Separation of Cloud Generated Audio Streams

Team StratoSplit

Introduction

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Problem Statement

- Bulky hardware setup
- Application is installed locally
- Complicated User Interface
- Little redundancy
- Login with passwords



Solution Overview

- Real-time 3D audio management
- Zero Trust secure architecture
- Advanced logging and monitoring tools
- Comprehensive test code coverage
- Scalable, responsive design deployment
- Low-latency, high-quality audio streams





Key Requirements

- Generate multiple audio streams using **Python**
- Play real time audio streams through a centralized dashboard with Web Audio API
- Built with **Express.js** for streamlined UI
- **Node.js** for server-side logic
- **Python** for audio processing tasks
- Hanko for user authentication
- **MongoDB** used for storing users, configurations, and roles

Implementation Overview

- Spatial Audio
- Zero Trust Access
- Passwordless login
- Multicasting communication
- NoSQL database

Implementation Overview Cont.



Prototype Audio Dashboard

Admin					Mute All Cance	I Mute Clear Configu	ation <u>Settings</u>	<u>_ogout</u>
Master Volume Volume:	Channel 1 of Volume: Panning:	Channel 2 off Volume: Panning:	Channel 6 or Volume: Panning:	Channel 7 Off Volume: Panning:			Active Channels Save Configuratio Configuration Name Save Configuration Load Configuratio Select a configuration Delete Selected Configuration	s on r

Prototype Login

Caelum	
Caelum	
Sign in	
Email	
Continue	
or	
Sign in with a passkey	
Don't have an account?	

Prototype Admin Panel

Stream Controls User Management Team Management		Stream Controls User Management Team Management
Team Management		Stream Controls
Assign User to Team nolan ~ Alpha ~	Create New Team New Team Name Create Team	Channel Selection Channel 1 Channel 2 Channel 6 Channel 7
Assign Team Assign Channels to Team	Delete Team Alpha ~	Stream Command: Start ~ Duration(s):
Alpha ~ 1 2 3 4 5 6 7 8 9 10 Assign Channels Ass	Delete Team	15 Execute

Prototype Audio Generator

```
Listening for pings on 239.0.0.11:5000...
Received command: start, Channels: [1, 2], Duration: 15
Streaming bread.mp3 on 239.0.0.1:5001 for 15 seconds.
Streaming hip-hop.mp3 on 239.0.0.2:5003 for 15 seconds.
Streaming bread.mp3 stopped.
Streaming hip-hop.mp3 stopped.
Received command: start, Channels: [2, 7], Duration: 120
Streaming hip-hop.mp3 on 239.0.0.2:5003 for 120 seconds.
Streaming rain.mp3 on 239.0.0.7:5013 for 120 seconds.
Received command: stop, Channels: [], Duration: 120
Streaming rain.mp3 stopped.
Streaming hip-hop.mp3 stopped.
Streaming stopped.
```

Challenges and Resolutions

- Spatial Audio
- Passkey authentication
- Playing sound to user's computer
- Multicasting on AWS





Testing Plan

- Comprehensive code coverage
- Unit tests for each module
- Integration Testing
- Client/mentor demos
- Semi-guided walkthrough



Schedule

Namo	Start Date	End data	Dave	Sontombor	Octobor	November	December	lanuany	February	March	April	May
Name	Start Date	Linu uale	Days	September	October	November	December	January	Tebluary	Warch	Арпі	Iviay
Documentation	9/2/2024	5/9/2025	180									
Audio Generator	10/14/2024	12/31/2024	57									
Database	11/8/2024	1/30/2025	60									
User Interface	11/8/2024	3/31/2025	102									
Spatial Audio	11/8/2024	2/27/2025	80									
Testing	12/2/2024	4/29/2025	107									
Zero Trust	12/16/2024	4/16/2025	88									

Conclusion

- Current software is inflexible and inefficient
- Our solution will be easier to use and implement
 - Access from anywhere
 - Compatibility with many platforms
 - Easy to maintain and update
 - Security through Zero Trust
- Low risk through redundancy