AWS-Based Task Management Application

Introduction and Overview

- **Comprehensive Architecture:** Integrates Cognito, API Gateway, Lambda, DynamoDB, and S3 for a full-stack serverless solution.

- **Secure User Management:** Implements OAuth 2.0 with Amazon Cognito Hosted UI for robust authentication and authorization.

- **Efficient Task Handling:** Features a React SPA interfacing with a RESTful API for seamless task operations and file management.
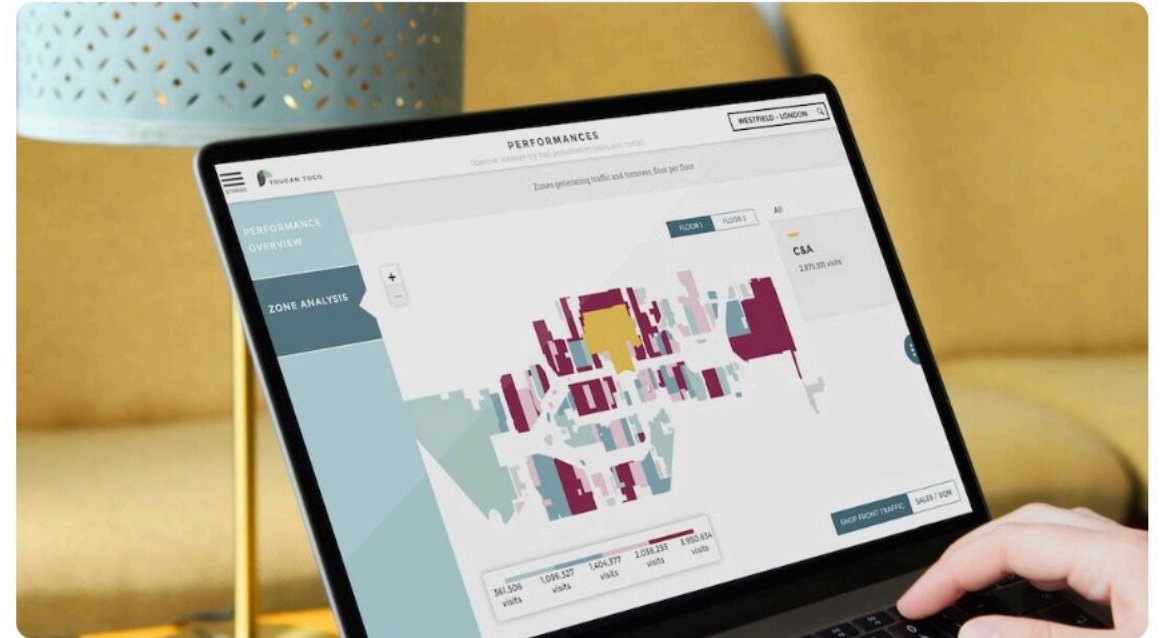

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User Authentication & Authorization

Secure Identity Management with Amazon Cognito

- **OAuth 2.0 Authorization Code Grant:** Uses Cognito Hosted UI for sign-in/sign-out with secure token exchange.

- **Session Management via AWS Amplify:** Handles token refresh, storage, and user context within the SPA.

- **Scoped Access Control:** Leverages identity tokens with customizable scopes for fine-grained permissions.
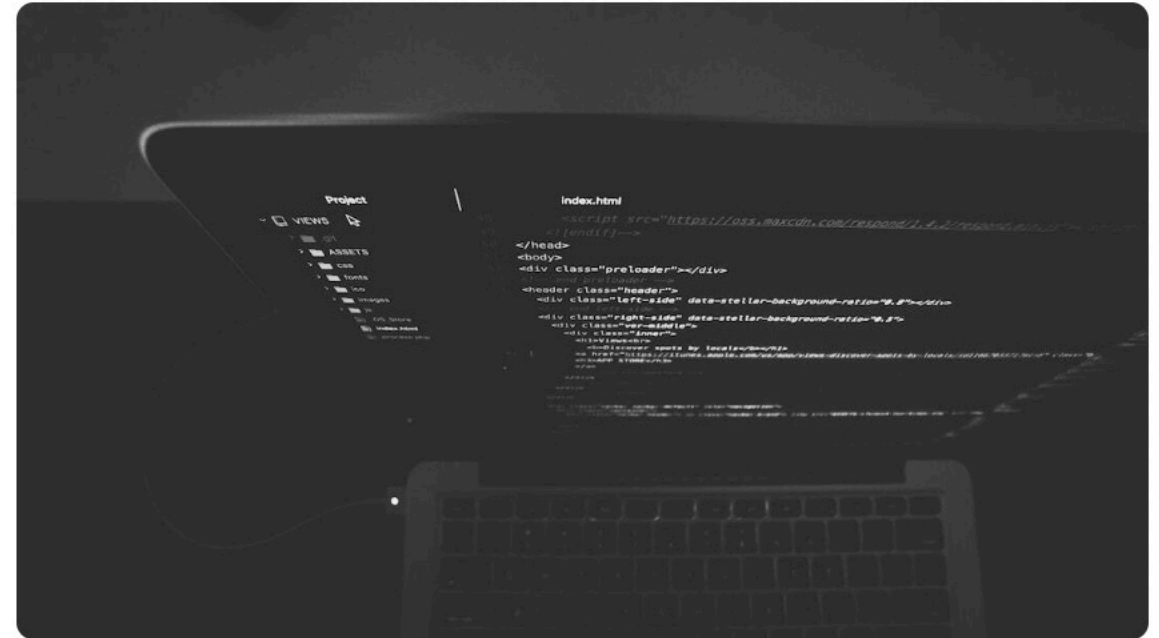
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RESTful API Design

API Gateway and AWS Lambda Integration

API Gateway as Entry Point
Exposes RESTful endpoints to handle CRUD operations on Task resources.

AWS Lambda for Logic
Each endpoint integrates with a Lambda function performing the relevant server-side logic.

Secure Access with Cognito Authorizer
All routes are protected using a Cognito User Pool Authorizer for token validation.

Data Storage Architecture

Scalable Storage with DynamoDB and S3

DynamoDB Table for Tasks

Stores task metadata including title, description, due date, and status in a NoSQL schema.

S3 Bucket for Attachments

Handles file uploads and downloads using pre-signed URLs for secure access.

Efficient and Cost-Effective

Combines high-throughput, low-latency DB with scalable object storage.

Messaging & Event Handling

Using SNS and SQS for Notifications and Logging

📢 SNS for Event Broadcasting
Publishes notifications for task events like creation or deletion.

✉️ SQS for Reliable Queuing
Receives and stores events for processing by downstream systems.

🧩 Extensible Architecture
Supports audit logging, analytics, or third-party integrations.

Client-Side Application

React SPA Powered by AWS Amplify

Single Page Application
Built with React for fast, responsive user experience.

Amplify-Managed Auth & API
Handles authentication and backend communication securely.

Task & Attachment Management
Includes UI for task CRUD operations and file upload/download.

Architecture Diagram

End-to-End System Overview

- **Cognito for Auth:** Manages user sign-in and token issuance via OAuth 2.0.

- **API Gateway & Lambda:** RESTful endpoints for business logic and task management.

- **DynamoDB & S3:** Stores task metadata and file attachments securely.
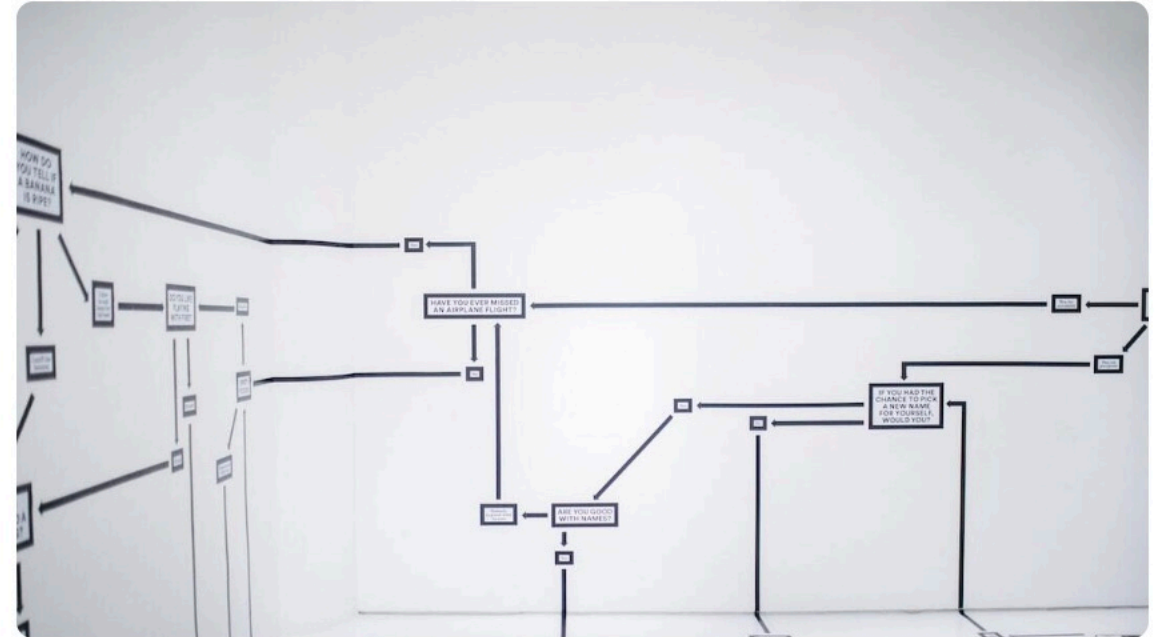

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Setup Guide Summary

Essential Steps to Deploy the Application

- **Cognito User Pool:** Create user pool, set OAuth, callback URLs, and app client.

- **DynamoDB and S3:** Set up task table and attachment bucket with appropriate policies.

- **Lambda & API Gateway:** Deploy CRUD and attachment handlers; define routes and authorizers.
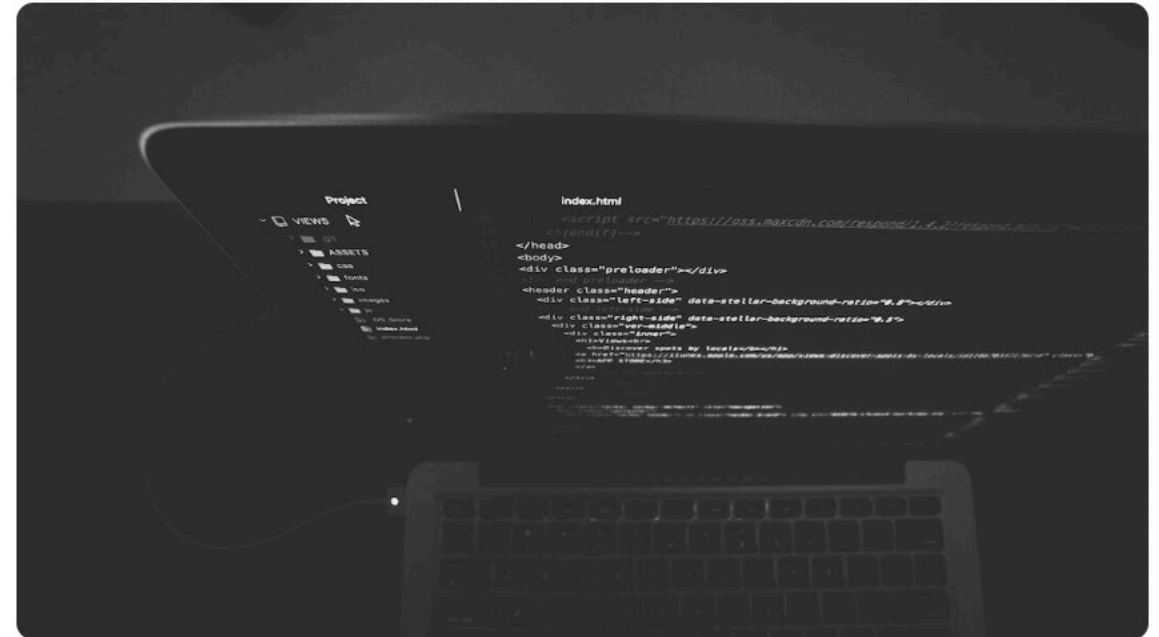

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User Manual

Using the Task Management Web App

- **Sign In & Out:** Access via Cognito Hosted UI; manage sessions securely.

- **Task Operations:** Create, edit, delete, and view tasks with user-friendly UI.

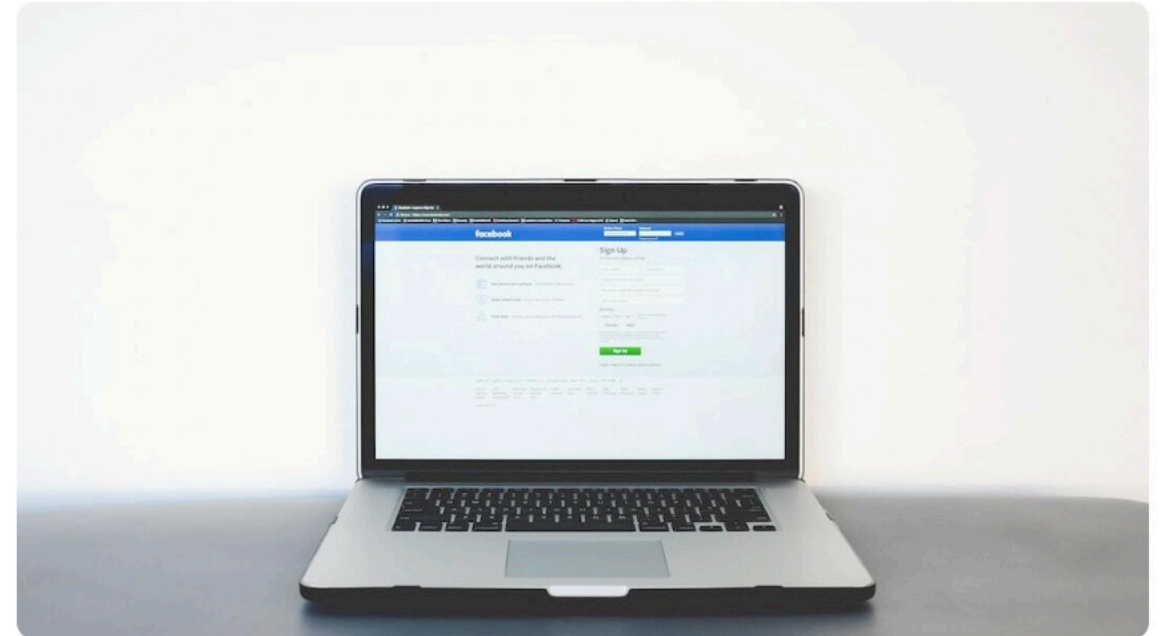- **File Attachments:** Upload/download attachments using pre-signed URLs.

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Conclusion

Scalable and Secure Cloud-Based Task Management

- **Serverless by Design:** Eliminates server maintenance using managed AWS services.

- **Security First:** Integrated authentication, authorization, and token management.

- **Future-Ready:** Supports extensions for messaging, analytics, and auditing.

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