

University
of Idaho

Speech Therapy Application Engineering Release Review

Team Dialectric

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Sponsored by: Micron Foundation

Value Proposition



- About **8% of children need speech therapy** globally and while there are many speech therapy apps intended to help these children, most only supplement typical sessions, require a therapist to use, or are of little use for research.
- This project aims to create a one-stop-shop application for speech therapy that is **useful to children, therapists, researchers, and caregivers** alike.



Product Requirements



User Interface

- A complete interface to **navigate through the application**
- **Intuitive** enough for young children
- Grants therapists, caregivers, and researchers **viewability of patient records** and allows **filtering** of data fields

Audio Parsing

- Patients must be able to **record audio and store it** with their associated account
- Audio recognition software must **parse the audio into text** and filter out any background noise

Security

- Ensure only users with **proper credentials** can access patient data
- **Authenticate users** before every database access request

Testing Requirements



- Ensure Speech-To-Text granularity is on the level of phonemes
- Ensure records can only be viewed by the associated caregivers, researchers, or therapists
- Minimize amount of data loss as a result of compression when uploading recordings.
- Ensure the front end connects to a backend consistently
- Ensure the front end can call all functions from the backend
- Ensure session tokens are bound to the correct accounts at the correct times



Interface Design

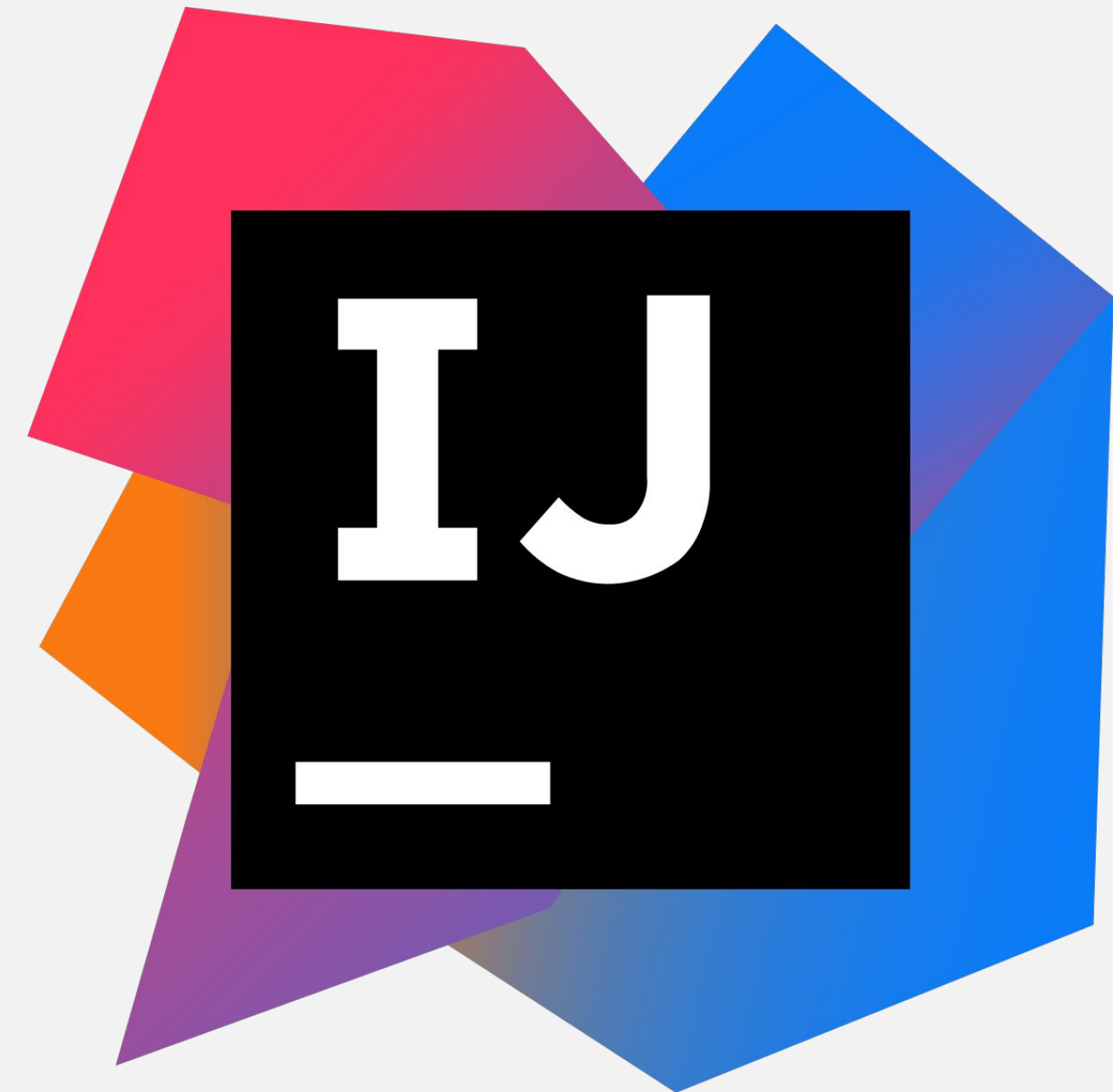


Programming Framework: Angular

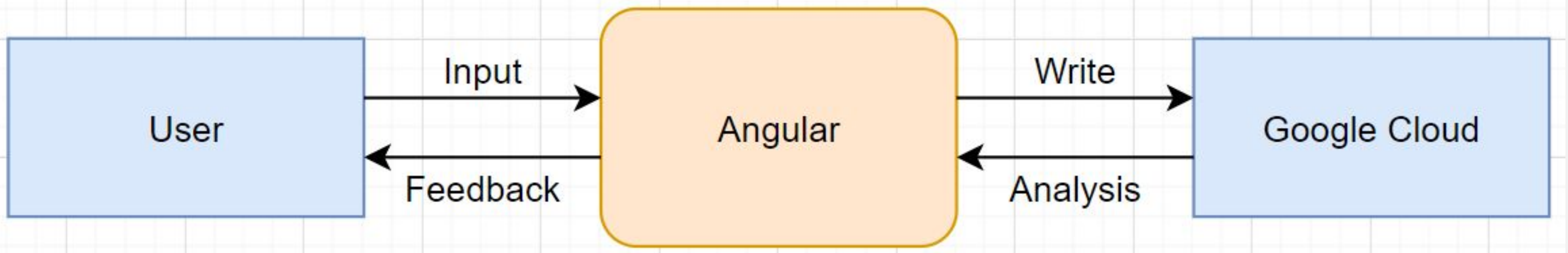
- All-in-one
- Platform agnostic
- Scalability
- Longevity

Source-code Editor

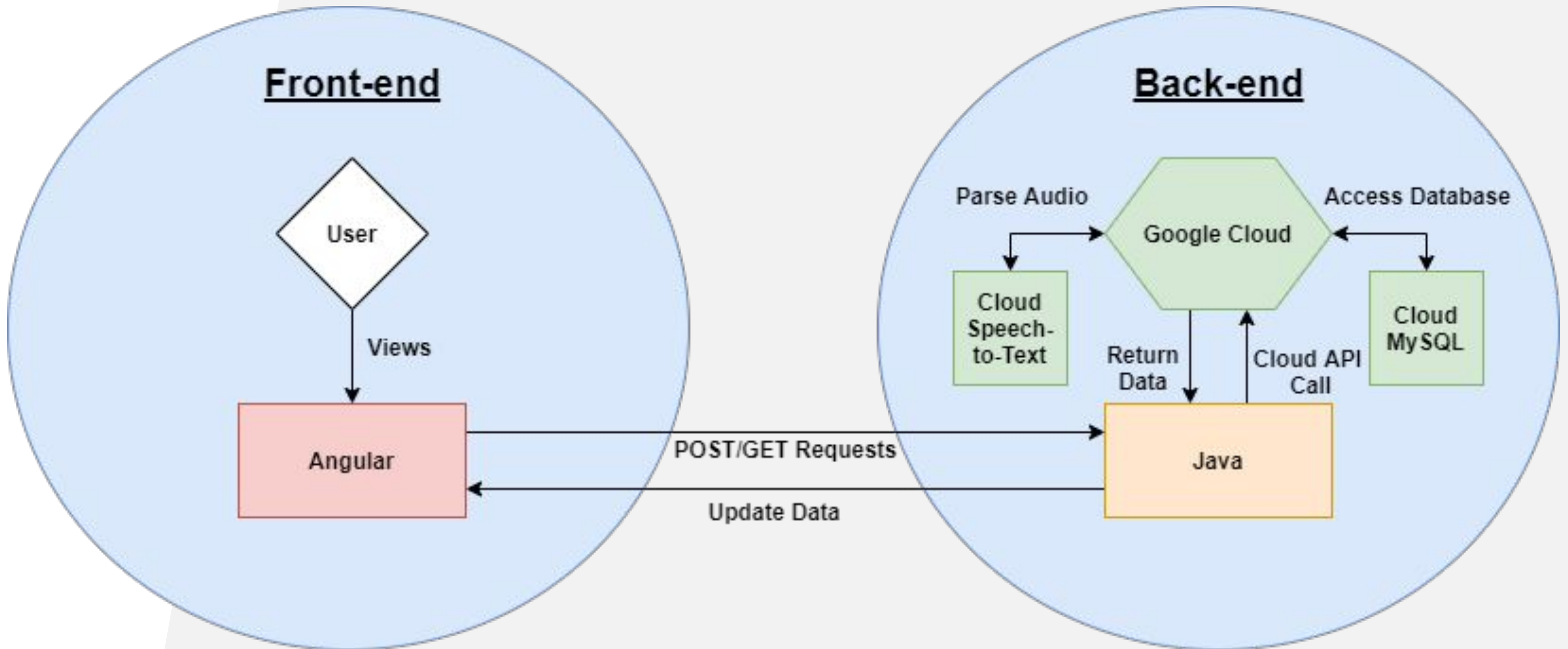
- Vs code
- IntelliJ



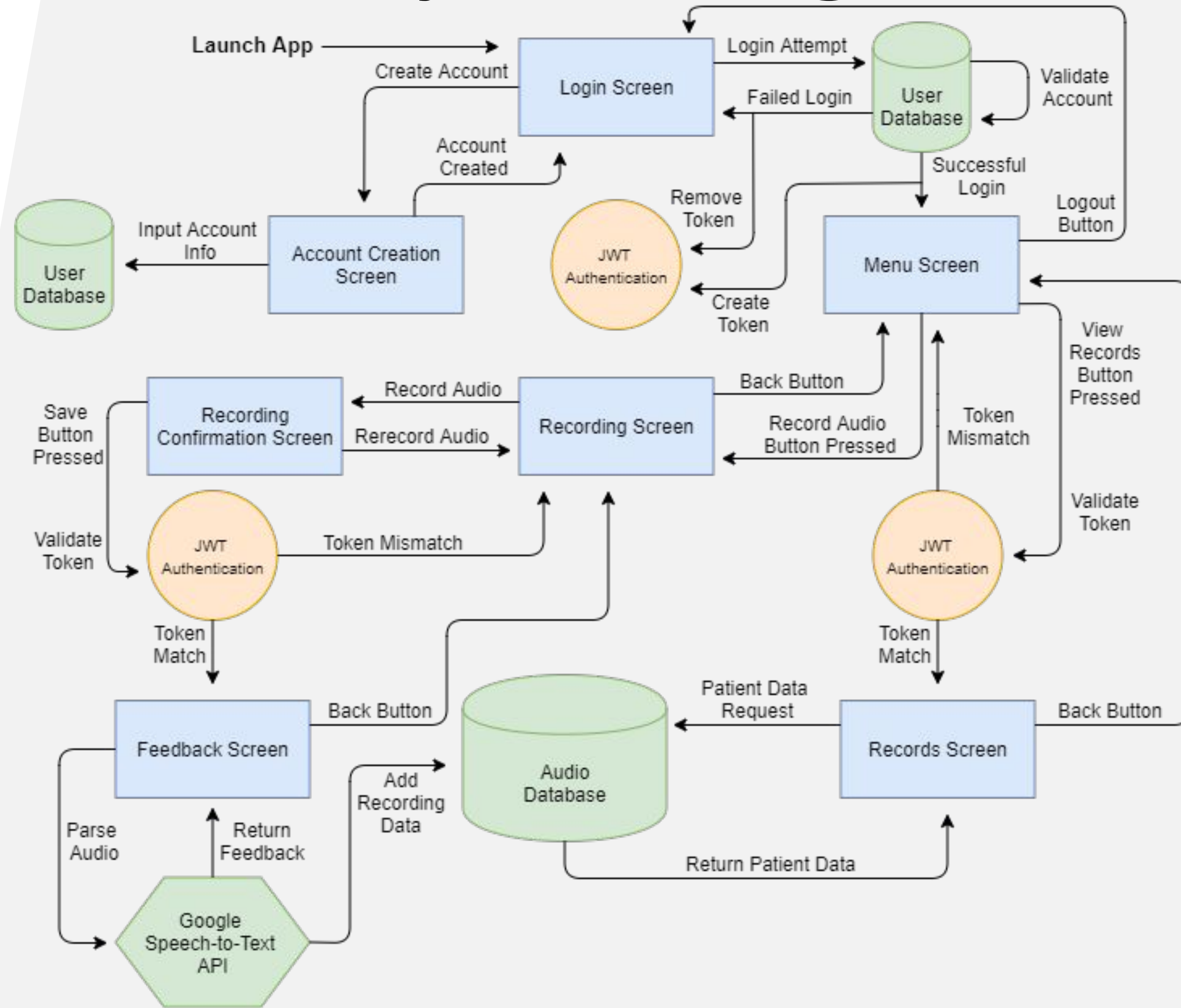
Interface Context Diagram



Component Communications



Full System Diagram



Frontend First Pass



First Pass Complete:

- **Login Screen**
- **Register Screen**
- **Records Viewing Screen**

In progress:

- **Upload Audio Screen**

Children Speech Therapy

[Login](#)[Register](#)[Help](#)

Login

Username

Password

Children Speech Therapy

[Login](#)

[Register](#)

[Help](#)

Register

Character

Researcher

Researcher

Researcher

Therapist

Developer

Username

Password

Create

[CareGiver Register](#)

CareGiver Register

Character

Username

Password

BirthDay:

Sex

Race

Nationality

Speech Ability

Diagnosis

Therapist First Name

Therapist Last Name

[Back](#)

Patient Records

Filter

ID: patient1

ID: patient2

ID: patient3

ID: patient4

ID: patient5

ID: patient6

ID: patient7

ID: patient8

ID: patient9

ID: patient10

ID: patient11

Patient Records

Filter

ID: patient1

ID: patient2

ID: patient3

ID: patient4

ID: patient5

ID: patient6

ID: patient7

ID: patient8

ID: patient9

ID: patient10

ID: patient11

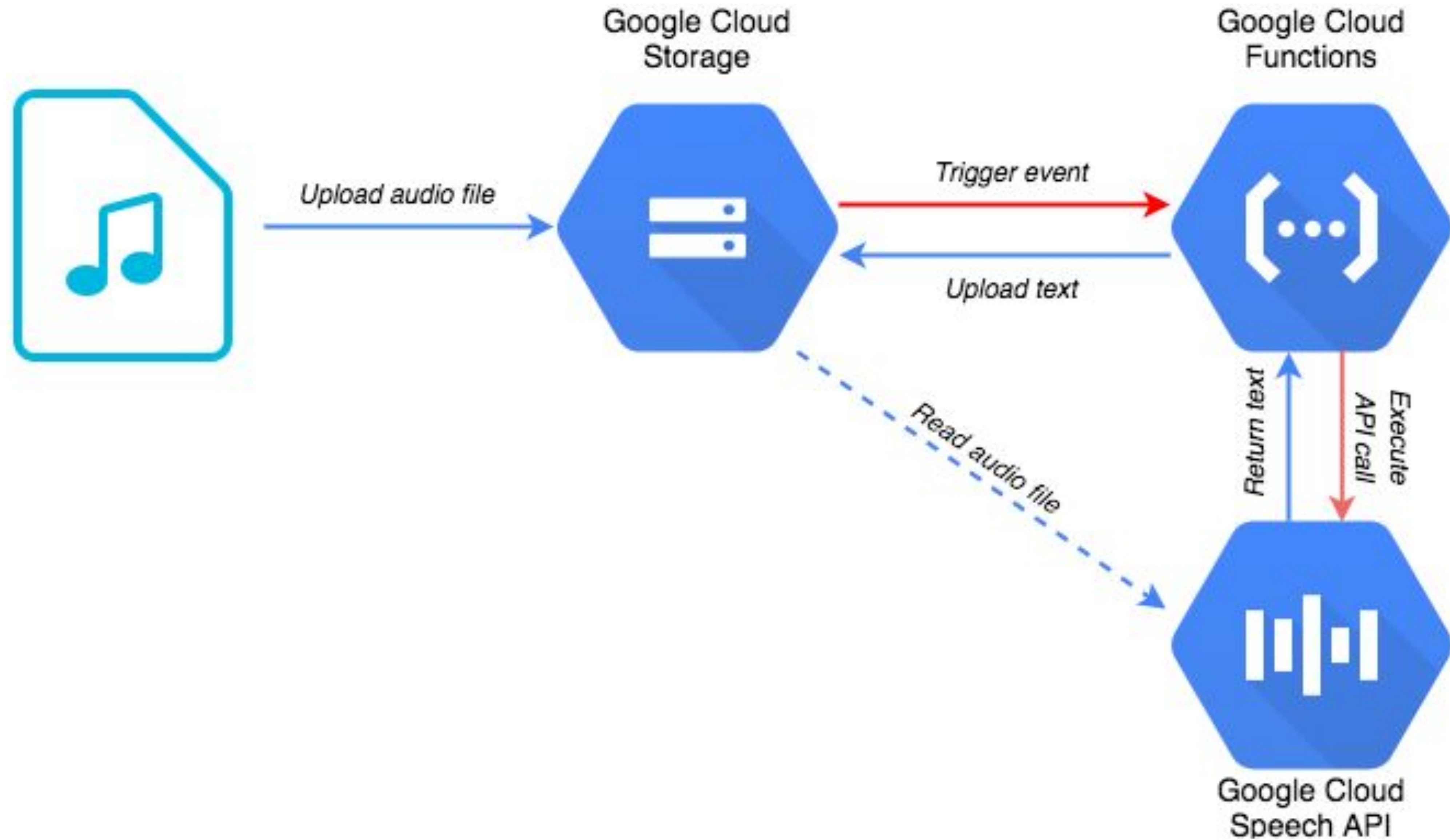
patient5 Details:

id: patient5
birthday: 06/22/2010
sex: m
race: caucasian
nationality: United States
speech ability: low
diagnosis: apraxia
therapist: therapist4
caregiver: caregiver4

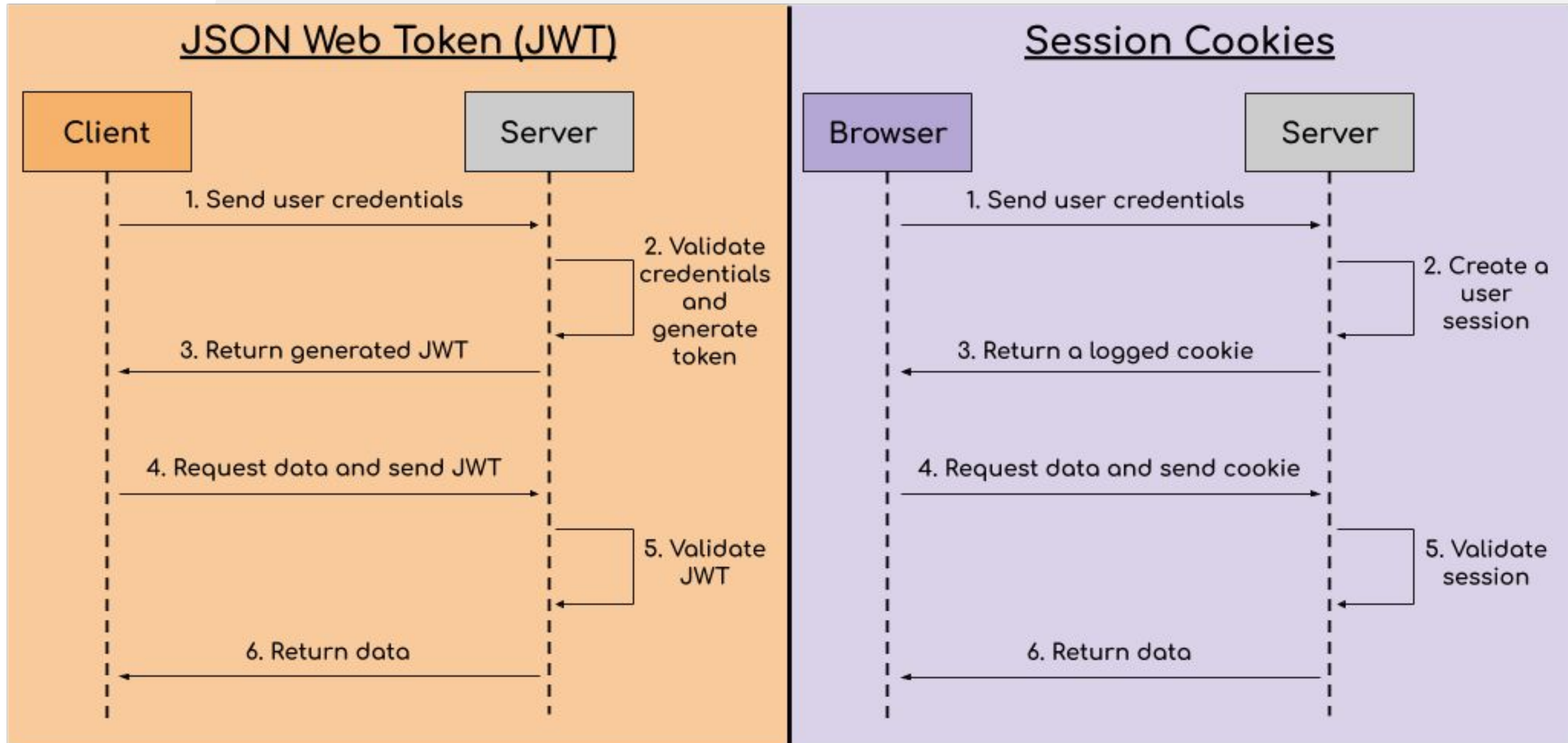
Select recording ▼

Download Patient Data

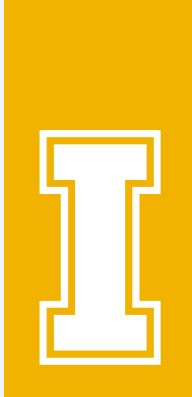
Audio Parsing



Security



Risk Management



- **Areas of risk:**

- Failure to implement a feature in time
 - Features will be created in order of highest priority to lowest with priority of completion on higher priorities
 - Features will be dropped from lower priorities to ensure higher priorities' success
- This is an ongoing project so any features that need to be cut to deliver the product on time can always be eventually added by the next team

<u>Priority</u>	<u>Feature</u>	<u>Specification</u>
High Priority	Recording audio as a speaker dependent model	-Must allow the ability to record audio of the user for various time lengths
	Storing audio with the associated profile	-Must ensure data is linked to the recorder's user database
	Basic interface functionality	-Must be minimally functional
	Patient data access	-Researchers, caregivers, and therapists must be able to access their associated patient records
	Searching and filtering of patient data	-Patient data must be able to be sorted by various filters such as ages, races, genders, etc.
	Security overhaul and authentication implementation	-Security must be expanded upon to comply with modern standards
Medium Priority	HIPAA* and COPPA* compliance	-The program must comply with these medical and child privacy acts
	Complete interface functionality	-Must be fully functional and aesthetic for all user types
	Dynamic interface dependent on user type	-Information displayed must be simplified for children
	Feedback for patient recordings	-Recordings should provide some sort of accuracy feedback for the speaker
Low Priority	Recording audio as a speaker independent model	-Audio should be divided based on different voices detected in the recording
	Mobile porting	-The application should eventually be ported to mobile devices

Risk Management



- **Areas of Risk:**

- Failure to comply with laws such as COPPA or HIPAA
 - These privacy laws require “reasonable” levels of security for medical and children data
 - App cannot be marketed if in violation of these laws, but will still function correctly
- Authentication mistakes
 - Authentication system will be extensively tested to make sure no unauthenticated users can view records they don't have access to
 - JWT will expire tokens periodically to help alleviate mistakes

Manufacturing Plan

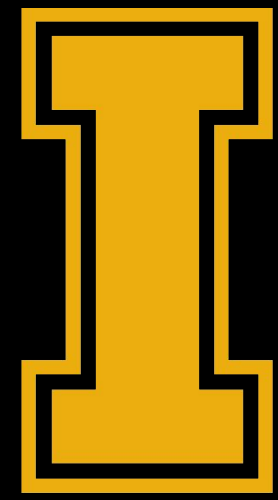


Tools Used	Cost
Google Cloud	~\$100 monthly
Cloud SQL Database	Included with Cloud
Speech-to-Text API	Included with Cloud
IntelliJ	Free
Visual Studio Code	Free
Angular Framework	Free
Java	Free

- **Google Cloud cost depends on amount of time services are used**
 - Average use has been from \$70 - \$100 a month

Budget





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Thank You!

Any Questions?