ACCESSIBILATOR

ByteTheBarrier (Team 3)

- Cheril Mariam John (D22124272)
- David Ayang (D21127639)
- Mountdenyraj Chelladurai Nadar (D22124430)
- Joel Felix Quadras (D22125093)

Table Of Content


Project Vision


Technology Stack


Data Stack


Key Technical Challenges


Evaluation


System Review


Conclusion

Project Vision

- To make documents highly accessible for users with Dyslexia.
- To spread more awareness about Dyslexia and the challenges people face.
- To enable users in general to create accessible documents.

- No other such application that automatically converts documents that make documents accessible.
- Promote inclusivity and awareness

Project Vision

User Personas

The Student Living With Dyslexia

Name: Emily
Age: 21

Scenario

Emily is a university student pursuing a degree in Psychology. Her studies require her to read dense academic papers and textbooks. She often finds herself spending more time on reading assignments than her classmates due to dyslexia, which affects her ability to participate in group discussions and other academic activities.

Goals

- Improve her academic performance.
- Reduce the time she spends on reading and re-reading materials so she can focus on other aspects of her studies.

Pain points

- Struggles with reading comprehension.
- Often has to re-read paragraphs multiple times.
- Prolonged study hours leading to reduced leisure time.
- Increased stress levels due to academic pressures.

The Professional Living With Dyslexia

Name: Mark
Age: 42

Scenario

Mark is a marketing manager in a tech company. His job involves reading and creating lengthy reports, as well as going through a large number of emails daily. Due to dyslexia, he finds it challenging to quickly process written information, which sometimes affects his ability to make timely decisions and contribute effectively in meetings.

Goals

- Become more efficient at his job.
- Read and comprehend work-related documents quickly to make more timely managerial decisions.

Pain points

- Difficulty in quickly processing written information.
- Has to re-read documents multiple times.
- Delays in decision-making due to reading challenges.
- Stress exacerbates reading difficulties, creating a vicious cycle

The Supportive Parent

Name: Jamie
Age: 55

Scenario

Jamie is a sculptor and the parent of a 12-year-old, Tim, who is living with dyslexia. They are actively involved in Tim's education and often help him read through his school assignments. They also attend school meetings and consult with special education therapists to find ways to better support Tim's learning. They are constantly on the lookout for resources that can help Tim become more independent in studying.

Goals

Find a reliable tool that can make reading easier for Tim.

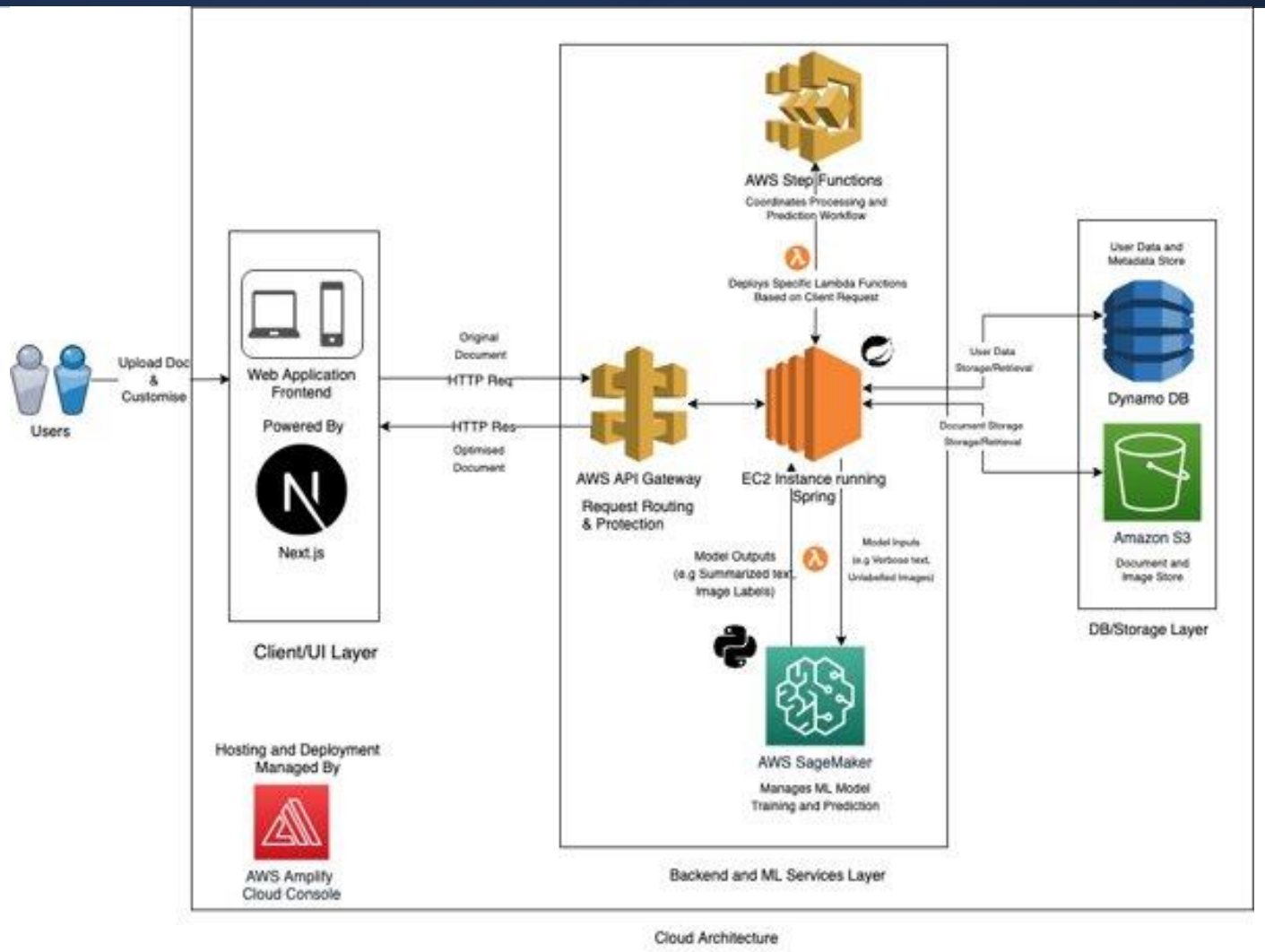
Pain points

- Difficulty in finding suitable reading materials for Tim.
- Extended time spent on helping Tim with studies.
- Reduced family leisure time due to educational commitments.
- Stress and pressure felt by the entire family.

Need to how how the application helps the different personas.

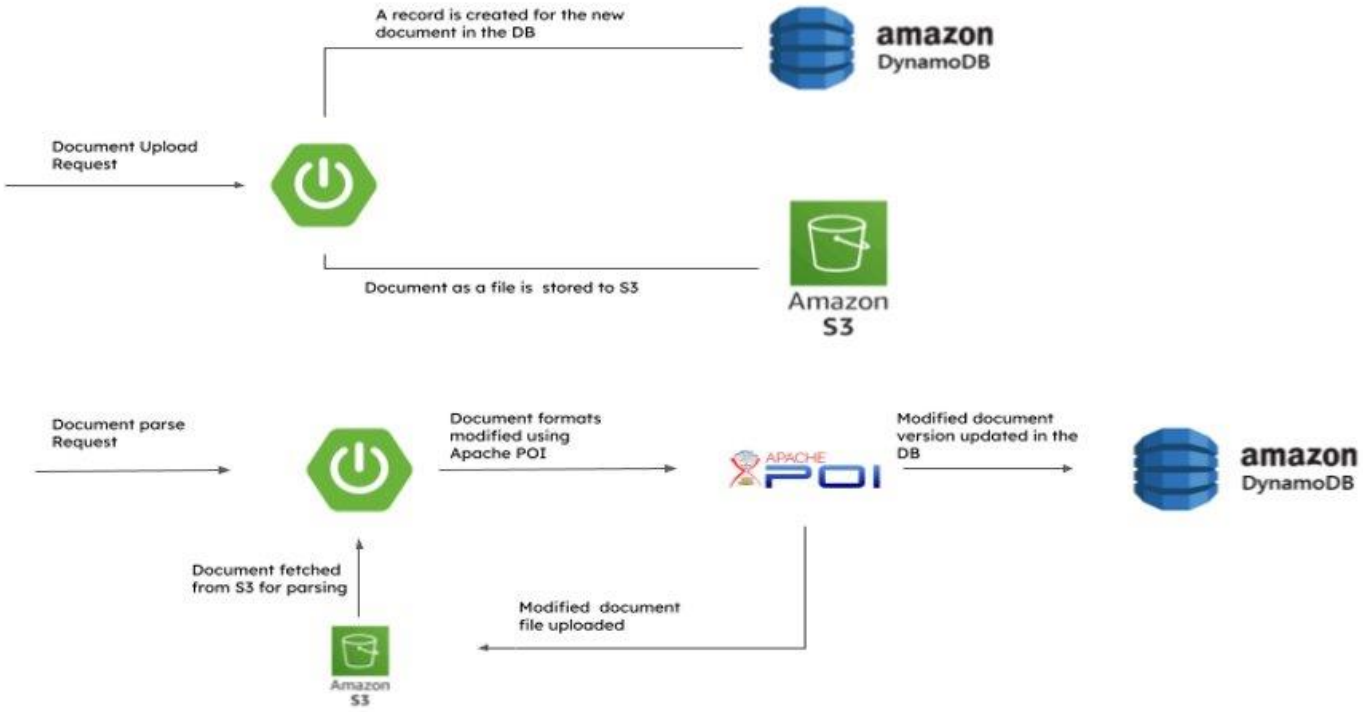
Technology Stack

- System Architecture



Technology Stack

- Backend Architecture



Data Stack

- To make documents highly accessible

User Evaluation

Phase 1

- Domain Research
- Market Analysis
- PMI Analysis

Identify users and gain domain knowledge

Phase 2

- Dyslexia Expert Interview
- Survey
- Think Aloud
  - Team
  - Experts

Identified features and technical solutions

Phase 3

- Cognitive Walkthrough
- Application Feedback
- Think Aloud
  - Users
  - Experts

Refined and added new features. UI Improvement.

Phase 4

- Cognitive Walkthrough Questionnaire
- Think Aloud
  - Users
  - More Experts

Identify system limitations and outline future work.

Technical Evaluation

- Feature Evaluation
- UI Evaluation
- Data Evaluation

Technical Evaluation – Feature Evaluation

Evaluation Techniques

- Auto Biographical Testing
- Survey
- User testing
  - Quantitative Analysis
  - User Feedback
- Expert Review

Outcomes & Improvements

- Refined feature selection
- Identify and resolve Technical Issues and Challenges
- ~ 30% increase in AVG readability scores

Add visual Changes of Feature evaluation

- Like comparing screenshots of the changes.
- Scoring by the users for the comparisons

Technical Evaluation – UI Evaluation

Evaluation Techniques

- Auto Biographical Testing
- Think Aloud
- User testing
  - Cognitive walkthrough
  - User Feedback
- Expert Review

Outcomes & Improvements

- Iterative Cycle improved UI Layout.
- Simplified Textual Elements.
- Improved Page Load Time.
- Improved Site Accessibility.

Key Technical Challenges

- To ensure the security of sensitive documents uploaded by users
- To implement Data Science solutions and host them using Open Source LLMs on Virtual Machines or the Cloud
- Scalability

Key Technical Challenges

Frontend

- Accessible and Intuitive UI.
- Word document rendering.
- Performance

Backend

- Parsing Word Document
- Authentication using Google.
- Feature orchestration.

Data Science

- Finding Dataset.
- Lack of computational resources.
- Limitations of infrastructure

Cloud

- Automated deployments.
- Model Hosting.
- Lack of documentation.
- Lack of transparency

Solutions

Frontend

- Accessible and Intuitive UI.
- Word document rendering.
- Performance

Backend

- Apache POI library
- Magic link
- Iterative improvements

Data Science

- Using Local GPU for model Training.
- Using NLP solutions

Cloud

- Automated deployments.
- Model Hosting.
- Lack of documentation.
- Lack of transparency

Solutions

Frontend

- a

Identify users and gain domain knowledge

Backend

- Apache POI library
- Magic link
- Iterative improvements

Identified features and technical solutions

Data Science

- Cognitive Walkthrough
- Application Feedback
- Think Aloud
  - Users
  - Experts

Refined and added new features. UI Improvement.

Deployemnt

- Research
- Expert consultation.

Identify system limitations and outline future work.

Add visual Changes of UI evaluation

- Like comparing screenshots of the changes.
- Scoring by the users for the comparisons

Technical Evaluation – Data Science Evaluation

Evaluation Techniques

- Implemented Various Approaches
  - Ground-Up Approach
  - Pre-Trained Approach
  - NLP Approach
- User Testing
  - Quantitative Analysis

Outcomes & Improvements

- Deployed NLP solutions to reduce cost and time.
- Pre-trained models don’t necessarily give better solutions than NLP solutions.

Add visual changes of Data Science evaluation

- Like comparing screenshots of the changes
- Scoring by the users for the comparisons

System Review

- To make documents highly accessible

Conclusion

- To make documents highly accessible

Future Work

- Improve the User Interface - Maintain colour consistency across the application, change the word 'presets' to 'settings'

Thank You