

SoundSync

Application System Design Report

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Introduction

SoundSync is a creative start-up which is changing the traditional music industry with its product – SoundSync Pro, an AI-powered music collaboration platform. SoundSync Pro provides many features on the platform such as music creation collaboration, AI-generated music track and cloud management system. These features make both professional and amateur music producers can work on their music easier than traditional ways, and could come up with more creative ideas with its AI tools integrated into the platform.

Opportunities

* It provides a global collaboration platform which can promote diversity of the community.
* Integration of AI could enhance the users’ productivity and provide better UX.
* Virtual Venues could change the way people interact with singers and save a lot of cost

Challenges

* To provide a platform with low latency for real-time collaboration, it requires advanced networking and synchronization solutions.
* AI integration is a tricky one, the algorithm behind the scenes may be very complicated to deal with.
* A friendly user interface is a critical point for the success of this application. We have to find a balance point between good user experience and a variety of features. To achieve this, some tradeoffs could happen.
* Protection of user data is another key for success, and it is also important to protect intellectual property for the music creators on our platform.

Conclusion

SoundSync has the potential to transform the music industry with its AI-powered collaboration platform, offering global collaboration, enhanced creativity, and cost-effective interactions. However, challenges like low latency, complex AI integration, user-friendly design, and data protection must be dealt with properly for its success. With the right solutions, SoundSync may redefine music creation and have a big victory in music industry.

1 Gather and Analyse Requirements

**Project Aim and Objectives**

The aim of SoundSync Pro is to promote global music collaboration by providing a platform which provides music creators a real-time and low-latency workspace. Objectives include developing AI tools for real-time music track suggestions, ensuring low-latency synchronization, providing a user-friendly interface, offering virtual venues for immersive experiences, enabling cloud-based project management, and protect users' intellectual property and data.

**Project Domain**

The domain of this project is AI-driven music tech, combining AI, real-time collaboration, and low-latency networking. It’s all about making global music creation easier by using advanced technology stacks, breaking down location barriers, and keeping project management simple and smooth for musicians everywhere.

Key Stakeholders

The key stakeholders of the SoundSync Pro project are:

1. Music Creators (End Users): Professional/Amateur music creators who use this platform to produce music.
2. Software Developers: The tech folks who are responsible to develop and maintain the platform. This includes all types of engineers such as frontend engineers, backend engineers, DevOps, networking engineers, machine learning engineers…etc.
3. Project Managers: The individuals who are responsible for developing a good project plan, communicating between stakeholders and making risk management decisions.
4. Investors: The individuals or organizations who provides fund to this project or this company.
5. Cloud Services Providers: The companies who provide cloud services and infrastructure such as AWS and Azure.
6. Legal Team: The team who ensures the application doesn’t violate any regulations and laws.
7. Marketing Team: The team who promotes the platform and gain more users.

Constraints and Challenges

The SoundSync Pro project has many potential constraints and challenges, which are the keys of the success of this project. Here are the detailed constraints and challenges for SoundSync Pro:

1. Real-time Collaboration: The frontend engineers need to design an easy-to-use UI for collaboration and the networking engineers have to make sure the latency as low as possible.
2. AI Algorithm development: The system must ensure that the recommendation algorithm is precise to end users so that they can enhance their productivity and have a good user experience.
3. UI Design: A good UI can enhance user stickiness, make users spend more time and money on the platform, in the other hand, a bad UI can make a company keep losing existing and potential users.
4. Data Storage: Design a proper database for saving users’ creation is a big challenge, as the size of audio files are usually larger than text files and picture files, which means it will cost more money than storing text and images no matter you decide to store them on local or cloud.
5. Security and Privacy: Protect user data and privacy is always a critical point, one cybersecurity incident could make a huge loss of the company and make it not able to come back forever.
6. Cloud Infrastructure & Scalability: Designing a system that can accommodate high traffic in peak time is tricky. Furthermore, building infrastructure on cloud can save money in most of time but it is more complex than building on local.

Requirements Gathering

Requirements gathering for SoundSync Pro involves collecting input from end users, software developers, AI engineers, and project managers to identify key features like real-time collaboration, AI-powered suggestions, and cloud management. In our project, the most suitable approaches for requirements gathering are workshops and interview. The workshops can create an environment that all developers and project managers can sit in a table and discuss. In other hand, interview with end users can collect valuable information, knowing what features do the users like much and what features do the user feel bad at.

Workshop and Interview Plans

Workshop Plan

The workshop plan for SoundSync Pro is designed to gather deeper insights into user needs and test initial concepts

Objective: The goal is to engage developers in hands-on activities to make the platform's features, usability, and AI tools better.

Participant Recruitment: Participants will be recruited from every related department of SoundSync

Pre-workshop Preparation: Before the workshop, we'll get a quick rundown of the platform's vision and be hooked up with any software or materials we need. The convenor will set up some hands-on activities to test some cool features which haven’t been public released.

Agenda:

Welcome and Introduction (15 minutes):

* Brief overview of SoundSync Pro’s goals.
* Introduce convenors and participants.
* Outline the objectives and expectations for the workshop.

Hands-On Session (60 minutes):

* Participants experiment with the AI-generated melodies, harmonies, and rhythms.
* Testing user control over AI suggestions.
* Collect feedback on how well the AI fits individual styles and preferences.
* Test real-time synchronization and communication tools.
* Explore customization options for virtual venues and user interaction.

Group Discussion: AI Tools Feedback (30 minutes):

* Shares insights and critiques on AI-generated suggestions.
* Discussion on user experiences with latency, synchronization, and communication during collaboration.
* Gather ideas on how to enhance virtual venues for better creative flow.

Q&A (20 minutes)

* Participants ask additional questions and provide further insights.

Conclusion (10 minutes)

* Recap of the workshop’s outcomes.
* Discuss opportunities for further involvement or future workshops.

Interview Plan

The interview plan for SoundSync Pro aims to gather valuable insights from users and developers to inform platform design.

**Objective**: The objective is to identify key features, pain points, and desired functionalities for real-time music collaboration and AI integration.

**Participant Recruitment**: Participants will include amateur and professional music creators.

**Pre-Interview Preparation**: Before the interviews, participants will receive a brief overview of SoundSync Pro, its goals, and a consent form explaining data usage. Interviewers will prepare by researching the participant's background and detailed questions

**Interview Questions**: Interview questions will focus on participants' current music collaboration experiences, desired features in a collaboration platform, their preference with AI tools, and security or privacy concerns. Here are the questions:

1. Can you describe your current experience with remote music collaboration? What tools do you use, and what challenges do you face?
2. What features would you like the most in an AI-powered music collaboration platform like SoundSync Pro?
3. How comfortable are you with using AI to assist with music creation? How can these features make more useful for you?
4. How important is real-time collaboration for you when working with other music creators? What issues have you encountered with latency or synchronization?
5. What would you like to see in a virtual studio environment on our platform that could enhance your creativity or workflow?
6. How do you currently manage your music projects across collaborators? What challenges do you encounter with version control or cloud storage?
7. How concerned are you about security and privacy when collaborating online? What steps do you expect a platform like SoundSync Pro to take to protect your personal data and privacy?
8. What types of virtual venues would you like to attend in the future?
9. How would you like to be able to personalize or control the level of AI assistance in your working process?
10. . What devices and the operating system of it do you use the most when you are creating music? (Mobile/Desktop/Laptop) (Windows/MacOS/Linux)

Follow-Up: After the interviews, key insights will be recorded, and participants will receive a thank you message along with potential opportunities for further involvement in the project.

Functional Requirements

The functional requirements for SoundSync Pro define the essential features and operations the platform must support to achieve its goals. These requirements focus on ensuring that users can effectively collaborate in real-time, utilize AI-assisted music creation tools, manage their projects, and maintain security and privacy. The platform must be intuitive and provide a seamless experience for musicians at different skill levels. Here are the functional requirements:

1. Real-Time Collaboration: The platform must support low-latency, real-time collaboration across multiple locations, allowing users to work together synchronously.
2. AI-Assisted Composition: The platform should offer AI-generated suggestions for melodies, harmonies, rhythms, and backing tracks.
3. Virtual Venues: Users should be able to select from a variety of virtual venues for working sessions, with customization options for the environment.
4. Cloud-Based Project Management: The platform must offer cloud-based storage and project management, allowing users to save, share, and access the latest versions of music projects.
5. User Authentication and Access Control: Users must be able to create accounts, log in securely, and manage access to their projects, including inviting other collaborators.
6. Communication Tools: The platform should integrate real-time communication features, such as chat, video, and voice calls, to facilitate collaboration during sessions.
7. Multi-Device Support: The platform must be accessible from multiple devices, including desktops, tablets, and mobile devices.
8. Security and Privacy: The platform must implement encryption and other security measures to protect users' data and intellectual property.
9. User Interface: The platform should have an intuitive and user-friendly interface that caters to both amateur and professional music creators, making navigation and feature usage easy.

Non-Functional Requirements

The non-functional requirements for SoundSync Pro include important aspects like performance, reliability, and user-friendliness that need to be hit for the app to run smoothly. These include things like security, scalability, speed, and accessibility, these can make sure that as the platform grows bigger, it stays reliable, efficient, and secure. Here are the non-functional requirements:

1. Performance: The platform must maintain high performance with low latency (less than 100ms ideally) for users, even under high traffic loads.
2. Scalability: SoundSync Pro must be able to scale to support a growing number of users, projects, and simultaneous collaborations without affecting performance.
3. Availability: The platform should ensure 99.9% uptime, providing reliable access to users globally without frequent outages.
4. Privacy: The platform must comply with global data privacy regulations, such as GDPR, ensuring the protection of personal and intellectual property data.
5. Usability: The system should be designed for ease of use, with intuitive navigation and responsive interfaces that cater to users with varying technical skills.
6. Cross-Platform Compatibility: SoundSync Pro must be accessible on various devices (desktops, tablets, and mobile) and support different operating systems (Windows, macOS, iOS, Android).
7. Maintainability: The platform’s codebase should be modular and well-documented, ensuring ease of maintenance, updates, and debugging.
8. Reliability: The system must be able to handle and recover from unexpected crashes or failures without data loss, ensuring the integrity of ongoing collaborations.

User Stories

Title: Collaboration

As a professional music creator,

I want to collaborate with others in real-time,

so that I can create music with people from different locations without latency issues.

Acceptance Criteria:

* The platform must support real-time collaboration between multiple users with delay as less as possible.
* The system must optimize network performance to reduce latency, even for collaborators with different internet speeds.
* The platform must be accessible globally and perform consistently well, even in regions with varying internet infrastructure.
* Users should be able to collaborate in real-time using any supported device (desktop, tablet, or mobile).

Use Cases

Use Case ID: UC-01

Use Case Name: Real-Time Music Collaboration

Description: Users want to collaborate with other music creators from different time zones and different countries.

Actors: Users

Stakeholders: Users and software developers

Preconditions:

- User is logged into SoundSync Pro.

- Participants have an internet connection and supported devices.

- Audio equipment is connected and functional.

Post Conditions:

The real-time music collaboration session is successfully completed without latency issues.

Flow of Activities:

Initiate Session: The music creator logs in and starts a real-time collaboration session.

Invite Collaborators: The creator invites other creators by sending an invitation link.

Join Session: Collaborators join from their respective locations using the platform.

Establish Connection: System establishes a low-latency connection (≤100ms) for real-time audio collaboration.

Collaborate in Real-Time: Participants create and record music together in real-time.

Real-Time Feedback: Participants communicate through voice or chat tools without serious delays.

Save and Sync Progress: The system automatically saves the session in the cloud.

End Session: The session ends, and final progress is saved with project files synced in the cloud.

Frequency of Use: Expected to be used frequently for real-time music collaboration.