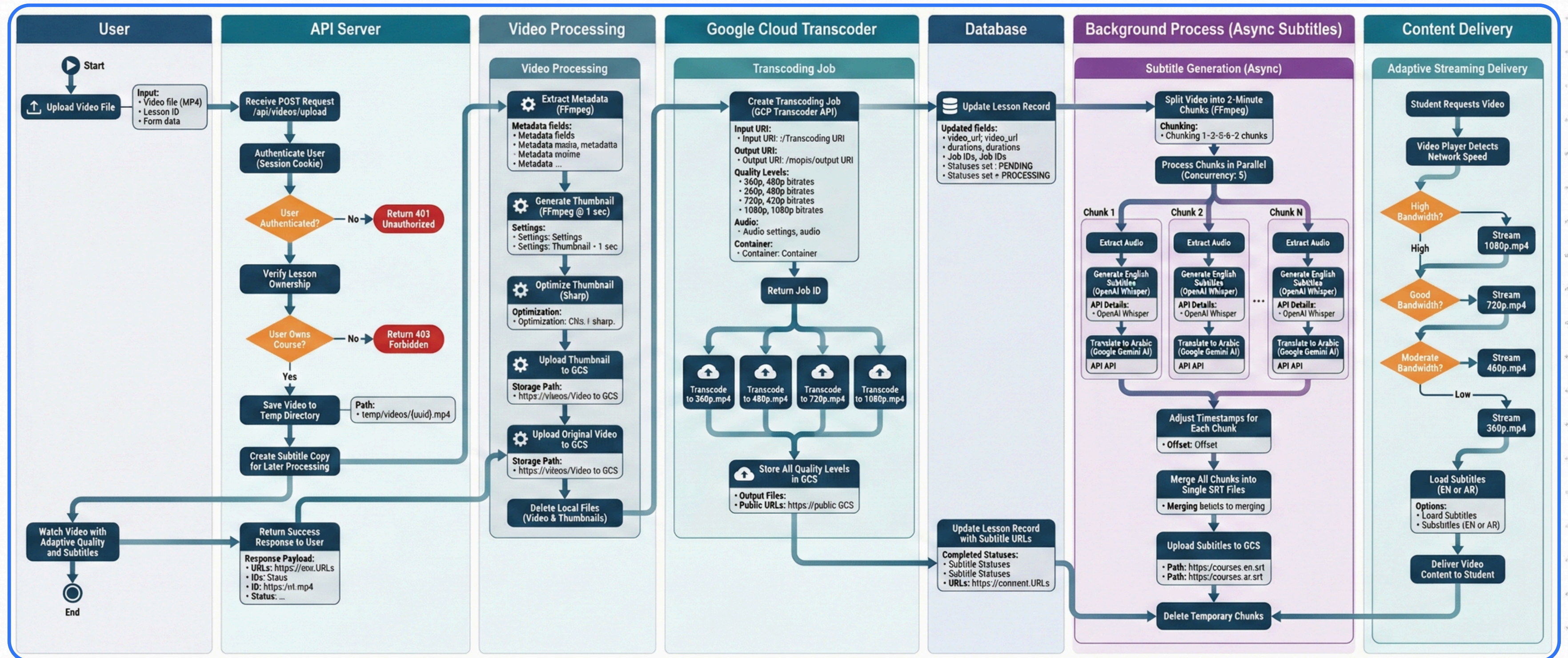
- Multi-quality transcoding
- Subtitle generation
(EN & عربي)
- Thumbnail generation

The screenshot displays a course management interface for "Hamza's Calculus 101". The top navigation bar includes a back arrow, the course title "Hamza's Calculus 101" (marked as "Published"), and buttons for "Settings", "Unpublish", and "+ Add Module". Below this, a section titled "Intro to Calculus" (3 lessons) contains a "+ Add Lesson" button and a list of lessons:

Lesson	Duration	Status
Intro to Calculus	5:04	Free
Reading Week	5:00	0
Intro to Calc	8:00	0

The main content area shows a video player for the selected lesson "Intro to Calculus" (5:04, Free). The video player includes a progress bar (1:09 / 5:04), a subtitle menu, and a volume control. The subtitle menu is open, showing options for "English" (selected), "العربية", and "Off". The video content shows a graph of a curve with two points labeled $(x_1, f(x_1))$ and $(x_2, f(x_2))$, and a dashed line connecting them with labels "Rise" and "Run".

Video Processing Pipeline



Personalized Learning Paths

The screenshot displays a user's learning journey for Calculus. At the top, the title "My Learning Journey" is followed by "Calculus" and two buttons: "Regenerate" and "Delete". Below this is a progress bar showing "Overall Progress" at 20%, with "1 / 5 steps completed" and a "Keep going!" prompt. The "Your Learning Path" section lists two steps: "Introduction to Limits and Continuity" (Completed) and "Derivatives: Definition and Basic Rules 0". The first step includes a description, a duration of "1-2 weeks", and a recommendation for "Hamza's Calculus 101". The second step is partially visible. On the right, an "Overview" section provides a summary of the roadmap, and a "Your Stats" section shows the "Current Level" as "Beginner". A vertical sidebar on the left contains navigation icons for home, calendar, profile, chat, and settings.

My Learning Journey
Calculus

Regenerate Delete

Overall Progress 20%

1 / 5 steps completed Keep going!

Your Learning Path

1 **Introduction to Limits and Continuity** Completed Undo

This step introduces the fundamental concept of limits, which forms the basis for calculus. You will learn how to evaluate limits algebraically and graphically, and understand the definition of continuity. This step is crucial for understanding derivatives and integrals.

1-2 weeks 1 course

Recommended courses:

Hamza's Calculus 101
This course provides a comprehensive introduction to single-variable calculus. Students will learn about limits, deri...

2 **Derivatives: Definition and Basic Rules 0** Complete

This step introduces the concept of the derivative as a measure of the instantaneous rate of change. You will learn the formal definition of the derivative and master basic

Overview

This roadmap guides you from a beginner level to a solid understanding of single-variable calculus. You will learn the fundamental concepts of limits, derivatives, and integrals, and gain the ability to apply them to solve real-world problems. This roadmap is designed to be completed within a reasonable timeframe given your weekly time commitment.

Your Stats

Current Level Beginner

Lesson Summary

The screenshot shows a video player interface with a dark theme. At the top, there is a video player with a progress bar from 0:00 to 5:04 and standard playback controls. Below the video, there are three tabs: 'Summary' (selected), 'Flashcards', and 'Practice'. The 'Summary' tab displays an 'AI-Generated Summary' section with a star icon and the text: 'Get a comprehensive summary of this lesson with key takeaways.' Below this text is a blue button labeled 'Generating...'. At the bottom of the interface, the lesson title 'Intro to Calculus' is shown with a duration of '5h 4m' and a blue button labeled 'Mark as Complete'. A vertical sidebar on the left contains several navigation icons, including a home icon, a grid icon, a document icon, a list icon, a book icon (highlighted in blue), a settings icon, a globe icon, and a share icon.

Flashcards & Practice Questions

The screenshot shows a video player interface with a dark theme. At the top, there is a video player with a progress bar at 0:00 and a total duration of 5:04. Below the video player, there are three tabs: 'Summary', 'Flashcards', and 'Practice'. The 'Flashcards' tab is active, displaying a blue book icon and the text 'AI-Generated Flashcards' and 'Study key concepts with interactive flashcards'. A blue button with a loading spinner and the text 'Generating...' is centered below the text. Below the flashcard section, the video title 'Intro to Calculus' is displayed, followed by a clock icon and the duration '5h 4m'. A blue button labeled 'Mark as Complete' is positioned below the title. On the left side of the video player, there is a vertical sidebar with several icons: a home icon, a grid icon, a play icon, a group of people icon, a speech bubble icon, a document icon, a settings icon, a globe icon, and a share icon.

Results & Performance

Neureom demonstrates robust performance across all core functionalities, delivering fast processing times, reliable real-time communication, and an exceptional user experience.

Video Processing Performance

- Upload success rate: 99.5%
- Thumbnail generation: ~5s
- Transcoding completion: 1-2 min
- Subtitle generation: 1-2 min

AI Feature Performance

- Course outline generation: ~5-10s
- Roadmap generation: ~5-10s
- Content transformation: ~10-20s
- Subtitle translation: ~2-5 min

Real-Time Communication

- WebRTC connection est: ~1 s
- Call quality: HD video
- Audio latency: <100ms
- Socket.IO message delivery: <50ms

Database Performance

- Query response time: <100ms (avg)
- Concurrent users supported: 1000+
- 29 tables with optimized indexing
- ACID compliance maintained

Challenges & Solutions

Video Processing at Scale

Problem

Large video files,
slow processing

Solution

async processing &
chunked subtitle generation

Real-Time Communication

Problem

NAT traversal,
signal complexity

Solution

STUN servers, Socket.IO
signaling, WebRTC w ICE
candidates

AI Content Quality

Problem

Generic AI outputs
& hallucinations

Solution

Prompt engineering,
context injection

Multi-Language Support

Problem

RTL layout,
translation accuracy

Solution

Next.js i18n, CSS RTL support,
Gemini AI translation with
retry logic

Payment Integration

Problem

Secure payment
processing, webhook
handling

Solution

Stripe integration,
webhook verification,
enrollment automation

Database Performance

Problem

Complex queries,
slow response
times

Solution

Strategic indexing, query
optimization, connection
pooling

Conclusions & Future Work

Achievements

- Comprehensive AI-powered learning platform
- Advanced video processing pipeline
- Real-time communication (WebRTC)
- Personalized learning roadmaps
- Multi-language support (EN/AR)
- Payment integration (Stripe)
- Community engagement features
- Mobile application (Flutter)

Key Learnings

- AI requires careful prompt engineering
- Cloud infrastructure is vital in Software
- RT communication needs robust signaling
- UX is paramount in education technology

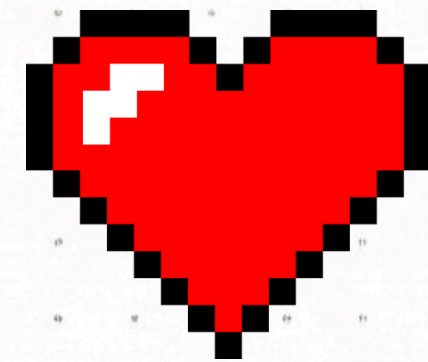
Advanced AI & Analytic

- Voice-based AI tutor with automated essay grading
- Predictive learning analytics and performance insights
- Emotion detection for engagement tracking
- Comprehensive instructor and revenue dashboards

Enhanced Collaboration & Live Learning

- Live virtual classrooms with screen sharing
- Collaborative whiteboards and group study rooms
- Gamification features (badges, leaderboards, skill trees)
- Real-time peer-to-peer learning experiences

THANK YOU



Brought to you By
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Supervisor: Eng. Haya Samaana